Recommendations for technology re-invention for an older market

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(7,500 word limit)

Abstract

Older people can often fall on the wrong side of the 'digital divide' in terms of accessing and enjoying new digital technology. One approach to this issue is to provide training programmes and customisation techniques for using existing technology. However, another is to re-invent technology with and for older people themselves. In this paper, I propose four recommendations for re-invention, and illustrate these with examples in the domain of digital photography.

1. Introduction

There is a theory in sociology which suggests that technology needs to be perceived to be useful and appropriated into everyday life for it to be successful (e.g. Bijker et al 1987). It is not enough for technology to be useful alone. This viewpoint is especially relevant to the field of gerontechnology, which studies the relationship between technology use and the lives of older people. Modern digital technologies have many known benefits for accessing information, goods and services, connecting people and entertaining them, promoting wellbeing and managing health conditions. All these are relevant to older as well as younger people. But these technologies are useless and ineffective if they are not welcomed and appropriated by each generation in their own way. This may be a problem particularly for technology which is designed with young people in mind, which is probably the majority of technology in the Western World. Most designers are themselves young. Older people may not relate to such technology. They may not see its value or find a place for it in their lives.

A common response to this situation is to blame older non-users of technology for their lack of appreciation and skills. Why can they not see the benefits of technology when it patently works for everyone else? Programmes of education and training are surely needed to teach the benefits of existing technology and how to use it, so that non-users can benefit too. Indeed these programmes are often successful with a part of the older population for a limited period of time. But they do not address the more fundamental problem of treating older people as a growing consumer market in their own right, with their own particular needs and perspectives on what technology might be good or bad for them, and their own preferences for how this should work.

In this paper, I want to recommend and illustrate this approach from my own work to re-invent some of the technology for photography with older people in mind. This was inspired

by a transition from HP Labs where I worked on the future of digital photography from its inception around 1995, to the University of Surrey in 2005. Two formative stepping stones between these jobs converted me to the need for locally and globally inclusive design, which I have subsequently developed in several forms at Surrey. One stepping stone was a placement at HP Labs Bangalore throughout 2003 to lead an interdisciplinary study of media literacy in the villages, towns and cities of north and south India (Frohlich & Prabhu 2003). The other was an affiliation from 2001-2004 with the Helen Hamlyn Research Centre at the Royal College of Art, specialising in inclusive design. In India, I could see first-hand the uselessness of much personal technology of the day, and the need to re-conceptualise it for a very different culture, infrastructure and community-based way of life. At the RCA I watched and mentored young designers engage with older people through user studies of various kinds, and change their assumptions and way of thinking when exposed to the wisdom of age. Both experiences convinced me of the need to go beyond studies of the utility and usability of technology for a 'mass market', and to get more specific about the 'segment' it is trying to address. They also showed the lamentable lack of attention by technology providers to populations considered outside their mainstream market, leading to the problem of non-use described above.

2. Purpose

Given the rising proportion of the global population over 60 and their considerable spending power, it makes good business sense to address them directly in the design of new technology and also in the re-design of existing technology. The aim of this paper is to promote four simple design recommendations for doing this, with examples from the area of digital photography. Photography is a good domain to consider in this way because its three fundamental values resonate with the process of ageing in different ways. We take photographs to remember the past, supporting **memory**, to share it with others, supporting **communication**, and to find our own meaning and role in life, supporting **identity** (Van Dijck 2008). The balance of these has changed with the transition from analogue to digital photography, roughly reversing the order of importance of these elements above but keeping them all in play (Sarvas & Frohlich 2011). A wide range of devices and services now existing for photo capture, work and use, with a key shift towards the consumption of images on screens rather than on paper (e.g. Frohlich et al 2002, Kirk et al 2006, Broekhuijsen et al 2017). While many older people have embraced these changes, others have not, with some evidence that the widespread sharing of personal images over social media is not consistent with the more conservative attitudes of older people towards privacy, trust and relationship maintenance (e.g. Lindley et al 2009). How then should we reinvent these technologies to be more relevant and attractive to an older market?

3. Methods

Since this not an empirical paper reporting the collection and analysis of research data, the usual kinds of methods do not apply. If anything, this paper fits into a line of enquiry referred to as 'research through design' (e.g. Frayling 1994, Zimmerman et al 2007, Fallman 2003), exemplified in the proceedings of a new conference series of that name: https://www.researchthroughdesign.org In this approach, design knowledge is generated from design explorations themselves, and the reflections of design practitioners on what they have learned in conducting them. I adopt this approach here, with respect to four

design explorations, in order to make recommendations for designing with and for an older population.

4. Design recommendations

4.1 Familiar design

When performing perceptual motor skills with objects or trying to get computing devices to do what you want, people draw on the tacit skills and knowledge they already have (Polanyi 1958). There is a known transfer of learning effect which may work between systems which are similar enough in operation to make the old learning still relevant, but not between systems whose operation is so different as to make the old learning positively interfere (c.f. Frohlich & Elliott 1984). For example, someone who is good at badminton may also be good at squash, but not at tennis where the ball dynamics are very different and demand longer arm strokes rather than short wrist movements. In fact, badminton players may be particularly bad at tennis because they will find it hard NOT to use the shorter wrist movements they have learned in badminton, when playing tennis.

The same effect applies to older people when trying to use new digital technology. They will import knowledge and skills from their wide experience with analogue technology that simply may not transfer to the digital domain. In fact it may interfere. Many years ago, I observed older people struggle with their first use of a mouse, in a study of an early online form-filling system. This was implemented on the very first computer to use a graphical user interface and mouse: the Xerox Star system (Frohlich 1987). The screen-displayed cursor was angled at about 45 degrees anticlockwise from vertical, as in most current operating systems. Older users tended to align the body of the mouse itself with the cursor, instead of keeping it vertical when moving it across the mouse mat. This radically changed the control dynamics of the mouse such that an upward movement of the mouse moved the cursor up and to the right of the screen at 45 degrees, and a downward movement moved it down and to the left at 225 degrees from vertical. Not surprisingly, the users struggled to move the cursor to desired targets on the screen. (You can experience the most extreme version of this effect if you try to use a mouse upside down where the control dynamics are fully inverted, as in mirror drawing). Something in the experience of these older novice users was encouraging them to align physical and screen-displayed gestures with each other, in a way which interfered with their effect on the cursor. The design solution was simply to make the cursor point vertically upwards so that users kept the body of the mouse pointing up during mouse movements. This is an example of using familiar design in technology for older people.

Lim (2010) has shown that these learning effects are generational. People born between particular year periods will have grown up with the same kind of technology as children, then adults and then older adults. Their experience will reflect this and be transferred to new technologies which may be more or less compatible. Lim proposes a *Generation Timeline Tool* to map historical frames of reference for different aged people. He suggests that there is a formative period for learning between about 10 and 25 in which the technology lessons experienced then have particular weight for the rest of your life. Hence, older people born before 1930 will be most familiar with Mechanical products, those

between 1930 and 1960 with Electro-Mechanical, and those after 1960 with Digital-Software.

In the photography domain, a simple example of this generational learning effect is that older people will be more familiar with viewing and sharing physical printed photographs rather than screen-displayed photos. To view photographs on screen is not simply a question of looking at the screen, except perhaps on a photo display or screen-saver which changes the images automatically. Manual control of the photos is usually required, involving new mental models of photo repositories residing on a device or in the cloud, and ways of navigating these within the operating system of the viewing device. In fact, a benefit and a curse of digital photography is that photographs become digital *files* like any other type of data, and the technology of photography becomes part of the modern ICT infrastructure for manipulating files (Sarvas & Frohlich 2011). This means that digital photos can be copied, transmitted or deleted in an instant, and combined with other data to enrich them. This is fine for someone who has learned conventions for file manipulation on a computer or smartphone, but potentially confusing and dangerous someone who has not. Physical photographs do not suddenly reproduce or self-destruct or appear in the hands of friends and strangers, whereas digital photographs can do all these things.

These observations underlie a longstanding interest I have had in augmenting physical photographs with other digital data, especially sound. At HP I argued for a new form of *audiophotography* lying somewhere between photography and videography, and involving single or multiple photographs with sound (Frohlich 2004). While these kinds of *audiophotos* can be viewed and played back on screen-based devices like video clips, it is also possible to play them back from paper. I called these *audioprints* and created an *Audioprint Player* demonstration in 1999 with my colleague Guy Adams of an embedded chip in a photograph containing 30 seconds of high quality sound which could be played back through a handheld MP3 player alongside the photo (Frohlich et al 2000). This is shown in Figure 1.

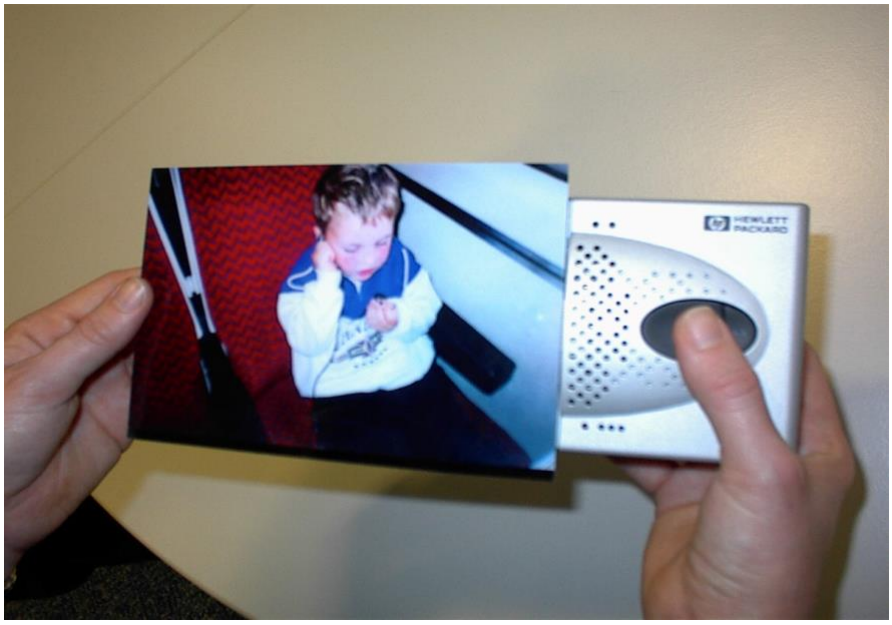

Figure 1. The Audioprint Player

Switching to another technology for this effect, I worked with other colleagues from the Universities of York and Central Lancashire to create an *Audiophoto Desk* for the Helen Hamlyn show at the Royal College of Art in 2004 (Frohlich et al 2004). This is shown in Figure 2. Designed to be accessible to an older population, the desk played sound files associated with printed photographs, by recognising the photos from an overhead camera and hidden computer. The software also tracked the x,y position of each photo on the desk and used its position to control volume (y axis) and stereo panning between two speakers either side of the desk (x axis). It could also play multiple photographs at once. Sound files played through rather than looping, so that each sharing event became an audiovisual performance depending exactly upon where and when each photo was placed on the desk in relation to every other one, and which sound files played back and then stopped in overlap. Individual audiophotos could be captured on HP cameras of the day, which supported audiophotography through a point-shoot-and-hold action; recording a variable length sound clip after the click and storing it in the image file. The vision was for a simpler type of digital photography which preserved the beauty of the printed image as an interface to additional digital data enriching the memory of the event, and supporting new forms of storytelling and reminiscing about it (Frohlich & Fennel 2007). With an audiocamera, photo printer and reading lamp, consumers could create new multimedia experiences in their own homes, using the familiar medium of paper. Some example sets of audioprints playing on the audiophoto desk can be seen here: https://vimeo.com/manage/showcases/3430148/info

Figure 2. The Audiophoto Desk

Although designed with older people in mind, the *Audiophoto Desk* was enjoyed by old and young alike, as evidenced informally at the exhibition and at many other demonstrations held since. In fact, the only formal evaluation was with students at the University of York who enjoyed the creativity of making audiophotos to play on the desk, and the humorous and unusual effects that resulted (Lindley & Monk 2005).

Although HP pulled out of the camera market in 2005, I have developed some of these ideas further at the University of Surrey. In 2015 I returned to embedded chip technology with colleagues Radu Sporea and Janko Calic to create an *Audiophotobook* (see Figure 3). This used what we called 'light tags' on each page, wired to an embedded Bluetooth chip in the binding, to tell a nearby device which page was open to light and play a corresponding sound file on a Bluetooth speaker in the room (Frohlich et al 2016). The effect was magical; resulting in the playback of narrations or ambient sounds from the scenes in the photos, simply by turning the pages. Example books can be seen playing here: https://vimeo.com/manage/showcases/3430190/info We are currently developing two types of augmented paper technology based on image recognition and embedded electronics on the Next Generation Paper project at Surrey (e.g. Frohlich et al 2019). This technology would make it very easy to create the kinds of Talking Photo Albums that are commercially available today, and related research prototypes that have been shown to be beneficial for older people or those suffering from dementia (Piper et al 2013, Lazar et al 2017).

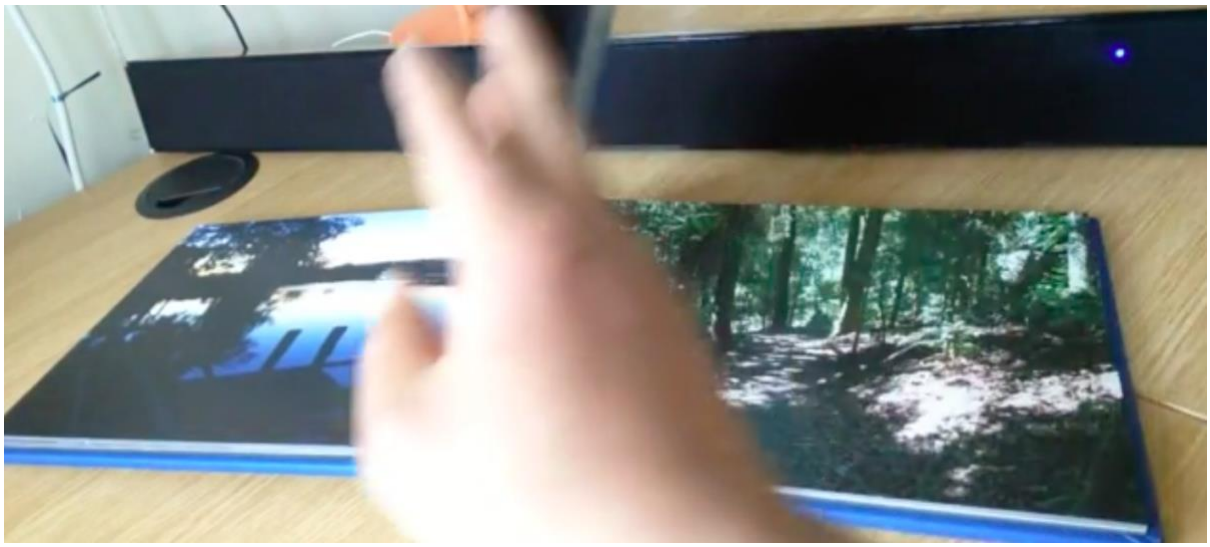

Figure 3. The Audiophotobook

4.2 Co-design

In the examples above, older people were not directly involved in the design process. Ideally they should have been, to ensure that their perspectives and feedback were taken into account in the development of the technology itself. This partialy reflects the context in which the research above was done, within HP for a mass consumer market which either ignores or glosses the subtleties of age. In other research at Surrey, I had the opportunity to work for three and a half years with older people's groups directly, as part of the *SUS-IT* project. The project aimed to understand ways of 'SUSstaining IT use in older people to promote autonomy and independence', and was funded by the UK New Dynamics of Ageing

programme (grant number RES-353-25-0008). I was responsible for a series of innovation workshops or 'sandpits' with older people's groups to co-design new ICT products and services with and for older people. This required us to develop a new process of co-design to help older people contribute design ideas in an accessible and enjoyable way.

The resulting methodology was called *Focusgroup+*, because it is done as an extension of the classic focus group format (Frohlich et al 2014). Rather than asking people to come up with new technology ideas from scratch in a brainstorming activity, we ask them first to critique three new product concepts introduced by us. After a break, we split the focus group of about 9 people into three groups of 3, each with a designer/facilitator to mediate the discussion. Each group takes a different concept to re-design within a fixed period of time, before presenting back their new concept to the reassembled group. To trigger this activity we ask participants what they would like to keep, lose or change about the starting concept. Most people can relate to these questions as they know what they like about the concept and what to keep, what they don't like and want to lose, and what they half-like and want to change in some way. The trick of facilitation is to get the sub-group to come to some consensus about the new concept they would like to propose, and to document this in simple sketches and descriptions ready for sharing. This often leads to disagreements and arguments about the merits of various options, and a degree of compromise and practicality in final decision making. The resulting new concept usually reflects the will of the whole group, while the recorded talk reflects its rationale. This leads to two equally valuable outputs from the re-design activity.

The power of this process to improve design ideas can be illustrated with reference to one particular concept in a sandpit on the topic of supporting memory and communication. We introduced three new design concepts to two distinct groups of older people who were either digitally engaged or digitally disengaged with internet computing (Frohlich et al 2016). One of these concepts was derived from the *Audiophoto Desk* above. We called it the *Story Lamp*, because it was designed to associate verbal stories with photographs or objects placed under the lamp, or with digital photographs imported from a camera and projected onto a table or wall by an integral pico-projector. A mock-up of this system working with actual photographs, objects and spoken recordings is shown in Figure 4, and was demonstrated to both groups of participants for feedback prior to re-design.

The responses of the two groups of older people to the *Story Lamp* were typical of those towards other concepts in the sandpit series. The digitally unengaged group loved the appliance nature of the idea and worked together to improve its functionality and interface. In fact, they designed a *Multimodal Lamp* for playing back multiple stories from any photo or object trigger, and assembling sequences of photo projections for longer stories. In contrast, the digitally engaged group of older users chose to KEEP the scanning and recognition of photos and objects but LOSE the lamp interface. They CHANGED this for a laptop implementation in which a swivelling camera at the top edge of a laptop could be angled backwards to capture photos and objects behind the screen, as if looking through it. They called this a *Laptop Media Scanner* (see Figure 5). A software application would then allow the annotation of scanned artefacts with verbal narratives stored in the cloud, so that a distributed extended family could view and contribute to a shared family history. For both groups these concepts were considerably better than our starting concept, and better

reflected their preferences and ICT infrastructure. In general, participants loved the re-design activity and were able to contribute significantly creative ideas, despite having little knowledge in many cases of the underlying technology.

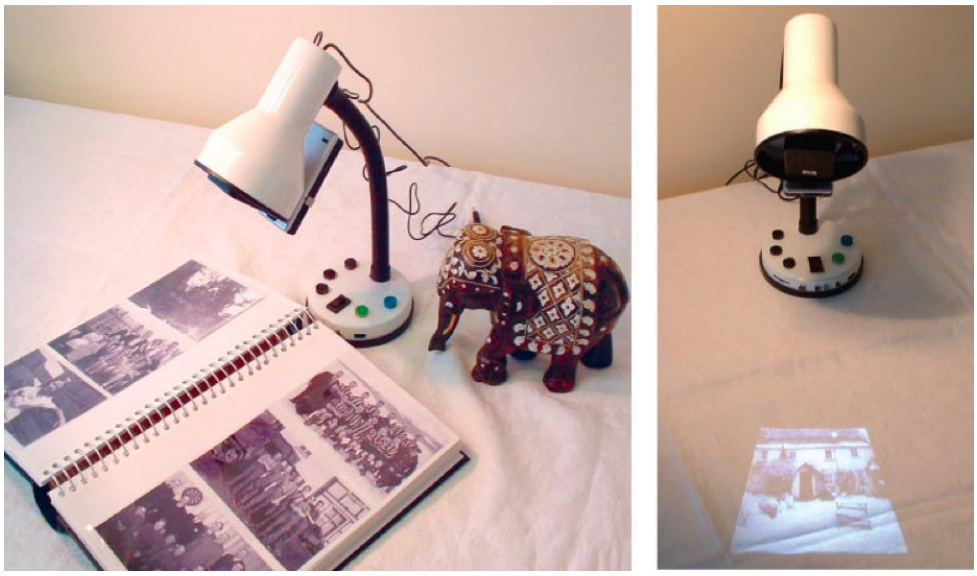

Figure 4. The Story Lamp

Explain the new Laptop Media Scanner idea here, and the benefits of co-design…

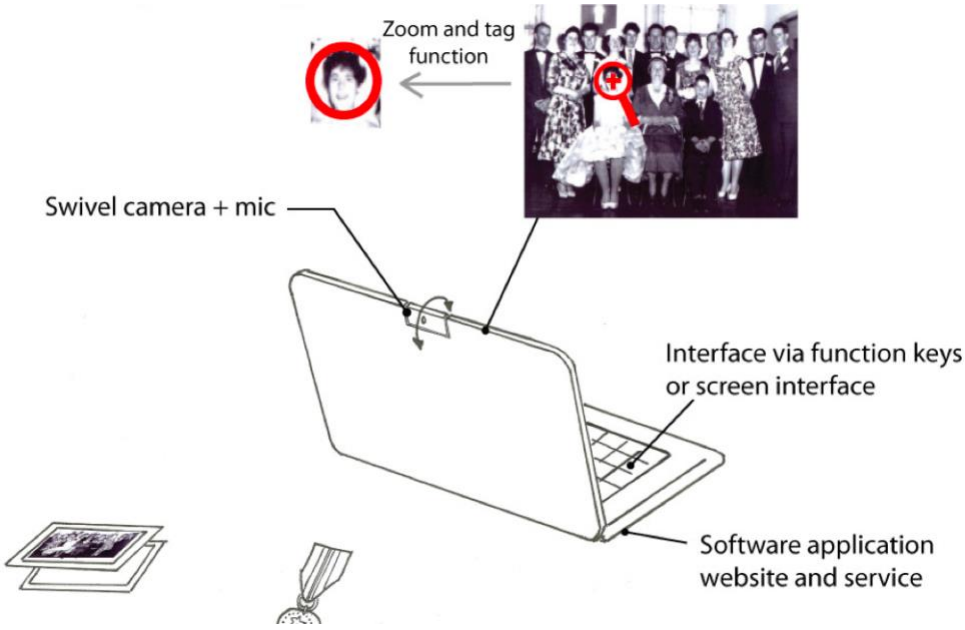

Figure 5. The Laptop Media Scanner

4.3 Appliance design

We saw in the previous section that digitally engaged and digitally unengaged older people responded differently to the concept of a special purpose *Story Lamp*. The digitally unengaged participants broadly liked and extended it, while the digitally engaged participants preferred to move its functionality to a laptop device that they already owned. This epitomises a debate that has been raging in the computer industry since the 1990s about the desirability of general or special purpose computing, given that electronics can

now be distributed and embedded in the world of things (Norman 1999). As it happens, the general purpose computing device has proved extremely resilient in the consumer market, first in the form of home and mobile computers and now in the form of smartphones and tablets. This is because of the standardisation of operating systems, the emergence of an app model of software customisation, and the huge value for money provided by a single device which can do virtually anything (Frohlich et al 2001). However, we see here an exception to this rule, for people not so familiar with the standard operating systems and without a device to run them on. For them, the idea of specialised devices is more attractive, especially because they can be simpler and easier to use.

Therefore my third recommendation is for appliance design, meaning the creation of specialised devices with focussed functionality and interaction. An example in the photography domain from my own work is in the category of photo displays. At Digital World Research Centre we have created a number of novel photo displays, including some with Microsoft Research and Kodak (Durrant et al 2009, Frohlich et al 2013). However, the one I want to feature here was co-designed and built by Sam Zargham as part of his PhD in human computer interaction, supervised by Janko Calic and myself. It is called *4Streams* and is shown in Figure 6 below. It was implemented on a Microsoft Surface tablet, disabled for everything except this functionality (Zargham et al 2015).

Figure 6. The 4Streams photo display

Photo displays are interesting precisely because of the transition of digital photo viewing from print to screen mentioned above. With this, the tangibility of the photograph is lost, *except* when it appears visibly on a screen. The screen itself is a tangible thing, and can display a single photograph forever, as with a photo frame. For as long as a photo is displayed on a screen, it *is* tangible. The difference between a photo display and a photo frame lies primarily in the transience of the image, which in the first case can change over time to become a sequence of images over time. In the *4Streams* photo display we utilise

this property to show a live stream of photos taken from four different smartphones simultaneously, on a quadrant display (Zargham et al 2012). The device was designed to give a tangible presence to transitory photographs taken by four close family members or friends, and establish a kind of ambient connection between them. Each user is intended to own and deploy a 4Streams display in their own home, as well as carrying a smartphone. Therefore one of the quadrants is dedicated to the display owner, while the other three are dedicated to three close contacts.

Many variants of this are possible, including asymmetric social networks for each person and more than three other photo streams projected on a wall with more surface area to spare. But we restricted our system to a single social network of four people, with each showing the others on their display. Technically, users posted selected images to a Facebook group, which then appeared immediately on their own and their partners' displays. The effect on the display was subtle, acting like a visual tweet coming in slowly and sporadically throughout the day, changing one quadrant or the other depending on the sender. In a final design twist, we gave users the capability to rewind the photo stream and to play it back in real-time or some faster multiple of real-time. This resulted in a kind of time lapse movie, showing what each of four people were doing in lock-step with each other over a selected period of time (Zargham & Calic 2014). The overall behaviour is similar to the Microsoft Research *4Photos* display, designed with 4 changing photo surfaces as a table decoration and talking piece for dinner parties (O'Hara et al 2012). With *4Streams*, the photos could trigger thoughts, memories and conversations locally, but also remotely across multiple homes, connecting people at a distance as well as those together.

The display had some surprising properties which we discovered as we tried it ourselves with family, friends and colleagues. It did indeed give us a closer sense of where our partners were, which was useful in a work context when trying to collaborate or share news of conference trips, holidays and meetings. We found it could be used for sharing quick written messages if we took photographs of post-it notes which popped up on all the displays together. And if some or all the partners on a display arranged to meet each other in person for a shared event or party, the photo streams naturally reflected all the preparatory and follow up activities before and after the event, sandwiched between a series of shared photos from the event itself. Although we were proud of the rewind and replay facilities for reminiscing about the past, the main value of the device seemed to be in its natural ambient mode for displaying the concurrent activities of three key contacts in photographs.

4.4 Iterative design

The 4Streams photo display is radically simple to use compared with a general purpose tablet device, and will even work without one of the users sending photos to the others from their phone. We can imagine it might be useful for older people living alone, as a new way of keeping in touch with remote family and friends, and for their family and friends in turn to keep in touch with them and make sure they are OK. However, without formal evaluation with older people themselves this is pure speculation. So the final recommendation for re-inventing technology for an older market is to practice iterative design. This means involving older users in the testing of technology prototypes and making changes to improve their design.

This can be illustrated here with reference to a trial of *4Streams* we carried out with an extended, multigenerational family split across three countries (Zargham et al 2015 op cit). Note that the trial was not exclusively with older people, nor was it large scale in the way that a randomised controlled trial of a health technology might be. Rather it was small scale and qualitative, in the spirit of most user studies in the field of human computer interaction, and involved a grandmother and grandfather as part of a distributed family. They were living in an eastern European country, while their son and his family lived with their two small children (aged 8 and 5) in the UK. A niece of the son also joined the study from the US, making up the four partners and quadrants of the display. Note that in this configuration, one quadrant was devoted to the grandparents jointly while two quadrants were devoted to the younger father and mother living in the UK. Such shared use and split use within households was not something we designed for initially but rather emerged in the process of recruitment and use.

This intergenerational family used the system for 7 weeks in the summer of 2014. We found that the grandmother was perhaps the biggest fan of the photo display which connected her with her children and grandchildren in a new way, with very little learning overhead. She was not a big user of a digital camera or cameraphone and only shared a small number of old photos with the others, or pictures of her garden. The other key users were the two girls of the middle family who loved to monitor the display and report any changes to each other and their parents. Something happened during the trial to make this particularly important to them. Over the summer the father took the girls to visit their grandparents and left them there for a time, returning home before the mother went to collect them and bring them back. This meant there was a period in which the girls were alone with their grandparents and missing their parents, making photo messages from home particularly precious. The individual parents left at home also appreciated photos from the other parent with their children at the grandparents house. The arrival of photos on the displays triggered local conversation and speculation about the incoming photos from the other partners. This sometimes led to emails or phone calls to discuss the meaning of the photos with the senders. For example, a picture of a fox in the garden of the UK family, triggered an immediate phone call by the grandfather to follow up a family joke about never seeing foxes in the UK.

These kinds of findings would have been valuable for improving the design of the *4Streams* system for intergenerational family communication at a distance as the primary use case. For example, more attention could have been paid to enabling the grandparents and children to contribute more photo content for sharing, perhaps through an integral camera in the display itself. Iterative design in this case would involve the use of evaluation findings in a new improved version of the system. As it happens, the design work on *4Streams* stopped with the trial since the system was a PhD prototype rather than a commercial product. Instead, we used these findings in a later research system called Media Parcels, designed to address loneliness in older people through a new kind of photo elicitation and sharing system (Zaine et al 2019). Photo and other multimedia content was requested from an older person and two close social contacts by a facilitator over a period of a few days, before being distributed to recipients in a second phase (see Figure 7). This begins to address the issue of contributing media to such a system, which we found to be beneficial in

its own right for helping people to reflect on and deepen their relationships with others. This another example of iterative design in which the findings from evaluation of one system are used in the design of another.

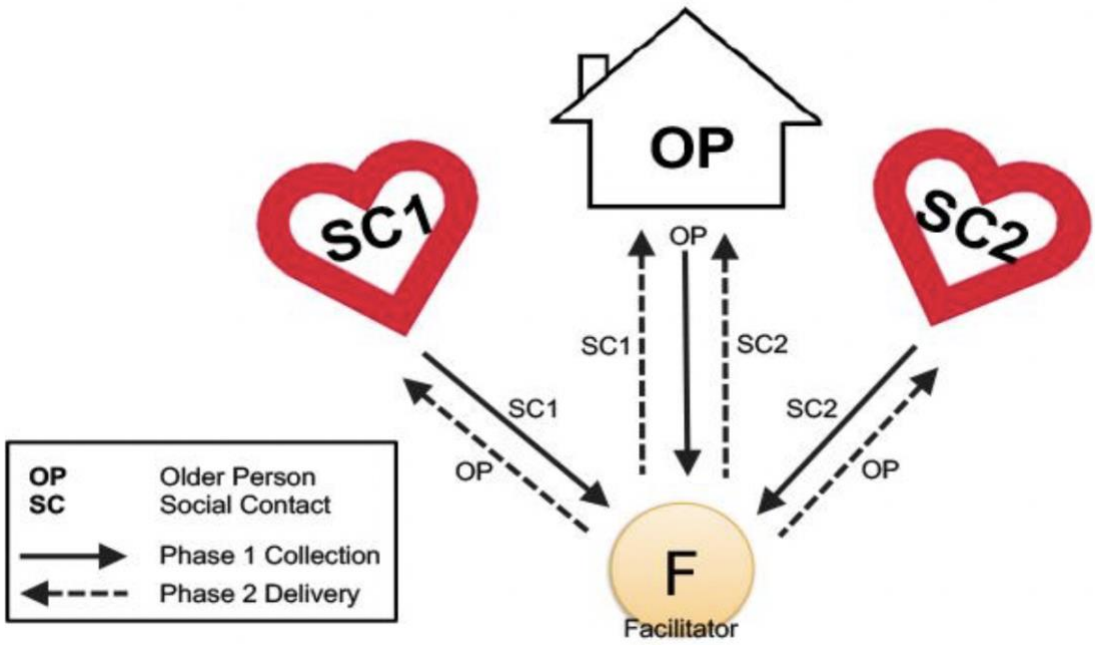

Figure 7. The Media Parcels system

Conclusions

The design examples above show how certain aspects of conventional digital photography products and services can be re-invented for an older market. Instead of capturing and sharing images on a smartphone through camera and social media apps, photographs could be printed for annotation with ambient sounds and spoken narratives, or displayed on dedicated photo displays for sharing within a smaller social network of family and friends. Focussed function digital cameras could form the front end of this process with transfer of content via an SD card to printers or photo displays, especially for digitally unengaged older people who do not own a smartphone or computer. Alternatively, photos could be captured on a cameraphone or smartphone and sent wirelessly to other devices, by digitally engaged older users and their younger partners.

The exact ICT infrastructure and skills for these activities depends heavily on individual users and their preferences, together with those to whom they want to communicate. The involvement of older people in the process of design and evaluation of new technology is therefore essential to take these factors into account, and ensure a level of compatibility and asymmetry appropriate to intergenerational photography and communication between people with very different skills. **Co-design** through the *Focusgroup+* method was shown to be simple and effective for older people's groups, in generating more appropriate design solutions for the participating groups such as the *Laptop Media Scanner*. **Iterative design** through field evaluation involving older users was shown to reveal core user values and

unmet user needs that were taken forward in the *Media Parcels* system as an evolution of *4Streams*.

These examples have also shown that the process of re-inventing technology for older people might involve a return to more familiar or 'retro' technologies and practices, augmented with digital life. The *Audiophoto Desk* was a good example of **familiar design** which utilised printed photographs as an interface to audio annotations. Another recommendation was for **appliance design** rather than app design, in which a focussed function device is specified as the interface to new digital service. The *4Streams* photo display was a good example of that because it behaved only to make four photos tangible for the period before another photo was taken from four different smartphones. This required no additional learning for older users simply consuming photos as a window on their remote family members, and only modest additional learning for others who already use a smartphone. An intermediate approach, not mentioned above, would be to develop a series of **custom docks** for general purpose devices such as tablets and smartphones. These would essentially turn those devices into appliances by switching OFF most functionalities and featuring particular behaviours and services. When removed from the dock, the device would become fully functional again.

A final observation on these design examples is that they may turn out to be attractive to younger as well as older people, according to the argument for inclusive design. By designing for a wide diversity of users, better designs may emerge for all. We can see this if we return to the issue of appliance design above. Although these designs tended to be attractive to digitally unengaged older users on the SUS-IT project, this was not a universal finding since many digitally engaged users also liked certain appliance-like concepts across the groups. While many of us with general purpose computing devices such as smartphones enjoy the convenience of having many functions in a single place, we are also likely to use and enjoy a variety of focussed function devices such as e-books, televisions, radios and so on. As a final thought experiment on this point, consider whether you would like to own any of the design examples above, alongside your existing technology. If you are under about 60 and answered yes, my point is proved. Reinventing technology for older people, or indeed any group that lies outside the mainstream market for consumer products, is likely to stimulate new forms of innovation and inclusive design that may be attractive to everyone.

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