Northumbria Research Link

Painting the Ideal Home

Using art to express visions of technologically-supported independent living for older people in north-east England

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Abstract   In this paper we describe our experience of investigating the development of future technological products to support older people in everyday living through the agency of a community art group. Recent research has identified a number of challenges facing designers seeking to use traditional participatory design approaches to gather technology requirements data from older people. We describe a project that sought to get a group of older people to think creatively about their needs and desires for technological support through the medium of paint. The artistic expression technique described in this article allowed us to identify issues that had also been found by previous research that used a range of different techniques. This indicates that the approach shows promise as it allows information to be gathered in an environment that is comfortable and familiar using methods already known by the participants and which they find enjoyable. It provides a complement (or possible alternative) to standard protocols and has the potential benefit of extracting even richer information as the primary task for participants is enjoyable in its own right and is not associated with an interrogative process. Furthermore, it is argued that some of the key risks of traditional approaches are lessened or removed by the naturalistic setting of this project.

Key words   HCI – Participatory Design – assistive technology – art – older people

1 Introduction

By 1996 Venkatesh [29] had already pointed to the technological and social changes occurring in the late '80s and early '90s as precursors and paving stones for the introduction of modern computer based-technologies in the home environment. It was not just technological but also social changes and personal attitudes towards computers that facilitated the progress and emergence of a new area — *domotics*. Domotics is the discipline that deals with the integration of electronic devices, kitchen and home appliances, and control and communication systems in the house. Its origins date back to the 1970s when smart home projects that provided the interconnection of systems like lighting, security, and climate control were being studied. At the time the interconnection only offered consumers the possibility of automating a few activities. Weiser [30] expands on the idea with ideal computers that are so embedded in everyday life that they are *"indistinguishable from it"*. This idea of pushing the computer to the background, not only in the office environment but also in the home setting, has been generally welcomed because the ubiquitous computer, rather than being a barrier to human communication and interaction, in many cases facilitates them.

People accept computer-based technology as part of everyday life now that in many areas of public life, such as banks, airports, shopping malls, and bus terminals, activities are performed through the agency of computer-based technology. Venkatesh's predictions about automated household tasks, smart appliances, and smart homes in the future seem to be coming true sooner than expected. Heating systems, window blinds, fans, and other appliances can now be programmed and operated via a shared joint interface.

1.1 Quality of life for older adults

Difficulties in operating typical household appliances as well as performing other daily chores can be part of the effects of age-related sensory and cognitive decline. Economic benefits aside, recent efforts in the development of hardware and software solutions to these problems [3] to develop what is called assistive technology have shown the importance of improving the quality of life older adults. Most of these solutions have a positive emotional impact on their users, thus improving the quality of life, not just by making life easier and more pleasant in terms of object manipulation and interaction with the physical surroundings, but also by indirectly promoting the disappearance of physical constraints and thus having a very positive mental impact on users. In a small pilot study Sainz-Salces, England, and Vickers [25,26] built a simple computer interface that enabled older people to monitor and control the state of some common household appliances. The interface adopted a multi-modal approach using both visual and auditory feedback. The results from a user trial were disappointing and showed the system to take too long to

learn to be immediately useful. This initial study highlighted a common problem found when trying to design computer technology for older people.

User interface design has tended to rely on cognitive science models as a means for designing effective interfaces. However, Macaulay and Crerar [20] argued that we *"can no longer ignore the cultural, sociological, political and historical influences on human behaviour"*. That is to say, it has been recognised that effective design requires an understanding of the context of use of computer systems since all computer use is situated within a social and cultural context. Initiatives such as Senior Watch[1] are aware of the insufficient empirical data about the needs of elderly citizens that could be met by new information technologies.

However, empirical literature does argue that older people are able to learn to use technology provided it is useful to them (Cullen & Moran (1992) and Thursz et al (1995) in Hanson and Clarke [14]). Hanson and Clarke [14] felt it was important that the technology was used in conjunction with existing service provision *". . . in order to ensure that the positive aspects of the technology are fully realized and the negative aspects are kept to a minimum"* (p. 136).

2 Approaches to participatory design

When it comes to supporting the older person the concept of the average user does not apply. Quite detailed work needs to be undertaken to find the needs and wishes of users of such technology. Preliminary studies in designing earcons[2] as part of a multimodal household appliance control system Sainz-Salces, England, and Vickers [25, 26] showed that using a design approach typical of other earcon-based projects *not* oriented around older users (e.g. [7]) was not as successful as had been hoped. Sainz-Salces, England, and Vickers [25, 26] found that imposing an interaction technique that had been shown to work in other contexts did not automatically lead to acceptance by the older people in the study and substantial redesign work had to be undertaken. As Newell et al [22] discovered *"obtaining requirements . . . from older people is not straightforward."* Indeed, Venkatesh [29] warns:

> Don't assume that what the technology can do in the household is the same as what the household wants to do with the technology.

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[1] http://www.seniorwatch.com

[2] An earcon is a musically-structured motif used to communicate information from or about a computer interface. Earcons are typically arranged in hierarchic families the different levels of the hierarchy being used to represented nested or levelled information, with each hierarchic level being mapped to a variation or modulation of the earcon's parent (e.g. timbre, melodic contour, rhythm, etc). See Blattner [4], Brewster, Wright, and Edwards [7], Leplatre and Brewster [19], and McGookin and Brewster [21] for some examples.

A key tool in the design of user-centred systems is participatory design, or PD [5,6, 10]. A central feature of PD is its focus on collaborating with users during the design and development of a product rather than simply designing a product with the particular users in mind [11]. PD typically has three underlying principles [11]:

1. Its goal is to improve the quality of life of the user.
2. Its approach is collaborative rather than didactic.
3. It places value on interactive evaluation from users.

In addition, a result is that the developers learn much about the context of use of the system being developed [11].

A major challenge, then, is to find ways of establishing the needs of such a diverse (and often technologically naive) population. Designing technology for the home requires us to obtain *"'soft' data about users, such as their problems, preferences, lifestyles, and aspirations"* [22]. Goodman, Langdon, and Clarkson [13] discuss the necessity of training designers in how to obtain information about older and disabled users as more usual requirements gathering techniques do not necessarily work well in this domain. This may be partially owing to the unfamiliarity of this user group to designers [22]. Harley [16] offers the ethnographically-based *Cultural Probe* (see [12,8]) as a sound and holistic approach to assist with interaction design for the elderly. In recognition of some of the difficulties with running focus groups with the elderly Sayago and Blat [27] suggest a modified form of the Think Aloud protocol to help older people express their views in a more naturalistic setting. Older people are currently often unfamiliar with technical jargon [27] and can experience difficulty visualising how as-yet non-existent technology might help them live fuller independent lives for longer in their own homes.

3 Older people in rural north-east England

According to Hyslop [18, p. 54] there has been a *"revolution in telecommunications technologies over the last four years"* in the the north-east of England. The North East had the fastest growth rate in broadband connection in the UK between 2001-2004 and rose from bottom to top of the DTI[3] table in terms of overall infrastructure, the quality and quantity, and overall IT cultural attitude between 2000–2004 [18]. Through the One North East[4] and Codeworks (Centre of Excellence for Digital Technology)[5] venture the North East was the first region in the UK to have a dedicated centre for the commercialisation of academic communication technology ideas [18, p. 57]. It was within this context that we wished to explore the possibility of developing ideas for the design of future home technology systems to assist older people with independent living.

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[3] UK government Department of Trade and Industry
[4] `http://www.onenortheast.co.uk/`.
[5] `http://www.codeworks.net`.

According to van Berlo [28] there are several key requirements of a house suitable for older people: safety and security, comfort, communication, and energy saving. Therefore, we wished to investigate ways in which the needs and aspirations of older people could be recorded and successfully embodied in technology designed to support them in their everyday lives. Seeking to avoid the failures of earlier projects [26] we decided to investigate the problem from a quite different and more qualitative perspective before embarking on yet another design exercise. We began by gathering intelligence from particpants in the original Cybermoor project [17], a large-scale investigation of the role played by network technology in Alston, small rural hill community in northern England (on the border between Cumbria and Northumberland)[6]. To highlight some of the challenges associated with supporting older people (specifically those in a rural setting) we conducted an informal conversation over tea and coffee with older participants from the Cybermoor project (six of them made themselves available).

3.1 Key issues emerging from the focus group

From our conversations with the Cybermoor participants we were able to identify the following key issues raised by them:

Support networks of family, friends and/or community were found to be key to these older people, and this fits with van Berlo's 'communication' requirement (above).

Defining the population is also key at an early stage. Definitions of 'older' vary — some start with people in their fifties. Hanson and Clarke [14] identify the concept of 'frailty' as, perhaps, a more useful discriminator than 'older'. Indeed, the ultimate goal of assistive home technology will be the development of homes that are not specially designed for older people or disabled people *per se* but homes that accommodate to their needs as time goes by. Such was the intention of the Joensuul/Marjala development in Finland [1].

Dehumanisation. The perceived dehumanising of care that technology has the capacity to bring about was not welcomed by clients. This fear impacts upon van Berlo's issues of 'comfort', 'safety', and 'communication'. The ACTION project [14] involved the inclusion of videoconferencing equipment to be used by carers, the elderly cared-for person, and participating doctors, district nurses, and welfare rights Officers. One person would not have the equipment in her home. She expressed concerns regarding the portrayal of her own image and the perceived invasion of privacy. Another participant did have a conference with their doctor and whilst she felt it would be useful for the housebound, she would prefer to actually visit the doctor in person.

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[6] Alston was one of seven locations in the larger 'Wired up Communities' programme. The other participants were Blackburn, Brampton, Newham, Manchester, Framlington, and Kensington/Liverpool. See Devins et al [9] for more detail.

Training. Technical and training issues can be problematic. During the Cybermoor project (see Heery [17]) training had been given in Microsoft Word; however, the computers eventually supplied to the participants had Microsoft Works installed, causing much frustration for the participants. Successful training sessions involved using 'real' examples such as learning to email someone, learning how to attach a document to an email, and so forth. However, the reality of training was that things were often forgotten by the time the person had got home or when they tried to replicate things at home at a later time.

Identifying needs. It was also found to be difficult to establish future needs for hi-tech gadgetry without something for potential users to try out — there is no such thing as an 'average' user. Also, there are changing cultural issues in that in ten years older people will in general be far more IT literate than those of today. Hanson et al [15] noted how an IT technician changed his opinion about how much use the elderly could get out of technology following his experiences of training an elderly couple to use a computer and other equipment.

Localised availability of IT due to geography: Participants commented that their mobile telephone signal was often too weak to make calls. They also told how they were unable to receive Channel 5 on their televisions and couldn't use a Freeview digital television receiver. Again, this fits with van Berlo's 'communication' issue.

Language. The language used must be right for the target population. For example, in our focus group participants would talk about 'home' shopping rather than 'online' shopping. The acceptability of technological solutions in the home needs to be established using familiar pathways initially; for example, using the television set to host technological/domotic solutions. Hanson and Clarke [14] describe how the ACTION project used familiar items already in the home to embed the new technology and once the participant became familiar and confident with it they progressed to using technological gadgetry such as a navigational mouse.

Staged strategy. It came out that a staged strategy for product implementation is needed. For example, start with email, and maybe shopping, and progress to physio/doctor's appointments, and on into electronic medical consultation.

4 Delves Lane Community Art Group: Painting the Ideal Home

From the Cybermoor focus group we were able to draw out issues that would lend themselves well to further investigation, viz. support networks, an ill-defined population, dehumanising technology, training issues, identification of needs, availabiity of technology, and appropriateness of language. These issues fit well with the experience of the earlier investigations [25, 26] in which the technology designed to assist older people was less accessible than expected — particularly pertinent here is the issue of identifying needs.

We decided to approach the problem of gathering requirements information from older people through the agency of artistic expression. This can be thought of as a complement to more traditional forms of participatory design. Like PD the goal of the task was to find information that will lead (ultimately) to improvements in the quality of life of the participants; the nature of the relationship with the participants is collaborative; and the interactive evaluation is central to the process (see below). Where the approach differs is in the details of the process which is outlined in the following sections.

The motivation behind the task was to find a way of getting older people to think about their technological needs and wants without feeling constrained either by unfamiliar technological language or by uncertainty over what is or is not technologically feasible. We commissioned a community art group in the north-east of England[7] to produce pieces of artwork on the theme of Technology in the Ideal Home. The art group is regularly attended by between twelve and fifteen retired people from a former rural coalfield & steelworks area. The group was chosen because of the regional interest in addressing the rural/urban digital divide. The recent history of the area (closure of the coalfields and the steel works) also means that it has suffered from deprivation and social exclusion: members of this constituency are likely to have different experiences of and attitudes towards home technology than their more affluent urban counterparts. As painting was a task they already enjoyed and felt comfortable with we hoped the members of the group would be able to explore their ideas using a language and medium more natural to them.

4.1 Methodology

Our aim was to gather information from older people living in a rural setting about their ideas of how technology could assist them in the future. Specifically, the information needed was regarding the technology that would help them remain in their own homes rather than have to go into sheltered housing or care homes due to frailty. The strategy for conducting this research was to identify a group of individuals that fit the research brief and approach them with a view to their participation in the project and to gather ideas as to what technology would assist older people to remain in their homes. A researcher on the project team had prior connections with an individual who coordinated the activities of a group of older people that met regularly at a community centre near their homes to draw and to paint. This art group fulfilled the selection criteria and so was selected to participate in the project.

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[7] The Delves Lane Community Art Group, Consett, Co. Durham, UK.

4.2 Terms of reference

Before the potential participants were approached, the research team met up with the art group's coordinator and the project was explained and discussed and a research methodology agreed. The agreed outputs were that the research team would gather information from the group and they would produce some pieces of artwork for the project. Over a period of six weeks the team would meet the group briefly and introduce the project, attend a mid-point follow up session, and attend at a final session to collect the artwork. In return, funds would be made available to cover the coordinator's expertise and time, pay the room hire for the duration of the project, and to buy some art materials for the group. It was established that the project would be conducted on a fairly informal basis. A date and venue was set for the research team to meet with the group a few weeks in the future. It was decided that just two members of the research team would conduct the fieldwork so as not to dominate or cause unnecessary anxiety by a large group of researchers invading the art session, and that visits would be kept informal and light. The coordinator explained that immediately before the start of each art session members of the group would gather in the main hall of the community centre to chat over a cup of tea or coffee; it was agreed that the team would arrive early during the coffee drinking period. By interacting with the group during this time it was possible for the team and the art group members to become more familiar and thus build up a measure of trust which has been identified as necessary for successful participatory design [11].

4.3 Introductions

On arrival at the community centre and during the informal introductions the researchers found that the group leader had explained the visit to the group on a previous occasion and so the presence of the team was not a surprise to them; the group was interested, if a little cautious, in the research project. Introductions were fairly informal and low key as the project team members chatted amongst the group during coffee and biscuits before the group moved into a separate room in the community hall to begin their activities.

4.4 The group

The participants were a fairly static group of men and women that met up in local community centre on a particular morning of the week to engage in an organised activity. They paid weekly fees that went towards buying materials for their activities and for a yearly trip out. Activities in the past had included poetry writing and computer skills but the activity that they were undertaking during the period of research was an art class. There were approximately twelve to fifteen regular members of the group. The

participants were all retired from paid employment but ranged in age and all lived locally in a rural community. Group members also ranged in levels of mobility. The majority of individuals were quite active but a few had some minor physical difficulties. The group all knew each other. The group's coordinator regularly sought funding from external sources such as charitable organisations to keep the group together.

4.5 Introducing the project: first visit

Once gathered in the adjoining room the group members sat in their regular places facing some objects that had been arranged by the coordinator to practice their still-life drawing skills. Whilst the group got on with their sketching the project was explained to them by the research team in a fairly informal manner and questions were encouraged so the team could gauge understanding of the project. It was clearly explained that the project was a piece of research being conducted by Northumbria University into technology for the home and that all outputs would be used for research purposes only. It had become clear to the researchers during the coffee and biscuits discussions that the use of terminology and appropriate language during the explanation was an issue that needed addressing and careful handling. It was felt inappropriate to explain the project in terms of seeking to identify technology that would help participants when they were too old and frail to manage any longer in their own homes — this might come across as inconsiderate (and possibly offensive) and any amount of 'sugaring the pill' was felt inappropriate and could easily have led to a lack of participation. Instead the project team asked the participants to try to imagine technology from the future that could help people in their own homes — technology in the ideal home. The team further explained that they might wish to consider how people might manage if they were looking after elderly relatives (but not exclusively so).

INSERT FIG F01 HERE

To reinforce what was being asked, a copy of a design brief was handed to each member of the group (see Figure 1). It was felt that individuals might draw upon personal experiences of difficulties they had or might be having and in this case the research team would discover this in the artwork. It was explained that if they agreed to take part in the project a piece of artwork explaining their ideas was expected and that two full art group sessions (five hours) would be the expected time spent on it; they could, however, spend additional time on it if they so wished. Receiving verbal agreement from the group the team left the first meeting at this point and it was explained that the team would return after a period of three weeks. Leaving the group at an early point meant that they would be able to discuss their ideas about the project whilst it was still fresh in their minds without any pressure from the research team.

4.6 Second visit

Following agreement with the group coordinator, the team made a further visit to the group halfway through the project to be available to answer questions and to clarify what was wanted from the participants. On the second visit it was evident that some people had not started developing ideas for their piece of artwork whilst others had. The research team subtly encouraged those who had started to develop ideas to discuss them as it was felt that other group members over-hearing the conversation could be encouraged in their own ideas. A few individuals needed further reassurance about what was expected of them and encouragement to explore their ideas, to let their imaginations run wild regardless of how bizarre their ideas may have seemed to them at the time. Some participants were anxious about the level of artistry they would provide and were assured that we were not expecting perfect illustrations of their visions. It was agreed with the group that their pieces of artwork could take any form they wished including adding text to a painting, collage, sculpture, or any other medium they wished to produce, and that in addition the researchers would ask them to tell the story behind their piece. This narrative would be recorded alongside the artwork so they need not worry too much if they could not get all their ideas into the painting. This encouraged the participants and they seemed happier about their task. The team agreed to return on a certain day (three weeks later) to photograph the pieces of art and record the participants' stories.

4.7 Third and final visit

The research team arrived at the community centre in time to have a coffee and a biscuit with members of the group as they arrived before the art class began. The meeting was a little more relaxed as we had come to recognise each other and it was the end of the project. After coffee the session began in the adjoining room. As the group were busy with a still life project the research team approached each person in turn and asked them if they had time to show their piece of artwork and tell its story. Ten participants had produced pieces of artwork, the majority of them using either watercolour or acrylic paints as their preferred medium. Each piece of artwork was digitally photographed and the artist interviewed. Handwritten notes were taken during the interview as the artwork was explained by the group member. The interview was also digitally recorded on a small and unobtrusive hand-held minidisc recorder. Each interview took approximately 5-10 minutes as the artist enthusiastically explained their ideas and the researchers developed an understanding of their artwork through questions and reiteration of points made. Copyright clearances were obtained from each participant and it was again explained that their work would only be used for research purposes. It was decided that the project team would not take the original pieces of artwork, only digitised representations.

4.8 Analysis

Upon returning to the university after the final visit each of the ten interviews was written up against the pieces of artwork using the words and phrasing given by the participants. The content was simply analysed in terms of words used to explain the paintings and emergent themes in the technological ideas expressed were looked for. Common words were identified and a tally chart developed.

Through discussing the artists' explanations and interpretations of their work we were able to derive a number of emergent themes that might inform the design of future assistive technology. Table 1 lists the main themes that arose during our discussions with the artists. Below are digital images of the original artwork. Each image is accompanied by a summary of the artist's reflections upon their work and a discussion of the work as it relates to the themes identified in Table 1. Although permission was given by the participants to use their art work in reporting this research, in the following sections only the artists' initials have been used so as not to reveal their full names unnecessarily.

***INSERT TABLE 1 HERE ***
*** INSERT FIG F02 HERE ***

5 The stories behind the art

C.C. (Figure 2) describes her piece as depicting her domestic robot performing mundane tasks around the house such as cooking, cleaning windows, and doing the garden. The robot would have some intelligence so that it could do work without supervision. The robot would complete tasks based on direct speech and via thought activation. Like the artists of Figures 4, 5, and 10, C.C. has depicted labour-intensive domestic duties. These activities, the artists envisaged, could be undertaken by robots or automated machines which are controlled either through a remote control (generally hand held), voice- or thought-activation. C.C. was careful to stress that the 'robot' would be of benefit to people of all ages, not just older people; younger people would benefit whilst they were out at work.

*** INSERT FIG F03 HERE ***

J.M. (Figure 3) describes her work as the armchair telephone. J.M. has envisaged this piece of technology through necessity as she often finds it difficult to manage and she lives alone. J.M. would like to be able to use her domestic telephone to activate her oven, her microwave, and her kettle. She would have preloaded or filled them earlier in the day but then would not need to leave her chair to boil the kettle or cook some food. She lives in a small flat but still finds it difficult to walk around and often decides not to have a meal because of her difficulties. J.M. would also like to be able to answer her telephone with the sound of her voice rather than having to go and pick up the receiver. She would like

to speak to whoever is on the line from whichever room she happened to be in — this is reminiscent of the computer on *Star Trek*.

Although J.M. has some difficulties with mobility she did not envisage anyone else preparing her meals or snacks for her. She described how her new technology could relieve her of one task, that of leaving her armchair, walking into her kitchen and turning on her oven, microwave, or kettle and walking back into her lounge. This would save her a short but often difficult walk. She also wished to be able to answer her telephone without it physically being in her hand or needing to be near it. We interpreted this as the artist being keen to retain independence: if this technology existed it would not only help her in practical matters but she would also gain in terms of being able to manage within her home better and the feelings of wellbeing that would bring.

*** INSERT FIG F04 HERE ***

N.D. (Figure 4) would like an automatic window cleaner that could be operated remotely. She sees this as a pad of some kind which would attach to the window. There would be a base unit using steam and air to wash and dry the window. The window would have sensors on the edges to stop the pad falling off triggered by *'some kind of air cushion'*. The pad would stay on the window by suction. This device would be able to clean the inside and the outside of the window. N.D. identified similar themes to the artists of Figures 2, 5, and 10.

*** INSERT FIG F05 HERE ***

J.S.'s *Automatic Iron* (Figure 5), if invented, would make life a lot easier for J.S. The iron would be able to lift the creased item of clothing out of the basket, iron it, fold it, and then place in another basket awaiting collection. The iron would have different settings for different items of clothing (e.g. trousers, shirts, blouses, woollens and silks) and for different commands (e.g. fold and steam). The operator could use a remote control to direct the iron. J.S. identified similar themes to the artists of Figures 2, 4, and 10.

W.B. (Figure 6) produced a collage to explore what technology meant to her. She could see the good and bad sides of the technological age. She envisaged virtual reality entertainment projected into people's homes as well as technology to carry out such mundane tasks as providing clean clothing. W.B. explained that people would be in charge of the technology and not the other way round as she also questions whether all technology is good. W.B. cut out the following quotation from a newspaper article and used it as an example of how we should be careful of relying on technology:

> We didn't have computers and all those things, but while I appreciate that technology is good for them, I think talking over a computer with a camera takes away their social skills. We just had to get on with it and speak to people.

W.B. also felt that young people have the opinion that older people didn't have anything to do when they were young as they didn't have such things as mobile phones.

*** INSERT FIG F06a & F06b HERE ***

W.B. sees humour and practicality in technology as she advertises *"Wanted: Robot for household tasks. (Rest Day Allowed)"*, but then also describes *"Flying chairs and Bicycles (or automatic bells) (No more fears of being knocked down when out walking)"* to aid older people. W.B. took a philosophical look at the technology of today as well as thinking about what the future might bring. Again, today's and future technological advancements were seen as being of benefit to all ages not just to older people.

*** INSERT FIG F07 HERE ***

I.G. (Figure 7) would like to see a robot to do the cooking and washing dishes for her, tasks she particularly dislikes. This robot (named David) would be friendly and voice activated. David is the name of I.G.'s late husband and he had previously taken care of the cooking and washing dishes. Although I.G. did not appear to need this type of assistance through any physical disability, the presence and the assistance of 'David' in the kitchen would please her. This anthropomorphisation of the technology seems to be directly tackling the issue raised by our focus group of the concern about dehumanising technology. By constructing the technology in this manner I.G. is making it much more acceptable to her.

M.R.'s ideas (Figure 8) surrounded the regeneration of the human body. To ameliorate problems associated with old age such as varicose veins, cellulite, arthritic joints, impaired renal function, sagging flesh, loss of muscle tone, jaundiced skin due to poor liver function, poor cardiac/respiratory output, dowager hump due to degeneration of spine, facial line/wrinkles, failing eyesight, thinning hair, memory loss, impaired hearing and thinning lips, a computer that works on stem cell technology/cloning and DNA instead of microchips would be installed in the home. Each person would be able to connect to the computer to regenerate their body overnight to a younger healthier version of themselves. As a retired nurse M.R. was fully aware of the effects of ageing on the human body. She could not pinpoint the exact time that an individual would regenerate but saw it as perhaps an ongoing process in which people would be encouraged to indulge in excessive, drinking, eating, smoking and so forth. as the regeneration process would *'automatically rid the body of any harmful toxins'.*

*** INSERT FIG F08 HERE ***

M.R. also thought of the idea of grandparents having a telephone that would connect to their grandchildren whenever and wherever. Instead of waiting for letters or contact from grandchildren they would be able to contact them immediately and therefore feel less lonely. The artist called the phone a Gran-o-phone. Whilst this is very close to current mobile phone technology it does reiterate the importance of technology that supports communication [28].

*** INSERT FIG F09a & F09b HERE ***

T.N. (Figure 10) produced a representation of a robot that could perform gardening duties. To control the robot the operator would use an attachment for the television giving

optional buttons for different tasks. Pressing 'yellow' on the remote control, for example, would be for grass cutting. This technology would benefit those individuals that had a garden but were too old, didn't like gardening, or who had something better to do. The activation device would be embedded within a television as most people have a television but not a computer. T.N. identified similar themes to the artists of Figures 2, 4, and 5.

*** INSERT FIG F10 HERE ***

W.S. (Figure 11) describes a television with a retractable screen and a dispenser in the back of the television housing that could be pre-loaded. The operator would choose an item using a remote control handset and the screen would lift up to reveal a tray that would slide out with the items selected on it. Whilst W.S. described a device that would deliver a glass of whisky and a cigar as his original idea, he spoke of being able to pre-load the television with whatever might be wanted. He envisaged this being done by someone else (in W.S.'s case, his wife). W.S. imagined this as being a pleasurable experience, not a necessity.

*** INSERT FIG F11a & F11b HERE ***

M.J. (Figure 12) devised *'digitally advanced windows'*, a concept in which the view through a household window could be altered to suit the mood of the individual. Thinking about Seasonal Affective Disorder (SAD), M.J. devised images that could change. For example, in the winter a summer image could be shown, in the evening a daytime image could be shown. This may be of benefit, M.J. thought, to individuals who work long hours and rarely see daylight (especially in the winter months) and also to older people who find the long winter nights difficult/boring/miserable. At the height of a season pictures from the opposite season could be shown. For example, on hot summer days images of snowy days could be viewed. M.J. also explained that an image could be lightened to make the day look brighter (and *vice versa*). A remote control unit would be used to change the image.

M.J. could imagine benefits for people of all ages with her vision of digitally enhanced windows. Rather than being of purely practical use, the windows would be used solely for the benefit of the individual using it, to enhance their wellbeing, either physically as in showing snowy scenes in the heat of the summer for those individuals suffering from too much heat be they, young, old or in-between, or by increasing the amount of light into a room on dark miserable winter days for people who are housebound, (which could include the elderly or perhaps young mothers or ill people) or for people who work on shifts. The windows could also benefit those that work long hours or those who during the winter months find themselves leaving the house in the morning when it is still dark and returning again later in the day having missed most of the daylight hours.

*** INSERT FIG F12 HERE ***

6 Emerging Themes

Table 1 (above) lists the keywords that we identified from analysis of the artists' descriptions of their work. From this we were able to identify the following thematic areas:

– Independence
– Mundane tasks (domestic duties)
– Mundane tasks for everyday survival (Practical, Necessary)
– People of all ages
– Remote Control
– Robot
– Voice activation
– Wellbeing

The themes that emerged from the artists can be taken forward into the development of future assistive home technology. It will be important that such developments take account of the context emerging in this small scale study where technology can be seen to be used for mundane tasks by people of all ages. In this context, ageing will be less of a focus *per se*, and the acceptability of assistive devices will be established earlier in the life course thereby increasing the likelihood of usage into old age where their benefits will be even greater. This means as developers we must begin building technology that enhances and supports life from an earlier age, technology which is then easily extended to cater for our differing needs as we age. A key to success will not be the provision of assistive technologies that we 'need', but the emergence of ubiquitous and networked devices that are aspirational in their own right but which already provide functionality to support independent living. For example, large screen televisions connected to a home computer network and audio-visual entertainment system could also act as the main portal through which various household appliances can be controlled and community services accessed. A priority, then, is to identify key themes associated with independent living across all ages and look for ways in which existing (or emergent) technologies can be adapted and enhanced to support these themes.

The themes that emerged from the art group (see Table 1) link up with the key issues that came out of the focus group discussed in §3.1. In particular the 'dehumanising of care', the 'technical/training issues' the 'establishing needs' and the 'staged strategy' issues came out very strongly.

6.1 Dehumanising of care

Some of the artists envisaged robots playing a part in their lives. Furthermore, we can also see that far from being sterile automata these robots have an element of humanity. In *David* (Figure 7) the artist describes 'him' as friendly; in *Technology: what it means*

to me (Figure 6), the artist has a sense of humour with regard to her view of robotic domestic help by indicating the robot would have its own day of rest. The painter of *Voice Activated Robot* (Figure 2), describes the robot as having some intelligence and being able to conduct domestic duties unaided.

6.2 Technical/training issues

The training issue (§3.1) could be very pertinent here. The fieldwork has shown that far from using 'new' technologies the artists have depicted their visions using predominantly existing technology[8]. The majority of artists expanded on technology that has become familiar to them over time such as telephones (landline and mobile), televisions, and remote control handsets. The issue of familiarity was identified by [24] as an important factor in achieving a good design for older people. A television has been adapted for two of the pieces of artwork *Garden Robot* (Figure 10) and *Self-Service* (Figure 11) and the adaptation of a '*normal looking*' telephone would bring much needed assistance to one artist. A remote control features in many of the pieces: *Lazy Window Cleaner*, *Automatic Iron*, *Garden Robot*, *Self-Service* and *Changing Moods*. If the artists did not envisage the use of a remote control device they tended to use voice activation, although in *Voice Activated Robot* (Figure 2) thought activation was also being used. However, the recently retired nurse in the group did depict an advanced computer being used for futuristic activity in *North and South* (Figure 8).

6.3 Establishing needs

Far from identifying future needs, the majority of the artists in the study described what would help them in the here and now. The artists were given a brief to produce a piece of artwork that for them would depict *Technology in the Ideal Home* and here we see concepts for assisting individuals of all ages in the majority of cases. The *Telephone Automation* example shows a piece of technology that would assist old and young, but would particularly benefit those less able to walk, as is the case with this artist.

6.4 Staged strategy

Many of the ideas from the artists would support a staged introduction of new technologies as they themselves often suggested using technology for the more mundane and often labour intensive household duties, this would then lend itself to familiarization and acceptance of future technologies to meet their needs in later life.

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[8] This is not wholly surprising as it can be very difficult to envisage a technology never seen before.

7 Conclusions

On balance we felt the project was a success inasmuch as we were able to get a number of older people to engage thoughtfully and intelligently in thinking about what technology might be used to support people in the future in independent living. A number of factors contributed to the success of the project and these are briefly summarized below:

– Initial approval of the group coordinator helped the project piggy-back on to an existing activity. The activity was familiar and enjoyable to the participants and was already a medium they felt comfortable about expressing themselves in.
– The participants were a pre-existing group who knew each other and had met up regularly previously, so there was an existing and comfortable group dynamic. This avoided the problems of gathering together a group of strangers and allowed natural communication to take place.
– Pre-introduction meeting — the coordinator had discussed the event prior to the arrival of the researchers and the researchers met up with participants over tea/coffee before the group meeting. This meant the team's intentions were familiar to the group prior to the first meeting and the pre-meeting coffee helped to break the ice.
– The project was introduced in a fairly informal manner in a familiar setting with as little change as possible made to regular activity (i.e. no formal presentations, no formally dressed presenters, no arranging of seats in rows etc.). Again, this helped to preserve the naturalness and continuity of a situation familiar and comfortable to the participants.
– Questions were encouraged to gauge understanding. We found the group appeared to be genuinely interested and not at all hesitant in seeking information and clarification.
– The team was sensitive to the feelings of the participants and tailored overall explanation of the project and data gathering to each individual as appropriate.
– Due to the length of time allocated to gathering the data (i.e., over the six weeks of the project) the participants had time to think, to ruminate over the idea, to discuss it with others, to consider scenarios, to remember personal situations. The time constraints of a typical focus group were not present here thus allowing plenty of time for reflection and creative thinking.
– The research outputs blended into activity that was already familiar to the participants (paintings /sketches etc). This meant that participants were allowed to express themselves in a way that was familiar or natural to them rather than in a manner constrained to fit a particular information gathering protocol.
– By the second and third visits they knew us a little and we knew them a little. We got to know the names of people and used their names when addressing them. The participants became used to the research team and so communication become less formal and more relaxed.

- The participants were pleased with their efforts and keen to explain their concepts. This meant that there was little problem in getting the participants to express themselves.
- It was clear that each participant had thought of their own ideas and worked on them but they may have felt supported in a group activity where many others were unsure of their abilities.
- The interview that took place regarding each participant's artwork was conducted in an informal manner whilst being openly recorded and noted. The interviewer asked each participant to explain his/her paintings and entered into a conversation to try and understand what the painting was about and where their ideas had come from. It was felt that this open conversation could only have existed between people that were comfortable with each other which was facilitated by having met on several occasions.

Benyon [2] observed that designing *"interactive systems is concerned with developing high quality interactive experiences and products that fit with people and their ways of living"*. Our study has highlighted the need for designers to concern themselves with a broad picture of users' lifestyles and behaviours for each person in the study had a very different life experience and set of expectations of what technology could do for them. Needs were very personal and by expressing their ideas in terms relevant to them, participants were very forthcoming. All the individual responses could then be analysed as a whole to look for patterns and trends.

The artistic expression technique described in this article allowed us to identify issues that had also been found by previous research that used a range of different methods. This indicates that the approach shows promise as it allows information to be gathered in an environment that is comfortable and familiar using methods already known by the participants and which they find enjoyable. It provides a complement (or possible alternative) to standard protocols and has the potential benefit of extracting even richer information as the primary task for participants is enjoyable in its own right and is not associated with an interrogative process. In Ellis and Kurniawan's [11] tailored participatory design approach the very first step is labelled 'build bridges'. The method described above appears to be very good at building bridges between the designer and the older person and so commends itself as a useful addition to the participatory design family.

Ellis and Kurniawan [11] observed when working with older people that less confident or less experienced group members could be diffident about offering opinions. We identified above that one of the success factors of our project was that although each participant had worked individually on their own ideas there did appear to be group support so that those who felt unsure of their abilities were able to draw on the help and support of the group. This meant that by the time the project ended every member of the group was able to give a full and insightful account of their artwork. Newell et al [22] observed that older people's confidence *"in their ability to use technology can also be very fragile, and it is important not to put older people in a position which threatens any confidence they may*

have". The approach we took to meet the participants in their own settings and using familiar tasks as the vehicle for exploring technology requirements seemed to remove the danger of threatening their confidence. Furthermore, the familiar group setting acted as a further support mechanism to boost confidence.

When seeking knowledge about requirements for technology that would enhance their lives there is the risk that even the more confident could be hesitant because, as Newell and Gregor [23] observed in their manifesto seeking a new paradigm for carrying out user sensitive inclusive design, users *"are not very good at explicitly stating what they need of a technology which does not yet exist"*. Ellis and Kurniawan [11] identified that empowering participants to have and express an opinion is important for successful design, and we found that by working with people in a context and setting that is familiar to them on a task that is already part of their lives (in this case a hobby) we were able to do just that. Whilst acryllic-on-canvas is an unorthodox medium for technology requirements specifications, we found it to be an excellent enabler for beginning the dialogue with older people about technologies that would enhance their lives. Newell and Gregor [23] were seeking to establish a meeting of the ways between the more European *"holistic, qualitative and socially sensitive"* research and the more American formal quantitative research. We offer this study as a contribution to that agenda and hope that it sparks others into finding new and useful ways to engage meaningfully with participants in Universal Usability design projects.

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Figure captions

F01: Brief for Technology for the Ideal Home

F02: *Voice Activated Robot* by C.C., (Words in speech bubbles — Lunch, Bathroom, Garden, Dusting and Windows). **Table 1 Keywords:** *Mundane, People of all Ages, Remote Control, Robot*

F03: *Telephone Automation* by J.M. **Table 1 Keywords:** *Wellbeing, Mundane for Necessity, Independence*

F04: *Lazy Window Cleaner* by N.D. **Table 1 Keywords:** *Mundane, People of all Ages, Remote Control*

F05: *Automatic Iron* by J.S. **Table 1 Keywords:** *Mundane, People of all Ages, Remote Control*

F06: *Technology, What It Means To Me* by W.B. **Table 1 Keywords:** *Mundane, Wellbeing, Robot* (a) Full Picture (b) Closeup of corner

F07: *David* by I.G. **Table 1 Keywords:** *Robot, Voice Activation, Wellbeing, People of all Ages*

F08: *North and South* by M.R. **Table 1 Keywords:** *Wellbeing, People of all Ages, Independence*

F09: *Gran-o-phone* by M.R. (a) Gran-o-phone (b) Gran-o-phone: closeup

F10: *Garden Robot* by T.N. **Table 1 Keywords:** *Mundane, People of all Ages, Remote Control, Robot*

F11: *Self Service* by W.S. **Table 1 Keywords:** *Wellbeing, People of all Ages, Remote Control* (a) Self Service (b) Self Service: closeup

Table 1 Keywords emerging from the group members' descriptions of their art

Keywords/phrases	No. of occurrences
Air	I
Any room (remote)	I
Automated Domestic Appliances (window cleaner, iron, bell, oven, microwave, kettle)	IIII
Different settings, commands (via remote control)	I
Digitally advanced windows	I
(Domestic) robot	IIII
For people of all ages	I
For those working long hours	I
Gardening	I
Inside and Outside	I
Mood Altering	I
Mundane tasks (domestic duties, cooking, dish washing)	III
Regeneration of human body	I
Remote control (hand held)	IIIII
Seasonal Affective Disorder	I
Security outdoors (e.g. whilst walking)	I
Steam	I
Suction pad	I
Task Operated (remote control)	I
Telephone	I
— Armchair telephone	I
— Telephone hotline to grandchildren	I
Television	II
— Television-facilitated self-service products	I
Thought activation	I
Virtual Reality Entertainment	I
Voice activation	III

We are investigating how technology can be incorporated into the average home to make our living spaces even better. In particular we are interested in:

– How technology can facilitate safer environments and empower people to retain and maintain independent living in their own homes drawing on support and services as they require.
– How this technology can be designed so that it is as easy to operate as possible.

We would like you to create a piece of artwork on the theme of Technology in the Ideal Home. Think about what technology you would like to see in your ideal home. What would make your home better, more convenient, more accessible, more comfortable, etc. What particular needs do you have or challenges do you face that you would like to see home technology help out with? Don't restrict yourself to what already exists and don't reject ideas that you think might be impossible: anything goes.

Fig. 1 Brief for Technology for the Ideal Home

Fig. 2 *Voice Activated Robot* by C.C., (Words in speech bubbles — Lunch, Bathroom, Garden, Dusting and Windows). **Keywords:** *Mundane, People of all Ages, Remote Control, Robot*

Fig. 3 *Telephone Automation* by J.M. **Keywords:** *Wellbeing, Mundane for Necessity, Independence*

Fig. 4 *Lazy Window Cleaner* by N.D. **Keywords:** *Mundane, People of all Ages, Remote Control*

Fig. 5 *Automatic Iron* by J.S. **Keywords:** *Mundane, People of all Ages, Remote Control*

(a) Full picture

(b) Closeup of corner

Fig. 6 *Technology, What It Means To Me* by W.B. **Keywords:** *Mundane, Wellbeing, Robot*

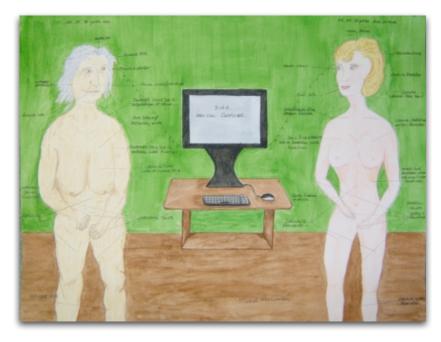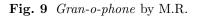**Fig. 7** *David* by I.G. **Keywords:** *Robot, Voice Activation, Wellbeing, People of all Ages*

Fig. 8 *North and South* by M.R. **Keywords:** *Wellbeing, People of all Ages, Independence*

(a) Gran-o-phone

(b) Gran-o-phone: closeup

Fig. 9 *Gran-o-phone* by M.R.

F12: *Changing Moods* by M.J. **Table 1 Keywords:** *Wellbeing, People of all Ages, Remote Control, Mood Altering*

Fig. 10 *Garden Robot* by T.N. **Keywords:** *Mundane, People of all Ages, Remote Control, Robot*

(a) Self Service   (b) Self Service: closeup

Fig. 11 *Self Service* by W.S. **Keywords:** *Wellbeing, People of all Ages, Remote Control*

Fig. 12 *Changing Moods* by M.J. **Keywords:** *Wellbeing, People of all Ages, Remote Control, Mood Altering*