Designing Out-of-Box Experiences for Older Adults: Exploring the boundaries of Inclusive Design

by

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Abstract

This thesis investigates the Out-of-Box Experience (OoBE) of interactive consumer products for older adults, with a view to improve the User Experience (UX) of a product by manipulating factors of the OoBE. This research emerges in the context of current demographic trends, which see people living longer and in better health, and the increasing ubiquity of technology in modern life. The OoBE describes the very first stages of interaction with a new product, including acquisition, unpacking and setup. This crucial initial experience has the potential to influence product acceptance and therefore determine its future use. Creating a positive OoBE requires an empathic understanding of the intended users, as well as contextual knowledge about current practices. A review of the literature revealed that many of the difficulties older adults experience with technology concern elements of the OoBE, such as complicated documentation, technical jargon and inadequate support for inexperienced users. However, the absence of research on how to engage older adults during the OoBE of new technology reinforced the need for further research.

To this end, two user studies were conducted with older people, followed by a design study with designers. The first study explored older adults' relationship with technology and their current practices of the OoBE, using the Technology Biography method. The second study used cultural probes to investigate the social side of UX and its effect on personal feelings of independence. Data from these two studies were used to create four personas, which were used in the design study. This third and final study focused on whether the construct of social benefits could be operationalised within the OoBE of new technology. Collectively, the findings indicated that the involvement of other people during the OoBE can be a strong motivator for older people to take up and use technology. Far from impinging on individual perceptions of independence, some older people actively manipulate the OoBE in order to derive social benefits. This research thus contributes to the discussion of how Inclusive Design can evolve through the incorporation of social benefits, in order to generate desirable and successful future products.

Keywords: Inclusive Design, older adults, User Experience, Out-of-Box Experience, new technology, social benefits, independence

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Publications

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Burrows, A, Mitchell, V and Nicolle, C (2010). 'Out-of-Box Experiences: An opportunity for inclusive design'. Proceedings of *CWUAAT 2010*, Cambridge

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1 Introduction

This chapter establishes the context and scope of this research, as well as its general aim and objectives. It concludes with a summary of the subsequent chapters and an outline of the thesis structure.

1.1 Motivation for the research

The 31st October 2011 symbolically marks the day the world population reached 7 billion. This milestone represents a population growth of 1 billion in just 12 years, the product of higher birth rates and increased life expectancy. But this triumph of development has been largely responsible for another demographic trend, which sees the proportion of older persons growing faster than any other segment of the population. According to *Ageing in the 21st Century: A celebration and a challenge*, a report produced by the United Nations Population Fund (2012), one in nine people in the world are aged 60 or over, a number that is expected to rise to one in five by 2050. Figure 1.1, taken from this report[1], clearly illustrates how the demographic landscape is due to evolve. On a regional level, it is anticipated that by 2050 over a quarter of the populations of North America, Latin America and Europe (more than 30%) will be aged 60 or over. Asia and Oceania can expect up to 24% of their populations to belong to this age group, with Africa having the lowest percentage of over-60s by 2050. An ageing population has been one of the driving forces behind Inclusive Design, which advocates a social responsibility to counter exclusion through good design (e.g. Clarkson et al., 2003; Keates and Clarkson, 2003; Nicolle and Abascal, 2001). These figures are often cited to illustrate the

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[1] Original source: UNDESA, Population Ageing and Development 2012, wall chart.

economic and social struggle society is faced with, but within them lies an untapped wealth of opportunities for a more meaningful and ethical design. Far from being a uniform group of passive consumers, older people are as diverse as any other market segment and, in the UK, collectively control a significant amount of disposable income (Coleman, 2002).
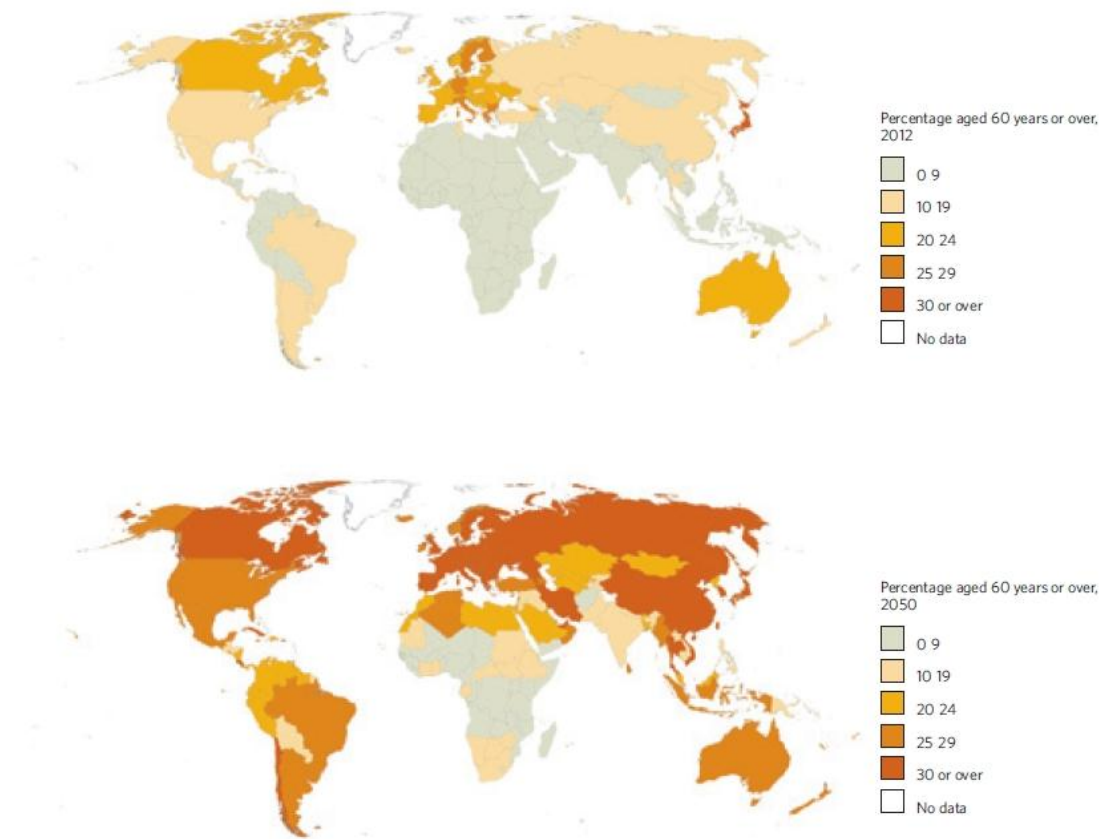
Figure 1.1 Percentage of population over 60 years old in 2012 and 2050 (United Nations Population Fund, 2012)

Alongside these demographic changes, the 20th century also registered an unprecedented technology boom. Nowadays we rely on technology to perform a myriad of daily activities, from leisure to work and education, all of which are essential for individuals to function independently and interact successfully in society (Hiltz and Czaja, 2006). The ubiquity of the internet has fundamentally changed our economic, political and social practices, as well as facilitated the provision of services, communication and entertainment. Research trends hint at technology developments that could specifically support independent living for the ageing population, through the provision of smart home systems and telecare. While statistics reveal that the older consumer market still falls behind in terms of adoption of new technology (Ofcom, 2011), it is a mistake to assume

that technology is the preserve of the younger generations. In fact, UKOM/Nielsen figures for May 2010 reveal that 31% of internet users in the UK are aged 50 or over (see Figure 1.2).
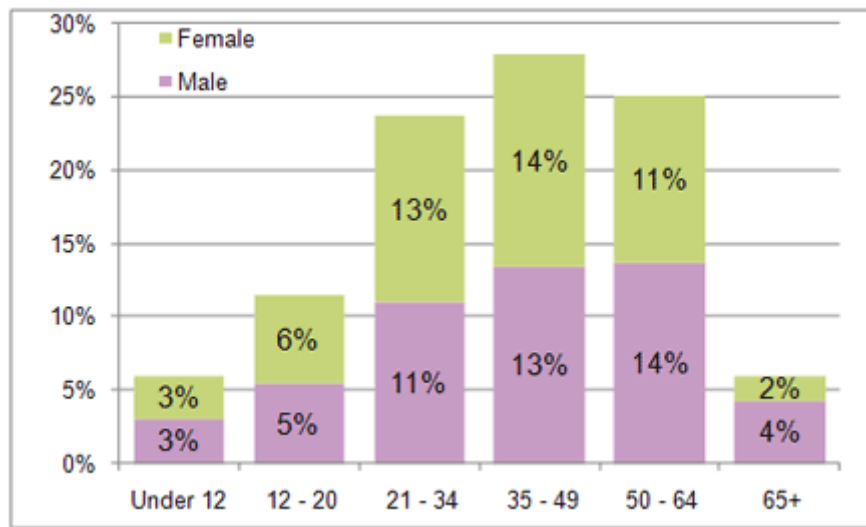
Figure 1.2 UK internet audience in May 2010 (UKOM/Nielsen)

More recently, it has been reported that 45% of 55 to 75 year-olds in the UK spend up to 30 hours a week on the internet, with 25% being termed 'heavy users' because they spend more than 30 hours a week online (Forster Communications, 2012). Within this age group, 47% use Skype or instant messaging services to keep in touch with others, and a quarter stream films and TV shows at least 2-3 times a month. This study also reveals that a third of people over 55 use social networking sites, with the over-50s being Facebook's fastest growing audience.

This central role of technology, experienced today and envisaged for the future, is fuelling a concerted effort to further encourage older people's digital participation. The British government has invested in cross-sector initiatives that seek to drastically improve older people's access to the internet, an example of which is Go On UK[2] (formerly Race Online). In the European Union, the Europe 2020 strategy sparked the Digital Agenda for Europe[3], launched in May 2010 to explore how Information and Communication Technologies (ICT) can promote innovation, economic growth and progress. Among the seven priority areas of this agenda is enhancing digital literacy skills and inclusion.

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[2] www.go-on-uk.org
[3] https://ec.europa.eu/digital-agenda/en

Within this European framework for e-inclusion, the AGE platform[4] is a key advocate for the interests of people aged 50 and over, coordinating policy work and projects addressing the accessibility of new technologies.

The importance of developing technology that is accessible and usable for older people has long been recognised by the research community, whose efforts have focused largely on understanding barriers to adoption and interaction. Frequently identified barriers include socio-demographic factors, such as level of education, employment status and occupation; attitudinal variables, such as computer anxiety and self-efficacy beliefs; age-related decline in abilities; complexity of systems, technical manual and jargon; and generational differences (Czaja et al., 2006). However, concentrating on the negative aspects of older people's relationship with technology has sometimes led to over-simplified, limited designs (e.g. the Doro mobile phone in Figure 1.3).

Figure 1.3 Doro mobile phone[5] and Samsung Galaxy S3[6]

In reality, a growing number of individuals who belong to the 'older' age group do not view themselves as old and, as a result, do not want stigmatising products that fail to meet their wants and needs. As Wales puts it, 'older people like to be like others' (2004, pp. 42). And this is likely to be increasingly true in

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[4] www.age-platform.eu
[5] Source: www.doro.co.uk (retrieved 11 February 2013)
[6] Source: www.samsung.com/uk (retrieved 11 February 2013)

the future, as people who grew up with technology make the transition into the 'older' consumer category.

So the challenge becomes how to persuade older people to overcome inevitable barriers presented by the mainstream products they aspire to own. The value of good usability cannot be ignored, but the successful and desirable products of today demonstrate that User Experience (UX) is a key element of interactive consumer product design (Preece et al., 2002). Interactive product experiences are naturally dynamic, resulting from a complex interplay of factors pertaining to the individual, the product and the context of interaction. Accordingly, there is no consensus in the UX literature as to its definition or what exact factors can be manipulated to generate a particular user experience. Nevertheless, it is widely accepted that a sensitive understanding of the target users, their needs and motivations to use a product or service enables designers to influence the user experience through design (Sleeswijk Visser, 2009).

According to IBM (cited in McCarthy and Wright, 2004), the scope of user experience design should extend to the user's initial awareness, discovery, ordering, fulfilment, installation, service, support, upgrades, and end-of-life activities. This definition clearly emphasises the importance of peripheral experiences associated with the actual interaction between the person and the product or service, many of which fall under the definition of Out-of-Box Experience (OoBE). Specifically, the OoBE refers to the very early stages of a user's interaction with a new product, from purchase decision to unpacking, set-up or installation, configuration and initial use (Ketola, 2005). It is a spontaneous and transitory phase, but powerful enough to influence people's perception of a product and brand even before use. In other words, a negative OoBE can have a damaging effect on the acceptance of a new product and similar products in the future. This is attested by the abundance of homemade unboxing videos on YouTube, a phenomenon that provides an ad-hoc glimpse into the trials, tribulations and successes of the OoBE.

In a survey on older adults' use of computers, Goodman et al. (2003) found that many of the difficulties experienced concerned elements of the OoBE such as complicated documentation, too much jargon and inadequate support for inexperienced users. The study indicated that only 33% of older computer

owners choose them themselves, with the majority relying on friends or family to choose for them; 16% of older adults obtained their computer over four years ago and 28% had acquired second-hand models. In addition, Peacock and Kunemund (2007) suggest older adults may require custom-tailored support for proper installation routines.

A richer understanding of older people's initial experiences of new technologies is not only opportune within this context, but may point to innovative ways of encouraging digital participation. Research has generated some recommendations on how to create a positive OoBE (Kowalski, 2001; Intel Corporation et al., 2000), though the question of whether it can become a tool for inclusivity, persuading older adults to overcome barriers to their use of these products, remains unexplored. The present research sets out to address this challenge.

1.2 Scope

The research presented in this thesis is limited to investigating older people's Out-of-Box Experiences of new technologies. It therefore concentrates on the following aspects, identified as key elements of the OoBE: purchase decision (Intel Corporation et al., 2001), packaging and unpacking, set-up or installation, configuration, initial use, and assistance (Ketola, 2005). Aspects concerning interaction with the device itself, such its design or usability, and its sustained use are beyond the scope of this research.

Literature that investigates older adults' use of new technologies analyses their interaction with specific products or services such as computers, mobile phones and the Internet. Researchers refer to these by using a variety of general terms including 'new technologies', 'information and communication technologies' (ICT), or 'interactive devices to describe their area of investigation. This research looks at some of these studies and these terms may be used inter-changeably throughout the thesis. However, this research focuses on 'interactive consumer products', which are understood as products with a digital output and multimodal styles of interaction that have a personal or domestic context of use.

For the purpose of this thesis, older people are defined as those over 50 years old. While it is acknowledged that many people in this age group do not view

themselves as 'old', the adopted distinction is generational and based on life stages. The inclusion of people from the age of 50 factors in the impact of the mass consumer society that grew in the aftermath of World War II, which boosted people's exposure to and consumption of domestic technologies (Gilleard and Higgs, 2008). This Baby Boom generation, born between 1943 and 1960, witnessed the home computer revolution of the 1980s. Many Baby Boomers had to get to grips with computers at work, while several actually contributed to the advancement of digital technology. Moreover, in recent years this cohort began to reach an important life milestone that can affect their relationship with technology, the age of retirement. The adopted segmentation therefore comprises markedly different groups, whose experiences and contexts of use of technology provide a glimpse into the needs for the design of inclusive products for the future.

Accordingly, this research includes young Baby Boomers who are still working, retired Baby Boomers (corresponding to the 'young-old' designation), and those in the 'old-old' and 'oldest-old' categories (Neugarten, 1974). People in the over-50 age group do not necessarily manifest age-related impairments and, therefore, this research does not focus specifically on related usability issues. Rather, it acknowledges older people as a diverse social group that is likely to share certain experiences, expectations and feelings regarding the use of new and unfamiliar technologies.

Seen as the research topic brings together Inclusive Design and User Experience considerations, the attainment of the following aim and objectives makes a contribution to both these fields.

1.3   Aim and objectives

This research seeks to contribute to the design of engaging Out-of-Box Experiences of new technologies for older adults. Specifically, the aim of this thesis is to investigate the Out-of-Box Experience (OoBE) of interactive consumer products for older adults and to apply these findings to improve the User Experience of a product, through manipulating factors of the OoBE.

In order to achieve this, the research was guided by the following objectives:

1. To understand current practices and aspirations of the OoBE of interactive consumer products for older adults.

In particular, the researcher set out to determine (a) what characteristics of the OoBE engage older people in the use of interactive consumer products and (b) which ones typically present barriers to use.

2. To develop and implement a resource that can be used to inform the design of engaging OoBEs for older adults.

An integral part of the research aim was to produce a meaningful output that could be used to improve the design of the OoBE of interactive consumer products.

3. To explore how the Inclusive Design paradigm can expand through the integration of UX considerations.

The final objective was to review the implications of the research findings for future developments in Inclusive Design.

1.3.1.1 *Research stages*

The Inclusive Design waterfall model (Clarkson et al., 2007) provides a useful and compelling tool to visualise the steps required to successfully respond to real user needs. Specifically, the recommended steps are:

Discover - systematically explore the perceived need to ensure the right design challenge is addressed, with due consideration of all stakeholders; this step generates an understanding of the real need;

Translate - convert this understanding into a categorised, complete and well defined description of the design intent; this step generates a requirements specification;

Create - produce preliminary concepts that are evaluated against the requirements; this step generates concepts;

Develop - design of the final product or service in detail, ready to be manufactured or implemented; this step generates solutions.
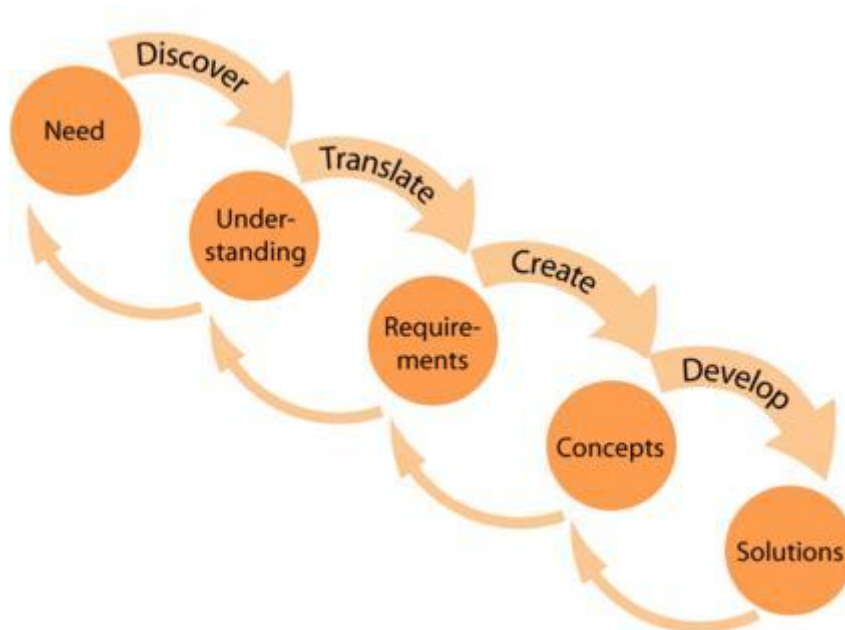
Figure 1.4 The Inclusive Design waterfall model (Clarkson et al., 2007)

Using this model as a guideline, the following steps were outlined to achieve the research objectives:

Discover

- Understand current theoretical thinking about Out-of-Box Experience design in order to achieve a working definition for this research

  ✓ Literature review (Chapter 2)

- Review existing methods and tools used by designers and researchers to study user experience (UX), in order to develop a suitable methodological approach to investigate the OoBE

  ✓ Literature review (Chapter 2)
  ✓ Methodology (Chapter 3)

- Understand the characteristics of the older population as a heterogeneous and complex group, and their motivations for using interactive consumer products

  ✓ Literature review (Chapter 2)
  ✓ Study 1 (Chapter 4)
  ✓ Study 2 (Chapter 5)

- Determine what characteristics of the OoBE engage older people in the use of interactive consumer products and which ones typically present barriers to use

    ✓ Literature review (Chapter 2)
    ✓ Study 1 (Chapter 4)

Translate

- Use empirical data from the user research studies to produce a resource that can be used by designers when designing for the OoBE of interactive consumer products

    ✓ Personas (Chapter 6)

Create

- Implement workshops to evaluate the aforementioned resource as a tool to inform the design of engaging OoBEs for older adults

    ✓ Study 3 (Chapter 7)

1.4 Structure of the thesis

The thesis comprises a further eight chapters, whose contents are summarised below.

Chapter 2reviews the literature that shaped this research and is divided broadly into two parts. The first section introduces the topic of older people and technology from an Inclusive Design perspective, with particular emphasis on their motivation and barriers to the use of new technologies. The second section describes the theory and current practices in the field of User Experience, and how these pertain to the Out-of-Box Experience. The chapter concludes with a discussion of the significance of the Out-of-Box Experience of new technologies for older people. Key contributions include:

- Articulation of existing knowledge on older adults to establish the diversity of the population;
- Conceptual framework of the OoBE.

Chapter 3 outlines the methodology used to pursue the aim and objectives laid out in Chapter 1. By underpinning the key methodological challenges of conducting a user-centred investigation of User Experience related to the OoBE,

the research purpose, type and strategy were determined and justified. The chapter also provides an overview of the methods and analysis techniques adopted. Lastly, the chapter discusses the quality of the research and what measures were taken to establish the validity and reliability of the data collected. Key contributions include:

- Critical review of relevant methodology to investigate User Experience.

Chapter 4 reports the method and results of the first study, undertaken to investigate older people's attitudes and initial experiences with new technology. It describes how the Technology Biography method was adapted to suit the aim of the study and discusses its suitability as a user experience research method for older adults. The results reveal barriers and motivations that participants experienced regarding new technologies, as well as providing rich information about the social context of their Out-of-Box Experiences. Key contributions include:

- Insights into older adults' motivation and current behaviours regarding the OoBE of interactive consumer products.
- Development of the construct of social benefits as a way to engage older adults in product interaction.

Chapter 5 details a cultural probe study conducted to further investigate the social context of older people's daily activities, particularly concerning its effects on feelings of dependence and independence. The data collection tools employed in the study are described and critically reviewed in light of the objectives of this thesis. The findings of this study are discussed and the chapter concludes by providing a framework of dependence and independence for older adults. Key contributions include:

- Development of the construct of social benefits as a way to engage older adults in product interaction.
- Development and application of creative tools to investigate dependence and independence.
- Model of dependence-independence for older adults.

Chapter 6 introduces, develops and discusses the use of personas as a design tool. The chapter demonstrates how data from the previous two studies (described in chapters 4 and 5) were used to inform the creation of four personas. The primary differentiating criteria of these data-driven personas are their experience of social benefits from the Out-of-Box Experience and their desire to learn through these social interactions. Key contributions include:

- Translation of user requirements into an educational resource for empathy and design inspiration.

Chapter 7 describes a design study that evaluated the personas as tools for inspiration, empathy and engagement. Workshops were conducted with design students to create engaging Out-of-Box Experiences for a subset of the personas. The design outputs were reviewed, with a view to determine the feasibility and suitability of the OoBE concepts. This chapter concludes with a discussion of the meaningfulness of the construct of social benefits for improving the design of OoBE of new technologies for older adults. Key contributions include:

- Development of the construct of social benefits as a way to engage older adults in product interaction.
- Development of OoBE framework through the integration of strategies that facilitate social interaction.
- Preliminary identification of strategies that facilitate social interaction during the OoBE of an interactive consumer product.

Chapter 8 critically reviews five key topics that emerged throughout this research. Specifically, it discusses the heterogeneity of the older population and the design opportunities this represents. It then discusses how the OoBE can be enhanced through the involvement of other people, with a particular focus on maintaining a sense of independence during this co-experience. The chapter also provides a discussion of how Inclusive Design needs to evolve through the incorporation of the construct of social benefits. The chapter concludes with a reflection on the methodological challenges and lessons learned during this research. Key contributions include:

- Discussion of how to extend the Inclusive Design paradigm by embracing the construct of social benefits.

Chapter 9 brings together the overall findings of this thesis, linking them to the general aim and objectives stated in Chapter 1. This final chapter summarises the contributions of this research, discusses its limitations and identifies areas for future work.

2 Literature review

This chapter explores relevant literature, divided into the two broad areas that concern the Out-of-Box Experience of interactive consumer products for older people. The first section contextualises the need for Inclusive Design thinking, with a particular focus on the challenges of an ageing population. This section specifically reviews research into older adults and technology. The second section describes the different perspectives on User Experience and its significance for design. This section also reviews current thinking on the Out-of-Box Experience, with a view to establishing its importance for the success of a product or service. The chapter concludes with a discussion on the need to investigate the Out-of-Box Experience of new technology for older adults.

2.1   Inclusive Design

2.1.1   Philosophy

In 1970, Viktor Papanek (2004) criticised design for satisfying only frivolous desires with temporary solutions, instead of responding to genuine human needs. More than thirty years later, Coleman (2003) explains how developments in human rights, consumer demands and an overall better understanding of human diversity led to a shift in focus when designing products, services and environments. The new-found awareness acknowledged the fact that it was no longer sustainable to design for demographic stereotypes: modern society had become a mosaic of generations, cultures and abilities, many of whose individuals were being excluded by inadequate design. This shared vision of creating a more equitable world through design produced a number of different schools of thought, the most notable of which Universal Design, are Design for All and Inclusive Design. These terms are sometimes used interchangeably, though purists may argue about the subtle differences that set them apart.

Universal Design emerged in the USA, largely influenced by the concept of barrier-free architecture. In its original form, the term was described by architect Ronald Mace (1988, p. 3) as 'an approach to design that incorporates products as well as building features which, to the greatest extent possible, can be used by everyone'. Boosted by several legal resolutions and with other disciplines entering the dialogue, the field grew in scope and ambition. By the late 1990s, a multidisciplinary group at the Center for Universal Design (1997) developed and published seven Principles of Universal Design.

Table 2.1 Seven Principles of Universal Design

Principle	Guideline
1. Equitable use	• Provide the same means of use for all users. • Avoid segregating or stigmatising any users. • Provide equal availability of privacy, security, and safety. • Make the design appealing to all users.
2. Flexibility in use	• Provide choice in methods of use. • Accommodate right- or left-handed access and use. • Facilitate the user's accuracy and precision. • Provide adaptability to the user's pace.
3. Simple and intuitive	• Eliminate unnecessary complexity. • Be consistent with user expectations and intuition. • Accommodate a wide range of literacy and language skills. • Arrange information consistent with its importance. • Provide effective prompting and feedback.
4. Perceptible information	• Use different modes to present essential information. • Provide adequate contrast and maximise legibility of information. • Differentiate elements in ways that can be described. • Provide compatibility with devices for sensory limitations.
5. Tolerance for error	• Arrange elements to minimize hazards and errors. • Provide warnings of hazards and errors. • Provide fail safe features. • Discourage unconscious action in tasks that require vigilance.
6. Low physical effort	• Allow user to maintain a neutral body position. • Use reasonable operating forces. • Minimise repetitive actions. • Minimise sustained physical effort.
7. Size and space for approach and use	• Provide a clear line of sight to important elements for any seated or standing user. • Make reach comfortable for any seated or standing user. • Accommodate variations in hand and grip size. • Provide adequate space for the use of assistive devices or personal assistance.

The concept of Design for All, popular in mainland Europe and Scandinavia, had its origin in barrier-free accessibility for people with disabilities. It champions design for human diversity and aims to create equal opportunities for all people to participate in every aspect of society (European Institute for Design and Disability, 2004). There are numerous organisations and initiatives that promote the Design for All cause, including the European Institute for Design and Disability (EIDD)[7] and European Design for All e-Accessibility Network (EDeAN)[8].

Along these lines, the concept of Inclusive Design evolved primarily in the UK and is today the focus of a considerable amount of literature (e.g. Clarkson et al., 2003; Nicolle and Abascal, 2001). Inclusive Design is defined by the British Standards Institute (2005) as:

> *The design of mainstream products and/or services that are accessible to, and usable by, as many people as reasonably possible on a global basis, in a wide variety of situations and to the greatest extent possible without the need for special adaptation or specialised design.*

Proponents of Inclusive Design describe it as a framework to influence business stakeholders and designers to adopt appropriate strategies and obtain the relevant knowledge to implement those strategies (Clarkson et al., 2003). Those seeking to further their understanding of this approach can find a wealth of resources online, such as the website of the Royal National Institute of Blind People[9] on digital accessibility, the Inclusive Design Toolkit[10] and Designing With People[11], both of which are outputs from the i~design project. A key concept within Inclusive Design is design exclusion, which should be investigated to pinpoint the limitations of everyday products and services (Keates and Clarkson, 2003). Overcoming design exclusion is a core goal of Inclusive Design, which neither attempts to design a single product that is usable by the entire population, nor limits its user pool to people with disabilities. In taking this approach, it seeks to promote the design of products

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[7] www.designforalleurope.org/
[8] www.education.edean.org/
[9] www.tiresias.org/
[10] www.inclusivedesigntoolkit.com/
[11] www.designingwithpeople.org/

that are usable and viable, functional and desirable. In addition to the strong social, ethical and business grounds for designing for human diversity, Inclusive Design has the potential to inspire designers to become more innovative by highlighting real problems and markets yet to be explored (Trigueiros and Burrows, 2007; Choi, 2009).

While the three related fields of Universal Design, Design for All and Inclusive Design started off separately, they have evolved towards a shared goal of creating products and services that respond to the wants and needs of the widest possible audience. Debating the terminology detracts from the important mission at hand. In fact, a recent paper by Donahue and Gheerawo (2009) discusses how Inclusive Design must become embedded in design practice, losing all labels and being acknowledged simply as 'thoughtful design'. The debate must shift to how Inclusive Design should evolve in order to address the ever-changing realities of today. This viewpoint is shared by Stephen Wilcox (2009). In a paper which compares the reality of ageing of the Bangwa people in Cameroon with ageing in the developed world, he challenges some assumptions propagated by Inclusive Design literature. Although Wilcox accepts the importance of understanding the age-related decline in abilities, he argues that there is still much work to be done in the field of Inclusive Design. For instance, he questions society's tendency to accommodate changes that occur with age rather than embracing the benefits of challenging them; he argues for productivity in later life rather than marginalisation. In order to achieve this, researchers and designers need to be sensitive to societal developments and re-focus their attention accordingly.

2.1.2 The demographic imperative

Most writings about designing for older adults bombard the reader with facts and figures on the world's population, and this thesis is no exception. The 20th century saw significant changes in the structure of western society, with the average human lifespan rising from 47 to 76 years (Story et al., 1998). Healthier living, better medicine, vaccines, sanitation, and the resulting eradication of many lethal infectious diseases are credited as the main contributors to an overall increased life expectancy, where 80% of the population can expect to live past the age of 65.

Roe (2001), quoting figures from Eurostat, claims that Europe had over 80 million people aged 60 or over and that this number would rise to 100 million by the year 2020. Coleman (2003) says that in this same year half the adult population of England will be over 50 years old, whereas 20% of all American citizens and 25% of Japanese will be over 65 years old. These demographic trends are the driving force behind changes in product and service development, as well as social welfare on a broader scale.

2.1.2.1 The meaning of 'old'

In a review of the literature, Mellors (n. d.) found that there is no fixed age for a person to become old and different societies use different criteria. For example, some groups in Kenya consider men to be old when they no longer wake up with the smell of food and women are old when they begin to drop the cooking pots. This view appears to equate age with disability. In other cases it is the birth of the first grandchild that marks this transition. In western societies the definition of third age is somewhat arbitrary and is mostly fixed at between 60 and 65, as a result of work and pensions legislation. This lack of consensus as to what constitutes an 'older adult' means that the issues discussed may pertain to adults within different age groups, above the age of 45. A compelling discussion of the definition of 'old' is given by Gorman (1999):

> The ageing process is of course a biological reality which has its own dynamic, largely beyond human control. However, it is also subject to the constructions by which each society makes sense of old age. In the developed world, chronological time plays a paramount role. The age of 60 or 65, roughly equivalent to retirement ages in most developed countries, is said to be the beginning of old age. In many parts of the developing world, chronological time has little or no importance in the meaning of old age. Other socially constructed meanings of age are more significant such as the roles assigned to older people; in some cases it is the loss of roles accompanying physical decline which is significant in defining old age. Thus, in contrast to the chronological milestones which mark life stages in the developed world,

old age in many developing countries is seen to begin at the
point when active contribution is no longer possible.

In Britain, the 1875 Friendly Societies Act holds the definition of old age as 'any age after 50', but traditionally the ages of 60 or 65 are used in accordance with eligibility for pension schemes (Roebuck, 1979). A widely adopted categorisation, attributed to Neugarten (1974), segments this age group into young-old, old and oldest-old to factor in significant life stages such as retirement. But ultimately ageing is an individual process and definitions vary almost on case-by-case basis.
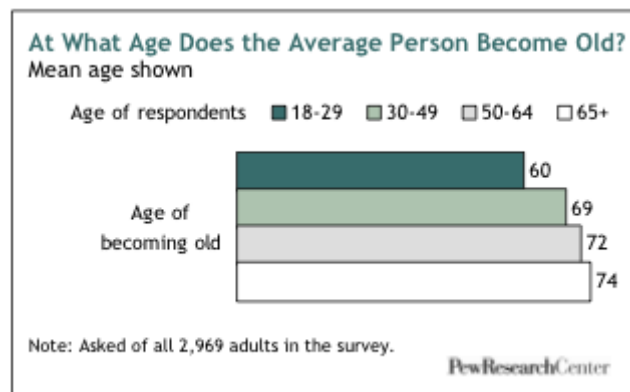
Figure 2.1 Survey results about when old age begins (Pew Research Report, 2009)

Figure 2.1 is taken from a Pew Research Center (2009) report about ageing in America. On average the survey respondents felt old age begins at 68, but this figure reveals that people push forward the boundaries of 'old' as they approach the age established by younger generations. It seems that old age remains elusively around the corner. As explained in section 1.2 (page 6), older adults in this thesis are defined as being over 50 years old. The following sections further qualify this decision.

2.1.2.2 The needs of an ageing population

As people age they suffer physical, mental and health related decline, which means their abilities change. Even though people are living longer and healthier lives, many of them will eventually be affected by physical and/or mental impairments, which may cause difficulties using some products and services (Clarkson, 2008). Though capability loss can occur at any age, people over the age of 75 are 10 times more likely to have one or more losses in capability than those aged 16-49 (Keates and Clarkson, 2003). Typically, these losses are

physical, when there is a decline in strength, flexibility, balance and endurance; sensory, when there is a decline in vision, hearing, taste, smell and touch; cognitive, when there is a decline in the mental capabilities which enable people to understand and process information received by the senses. Gregor et al. (2002) roughly group older people into three categories, based on their abilities:

- fit older people, who do not have severe disabilities but whose abilities, needs and wants differ from those they had when they were younger;

- frail older people, who have one or more disabilities as well as a general decline in other abilities;

- disabled people who grow older, with the possibility of incurring further age-related decline in other faculties.

A focus group study undertaken to determine what problems older adults experienced in their everyday lives found that 47% of problems were due to general concerns, such as financial limitations or health concerns (Fisk et al., 2004). Of the remaining problems reported, around 25% had the possibility of being solved through better design. The remaining 28% of problems could be solved by providing adequate training or by a combination of training and redesign.

Huppert (2003) explains that even though abilities decline with age, disabilities can become more evident when a person is faced with a new, demanding or complex situation. Knowledge acquired over long periods of time – such as vocabulary, information pertaining to jobs, hobbies or other interests – remains relatively stable, whereas the ability to perform tasks that require understanding and analysis of new information tends to decline quite suddenly. However, Huppert adds that it is a mistake to accept society's negative stereotypes of ageing and to think of our elders as people who are frail or severely disabled. On the contrary, today the majority of older adults are healthier and more robust than ever, and they make up a large group of people with slight disabilities who are keen to maintain their independence and contribute to the community. Scales and Scase (2000) reported that people in their 50s have similar lifestyles and leisure patterns to those in their 30s and 40s.

Figure 2.2[12] shows that living arrangements of people over the age of 60 vary widely, but more and more people are living alone (Vos et al., 2008). There is a general trend towards ageing in place, which means people continue to live in their own homes and communities as they grow older. However, this statement has different implications for developed and developing regions. In developed countries, one in four older persons lives on their own, which can lead to isolation and the need for additional support.
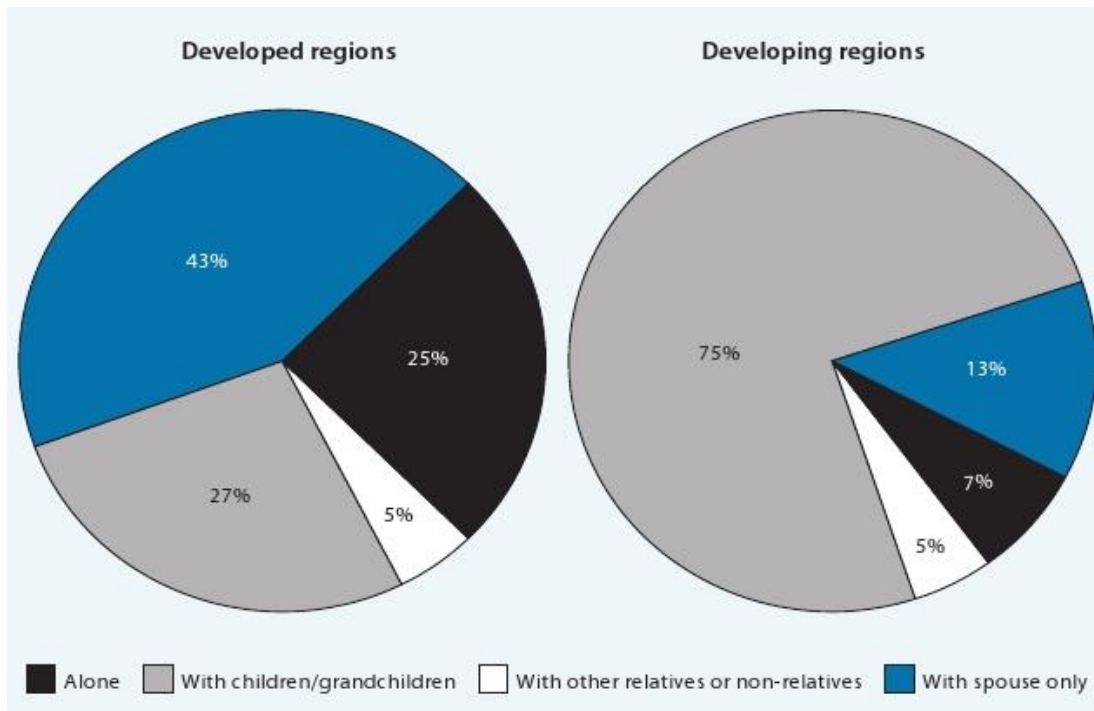
Figure 2.2 Living arrangements of older people across the world (Vos et al., 2008)

In spite of the disparities among older adults' incomes, their average incomes are higher both absolutely and when compared to other age groups (Coleman, 2002). As the older population continues to grow, there is a social duty and equally a business case to promote inclusivity through design, so that people may enjoy active and independent lives for as long as possible.

2.1.3   Older adults and technology

Huppert (2003) claims 'older users are us', either because we are or because eventually we will be over 50 years old. This means that a growing number of older adults will rely on technology and they will have increasingly higher expectations of its benefits in their daily lives. With technology playing an

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[12] Original source: United Nations Department of Economic and Social Affairs/Population Division. *Living arrangements of older persons around the world*.

increasingly important role in work, education, communication, entertainment and even healthcare, those with less experience of using technology run the risk of becoming disadvantaged and marginalised (Hiltz and Czaja, 2006). Among the challenges put forward by Donahue and Gheerawo (2009) are the digital barriers that are emerging as a result of the growing pervasiveness of technology, and the unexplored benefits of new technologies as social and business catalysts. They advocate moving beyond designing for anonymous 'users' and emphasise that it is important for designers to engage with people, their context, lifestyle and desires.

This rich area for research has not gone unnoticed by researchers and designers across the world. In the UK, for example, the UTOPIA project[13] focused specifically on the design and development of usable and desirable technologies for older people; similarly, the Sus-IT[14] project seeks to enable older people to use information technologies to support wellbeing and independent living. In America, these values are promoted by the CREATE[15] consortium through a number of research projects that focus on the home, health and work. Improving technology use by older adults has been approached from different angles and, consequently, there are various points of view across the literature. For the most part, research has focused on understanding the barriers experienced by older people regarding technology adoption and use.

2.1.3.1 *Moving beyond an abilities-centric view*
It is sometimes stated that older people have difficulty using interactive devices and perform less well during these interactions due to the physical, sensory and cognitive decline that occurs with ageing (e.g. Kang and Yoon, 2008). Yet, in a survey on older adults' use of computers, Goodman et al. (2003) found that most people who reported problems using a computer attributed them to complexity and jargon rather than physical difficulties. This view is supported by Czaja et al. (2006) who mention increased complexity of systems and technical manuals, and new procedures as constraints on the adoption of new technology. This suggests that, even though physical difficulties do exist, older

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[13] www.computing.dundee.ac.uk/projects/UTOPIA/
[14] http://sus-it.lboro.ac.uk/
[15] www.create-center.org/

adults do not perceive them as significant barriers to interaction with technology.

A multi-generational study conducted by Czaja et al. (2006) showed that older adults are less likely than their younger counterparts to use technology in general, computers and the internet. Their findings indicate that technology adoption is determined by a combination of *socio-demographic factors*, *attitudinal variables*, and *cognitive abilities*. In terms of attitudinal variables, self-efficacy and computer anxiety were identified as important predictors of general use of technology. Older adults were more likely to have higher computer anxiety and were, therefore, less likely to engage with computers or the internet. Furthermore, older adults tended to have lower self-efficacy when it came to using computers and this was linked to lower motivation to engage in tasks. The implication is that people who have a positive attitude towards technology are more likely to be interested in using it.

In a study of 240 healthy adults, Slegers et al. (2004) measured the problem solving ability of people aged 65 to 75, who had no prior computer experience, in terms of everyday technological devices such as cash machines. They determined that there is a relationship between cognitive skills and the use of technology in everyday life, which could be predicted by level of education and general cognitive speed.

Regarding socio-demographic factors, Peacock and Kunemund (2007) observed that employment and occupational status appeared to play a positive role in the likelihood of older adults using the internet. Interestingly, these authors noted that financial concerns were a less important reason for not using technology at a later age, a finding supported by Ofcom (2006). Moreover, despite the fact that women were less likely than men to access the Internet, the effect of gender roles was not as evident in older adults as in the younger age groups.

For other authors (e.g. Medeiros et al., 2008) older adults' resistance to technology may be explained by differing needs and expectations, since the extent to which these needs and expectations are met directly influences the affective response to a product and determines its acceptance and use. However, this theory fails to address the needs and expectations that are shared across the age range. Figure 2.3 shows data on the online activities of younger adults,

aged 19 to 39; middle-aged adults, aged 40 to 59; and older adults, over 60 years old (Czaja et al., 2006). It shows that there is some common ground between the online activities of older adults and those of younger generations, the most obvious of which is communication.
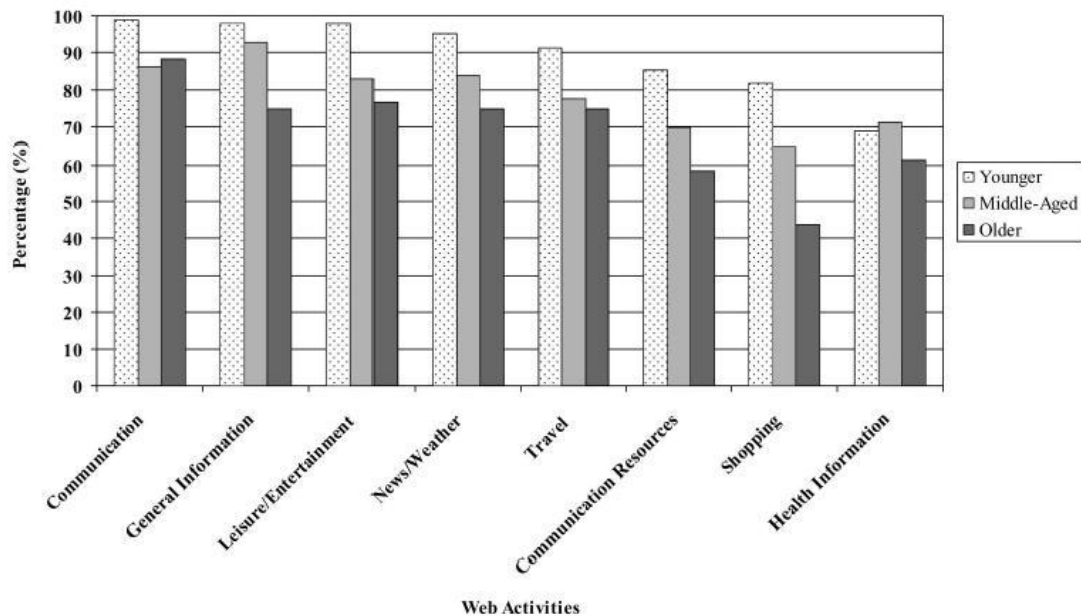
Figure 2.3 Web activities by age group (Czaja et al., 2006)

Monk (2004) suggests that investigating the similarities between older adults and younger generations will point to universal requirements for home technologies, such as dependability, sociability and enjoyment. In fact, there is evidence to suggest that older adults welcome state-of-the-art interaction paradigms and appreciate how technology can improve their lives (Lundell, 2004). Specific examples of these desirable interaction paradigms include voice recognition and pervasive access to personal information (*ibid.*).

2.1.3.2 *Generational divide*

The digital divide is perceived by some as a generational divide. Weinschenk (2008) describes how people born between 1943 and 1960, commonly referred to as Baby Boomers, consider technology to be a tool and prefer straightforward and predictable designs as a result. In terms of the type of technology they use, Weinschenk suggests that Baby Boomers tend to stick to what they know and are not interested in experimenting with new devices, or services for entertainment or social networking purposes. However this belief is, by the

authors own admission, a stereotype and would benefit from a more in-depth analysis of this user group's attitudes and expectations of technology.

Two experiments carried out by Docampo Rama et al. (2001) compared the performance of four age groups when using multi-layered hierarchical user interfaces, in which only part of the functions were visible to the user at any given time. These researchers identified three interaction styles of consumer products in the 20th century:

- a *mechanical style* up to the 1940s, which includes push buttons, switches and rotary dials;

- an *electro-mechanical style* up until the beginning of the 1980s;

- a *software style* from then on, which describes displays, touch buttons and wireless remote controls.

Basic functionality was present and visible to the user in a mechanical interaction style, but the software style has a number of invisible options and feedback is usually restricted. For mode error performance, people who had experienced software style interfaces before the age of 25 performed better than older adults who did not have this experience. They concluded that a generation-related lack of earlier experience with certain technologies contributes to difficulties using current electronic devices.

More recent research that examined data on internet use from the English Longitudinal Study of Ageing expands on this theory of a digital divide to include generational differences in exposure to domestic information and communication technologies (Gilleard and Higgs, 2008). This theory accounts for the recent rise in what some people have termed 'silver surfers' in the US and Western Europe, underpinning the importance of the post-Second World War mass consumer society and overall attitude towards participating in consumer culture. The implication is that, in the future, older adults will be more willing to use and take up new interactive consumer products.

Building on these ideas, Lim (2010) developed and evaluated the Generation Timeline Tool (GTT). The GTT comprises a visual compilation of everyday interactive consumer products organised along a timeline of generation profiles, to illustrate likely experience of the different interaction styles. This tool was

shown to have substantial benefits in terms of raising designers' and engineers' awareness of the generational-related effect when designing ICT products, while simultaneously engaging creative thinking.

2.1.3.3 *Looking past the barriers*

Since a considerable amount of literature focuses on older adults' difficulties with using interactive devices, people tend to be under the impression that people over a certain age are opposed to technology. However, the reasons given by older adults for not taking up technology are varied and complex, often reflecting individual attitudes (Ofcom, 2006).

Despite the negative stereotyping of older adults in the past, there has been a growing interest in recognising the older population as a heterogeneous group (Lahteenmaki and Kaikkonen, 2004). As with other age groups, there is variability in level of education and literacy, but also in psychosocial factors like self-efficacy and wellbeing (Syme and Eisma, 2004). Age is even likely to increase differentiation due to changes in abilities and the effect of life experience (Fisk et al., 2004).

The unique characteristics of this age group can be deceptive, leading people to believe that being old means being disabled. This may have the perverse double effect of putting designers off the challenge of designing for older adults, as well as convincing older people that they are unable to learn how to interact with new devices (Aula, 2004). In reality, there is evidence to suggest that older adults want to be able to use software and hardware in order to feel included in society (Wales, 2004).

Motivational factors are a key factor in older adults' adoption of new technology. Melenhorst (2002) demonstrated that older individuals are willing to invest in using new technology, provided the expected outcomes are perceived as being obviously beneficial. This research dismisses evidence that reducing costs – such as the investment of time and effort – encourages older adults to use new technology. Even though older individuals may see costs as barriers to their use of technology, it is more likely that an absence of benefits is the key disqualifier. Figure 2.4, taken from a survey of 1,335 people undertaken by Philips (2004), illustrates that interactive consumer products are not always relevant to older people's lifestyles. A common belief is that companies introduce products that

they think will sell, often guided by perceived rather than actual consumer needs. In the over 66 age group, none of the participants felt that technology companies researched and truly understood their needs.
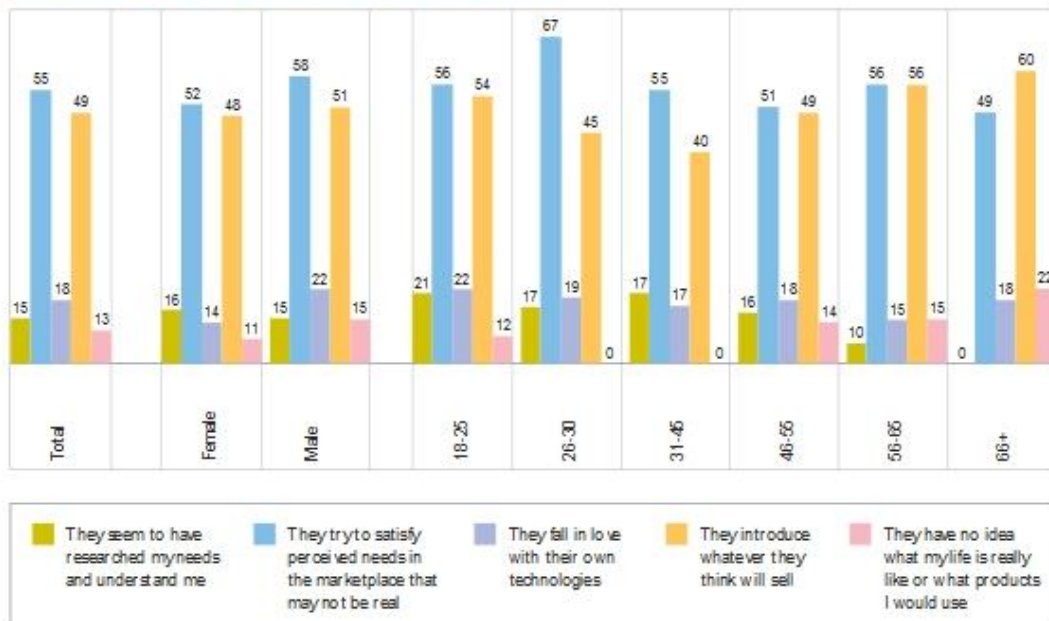
Figure 2.4 Relevance of technology to real life needs (Philips, 2004)

Melenhorst (2002) identifies three main requirements for the adoption of new technology by older adults:

- the potential *benefits of a new medium should be relevant* from the perspective of older users, with respect to their specific communicative aspirations;

- these relevant *benefits should be obvious and unambiguous*, which also prevents them from being perceived as 'lacking';

- the potential *costs involved in using a new medium should be transparent* to the older user, particularly when the user is inexperienced, in order to reduce uncertainty about the attainment of the benefit.

Research into the pattern of use of communication technologies between grandparents and grandchildren found that most grandparents used a variety of forms of contact, irrespective of the age of the grandparent (Quadrello et al., 2005). The study indicates that choice of communication technologies was directly influenced by distance and gratification that each means of contact

provides the grandparents. The authors go on to suggest that strong grandparent-grandchild relationships encourage the adoption of information and communication technologies when other forms of contact are unavailable, supporting the view that perceived benefits play a decisive role in the use of technology by older adults (Melenhorst et al., 2006). Lindley et al. (2009) offer further insights into the values held by older people regarding the use of communication technologies. These researchers found that older adults appreciate a level of personalisation and intimacy that cannot be supported solely through lightweight communication such as social media. Older people are therefore more motivated to spend their time on the relationships they find emotionally meaningful, rather than on acquiring knowledge to build new networks.

Lee (2007) conducted quantitative and qualitative studies to investigate older adults' experience of their mobile phones. One of the outcomes of this research was the separation of older adult mobile phone users into two groups: the *younger explorers* (mean age: 68.22), who are motivated to adopt innovative technology and use various personal interactive devices; and the *older minimalists* (mean age: 74.84), who are set in their ways and may use a computer or the Internet but not on a daily basis. Explorers learn how to use their mobile phones by interacting with the device and enjoy using many features, while minimalists lack basic knowledge about mobile phone use and consider the instruction manuals too difficult for them to use. These findings further support a generational link to positive relationships with new technology.

However, for Gothoni (1990, cited in Lahteenmaki and Kaikkonen, 2004) people over the age of 75 into 5 groups should be divided according to their lifestyles: *family oriented*; *work oriented*; *hobby club oriented*; *quiet life living*; and *illness-centred lifestyle*.

The studies reviewed thus far have practical and compelling implications for design. Nevertheless, there is still a need to represent the wealth of older adults' experiences in a meaningful and engaging medium for designers. There is a gap for future research to focus on creating additional resources that will inspire

designers to view older adults as a heterogeneous group and enable them to better meet their needs.

2.2 User Experience

2.2.1 The ongoing quest for a definition

The term 'User Experience' (UX) only recently entered the design vernacular, even though design has always endeavoured to attend to experience. Its origin can be traced to a growing disenchantment with usability, which originally described the functional aspects of interaction like learnability, ease of use and efficiency, though the concept has evolved to include satisfaction (Carroll and Mentis, 2008). The International Standards Organisation (ISO DIS 9241-11 1998) defines usability as:

> *The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.*

In other words, the central concern of usability is the characteristics and functionalities of a product. Usability thus fails to take a holistic view of product or service interactions, which are conditioned by the physical, sensual, emotional and aesthetic factors (Forlizzi and Battarbee, 2004). A high quality of user experience is one of the core goals for product developers (Preece et al., 2002). UX is a decisive factor in product success (Pine and Gilmour, 1999), which explains the growing body of research into capturing and designing for UX in recent years.

The all-encompassing and dynamic nature of the term 'experience' perhaps explains the lack of consensus in the field as to what is User Experience. Some attempts have been made to generate a UX manifesto, in the form of a workshop to clarify the principles, policy and plans of this broad field, with the purpose of becoming a reference model for future work (Law et al., 2007). No consensus was achieved, but this workshop did yield an analysis framework for the study of UX. It grouped related studies according to five aspects (Blythe et al., 2007): *theory* (reductive versus holistic); *purpose* (evaluation versus development); *method* (qualitative versus quantitative); *domain* (work-based versus leisure-based); *application* (personal versus social). There are several

different frameworks within each of these parameters, some of which are outdated and others are still being refined.

Hassenzahl and Tractinsky (2006) provide a useful model that distinguishes between three facets UX in the literature, as illustrated in Figure 2.5. One facet of UX addresses human needs beyond the instrumental; another focuses on affective and emotional aspects of interaction; and another deals with the nature of experience, specifically its situatedness and temporality. Mahlke (2005) adds that research into non-instrumental aspects of interaction can be further divided into aesthetics, hedonics and pleasure or fun.
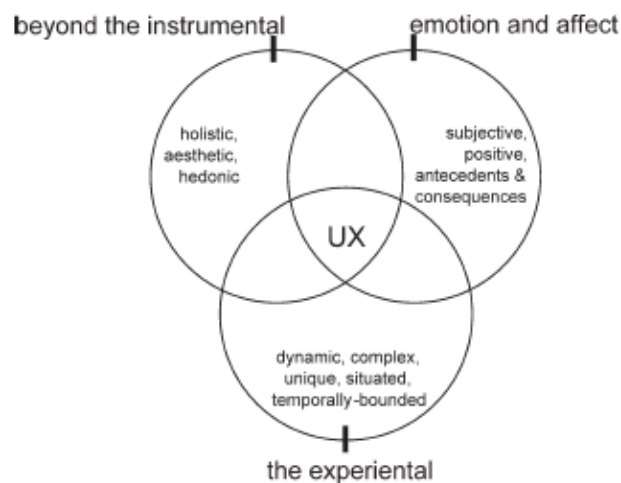
Figure 2.5 Facets of UX (Hassenzahl and Tractinsky, 2006)

2.2.1.1 Beyond instrumental

This approach to UX looks into ways of understanding people and the relationships they forge with products. This type of research envisions people's needs as the axis around which products should be developed.

In 1994, a model for assessing qualities of UX was created for the first ACM/ Interactions Design Award (Alben, 1996). This model proposed that the quality of experience depends on criteria that are directly linked to the interaction between the user and the product, and criteria that are related to design methodology. These included understanding the user, effective design, meeting needs, and creating products that are learnable and usable, appropriate, aesthetically pleasing, mutable and manageable. An obvious limitation of this model is that the criteria are too general to be applied to practical design settings.

From this person-centred perspective, the goals of a successful product are to engage users on behavioural, visceral and reflective levels (Norman, 2004). Jordan (2000) equates the behavioural level with functionality and usability, while the visceral level is linked to pleasure, and the reflective level to pride. The reflective level further includes properties that are specific to human thinking or emotions, such as moral and empathy (Norman, 2004). Looking beyond the instrumental is a good first step towards UX design, but designers may fail to understand how to implement these goals in design solutions.

2.2.1.2 Emotion and affect

Conversely, advocates of the emotion and affect aspects of UX focus on the qualities of the product and how they influence people's experiences and perceptions of them. The premise is that even conventional products have the potential to elicit different emotions (Desmet et al., 2001). This perspective of UX builds on usability theory, by suggesting that it is by manipulating characteristics of the product that designers can determine how a user perceives it. Figure 2.6, attributed to Hassenzahl (2003)[16], depicts how product features – such as content, presentation, functionality and interaction – shape the product's character. The pragmatic and hedonic attributes of the product in turn produce appeal, pleasure and satisfaction for the user.

This perspective of UX has a particular design appeal, because it attempts to tie down the relevant physical product features and, to some extent, provides a UX roadmap for designers. However, even Hassenzahl's model acknowledges the limitations of this approach by including 'situation' in the user's perspective.

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[16] Source: http://uxdesign.smashingmagazine.com/2011/03/15/why-user-experience-cannot-be-designed/
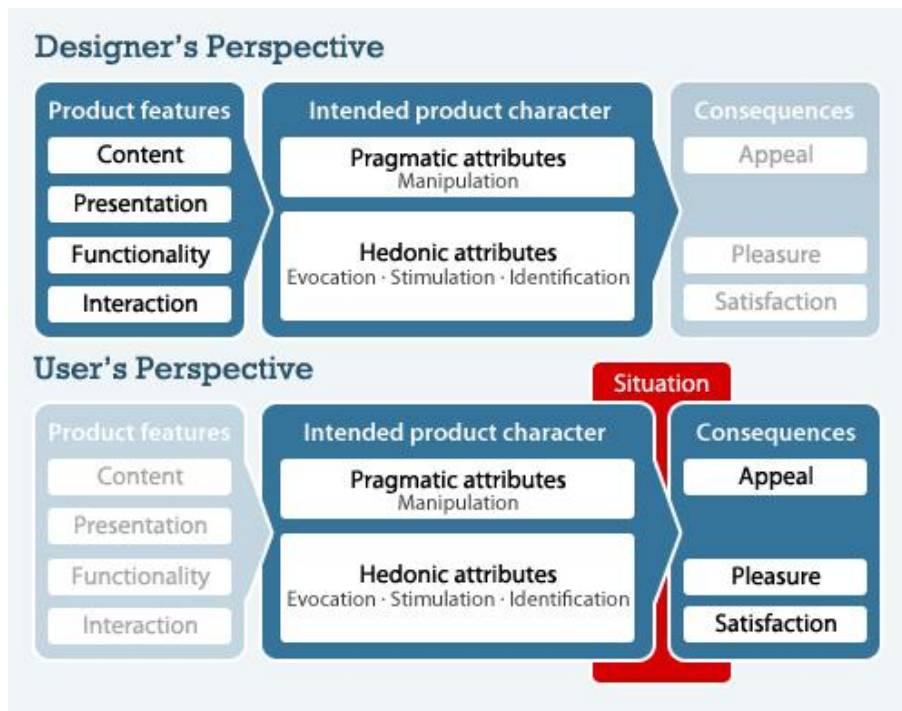
Figure 2.6 UX model (Hassenzahl, 2003)

The intangible nature of UX stems from the fact that experiences do not occur in a vacuum and people actively complete the experience for themselves (McCarthy and Wright, 2004). Ironically, this means designers cannot guarantee a particular experience, but a rich and sensitive understanding of the target users and the intended UX enables designers to influence the user experience through design (Sleeswijk Visser, 2009).

2.2.1.3   The experiential

Recent years have seen the broad field of Human-Computer Interaction (HCI) undergo a shift towards accepting embodiment, situated meaning, values and social issues, a phenomenon known as the third paradigm of HCI (Harrison et al., 2007).

Forlizzi and Ford (2000) state that user-product interactions are interpreted within the context of use in which they occur, emphasising that experience has a social, cultural and organisational meaning. People influence experience through their emotions, values and prior experience. Then again, the functional and expressive qualities of products, such as form language, features, aesthetics and accessibility, also influence the user experience. This model by Forlizzi and Ford is depicted in Figure 2.7.
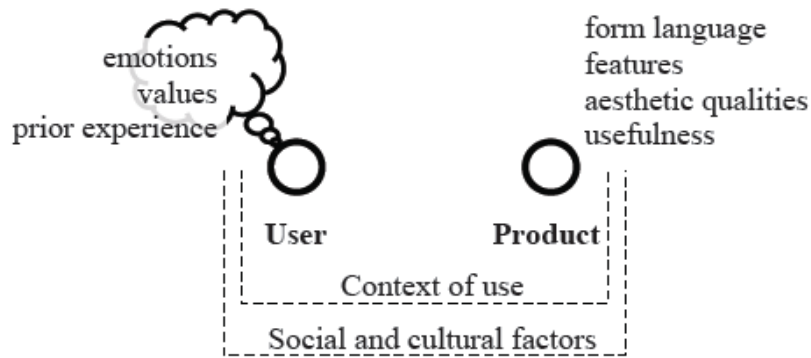
Figure 2.7 Experience in context (Forlizzi and Ford, 2000)

Adding to this point of view, Kankainen (2002) describes how UX is the product of a motivated action in context (Figure 2.8). Prior experiences and expectations affect the present experience, which in turn generates more experiences and adjusted expectations. This view highlights the importance of a person's changing expectations, supporting claims that people's experiences are retained in memory and directly influence expectations of the present product and similar products in the future (Westerink et al., 2008).
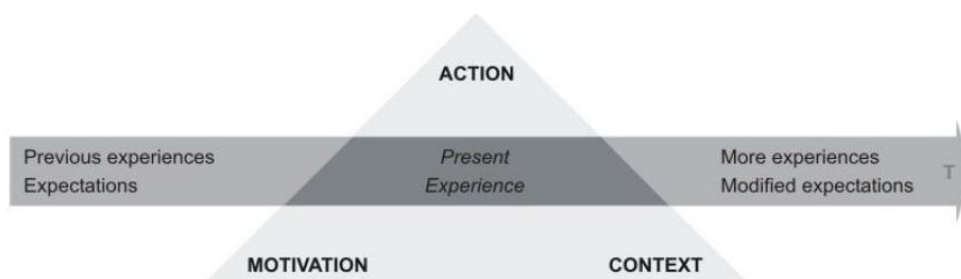
Figure 2.8 A situated model of UX (Kankainen, 2002)

The research described in this thesis follows the experiential perspective of UX, which sees product interaction as a subjective, situated, complex and dynamic encounter. Hassenzahl and Tractinsky (2006) sum up this stance by defining UX as a consequence of

- a user's internal state, including predispositions, expectations, needs, motivation, and mood;
- the characteristics of the designed system, such as the complexity, purpose, usability and functionality;

- the context or the environment within which the interaction occurs, for example and organisational/social setting, meaningfulness of the activity, voluntariness of use among others.

2.2.2 The Out-of-Box Experience

IBM's website (cited in McCarthy and Wright, 2004) proposed a comprehensive, transactional approach to user experience design:

> *User Experience Design fully encompasses traditional Human-Computer Interaction (HCI) design and extends it by addressing all aspects of a product or service as perceived by users. HCI design addresses the interaction between a human and a computer. In addition, User Experience Design addresses the user's initial awareness, discovery, ordering, fulfilment, installation, service, support, upgrades, and end-of-life activities.*

This definition clearly emphasises the importance of the peripheral experiences associated with the actual interaction between the person and the product or service. Many of these experiences lie within the scope of the Out-of-Box Experience (OoBE).

The Out-of-Box Experience is defined in the literature as the very early stages of a user's experience of a new product or service (e.g. Nathwani and Eason, 2005; Pirhonen, 2005). Preparing a ready meal and renting a new car were given as examples of an Out-of-Box Experience, but this term has come to be almost exclusively associated with technology. In the latter case, the OoBE typically involves purchase decision, packaging and unpacking, setup or installation, configuration, initial use and assistance (Intel Corporation et al., 2001). However, these steps need clarification if they are to be the focus of design research. 'Purchase decision' is an intangible and potentially misleading description, because it emphasises the psychological aspect of *deciding* to buy a product. It can be advantageously substituted with 'acquisition', a broader term that embraces the context surrounding this process. Setup, installation and configuration can be condensed into one step. The definition tentatively put forward by Ketola (2005) also includes product extension and product replacement as stages of the OoBE. However, these issues are not addressed as

such in this thesis, since they are viewed as OoBEs in their own right. For the purpose of this research, the OoBE comprises the actions of *acquisition*, *unpacking*, *setup*, *assistance* and *first use*. Furthermore, while it is acknowledged that the physical form of the device impacts upon the OoBE (e.g. influencing motivation to buy, expectations and feelings), it is considered beyond the scope of this thesis. Figure 2.9 illustrates the working definition of OoBE used within this thesis, as well as the physical elements that may be involved in each stage.

Acquisition	**Unpacking**	**Setup**	**Assistance**	**First use**
Shop	Packaging	Device	Instructions	Device
Internet		Accessories	Internet	
Gift		Instructions	Call centre	
		Software		
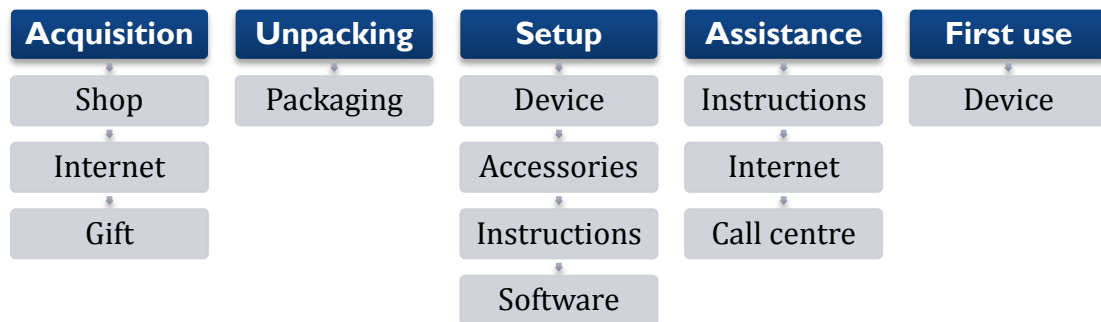
Figure 2.9 Stages and physical elements of the OoBE

Out-of-Box Readiness refers to a product or system having an easy first use for a novice user and is an OoBE goal of many company or manufacturer's (Ketola, 2005). Designing for the OoBE means contemplating two types of elements (Gilbert et al., 2005):

- *static elements* are components of the package that do not change over the life cycle of the product, such as physical form of the device, its accessories, and the user manual;

- *dynamic elements* are components that have the capacity to adapt to new user behaviour, such as software and user support.

The OoBE is a form of User Experience and, therefore, problems experienced during this phase can determine users' acceptance of a new product (McMurtrey, 2001; Gilbert et al., 2005; Serif and Ghinea, 2005) and negatively influence how they perceive the company (Fouts, 2000; Kowalski 2001). It is by definition a spontaneous and transitory phase, but one that is destined to be repeated as products become outdated or break, and need to be replaced (Figure 2.10). This means there is a strong business case for getting the OoBE right.
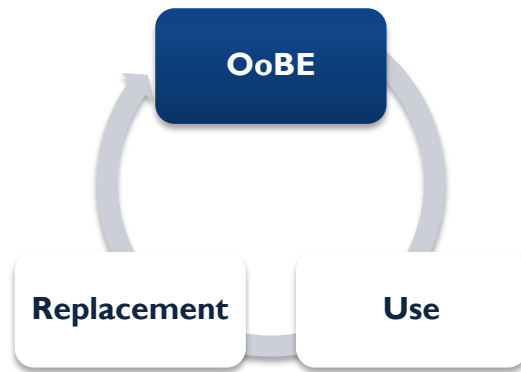
Figure 2.10 Cyclical occurrence of the OoBE

Currently, there are seven areas of research pertaining to the OoBE: user expectations (Nathwani and Eason, 2005); personal contexts and user segments (Gilbert et al., 2005); organisational contexts (Turner et al., 2005); learning (Pirhonen, 2005); design (Holtzblatt, 2005); evaluation of the OoBE (Serif and Ghinea, 2005); and user experience (Vastamaki et al., 2005). Nevertheless, these do not focus specifically on older adults and there appears to be a gap in research into older adults' current practices of the OoBE.

In 2009, Clara Gaggero and Adrian Westaway designed an OoBE of a mobile phone for Samsung[17]. The premise for their design concept was that the main barrier was learning to use the phone, rather than a problem with the user or the device itself. Part of their solution was to turn a throwaway instruction manual into an attractive hardcover book, which should be kept and referred to throughout the phone's life. Picking up on the fact that older people often ask someone they know for help, the book had a conversational tone and technical jargon was avoided. Each page of the book addressed a single step or problem, in an attempt not to overwhelm users with information.

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[17] Further details available on the Royal College of Art – Helen Hamlyn Centre for Design website: http://www.hhc.rca.ac.uk/2261-2270/all/1/Out_of_the_Box.aspx

Figure 2.11 Example of an OoBE concept inspired by the needs of older adults

 In terms of acquisition, Goodman et al. (2003) found that only 33% of older computer owners chose them themselves, as the majority relied on friends or family to choose for them. Additionally, 16% of older adults obtained their computer over four years ago and 28% acquired second-hand models. Considering these figures alongside evidence that suggests instruction manuals are not always used or regarded as useful (Philips, 2004) underpins a need to investigate the OoBE of new technology for older adults. It is important to understand if older people are opting out before the OoBE or because of it. Establishing how to create a positive and engaging OoBE for older people may persuade them to take up new and unfamiliar technology.

2.2.2.1 *Recommendations for creating a positive OoBE*
The first step towards creating a good Out-of-Box Experience is to define the intended OoBE for the target users (Kowalski, 2001). For many companies this means unpacking and setting up the new product, to expedite first use. And this is true for most users too. It is a wonder, then, that so many companies get it so wrong!

Improving the usability and user experience of PCs is one of the main goals of the Ease of Use Roundtable[18], a taskforce of companies working towards informing the industry on how to develop practical and implementable solutions. One of the whitepapers they published contains an analysis of call-centre and usability data revealed that the most commonly reported problems were set-up and initial configuration, network failure and wireless hardware

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[18] www.eouroundtable.com

issues (Intel Corporation et al., 2000). This report also contains a thorough set of guidelines for pre-empting and solving common OoBE problems, which currently feature on IBM's website under the section on initial experience. These guidelines focus on usability, such as making set-up faster and reducing the need for instruction manuals, but overlook the fuzzier issues of user experience.

Anyone who has acquired a Kindle will extol the virtues of its OoBE. Upon opening the box, the user is simply faced with the Kindle. On the screen an invitation to 'read me first', followed by instructions to plug the device in and turn it on, leaves no doubt as to what steps need to be taken. Setup is simplified by the fact that the Kindle is pre-registered, so the subsequent on-screen instructions are relatively simple to follow. Amidst this straightforward OoBE, the personalised message that identifies this as *Alison's Kindle* (for example) provides the kind of delight that bonds the user to the device and might encourage brand loyalty. Designing this kind of engaging experience goes beyond ease of use, by acknowledging the fundamental construction of meaning that occurs during the OoBE.

Motivation
Expectations
Prior experiences

OoBE

Future experiences
Modified expectations
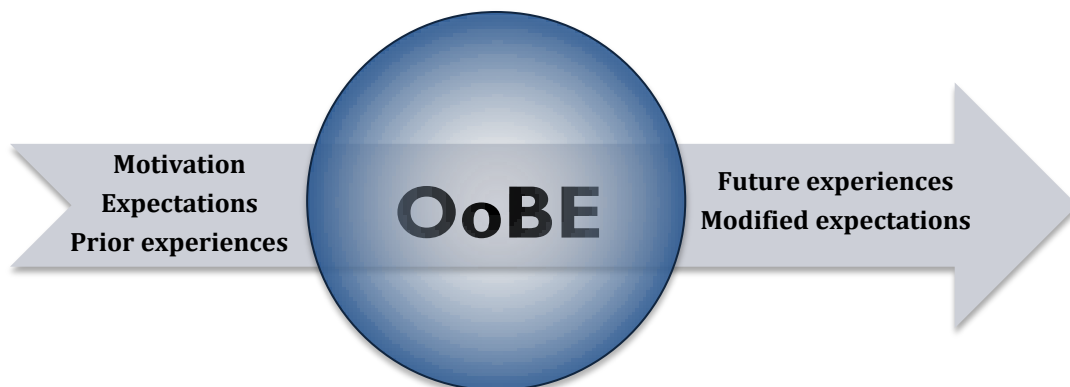
Figure 2.12 Construction of meaning during the OoBE

In concurrence with IBM's recommendations, Ketola (2005) suggests that a good OoBE should explain product features and capabilities; communicate sources of assistance; and give problem solving support in case of difficulty. It is interesting to observe there is some overlap between these recommendations

and those put forward by Melenhorst (2002) in terms of boosting older adults' motivation to take up new technology. Specifically, both authors suggest that it is essential to clearly communicate the benefits of the product, as well as any problems that may arise. Accordingly, there is strong potential for the OoBE to bridge the gap between barriers perceived by older adults and their adoption of new technologies.

2.3 Conclusion

This chapter has established that older people are often late adopters of new technology, with factors like computer self-efficacy and computer anxiety playing a determinant role in hindering technology adoption. Older adults experience significant problems with overly complicated applications and documentation, and may require custom-tailored support for proper installation routines. However, if the benefits outweigh the costs, most older people will invest the time and effort necessary to learn new skills. Facilitating technology adoption is particularly important for older adults, since being able to use technology successfully unlocks a growing number of social, educational, financial and even political opportunities. Moreover, in light of expanding markets and rapid technological turnaround, there is always going to be a need to research technology for older people. Investigating state-of-the-art technology illustrates the adoption of *innovative technology* by older adults, which is likely to be an ever-present issue in society.

Making technology easier for this user group is not necessarily the solution, so a question that needs to be asked is whether the Out-of-Box Experience can motivate older adults to overcome their perceived barriers to technology adoption. This literature review has set the scene for this research project. Additional relevant literature is reviewed within the background section of each empirical chapter.

3 Methodology

This chapter describes the methodology adopted for this research. In particular, it outlines different methodological approaches available with the purpose of determining how the aims and objectives established in Chapter 1 can be achieved. Pursuant to the selection of a methodology, the research purpose, strategy, type, data collection and analysis techniques are identified. Finally, potential methodological issues and limitations are discussed.

3.1 Introduction

Good research must be purposive, inquisitive, informed, methodical and communicable (Archer cited in Cross, 2007, p. 126). While these characteristics are not exclusive to design research, many of the problems tackled in this field have complex, variable and sometimes contradictory requirements that are not always solvable using traditional scientific approaches. Design thinking is a somewhat ambiguous but popular term used to describe the processes that designers employ to resolve these ill-defined problems practically and creatively (for an overview, see Buchanan, 1992). In his e-book *How Do You Design*, Dubberly (2008) compiled over one-hundred proposed design processes, clearly illustrating the lack of consensus in this arena. Common threads run through all of the models described: they all comprise a sequence of steps; they are all goal-oriented; and they all imply iteration and convergence. The research described in this thesis evolved from a desire to contribute to the design of more successful products and services for the older population. The following sections provide the rationale for the adoption of specific methods, connecting them to the intended outcomes of this research.

3.2　Research approach

How a researcher decides to investigate a topic is influenced by a combination of factors, including the researcher's personal experience, background and values, as well as existing research approaches which he or she may borrow from. This section details concerns that affected the research approach outlined in this chapter.

3.2.1　User-centred design

The multifarious nature of this research topic draws on a variety of disciplines, such as Inclusive Design, Human Factors and User Experience (UX). Underpinning these various fields is the view that user needs and interests are central to the design process. User-Centred Design (UCD), a term coined by Donald Norman and Stephen Draper (1986), had its origin in the field of Human-Computer Interaction (HCI) and describes a design philosophy as well as a set of methods, which are interpreted as both a design model and a business model. The UCD approach sees users and stakeholders involved in the design process, which includes planning, understanding requirements, specification of context of use, and generation and iteration of solutions (ISO 9241-210, 2010). As a result, implementing UCD is often a multidisciplinary and collaborative effort.

As its use expanded beyond the field of HCI, the term 'user' received much criticism because it was perceived as a limiting description of human beings. Alternative terms for User-Centred Design include Human-Centred Design and People-Centred Design, though the essence of these approaches is fundamentally one and the same. Another debate surrounding UCD concerns the degree of 'user' involvement and what role they should play in the design process (e.g. Eason, 1988; Damodaran, 1996). Sanders (2008) makes a distinction between an *expert mindset* and a *participatory mindset* in design research. An expert mindset typically sees low involvement of the people under study, who are often referred to as 'users', 'subjects' or 'consumers'. On the other hand, design researchers with a participatory mindset view people as experts of their own experience and, therefore, as uniquely qualified to contribute to the design process. Focusing on the adoption of new technologies, Battarbee and Koskinen (2005) advocate a participatory mindset as they posit

that rules of behaviour and product use are never absolute or complete, thus this type of approach facilitates an understanding of experiences in context. Inclusive design is by definition focused on meeting a wide range of people's needs and abilities, so must always stem from a user-centred approach. Successful products and services go beyond the pragmatic aspects of usability: they must be functional and usable, but also desirable and viable (University of Cambridge, 2011). In other words, successful and inclusive design must take a holistic view of people and their experiences, based on empathy and dialogue. This point is eloquently stated by Fulton Suri (2003, p. 52):

> *On the one hand, many design problems arise when we assume that everyone else is just like us. Poor design is often the result of [this] assumption [...]. On the other hand, many problems arise when we think of other people as so different from ourselves that we think of them as 'them'. Empathic design is all about navigating the course between these extreme ideas. Yes, people do say, think and feel different things and in different contexts. However, we can make sense of this and design appropriately if we use our ability to learn about, and identify with, their experience.*

In order to gain this rich understanding of older adults' experiences with technology, this research began from a user-centred approach with an inclination toward a participatory mindset. However, the researcher retained some degree of control over the research (e.g. defining the research questions and selecting the methodology) and, as the research progressed into a design study, older adults did not take on the role of designers or co-designers. Researching the experiences of others is never without challenges, particularly when striving for an empathic understanding of the participants. The following section discusses some of the initial concerns that affected methodological decisions.

3.2.2 Layers of experience

Experiences are by nature complex and holistic, and people's ability to describe them is tainted by multi-layered, fragmented, individual and ephemeral factors (Sleeswijk Visser, 2009). On the one hand, the complex web of factors affecting

user experience means that a person may not even be aware of the full picture. On the other hand, awareness of the research itself can also affect participants' responses and reactions. This means that relying solely on traditional research methods may not provide an accurate depiction of a user's experience.

In Figure 3.1, Sleeswijk Visser et al. (2005) illustrate how a range of methods are more or less suited for eliciting knowledge on different levels. Interviews expose explicit knowledge, or in other words what people say and think; observation should be used to study observable knowledge, such as what people do and how they use products. Yet tacit knowledge – practical knowledge that cannot be verbally articulated (e.g. ability to speak a language or use complex equipment) – and latent needs require other, often more creative methods to facilitate their communication.
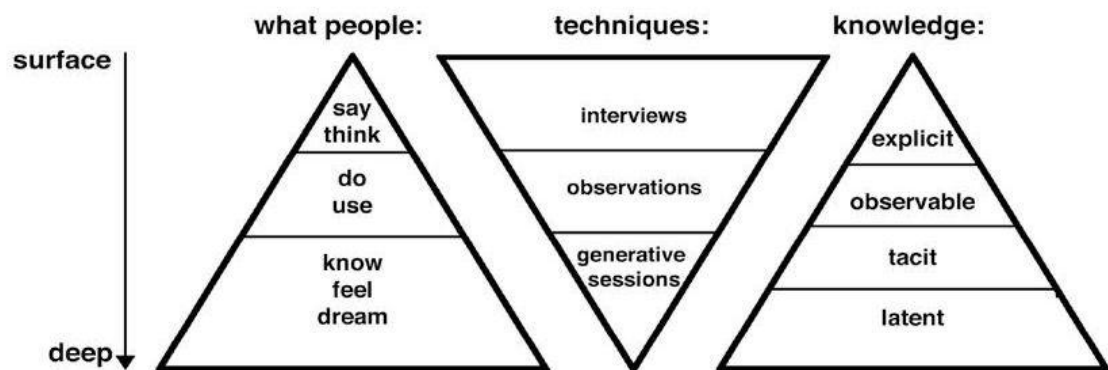
Figure 3.1 Different levels of knowledge and methods to capture them (Sleeswijk Visser et al., 2005)

Building on the work of Sanders (2001), these authors advocate the use of generative techniques to allow people to express their deeper levels of experiential knowledge. Generative techniques encourage people to create artefacts, which are then used to facilitate reflection by the participant and dialogue with the researcher.

3.2.3 Experience in context

In concurrence with the third paradigm of HCI (Harrison et al., 2006), the study of user experience must not be dissociated from the context in which it occurs. Designers cannot anticipate how their designs are used in practice, rather it is through their real life adoption and adaptation that people attribute and construct their meanings (Dourish, 2004). Factors pertaining to context of use also provide helpful clues about the success or rejection of new products (see

for example, Thomas and Bevan, 1996; Maguire, 2001; Elton and Nicolle, 2010). This understanding then enables designers to generate ideas that respond to authentic needs and support more rewarding future experiences.

An example of a design research procedure that focuses on capturing a rich picture of people's experiences in context is contextmapping (Sleeswijk Visser et al., 2005; Sleeswijk Visser, 2009). This type of research uses a small number of participants (typically between 6 and 20), as it aims to establish intensive and personal relationships between the participants and the researcher. Contextmapping combines a variety of research methods, including ones that encourage participants to express themselves creatively using generative techniques. The research described in this thesis does not follow a contextmapping procedure, but does share several of its principles. As well as a focus on capturing authentic experiences through a variety of methods, this research involves informants ('users' who contribute with information on their real life experiences), designers (who apply this information to their design activities) and the researcher (who receives and articulates the information, mediating the relationship between informants and designers). Acknowledging the intricacy of individual experience and embracing the challenges created by conducting the research in a real life context were decisive factors in producing a research design. The following section elaborates on the key decisions supporting the research plan.

3.3   Research design

Research within the field of design is somewhat lacking in theoretical tradition and, as such, frequently borrows from the human and social sciences. This is particularly true when the research focuses on the social and behavioural aspects of design (Koskinen et al., 2003). Yet even beyond the realm of design research, there is seldom consensus on the number of stages and the terminology of research designs (see for example, Crotty, 1998; Robson, 2002; Saunders et al., 2009).

The research here described was structured according to a widely used framework provided by Robson (2002), who proposes a methodology for social scientists and practitioner-researchers conducting research in the real world. This framework comprises five elements: research purpose, research type,

research strategy, research method and data analysis. These are be discussed in the following sub-sections.

3.3.1 Research purpose

The underlying motivation for research can be defined as exploratory, descriptive, explanatory or emancipatory. The main characteristics of each of these research purposes are outlined in Table 3.1, after Robson (2002).

Table 3.1 Purposes of research

Exploratory	• To find out what is happening, particularly in little-understood situations;
	• To seek new insights;
	• To ask questions;
	• To assess phenomena in a new light;
	• To generate ideas and hypotheses for future research;
	• Almost exclusively of flexible design
Descriptive	• To portray an accurate profile of persons, events or situations;
	• Requires extensive previous knowledge of the situation etc. to be researched or described, so that you know appropriate aspects on which to gather information;
	• May be of flexible and/or fixed design
Explanatory	• Seeks an explanation of a situation or a problem, traditionally but not necessarily in the form of causal relationships;
	• To explain patterns relating to the phenomenon;
	• May be of flexible and/or fixed design
Emancipatory	• To create opportunities and the will to engage in social action;
	• Almost exclusively of flexible design

Chapter 2 established that, while there has been extensive research into barriers experienced by older adults to the use of new technology, there is a gap in understanding their successful adoption of these products and how they incorporate them into their everyday lives. The purpose of this research was to gather new insights about older adults' current use of technology, with a view to designing more desirable and successful Out-of-Box Experiences for these

products, and as such can be framed as 'exploratory'. This research was not concerned with proving or disproving existing knowledge, but rather on building a richer picture of real life experiences.

3.3.2 Research type

According to Robson (2002), research can be divided into fixed design and flexible design. A fixed design requires the researcher to stipulate all the parameters of a study in advance, to collect the data so specified and analyse them in a controlled and predictable manner. A flexible design, as the name suggests, requires the researcher to modify the nature of the study as it progresses and as the data gathered indicates. Table 3.2 compares the main trends of fixed and flexible designs, after Robson (2002).

Other authors, such as Creswell (2009), equate fixed designs with a quantitative research design and flexible designs with qualitative research design. In fact, a fixed design often uses quantitative methods and a flexible design often uses qualitative methods, but this is a tendency and not a rule. Creswell adds that quantitative and qualitative research designs are not mutually exclusive, and can be combined in a mixed method approach. Accordingly, a distinction based on methods of data collection can be misleading.

Table 3.2 Main trends in fixed and flexible designs

Fixed Design	General features	Flexible Design
Measure and test	Purpose	Interpret and describe
Theory-driven	Approach	Inductive
Structured, pre-specified	Data collection	Unstructured, evolving
Uninvolved, objective	Role of researcher	Involved, subjective
Large, focus on generalisability	Samples	Small, often in natural setting

The main factor that influences what type of research is conducted is whether it is possible to pre-specify the data collection (Robson, 2002). The exploratory nature of the questions guiding this research meant that a flexible design was the most appropriate. This allowed more freedom during data collection and permitted the research to evolve as a reflexive process.

3.3.3 Research strategy

Fixed designs are separated into two categories, according to whether they use experimental or non-experimental strategies. Flexible designs typically include, but are not restricted to case studies, ethnographic studies and grounded theory. The features of the most commonly employed research strategies are summarised in Table 3.3, in line with Robson (2002).

It was not the objective of this research to generate new theory about older adults' relationship with technology, as a Grounded Theory study would; nor was it intended to investigate a tightly bound case, as a Case Study would. Gaining a comprehensive perspective of older adults' real-life experiences with technology required an in-depth investigation of the study population in context. However this could not be an Ethnographic Study per se, as true immersion in the community was not feasible.

Design ethnography, most notably employed by Intel's People and Practices research group, is the adoption and adaptation of ethnographic techniques with a view to designing products and services that respond to people's genuine wants and needs (Bell, 2001). According to Sanders (2002), the characteristics of applied ethnography are:

- it takes place in natural surroundings;
- the process is open to change and refinement throughout the process as the new learning shapes future observations;
- it combines a range of research methods;
- its goal is more likely to be exploratory than evaluative;
- it aims to discover the local person's point of view, where this 'native' may be a consumer or end user.

Bell (2001) adds that the focus should be on understanding the subtleties and complexities of people's social practices through what they say, do and think. These characteristics, combined with the long-term aim of producing actionable design outputs, correspond to the objectives of this thesis. This research can therefore be termed as a form of Design Ethnography, most closely in line with Bell (2001).

Table 3.3 Research strategies

Fixed design	
Experimental	The researcher actively and deliberately introduces some form of change in the situation, or circumstances of participants with a view to producing a resultant change in their behaviour
	<u>Typical features</u>: the selection of samples of individuals from known populations, allocation of samples to different experimental conditions, planned change on variables, measurement and/or control of other variables, hypothesis testing
Non-experimental	The same approach as above but the researcher does not attempt to change the situation, circumstance or experience of the participants
	<u>Typical features</u>: the selection of samples of individuals from known populations, allocation of samples to different experimental conditions, measurement on small number of variables, control of other variables, may or not involve hypothesis testing
Flexible design	
Case Study	Development of detailed, intensive knowledge about a single case, or of a small number of related cases
	<u>Typical features</u>: the selection of a situation, individual or group of interest or concern, study of the case in its context, collection of information via a range of data collection techniques including observation, interview and documentary analysis
Ethnographic Study	Seeks to capture and explain how groups live, experience and make sense of their lives and their world; aims to answer questions about specific groups of people, or about specific aspects of their life
	<u>Typical features</u>: the selection of a group, organisation or community of interest or concern, immersion of the researcher in that setting, use of participant observation
Grounded Theory	Aims to generate theory from data collected during the study; particularly useful in new, applied areas, where there is a lack of theory and concepts to describe and explain what is going on
	<u>Typical features</u>: applicable to a wide variety of phenomena, commonly interview-based, a systematic but flexible research strategy which provides detailed prescriptions for data analysis and theory generation

3.3.4 Research methods

Research methods are the means by which data is collected and should be consistent with the questions guiding the research. The same information can be elicited through a number of techniques, though some methods are more suitable to the objectives and constraints of the research.

Bernard and Ryan (2009) define three broad categories of data collection methods, which are indirect observation, direct observation and elicitation. The main distinction between direct and indirect observation concerns whether the researcher is present to observe the behaviour of interest, in the former; or whether the researcher is absent and must resort to other means to observe behaviour, in the latter. Robson (2002) elaborates on the options available to those conducting observational studies, summarised in Table 3.4.

Table 3.4 Types of observation

Approach to observation	
Formal	Highly structured and imposed direction on what to observe; fixed design and quantitative data.
Informal	Less structured, the observer has more freedom as to what to observe and how to record it; mostly qualitative data.
Role of the observer	
Complete participant	Observer actively participates and strives to blend into the group, but must conceal their identity as researcher.
Participants as observer	Observer actively participates in the group, but discloses their identity as researcher.
Marginal participant	Observer is a largely passive yet accepted participant, who may or may not disclose their identity as researcher.
Observer as participant	Observer takes no part in activities, but fully discloses their identity as researcher.

Observation in its many forms is suited to a number of research purposes, but is frequently adopted in an exploratory phase to uncover real life activities and events (Robson 2002). However, the role of the observer (see Table 3.4) is one of the method's greatest drawbacks. On the one hand, an observer who does not disclose their true identity (i.e. complete participant) is likely to raise strong ethical objections and incurs the risk of losing perspective on their research. On the other hand, the trade-off for the researcher who acknowledges their role as

observer is not knowing to what extent their presence is affecting the situation under observation. Within the exploratory stages of design research, these issues are sometimes overcome by employing indirect observation tools such as diaries (Rogers et al., 2011).

Elicitation techniques attempt to bring out information in a structured, unstructured or even semi-structured manner. A common elicitation technique used in qualitative research is the interview, which according to Robson (2002) can vary in terms of structure and number of participants. These variations are summarised in Table 3.5.

Table 3.5 Types of interview

Degree of structure	
Structured interview	Pre-determined questions, order and fixed wording; usually used in fixed and quantitative research.
Semi-structured interview	Pre-determined questions, but order and wording can be modified according to the researcher's perception; questions may be added or omitted.
Unstructured interview	The researcher has a general topic of interest, but allows conversation to develop within this area; prompts and cues may be used to guide the conversation.
Number of participants	
Individual interview	Single respondent; one-to-one dynamics; no peer pressure or comparisons.
Group interview	Several respondents; tends to be more flexible; facilitates discussion; a common example of this is the focus group interview.

Interviews are a useful method for gathering insight into what people say and think. But, as discussed in section 3.2.2, what people say does not always correspond to what they actually do, which in turn might not be the same as what they know and feel.

The generative sessions proposed by Sleeswijk Visser et al. (2005) explore creativity as a means to become aware of and to express the deeper levels of experiential knowledge. Typically they consist of creative tools or self-documentation techniques, though Sanders (2000) emphasises that the tendency is towards a visual rather than verbal language. The various outcomes

of these sessions, such as stories, drawings and photographs, provide a compilation of glimpses into people's experiences (Sleeswijk Visser, 2009) and can therefore arguably be described as having an element of indirect observation. Generative sessions, observation and interviews all have the potential to be interpreted and materialised in many forms to inform design research. While it is beyond the scope of this thesis to provide a review of all the manifestations of these methods, there are a number of useful and attractive resources for design researchers such as the IDEO Methods Cards documenting fifty-one techniques for researching user-centred issues (Moggridge, 2007). Owing to the flexible design of this research, the findings from each study influenced the research objectives of the following study and, subsequently, its methods of data collection (see Figure 3.2). In light of a desire to produce rich data and a need to confirm findings across studies (see section 3.4.3), this research employed a mixed method approach.
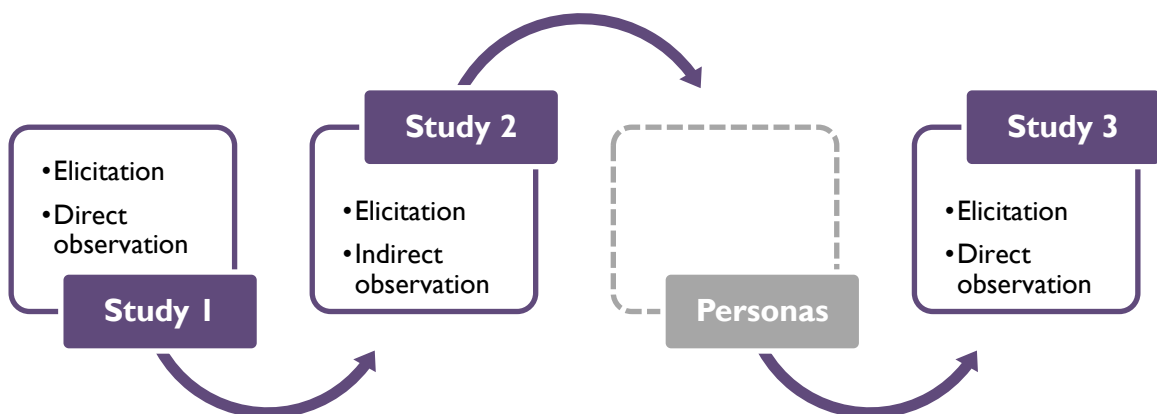
Figure 3.2 Relationship between studies in this thesis

In an attempt to describe the narrative of how the research developed, further details on elected methods and techniques are given within the relevant study chapter.

3.3.5 Data analysis

In qualitative research, data analysis should begin while data collection is underway to allow emerging findings to feed back into the study cycle (Maxwell, 1998; Miles and Huberman, 1994; Robson, 2002). A qualitative study is likely to produce large amounts of unstructured data, which can be analysed using a variety of individual or combined methods.

According to Miles and Huberman (1994), this analysis consists of three procedures: data reduction, data display, and conclusion drawing and verification. Data reduction is the process of selecting, simplifying, abstracting and transforming data from notes, transcriptions and other documents. These include summary sheets, coding and memoing. Data display refers to the process of presenting data in a way that facilitates pattern recognition or comparison. Miles and Huberman (1994) divide data displays into two main types: matrices and networks. These authors also list thirteen tactics for generating meaning from the data, among which are identifying patterns, themes and trends, clustering, and noting relationships between variables (for the full list, see Miles and Huberman, 1994, pp. 245-6).

Data analysis in this thesis broadly followed these steps, taking a manual approach rather than using one of the many tailor-made software packages. Firstly, to facilitate analysis, content from hand-written, audio and photographic files were transcribed into digital format using Microsoft Office Word and Excel. This procedure began while the process of data collection was underway to avoid errors of omission and errors of commission (Bernard and Ryan, 2009). The next step was to attribute category names to meaningful segments, also known as coding. Robson (2002) explains how coding can be a purely data-driven inductive process, as with grounded theory, but on the whole pre-existing theory, the researcher's experience and intuition also play a role in the development of codes. In light of the exploratory nature of this research, no *à priori* codes were assigned. The final codes were determined through a process of revising and refining initial, more intuitive codes.

Data displays often play a central role in design research, with design researchers favouring large visual forms of display such as posters or post-it filled walls. Sleeswijk Visser (2009) observes that these large data displays encourage data analysis to be a 'living' and evolving process. They also allow written data to be grouped with other visual artefacts (for example, photographs), making them uniquely appropriate for use within this research. For this thesis, several techniques were used to structure, re-structure and identify patterns in the data. Further detail on how data analysis was conducted and the types of display used in this thesis are provided in the relevant sections.

3.4   Research quality

Good research should provide a rationale for key decisions made, but also acknowledge limitations or uncertainties that arise during the process. This section describes the sampling process, related ethical considerations and a discussion of the validity, generalisability and reliability of the resulting research.

3.4.1   Selecting participants

This research can broadly be divided into two stages. Firstly, it focused on obtaining a rich depiction of older people's experiences with technology and associated Out-of-Box Experiences; secondly, it focused on translating these findings into tools that would better support the design of engaging Out-of-Box Experiences of new technology products for the older population. Accordingly, this research included two categories of participants: participants of studies 1 (Chapter 4) and 2 (Chapter 5) were people over 50 years old, who were designated 'older adults' for the purpose of this research (see section 1.2 on page 6, and section 2.1.2.1 on page 19); participants of study 3 (Chapter 7) consisted of designers and design students.

Owing to ethical concerns over conducting research in the homes of older adults, recruitment of participants for Study 1 began intentionally with people who were known to the researcher or supervisors, but who met the sample criteria. It was also anticipated that some degree of familiarity would help to overcome any privacy or trust issues that could arise. As the study progressed, some participants referred friends or acquaintances that might be willing and interested in taking part in the research. In other words, participants of Study 1 were recruited using initial convenience followed by snowball sampling methods.

Participants of Study 2 were selected to focus on particular characteristics that were deemed of interest to the study aims and objectives, and can therefore be described as obtained through purposive sampling for heterogeneity. These participants had taken part in Study 1, thus establishing the sustained engagement endorsed by design ethnography advocates (e.g. Bell, 2001) and design researchers investigating user experience (e.g. Sleeswijk Visser, 2009).

Participants of Study 3 were recruited within the Loughborough Design School. Participants for the pilot comprised two PhD students and a lecturer, who had backgrounds in design. Participants for the main study were recruited via a participant information sheet (Appendix G) distributed to postgraduate students in Industrial Design and Technology, Interaction Design, and Design and Innovation for Sustainability. This strategy consists of a form of purposive sampling, specifically expert sampling.

Table 3.6 Summary of study participants

Study	Chapter	Participants	Nr. of participants	Sampling
1	4	People aged over 50	24	Convenience and snowball
2	5	People aged over 50	9	Purposive (heterogeneity)
3	7	Designers and design students	16	Purposive (expert)

It is acknowledged that these sampling techniques and the number of participants per study are not conducive to statistically significant or representative samples. Even so it is argued that this is acceptable under the general aims and objectives of this research, since the focus was on obtaining rich contextual data. This strategy is further supported by Bell (2001), Maxwell (1998) and Sleeswijk Visser (2009). Section 3.4.3 discusses how these decisions might affect the quality of this research. Further details on the participants of each study are given within the study chapters (Chapters 4, 5 and 7).

3.4.2 Ethical considerations

An ethics assessment was carried out by the researcher and supervisors, and a Criminal Records Bureau (CRB) check of the researcher was undertaken. As some of the studies required home visits to people over the age of 65 and other vulnerable groups, ethical procedures were followed in compliance with the Loughborough University generic protocol.

Participants took part voluntarily, at a date and time that was convenient to them. Information was given prior to any visit to clarify what the study entailed

and contact details of the researcher and supervisors were provided, enabling participants to rearrange or cancel their appointments. A participant information sheet was also provided, explaining the purpose of the research, informing participants of their right to withdraw from the study at any time, and ensuring anonymity and confidentiality (Appendix A). The risk of harm or distress during the studies was negligible and, whenever possible, participants of Study 1 were encouraged to have a partner or family member present. Interviews were recorded in audio format for later transcription and stored in a secure location, to be used only for this study, related publications and presentations. All measures were taken to abide by the Data Protection Act. Upon being fully debriefed about the aforementioned issues, all participants gave their written consent before taking part in the studies (Appendix B).

3.4.3 Trustworthiness

Validity, generalisability and reliability are decisive in establishing the trustworthiness of research (Robson, 2002). Validity pertains to the legitimacy of the findings; generalisability is the extent to which the findings hold true for circumstances other than the ones studied; reliability refers to the ability of the research tools to produce consistent results. Yet the use of these terms is often contentious when describing flexible, qualitative design, with some authors such as Lincoln and Guba (1985, cited in Robson, 2002) preferring the alternative terms credibility, transferability, dependability and confirmability. Perhaps naturalistic research cannot address the concepts of validity, generalisability and reliability in the same way as a fixed design quantitative study might, but there are a number of measures that qualitative researchers can adopt to ensure overall research quality.

An important first step for the researcher is to acknowledge specific potential threats to validity and to develop measures to counteract them. Maxwell (1998) broadly distinguishes between two types of threats to qualitative studies. The first is researcher bias, where data collection or analysis is affected by the researcher's assumptions and preconceptions. The other is reactivity, where the researcher's presence can affect the setting or the behaviour of people involved in the study. Another related threat identified by Lincoln and Guba (1985, cited

in Robson, 2002) is respondent bias, where participants' responses are a reaction to what they perceive the researcher expects.

Robson (2002) compiled a list of strategies commonly used to address these threats, which include prolonged involvement, triangulation, peer debriefing and support, member checking, negative case analysis, and keeping an audit trail. Table 3.7 details how these strategies were adopted within this thesis.

Table 3.7 Strategies employed in this thesis to address threats to validity

Strategy	Provisions made by the researcher	Effect on validity
Prolonged involvement	• Adequate time in natural setting • Trust and rapport with participants • Overlapping participants in studies 1 and 2	Increases researcher bias Reduces reactivity Reduces respondent bias
Triangulation	• Combination of data collection methods within each study • Iterative questioning • Comparison of data across studies • Range of participants • Regular literature review	Reduces researcher bias Reduces reactivity Reduces respondent bias
Peer debriefing and support	• Regular meetings with supervisors • Yearly research report and meeting with external advisor	Reduces researcher bias
Member checking	• Participant feedback during the study • Participant validation of findings in subsequent visits/conversations	Reduces researcher bias Reduces reactivity Reduces respondent bias
Negative case analysis	• Examination of previous research • Openly searching data for outliers	Reduces researcher bias
Audit trail	• All interviews recorded in audio format and written notes • Photos taken whenever permissible • Some video recording • Records of all data and analysis • Transparent coding	Reduces researcher bias

Certain steps described in Table 3.7 equally contributed to the reliability of the studies, in particular the endeavour to maintain an audit trail of all research activities. The reliability of this research was also established in part through the adoption of appropriate and well recognised research methods. The

resulting materials and procedures were piloted to determine their feasibility and modifications were made whenever necessary. Usable pilot studies were incorporated into the main study, which is deemed acceptable for flexible designs (Robson, 2002).

The sampling techniques employed throughout this research in principle ruled out external generalisability. This means that the findings presented here pertain to a relatively small number of individuals and it is beyond the scope of this thesis to demonstrate whether or not they are applicable to other populations and situations. Shenton (2004) offers an interesting view of this matter, positing that the onus of transferability lies with the audience and that the duty of the researcher is to provide enough contextual information about the fieldwork to enable any such inferences to be made. For this reason, there is a concerted effort in this thesis to document the participants, methods, materials and procedures adopted in the different studies.

3.5 Conclusion

This chapter has outlined the decisions taken to define the methodology adopted within this thesis. Potential limitations and ethical considerations were discussed, with a view to establishing the quality of the research. The overall research design of this thesis is summarised in Figure 3.3.
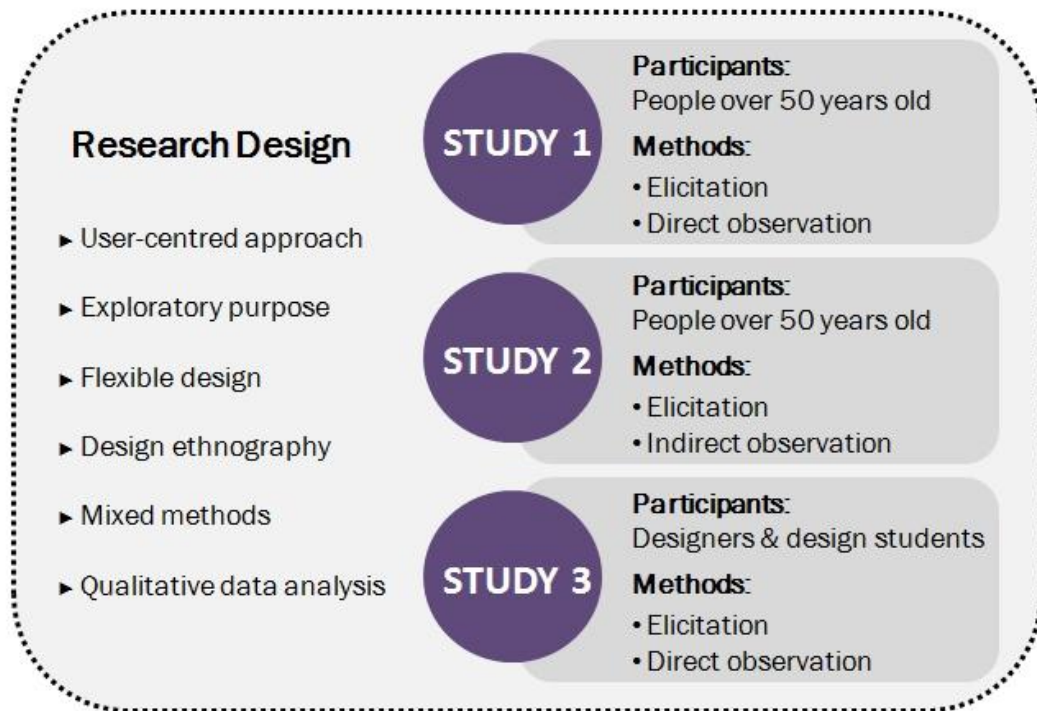
Figure 3.3 Research design within this thesis

4 Uncover motivation

This chapter describes qualitative study designed to investigate older adults' experiences with technology, particularly during the very early stages of interaction known as Out-of-Box Experience. The Technology Biography method was adapted and conducted among twenty-four participants over 50 years old. The findings indicate greater acceptance of technology than expected from existing studies. Moreover, even though older people value being able to perform tasks for themselves, this study revealed they often enlist others as a means to engage in social interaction. This work is discussed in the context of older adults' motivations to use technology, and how their expectations and aspirations affect the uptake of these products.

4.1   Introduction

4.1.1   Background

It is generally accepted that people use products that suit their needs and abilities. However, sometimes people engage with products that do not fulfil these criteria. And, even within the realm of products deemed 'useful', people will engage more with some than others. The characterisation of user experience put forward by Kankainen (2002, pp. 31), which describes it as 'a result of a motivated action in a certain context', accounts for this apparent selectivity by highlighting the importance of motivation in human behaviour. In the literature, motivation is analysed from many different viewpoints and there is no single prevailing theory. In this study, motivation is discussed predominately from a design research perspective and, therefore, no attempt is made to explain related issues such as mental states, cognition, values or drives. Krippendorff (2006) defines motivation as the reason to perform a certain action and, therefore, links it closely to human agency and the ability to make

choices. According to this author, when discussing the use of products, motivation can be divided into two types:

- Extrinsic motivation pertains to the completion of tasks and the instrumental benefits that this entails. In design terms, extrinsic motivation allows little if any scope for action, since it relates to issues outside of designers' control.

- Intrinsic motivation explains why people perform actions that surpass the achievement of measurable goals. Intrinsic motivation relates to the emotions experienced during a process and, consequently, has the potential to be enhanced through design.

Most of the impetus in this area stems from the widely cited hierarchy of needs proposed by Abraham Maslow (1943), which organises human motivation according to a needs-based model. This theory is often illustrated in pyramid form (Figure 4.1), with the most basic needs represented in the lowest level and more complex needs represented higher up. According to Maslow, people endeavour to satisfy the four lower levels of the pyramid (physiological, safety, love/belonging and esteem) or what he calls deficiency needs, before progressing toward the growth need of self-actualisation. Maslow's model is frequently criticised in the literature due to lack of empirical evidence (e.g. Wahba and Bridwell, 1976; Heylighen, 1992; Huitt, 2004), but remains popular among designers as a visual and intuitive tool that exemplifies the potential hedonic implications of objects.
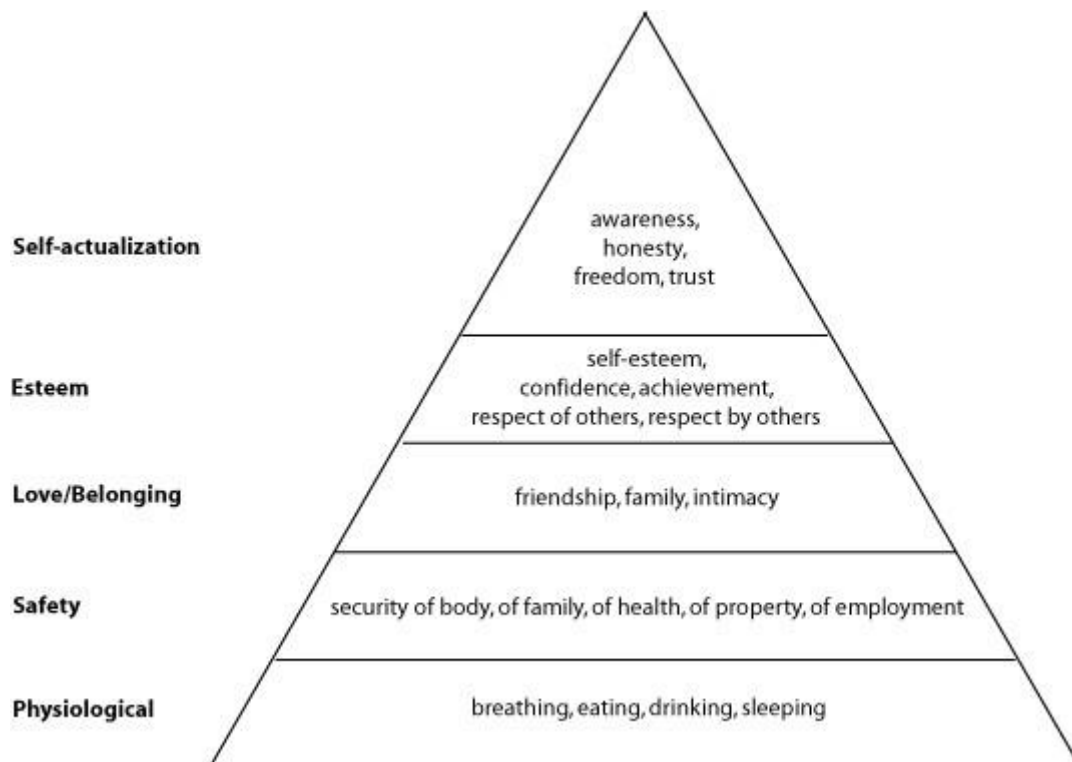
Figure 4.1 Maslow's hierarchy of need (Maslow, 1943)

Jordan (2000) explores the concept of needs that exceed basic usability issues in his Four Pleasures framework. In the context of products, the author claims that, on the one hand, pleasure should derive from the practical benefits to be gained from using a product for the purpose which it was intended; on the other hand, emotional and hedonic benefits can and should also be associated with product use in order to create pleasurable experiences. The pursuit of pleasurable experiences is an innately human characteristic and can be attained through four different types of pleasure: physio-pleasure, which pertains to pleasure originating from the sensory organs; socio-pleasure, which concerns the enjoyment of social interaction; psycho-pleasure, which relates to emotional and cognitive satisfaction; and ideo-pleasure, which is directly connected to individual values (Lionel Tiger cited in Jordan, 2000).

In addition, Jordan (2000) criticises the tendency for the relationships that people form with objects to be overlooked when taking an approach based solely on usability. Since intrinsic motivation cannot be explained in terms of the physical attributes of the object or be measured mechanically (Krippendorff, 2006), understanding people's relationships with products may provide insight into how behaviour gets started and what sustains it over time. The concept of

product relationships is illustrated by Battarbee and Mattelmaki (2004), who generated three main categories of product relationships. The first category is Meaningful Tool, which describes an object required to perform a meaningful activity. In this relationship, the object is necessary for the activity to take place but could be substituted for a comparable object. Within this category an object can represent: *facilitator*, when the emphasis is on its functionality and usefulness; *challenge*, when the emphasis is on learning; or *self-expression*, when the emphasis is on creativity and enjoyment.

The second category proposed by Battarbee and Mattelmaki (2004) is Meaningful Association, assigned to products that relate to cultural or individual meaning. In other words, the significance of these objects stems from something outside the actual objects, representing: *identity*, such as personal, cultural or professional identities; *style* or *taste*, which reflects individual aesthetic values; and *link* to a memory, a person, an emotion or a story when an object evokes past events or experiences.

The final category of product relationships is Living Object (Battarbee and Mattelmaki, 2004), which describes an emotional bond formed between a person and an object. In this instance, the person perceives the object as a companion with human characteristics, like a personality, soul or character. These researchers present distinct categories of product relationships, but often a variety of relationships occur simultaneously with a given object and uncovering these relationships provides a context for designing new products.

An underlying assumption which the abovementioned models do not fully account for is the influence of people's capacity to use an object appropriately. The relationship between motivation and ability has been explored by Fogg (2009), who lists three factors of persuasive design that determine whether a specific behaviour takes place. The Fogg Behaviour Model (FBM) states that motivation and ability play an important role in human behaviour, but specific behaviour will not occur without an appropriate trigger. In fact, Fogg (2009) argues that behaviour can occur even when ability is low provided motivation is sufficient, and the inverse also applies (see Figure 4.2).
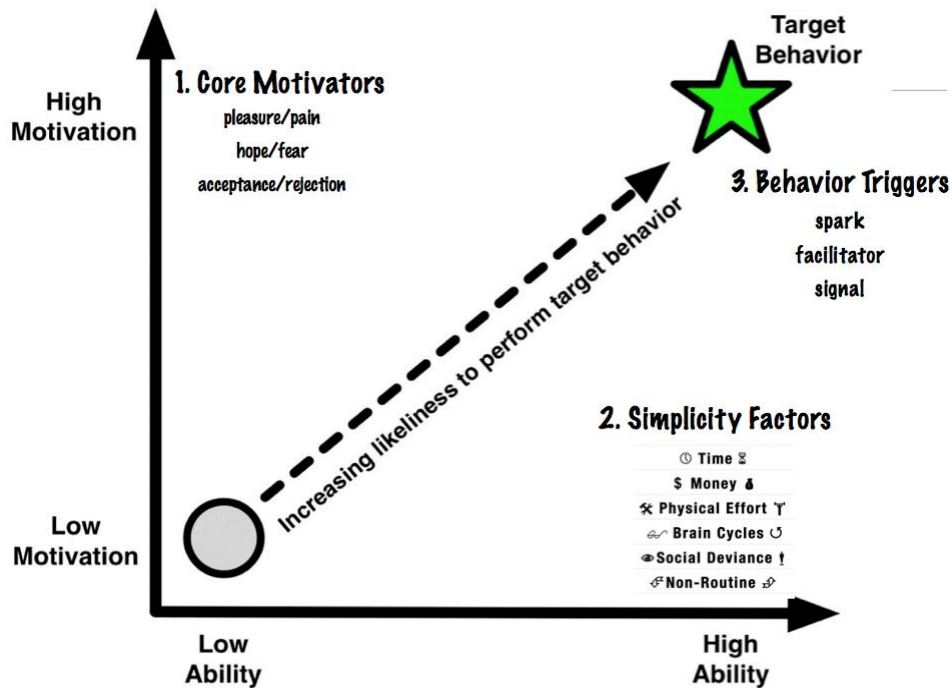
Figure 4.2 Fogg Behaviour Model (Fogg, 2009)

According to the Fogg Behaviour Model (2009), elements of ability – also called Simplicity Factors – are time, money, physical effort, brain cycles, social deviance, and non-routine. Motivation can be explained through three core motivators with opposing dimensions: pleasure/pain; hope/fear; and social acceptance/rejection. But, whereas levels of ability and motivation can be manipulated, people depend on triggers to prompt behaviour.

Triggers are calls to action and Fogg (2009) points to three main ways in which they can intervene. When motivation is lacking, a Spark is required to trigger target behaviour. Conversely, if motivation is high but there is a lack of ability, behaviour should not only be triggered but also made easier through a Facilitator. Finally, if both motivation and ability are present, a Signal serves as a cue or reminder to perform a particular task. Fogg emphasises the importance of choosing the correct type of trigger – for example, people may find Sparks annoying because they attempt to motivate them to do something they do not intend to do, or a Facilitator may be considered patronising by people who have sufficient ability to perform the task at hand. Overall, people are more tolerant of Facilitators or Signals as triggers than they are of Sparks.

4.1.2 Aim and objectives

Chapter 2 established that, when discussing technology use, older adults are frequently considered a homogenous group, mostly segmented according to age and abilities. However, the over-50s lead varied lifestyles and are involved in a wide range of activities, and this will become increasingly true in the future (Lahteenmaki and Kaikkonen, 2004). In order to better meet their technological needs and demands, it is essential to gain deeper insight into this user group and their motivations for using interactive consumer products.

The aim of this study is twofold: on the one hand, this study investigated older adults' attitudes toward technology; on the other hand, it also enquired into older adults' initial experiences with new interactive products, from acquisition, through set-up to early use. To achieve this, the study was guided by the following questions:

- How do older adults feel about technology and which user characteristics impact upon these feelings?

- What kind of benefits do older adults perceive technology to have for them?

- How do perceived benefits and actual experiences affect the uptake of technology among older adults?

- What role does the Out-of-Box Experience (OoBE) play in older adults' use of new products?

4.2 Method

4.2.1 Overview

Battarbee and Mattelmaki (2004) state that rich descriptions of products and their stories are a valuable way of gaining a deeper and more empathic insight into people's use of technology. The Technology Biography method (Blythe et al., 2002) is designed to elicit personal stories of people's expectations and experiences of domestic technology, which participants are encouraged to illustrate with examples. It was therefore selected as the basis for this study. Technology Biography is a combination of various elements: Technology Tours (Baillie and Benyon, 2001), where participants show the researcher round their home and answer questions about their use of technology; Last Time questions which are adapted from the critical incident method (Flanagan, 1954); Personal History interviews focusing on technology and routines that participants

remember from the past; Guided Speculation on possible future developments; and finally cultural probes (Gaver et al., 1999) adapted to elicit Three Wishes for products that participants would like to see. Each element of this method relates to different time scales: Technology Tours and Last Time questions pertain to information about present use; Personal History gathers information about the past; Guided Speculation and Three Wishes focus on the future (Blythe et al., 2002).

Blythe et al. (2003) explain this method combines a number of research and design orientated techniques, which generate critical and creative responses to domestic use of technology through people's description of their hopes, fears and expectations from technology use. These authors also state that technology biographies provide an engaging and effective way of opening up a dialogue with user groups that are difficult to research by other means, by eliciting information about people's emotional, psychological and social habits.

This method has been used to develop assistive technologies for user groups with varying support needs. However, this method can be tailored to elicit relevant data according to the purpose of the study, as data collected is invariably rich and interesting (Blythe et al., 2002). In this case, the focus of the study was on understanding older adults' experience of interactive consumer products in context rather than on developing technological solutions.

4.2.2 Participants and sampling strategy

Criteria for selecting participants were British people aged 50 or over. They were equally distributed into three age groups: 50 to 64 years old, 65 to 75 years old, and over 76 years old. Gender was not a criterion, but the ideal sample composition would comprise a mix of both male and female participants. Since the nature of the method required the researcher to have access to participants' homes and investigate the technology they own, a non-probability purposive sampling method was initially adopted. As the research progressed and participants became engaged in the outcome, some snowball sampling occurred naturally. Even though these strategies often introduce bias and the generalisability of findings may be compromised, they were deemed acceptable since the study was intended as an exploratory investigation of older adults'

attitudes and feelings toward technology (for more details, see section 3.4 Research quality).

4.2.3 Materials and procedure

The Technology Biography method was adapted to suit the purpose of this research. This study was conducted in the participants' homes, so that they could show the researcher the technology in its natural context. The first step was a semi-structured interview to inquire about participants' feelings toward acquiring and using new technology (see section 1 of Appendix C). Then participants were asked to show and discuss their most recently acquired, favourite and least favourite interactive consumer products, being prompted by questions regarding how the product was acquired, their expectations before first use and what the product enables them to achieve (see section 2 of Appendix C). This included questions related to exploring the Out-of-Box Experience. For example, participants were asked 'Where were you when you first opened the box?' followed by prompts like 'At home? At the shop? Were you alone?', which relate to whether or not people had assistance when setting up and beginning to use their new product .

These questions do not cover the Out-of-Box Experience directly, as people's recollection would be tainted by later experiences of the product and the information provided would not be reliable. They were designed to increase the researchers understanding of the context in which these experiences occur. The materials used and how they related to the objectives of the study are described in Table 4.1.

The Technology Tour also took the form of a semi-structured interview, intended to elicit rich narrative accounts of people's experiences with technology. Participants were asked to show the researcher round their house and talk about the technology present in each room. Finally, participants were asked about technology that they do not currently own but might like to own, and what benefits they expect from technology in the future (see section 3 of Appendix C).

All participants in the 50-64 and 65-75 age groups were interviewed individually. However, in the over 76 age group, six participants had their

spouses present during the collection of the data and, therefore, spouses often participated in the dialogue.

Table 4.1 Adaption of Technology Biography elements for this study

Study elements	Purpose	Adapted from
Most recent/favourite/ least favourite product	• Determine perceived functional, aspirational and emotional benefits; • Determine usability problems experienced, particularly associated with acquisition and early use; • Understand the context in which the OoBE takes place (e.g. the role of others).	Last Time questions/ Personal History
Technology tour	• Determine products older people own and ones they do not; • Understand the role of perceived benefits and actual experience on the uptake and use of technology.	Technology Tour
Guided speculation	• Determine overall feelings towards technology; • Determine what products they aspire to own and why they have not acquired them; • Understand how the OoBE could be improved.	Guided Speculation
Questionnaire	• Demographic data; • Participants for future studies.	

4.2.4 Data analysis

All technology biographies were captured in MP3 format and transcribed by the researcher using Microsoft Word 2007. Transcription occurred while data collection was in progress, enabling early analysis to be carried out. This was a useful approach, because reflecting on existing data stimulated critical thinking towards how data collection might be improved and ultimately helped to clarify emerging hypotheses (Miles and Huberman, 1994). A manual approach was taken in this study.

Data was analysed through thematic analysis, as it is particularly suited to capturing the intricacies of ethnographic interviews (Aronson, 1994). It is a widely used technique for detecting themes and patterns within data, yet remains an ill-defined analytic method (for a comprehensive review, see Boyatzis, 1998; Braun and Clarke, 2006). Table 4.2 summarises the steps to conducting thematic analysis, after Braun and Clarke (2006).

Table 4.2 Stages of thematic analysis

Phase	Description of the process
Familiarising yourself with your data	Transcribing data, reading and re-reading the data, noting down initial ideas.
Generating initial codes	Coding interesting features of the data in a systematic way across the entire data set, collating data relevant to each code.
Searching for themes	Collating codes into potential themes, gathering all data relevant to each potential theme.
Reviewing themes	Checking the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic 'map' of the analysis.
Defining and naming themes	Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells; generating clear definitions and names for each theme.
Producing the report	Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.

An implicit part of this process is the need to reduce the amount of detail in the data through coding (Miles and Huberman, 1994; Robson, 2002). As detailed above, this process required reading and re-reading the transcriptions to become familiar with their content and begin to identify patterns of experience within them. These recurring patterns were then assigned a label or code coined by the researcher. Miles and Huberman (1994) warn about the possible pitfalls of this method if the researcher attempts to identify patterns too early on in the

process, resulting in inadequate labelling of the data within the pattern. In order to counteract this effect, more general meanings were applied during initial analysis and, through an iterative revision of these potential codes as the study progressed, a final set of refined codes was established. Figure 4.3 provides a sample of coded text obtained from this study.

I was very keen (to acquire the computer) **[IF-ACQ-POS]**, *because I was interested for two reasons: one is information; and the other is communication* **[RSN-E-BEN]** *because, for example, my sister lives in British Columbia in Canada, and I just shoot photographs to her* **[BEN-SOC-COM]**. *(…) I take them on my digital camera, download them* **[BEN-FCT-LNK]** *and then send them all round the family* **[BEN-SOC-COM]**.

Figure 4.3 Example of coded response to Q3.6 (participant O05)

As an example of a final code, taken from Figure 4.3, **[BEN-SOC-COM]** is comprised of 'benefits', which is the category; 'social' is a second-order code; and 'communication' is the first-order code. The coding table can be seen in full in Appendix D.

Themes should describe relevant data as it relates to the research questions, but determining what constitutes a theme is tricky and relies on researcher judgement. Braun and Clarke (2006, pp. 82) state that 'ideally there will be a number of instances of the theme across the data set, but more instances do not necessarily mean the theme itself is more crucial'. Instead, these authors suggest that identifying themes is a question of 'prevalence' and that prevalence can be established in various ways, including counting at the level of the data item, counting in terms of participants who articulated the theme and counting each individual occurrence across the data set. However, as with Clarke and Kitzinger (2004, cited in Braun and Clarke, 2006), thematic analysis in this study was content-driven and thus no attempt was made to quantify occurrences. Final themes were taken to demonstrate the existence of meaningful constructs (Joffe and Yardley, 2003).

4.3 Results

Data analysis uncovered three overarching themes pertaining to the take up and use of technology: *commonalities* between older people and their younger counterparts; *specificities* of older people; and the role of *other people*. These

themes were developed by creating and refining maps, based on the codes listed
in Appendix D. Figure 4.4 represents a preliminary map for 'Reasons for
acquiring', with the category in the middle surrounded by its associated codes.
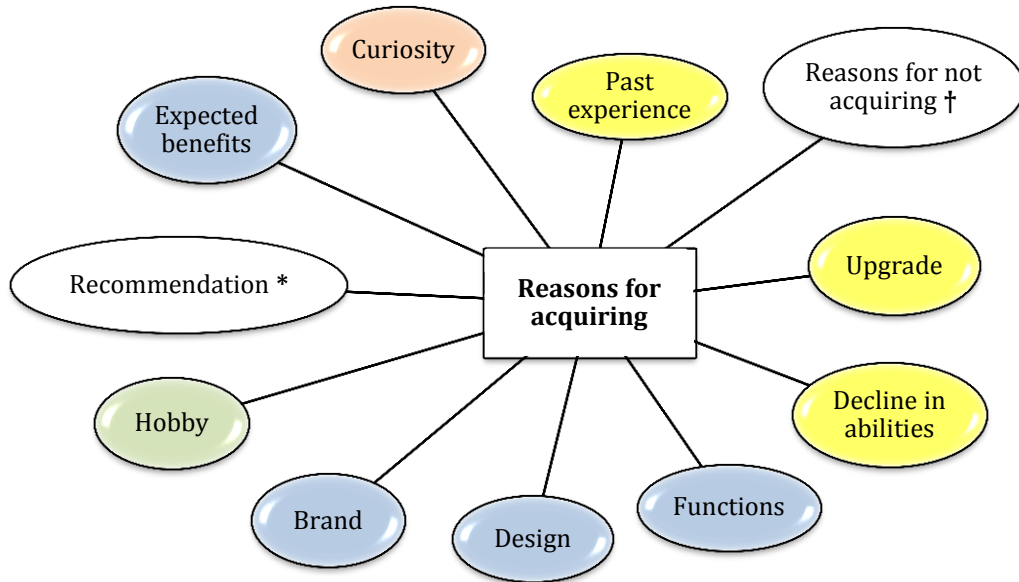
Figure 4.4 Initial map for 'Reasons for acquiring'

As illustrated in Figure 4.5, some codes were combined under broader
descriptors; for example, 'Expected benefits', 'Brand', 'Design' and 'Functions'
were grouped together under 'Product features'. Other codes were used to
inform new themes, such as the code 'Reasons for not acquiring' and the new
theme **Deliberation**.
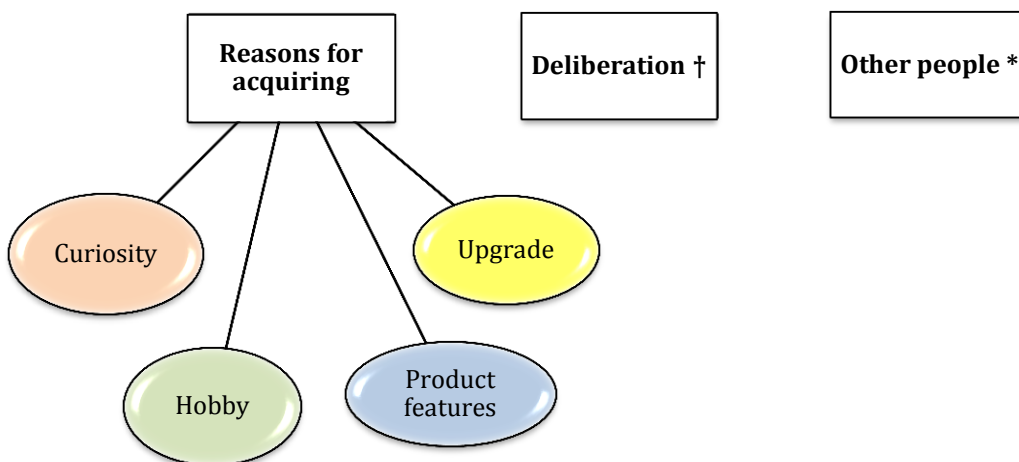
Figure 4.5 Development of the thematic map for 'Reason for acquiring'

This process required cross-comparison of the various code categories, with the aim of identifying patterns and relationships in the data. The final themes of this study are represented in Figure 4.6. The themes **Reasons for acquiring**, **Benefits** and **Barriers** represent original but refined coding categories, respectively numbered 3, 6 and 7 in Appendix D. **Variability** was derived from categories 1 ('Initial feelings'), 4 ('Experience') and 5 ('Use'). Within the second coding category ('Means of acquisition'), when contrasted to the emerging theme **Deliberation**, the code 'Impulse purchase' was deemed sufficiently interesting to warrant a new theme, **Impulsiveness**. The theme **Learning** was informed by elements of categories number 8 and 9, 'Coping strategies' and 'Out-of-Box Experience respectively. In the context of the research questions and the literature surveyed for this research, these themes were organised into two overarching themes: *Commonalities* across the generations, and *Specificities* of older people.

The existence across various categories of codes pertaining to the involvement of other people (e.g. 'Bought by someone else' in category 2, 'Recommendation' in category 3, and 'Had help from others' in category 8) was developed into the standalone theme *Other people*. This overarching theme contains **Motivation** , informed by categories 2 and 3; the **OoBE**, informed by categories 2, 3 and 9; **Coping**, informed by categories 8 and 9; and **Barriers**, informed by category 7. The subsequent sections present the results in more detail, structured according to these themes.
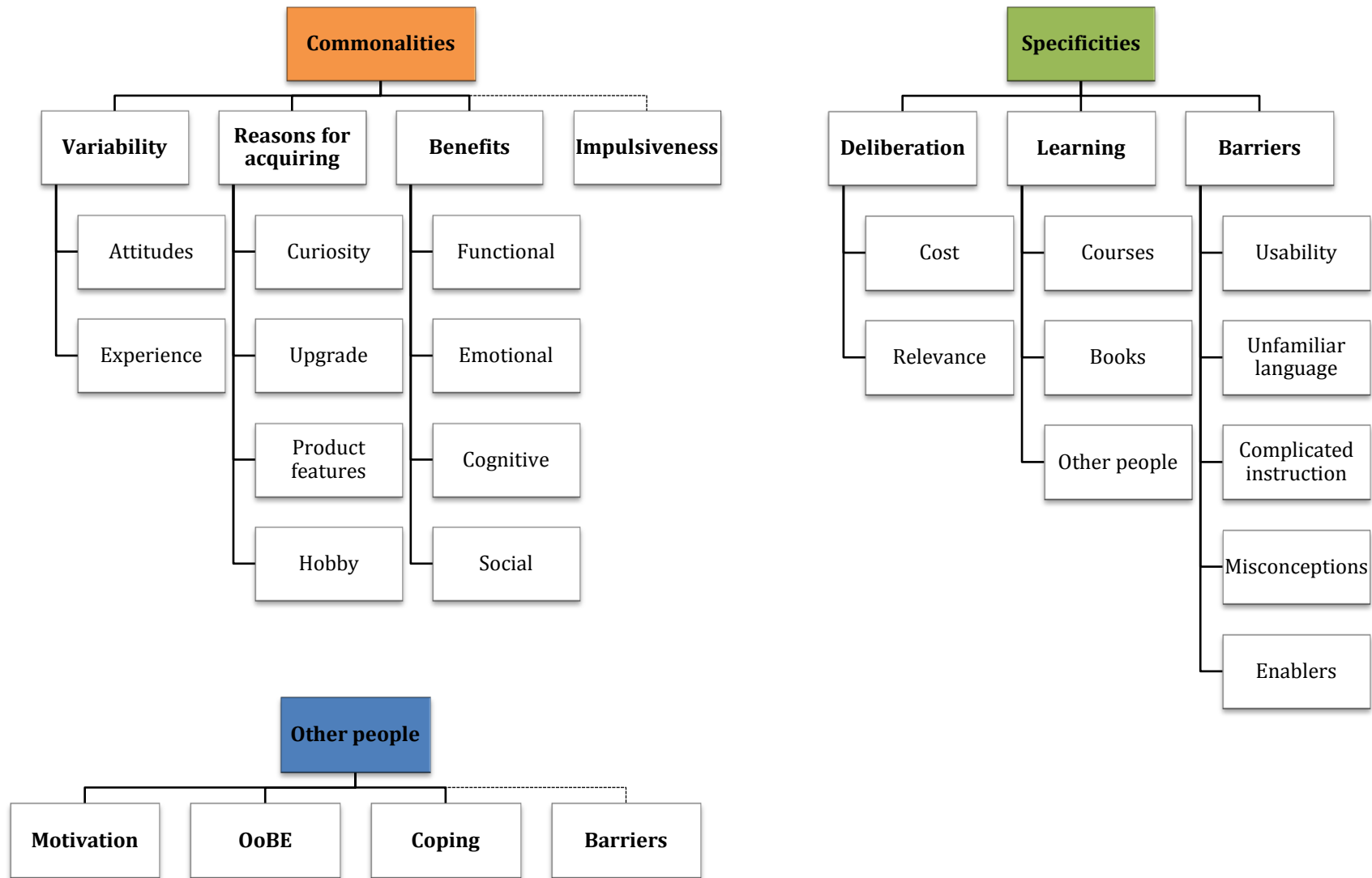
Figure 4.6 Thematic map

4.3.1 Participant characteristics

The sample for this study consisted of 24 participants, segmented into three age groups: 50 to 64 years old, 65 to 75 years old, and over 76 years old. As a group, they can be described as middle class, native English speakers, with post-secondary level of education or higher and in, or previously in, professional employment. Distribution of participants according to age and gender is recorded in Table 4.3.

Table 4.3 Number of participants according to age group and gender

	Male	Female	Total
50-64 years old	3	5	8
65-75 years old	4	4	8
Over 76 years old	5	3	8

In the 50 to 64 age group, ages ranged from 50 to 60 (M=53.88 and SD=4.16). In the 65 to 75 age group, ages ranged from 65 to 74 (M=66.63 and SD=3.07). All participants in these groups owned and used computers and mobile phones. In the 76 and over group, ages ranged from 77 to 85 (M=81.25 and SD= 2.19). In this group, all but one participant owned or had owned a computer. All participants in this group owned at least one mobile phone per household, occasionally shared with their partner.

Table 4.4 Y-participants aged 50 to 64

Participant	Gender	Employment	Education	Living arrangements
Y02	Female	Translator	College	With partner
Y08	Male	Retired (teacher)	University	With partner
Y12	Female	Teacher	University	Alone
Y16	Female	Translator	University	With partner
Y17	Male	Teacher	University	With partner
Y18	Female	Teacher	University	With partner
Y19	Male	IT manager	University	With partner
Y20	Female	Conflict management	University	Alone

Table 4.5 M-participants aged 65 to 75

Participant	Gender	Employment	Education	Living arrangements
M07	Male	Writer	PhD	With partner
M09	Female	Retired (bank teller)	College	With partner
M10	Male	Production manager	University	Alone
M13	Female	Retired (secretary)	College	With partner
M15	Male	Professor	PhD	With partner
M21	Female	Retired (school director)	University	Alone
M23	Male	Consultant (p/t)	University	With partner
M24	Female	Retired (teacher)	University	With partner

Table 4.6 O-participants aged 76 and over

Participant	Gender	Employment	Education	Living arrangements
O01	Male	Retired (schoolmaster)	College	Alone
O03	Male	Retired (draughtsman)	College	With partner
O04	Male	Retired (director)	College	With partner
O05	Male	Retired (industry)	University	Alone
O06	Male	Retired (engineer)	University	With partner
O11	Female	Retired (MI5)	Apprenticeship	With partner
O14	Female	Retired (teacher)	University	With partner
O22	Female	Retired (teacher)	College	Alone

The above tables show that in the younger age group, most participants were still working; in the 65 to 75 age group, half of the participants were retired; in the oldest age group, all participants were retired. Moreover, seventeen people in this sample lived with their partners. All participants had a minimum of post-secondary education, so no attempt was made to determine the impact of level of education on older people's feelings and experiences of new technology. No significant discrepancies were noted between male and female participants' responses.

4.3.2 Most recent, favourite and least favourite products

A number of different types of technology were discussed in this study. The computer was a favourite technology for many participants aged 50 to 64 (7 people) and 65 to 75 (5 people). While less frequent in the same category for the oldest age group (3 people), it came a close second to the television (4 people). Favourite technologies were praised for their functionality and what they allowed participants to achieve. Respondents in this study seemed to have

a noticeable antipathy towards DVD players (8 in total) but most people (11 participants) did not feel they had a least favourite technology, often explaining that they tended to own the type of products they liked to use. The results of 'most recent', 'favourite' and 'least favourite' technology for each age group are summarised in Table 4.7. These show the frequencies with which particular technologies were mentioned.

Table 4.7 Results for 'most recent', 'favourite' and 'least favourite' technology

	Most recent			Favourite			Least favourite		
	Y	**M**	**O**	**Y**	**M**	**O**	**Y**	**M**	**O**
Computer	3	3	2	7	5	3	-	-	1
Mobile phone	2	2	1	-	-	1	1	-	-
DVD player	-	-	2	-	-	-	3	3	2
Television	-	1	-	-	2	4	-	-	1
MP3 player	1	-	-	1	-	-	-	-	-
Digital voice recorder	1	1	-	-	-	-	-	-	-
Digital camera	-	1	-	-	1	-	-	-	-
Set-top box	-	-	1	-	-	-	-	-	-
Music system	-	-	1	-	-	-	-	-	-
Social networks	-	-	-	-	-	-	1	-	-
Printers	-	-	-	-	-	-	1	-	-
Power tools	1	-	-	-	-	-	-	-	-
Kitchen appliances	-	-	1	-	-	-	-	-	-

4.3.3 Commonalities

Participants in this study had varying levels of acceptance and enthusiasm towards the adoption of unfamiliar technology. As with younger generations, these participants bought new interactive devices out of curiosity, to upgrade a currently owned product, to take up or support a hobby, and were driven by product features. Likewise, they experienced common benefits from these products, including usability, emotional, cognitive, lifestyle and social benefits. Some older adults, namely those in the 50 to 64 age group, had an impulsive and exploratory attitude towards new technology.

4.3.3.1 Variability

The 50-64 and 65-75 shared the most similar responses regarding **attitudes** to new technology, but this might be explained by factors other than age. For

example, working status appeared to affect take up of new products, since retired people have more availability to explore unfamiliar technology. Even though people in this age group relied on technology for many of their daily activities, for some participants using these products was more of a necessity than a source of enjoyment. In the words of participant M10:

> *I use company computers and business systems and that's what my career has been, so the thought of coming back and sitting on the computer when I've got home from work…I just don't want to do it. I only use it when I need to use it, but when I retire I might find I want to do more things with it.*

Younger participants' familiarity with technology also made them more critical of product features and interaction. It was in these younger age groups that more negative feelings toward technology were expressed. Indeed, participants in the over 76 age group were generally more positive about technology than those in the other two groups. In terms of attitude towards technology, participant O06 remarked:

> *We're probably more vocal when we say 'oh, it is a nuisance', but we wouldn't be without it!*

The older adults who took part in this study had varying **experiences** with technology, from the positive and fun to the outright frustrating. Amongst the older participants, when encountering problems with technology, they felt that it was more likely to be their fault rather than technical issues with the device (participant O01):

> *One of the advantages of being the sort of person that I am is that if it does go terribly, terribly wrong I assume immediately that I have done it, so I don't get angry with the machine or the people who have sold it to me or anything like that.*

4.3.3.2 Reasons for acquiring

Overall participants acknowledged the potential of technology to support them in later life. Several participants mentioned **curiosity** about product capabilities as a driver for buying technology, including its potential role in keeping active and remaining autonomous. Participant O04 said:

> *We're quite keen about remaining agile from a brain angle*
> *but, physically, I don't think anybody is going to stop you*
> *getting older and less able to do things; so some of the things*
> *that are used by younger people as a luxury, for elderly*
> *people would make it easier to continue living in their own*
> *home.*

New products were also purchased as **upgrades** for technology the participants had previously owned. As with younger generations, **product features** guided the reasoning behind acquiring particular technology. For example, a less frequent but noteworthy theme was the importance of aesthetic attributes when choosing products, as illustrated by the response of participant O13 to why they had chosen a particular product:

> *...and the design. Design is very important to us.*

Participants in the oldest age group often mentioned taking up some form of technology, usually Information and Communication Technologies (ICT), as a **hobby** or as a tool to support existing hobbies after they retired.

4.3.3.3 Benefits

Perceived benefits played a determinant role in the take up of new technologies by older adults, and this finding held true across the age groups. In **cognitive** terms, participants in the oldest age group who own computers frequently reported the challenge of learning new things as an essential benefit, and valued this type of technology as a means of keeping mentally agile. For instance, while discussing the role of technology in households today, participant O04 observed:

> *This is where I think you only get involved in new technology*
> *when you need it, I think I am making more of an effort,*
> *gradually, to use the computer and learn a little bit more*
> *about it as I go along. So, in other words, it's a positive*
> *projection in a way, rather than just a passive projection –*
> *like when you get used to television and the DVD because*
> *everybody else does.*

According to this participant's views, 'positive projection' refers to technology that encourages people to learn and interact constantly, in other words, this type of technology is regarded as a challenge; the 'passive projection'

description identifies technology that maintains the same type of input and feedback over time.

All participants viewed technology primarily as tools for performing meaningful activities, focusing on the **functional** goals that interactive products enabled them to achieve. For example, for participant Y02 technology is a useful way of enhancing the way in which she communicates:

> *I was really pleased to find that my mobile phone links up to my computer via Bluetooth and so I can send text messages by typing them out on my keyboard. That makes it much easier to mix up languages, and quicker to send them. I can type much faster than I can text.*

Besides learning and communicating, some participants used technology for creative tasks (participant O06):

> *I've got a desktop publishing program that I can do all sorts of Christmasey decorative labels.*

Emotional benefits such as enjoyment from exploring unfamiliar interactive products were also mentioned in the younger age groups, though usually not regarding computers (participant M07):

> *Once I've gotten over the terror of learning about a new (digital) camera, I like playing with it.*

Finally, some participants mentioned the **social** benefits they gained from recruiting other people to assist them with new products. Older participants living on their own or couples whose children had moved away saw the process of setting up a new product as a chance to engage in social interaction, usually with family members. Participant O01 explained:

> *It's not selfishness, I like my family to feel they are needed.*

4.3.3.4 Impulsiveness

In contrast to those over 76 years old, younger participants were more likely to take an impulsive and exploratory attitude towards acquisition of technology. The novelty aspect of state-of-the-art interactive devices was more appreciated by people in the 50-64 and 65-75 age groups. This is evident in the explanation of participant Y02 for acquiring a new mobile phone:

> *I was sick of my old one, which was no fun to use, and I wanted a phone with an inbuilt camera.*

4.3.4 Specificities

Barriers reported in this study correlate with those anticipated from the literature, such as usability, unfamiliar language and overly complicated instructions. However, this study highlighted that misconceptions or a lack of information about the product may also affect technology adoption. The existence of enabling people, particularly in couples where one partner is more involved with technology, was also cited as a reason not to engage with technology. Older people are willing to make necessary investments to learn about a given product, but will generally weigh up the costs and benefits of this decision.

4.3.4.1 Deliberation

Most of the participants reported an interest in using technology and were willing to invest time in learning new skills, provided they felt it had some **relevance** to their lifestyles. For instance, when asked about products that they owned but never or only rarely used, a commonly cited reason for this rejection was that they had not felt the need to own that particular product but had been given it, usually by a family member. In the words of participant O14:

> *That (DVD player) they gave to us last Christmas and other people use, but I don't think I have ever used it...this is a typical case of one's children and grandchildren trying to bring one up into the 21st century! You see I have got loads and loads of videos, and I had my really nice old-fashioned video player that was fine for my use but they had to bring their own...*

Sometimes lifestyle changes mean that technology that was once perceived as beneficial stops being necessary, and the person no longer has an interest in continuing with its use. Participant O14 mentioned learning to use a computer for the first time when she began a Master's in her 70s, acquiring one second hand from relatives. She used the computer regularly as a word processor, but when she finished her studies and the computer became outdated she did not bother to replace it. As she explains:

> *Then it was so slow, so they (family) all said 'let's ditch this one and get you a new one' and we thought about it. And I thought no, I don't want a computer. People say 'oh it was very old, it was very slow – you won't have any trouble at all with the modern ones' but I thought no, I can live without a computer. I know a lot of people can't, but I can.*

It was more evident that participants in the over 76 group were less spontaneous with their acquisitions and owned fewer technological products, which were often selected after careful consideration. These participants cited being mindful about **costs**, such as finances and the environment, as reasons not to be frivolous when acquiring new technological products.

4.3.4.2 Learning

Participants in the over 76 age group were the most aware of the effort required from them to learn how to use new technological products. Nevertheless, these participants were also the most willing to invest time and effort in this activity (participant O01):

> *I knew I was building up problems for me – learning new techniques, learning this kind of stuff is difficult as one gets older but the fun of doing it made it worthwhile.*

For example, one participant in the over 76 age group (O06) explained that he borrowed **books** from the library or from family members to help him overcome problems with the computer. Several other participants had taken training **courses** before acquiring their first computer or mentioned an interest in doing so (participants O04, O05 and O14). A further mechanism used for learning was asking for help from **other people**, which helped participants to acquire new knowledge or gain confidence in knowledge they already possessed.

4.3.4.3 Barriers

Unfamiliarity, **complicated jargon** and **instructions** were cited as typical barriers to the uptake of new technology. Participant O01 remarked:

> *I find the vocabulary is not one that I recognise…in my day a monitor was a sub-prefect in school!*

The decline in physical and sensory abilities that occurs naturally with ageing was not mentioned as a deterrent to the use of technological products. On the contrary, participant O01 even cited this as a reason to upgrade existing products:

> *One of the problems I have with my eyes being aged was the fact that I wanted a larger screen.*

Analysis of responses to questions about their least favourite technological product revealed that **usability** issues play a central role in older adults' frustration with technology. DVD players were usually cited as a least favourite product and were compared unfavourably to VHS players. VHS players were considered simple to use, whereas the number of steps necessary to achieve the same goal with a DVD player were deemed overwhelming and unnecessary (participant O11):

> *I suppose we could not have the DVD player, we don't use that all that much. We still use the video, it's much easier to record something. It's so easy to record on the video, but they don't seem to be making them anymore. I wouldn't fancy that (DVD recorder) because I think that would be quite difficult to record on but obviously if you had to you would do it. While that (video) keeps going, we just do it on there.*

Another significant issue that arose was that participants did not always understand the benefits that a particular product may have for them. There were often **misconceptions**, particularly amongst the older participants, about the time and financial costs involved versus the positive outcomes that using technology could have for them. For instance, participant O11 felt:

> *I would like to be able to use a computer but I think that if you did you've got to go on this broadband thing, so you've got to pay every month and I can't see that we would use it enough.*

An interesting pattern emerged amongst participants who lived with their partners, which suggested that the presence of **enablers** negatively affected technology adoption. In these situations, it was almost an unspoken rule that

one partner dealt with technology-related issues, therefore the other did not bother.

4.3.5 Other people

An interesting theme to arise from this study was the role that other people play in the adoption and use of technology by older people. Specifically, other people provide motivation to take up a new product, they are often involved in the Out-of-Box Experience and, when problems are encountered, they are also part of the coping strategies.

4.3.5.1 Motivation

When asked about products that they do not own but might like to own in the future, there was consensus among the participants that they do buy the technology that they are interested in having and using. However, the decision to acquire new products is strongly influenced by other people, in particular family and friends. This theme appeared across the three age groups, but was most prevalent in the over 76 year olds (participant O04):

> *I mean the computer, I had a very slow start with the computer but then my granddaughter, who travelled extensively when she was at university, began to feel that it was worthwhile getting involved with the internet because, of course, I could keep in touch with her.*

4.3.5.2 The Out-of-Box Experience

Throughout the age range, choice of what product to purchase or product specifications usually had input from a third party like a relative, close friend or occasionally from shop assistants. In some cases this role was extended to the actual purchase of the product (participant O01):

> *(The computer) was ordered by a friend who knows these things. It was ordered online, it was delivered to me, it was charged to my card.*

Once they have acquired the new product, most participants (14 out of 24) said they would avoid unpacking and setting it up themselves. Three main reasons were given for preferring someone else to unpack and install new products: speed and efficiency, a learning mechanism, and an opportunity to spend time

with others. In the first case, there was the belief that the participant would not be able to do an adequate job and relying on someone else would ensure the process was done quickly and capably (participant Y02):

> *I got my son to sort it out. I knew what I wanted to be able to do, but it would have taken me a lot longer and probably I'd have messed things up and got annoyed. I reckon that we all have things we can do, and like doing, and we should do those and get other 'experts' to do their things!*

4.3.5.3 Coping

Another reason for involving other people in the OoBE was related to people's coping mechanisms when dealing with an unfamiliar device. In these cases, having someone else present for the installation of new interactive products serves as a way to learn about unfamiliar devices and build confidence about using them. Participant O13 stated:

> *When we buy something new, setting it up is something we would normally avoid. Something major like a computer and a television, we would be prepared to pay to have somebody do it so I could ask questions and learn how to use it.*

4.3.5.4 Barriers

In some couples one partner took a more active role regarding technology, while the other was more passive or avoided technology. This theme occurred across the age ranges but was more noticeable in the over 76 age group. Participant O14 mentioned how he had used this kind of strategy at work, before retiring:

> *I had a computer in my office, but I never used it. It was used all the time. My secretary learnt the computer, so anything I wanted she would find for me. I was lazy, I never learnt because she was always there to do it for me. But it is quite useful, very useful for design. Even like 20 years ago I realised the importance and had them installed.*

This type of attitude did not appear to be gender specific, but rather a reflection of individual personalities and relationship dynamics. To illustrate, participant O05 said:

*I've got a friend who has the most marvellous garden but he
was only boasting on Sunday that he didn't have the...he's
just lost his wife and he doesn't know how to use anything –
she'd got all his plants listed on the computer, but he doesn't
know how to find them. He was almost boasting that he
didn't know how to use it (the computer).*

4.4 Discussion

The findings indicate greater acceptance of technology by older adults than
expected from the literature, which overwhelmingly highlights the barriers
experienced by this sector of the population (e.g. Goodman et al., 2003; Czaja et
al, 2006). The discussion of these results focuses on the context of older adults'
motivations to use technology, and how their expectations and aspirations
affect the uptake of these products. By taking this approach, the study highlights
the diversity that exists in these age groups and uncovers new design
opportunities.

4.4.1 A diverse population

This study set out to investigate the variability that exists within the older
population concerning technology adoption and use, which is widely
acknowledged among other age groups. Responses about benefits attained from
using technology point to common reasons for the use of interactive consumer
devices, such as sociability, efficiency, and enjoyment or entertainment. These
findings support the theory proposed by Monk (2004), who states that universal
requirements exist across generations.

Neither age nor gender appeared to be determinant factors in technology
acceptance, in concurrence with Peacock and Kunemund (2007). Less
enthusiastic responses about technology were usually in the 50-64 or 65-75 age
groups (e.g. feeling negative or neutral towards technology in general, not
enjoying interacting with new technology). This is not surprising since many of
these individuals use or have used technology in their jobs and, therefore,
equate it with work. In contrast, participants over the age of 76 who reported an
enjoyment of technology had taken it up as a hobby or a challenge.

Whereas participants aged 50-64 and 65-75 might buy technology out of curiosity or for the enjoyment of playing with a new device, participants in the oldest age group make fewer and more considered purchases. This supports findings by Melenhorst (2002) who observed that older adults were more likely to weigh costs, benefits and relevance to lifestyle before acquiring new technology.

These differences in attitudes underline the importance of motivation for older adults, and suggest that life stage and lifestyle have a strong impact on their use and adoption of new technologies.

4.4.2   The importance of motivation

Participants in this study generally held positive attitudes to new technology, though experience with using unfamiliar devices and self-efficacy beliefs varied within the sample. It is anticipated that this variety in terms of ability is representative of older adults in general and, despite younger generations becoming more and more computer literate, it is likely that this finding will hold true in the future as unforeseen developments in technology and interaction styles occur.

Applying the Fogg Behaviour Model (2009) to the large proportion of participants who reported a high motivation to use technology, combined with the varying degrees of ability which exist, triggers are required to facilitate and prompt interaction with new products. This implies a challenge for designers to create Facilitator-triggers to build older adults' confidence to interact with new technology and Signal-triggers that would prompt them to engage more with these products. An everyday example is a button on a website that allows access to content that had not been initially considered. This calls for a deep understanding of what motivates technology-related behaviour among this segment of the population.

Contrary to what is proposed in this model, this study shows that attempting to trigger behaviour when motivation does not exist naturally is futile. In addition to being a possible source of irritation (Fogg, 2009), Spark-triggers may be ineffectual. Low motivation to adopt technology can be due to a lack of information about the product. This means designers need to clearly

communicate products' benefits and barriers, taking into account older people's lifestyles and aspirations.

4.4.3 Relationships with technology

The experiential categories of product relationships proposed by Battarbee and Mattelmaki (2004) can be used to further understand people's motivation to use products. Table 4.8 summarises the categories of older adults' relationship with technology that emerged from this study.

Table 4.8 Categories of product relationships and examples from this study

Category of product relationship		Example(s) from the data
Meaningful Tool	Facilitator	Using the computer for online banking
	Challenge	Using a computer and the Internet for the first time
	Self-expression	Using the computer to edit newsletters, design cards and create decorative labels
Meaningful Association	Identity	Choosing a digital camera because of the brand, as well as the specifications
	Style or taste	The importance of the design when choosing a new mobile phone
	Link to the past	Keeping a mobile phone that is less easy to use because it was a gift from a grandson
Living Object		Talking to the computer, asking it for things and scolding it when it 'acts up'

The important role of technology as a means to achieve goals was indicated by responses about expectations of and benefits attained from products, in particular when discussing favourite technology (c.f. Table 4.7, page 77). This provides evidence for its role as a Meaningful Tool in older adults' lives. Value was also placed on the aesthetics of a device, the brand and its personal significance; in this case the relationship is one of Meaningful Association. Some participants mentioned attributing human traits to a particular device and even

interacting with it as they would with a person, by talking to it or caressing it. The occurrence of this Living Object relationship could be explained by the fact that interaction styles and language used nowadays in ICT often mimics human behaviour.

As suggested by Battarbee and Mattelmaki (2004), these categories of product relationship often happen concurrently, indicating a layered and complex relationship with a product. The existence of Meaningful Tool relationships with technology reiterates that the usability and relevance of a product is paramount to older adults. Nevertheless, the occurrence of Meaningful Association and Living Object relationships reveals an opportunity for designers to encourage stronger feelings of affinity with technology through design.

4.4.4 Coping and overcoming barriers

Based on responses about least favourite products, this study confirms the concerns of Jordan (2000), who highlights the negative impact of a lack of emotional and hedonic benefits when using products. Many participants did not use or even own a microwave, even though they were aware that it could be time saving, because it eliminated sensory feedback and enjoyment which they felt was an important part of preparing food.

When asked about products that they do not currently own but might like to own in the future, all participants said that if there were a product they wanted they would buy it; this implies that older adults do not feel hindered by unfamiliar interactive devices. However, most participants reported that product functions were not always clear and they felt they did not use some products to their full potential. A significant pattern that arose from this study was the difficulty in setting up new products. Given the choice, participants would rather someone else set the products up for them. But, as it is not always feasible to rely on other people to perform this task, it is suggested that improvements at this level could encourage the take up of new technology among a wider user group.

Typical barriers mentioned, like unfamiliar language and complicated instructions, coincide with those identified by Czaja et al. (2006) and Goodman et al. (2003). However, contrary to what has been suggested by Kang and Yoon (2008), age-related decline in abilities was not mentioned as a deterrent to the

use of technological products and was even cited as a reason to upgrade existing products. As an example, one participant upgraded his computer monitor because he found it increasingly difficult to read information on a smaller screen.

Participants' interest in using technology and willingness to invest time in learning new skills, demonstrated for example by taking computer courses before acquiring their first computer, show that it is important for perceived benefits to outweigh the costs associated with an unfamiliar technology. These findings are backed by Melenhorst (2002), who discussed the key role of clearly outlined benefits in older adults' motivation to use new technological products. If barriers are encountered, two styles of coping strategies were identified in this study. On one hand, participants took action to overcome the barrier to their use of a given product. Examples of this approach include researching the problem or labelling cables on a device to enable them to disconnect and easily reconnect them.

On the other hand, participants mentioned coping with the emotions generated during interaction with technology, without necessarily addressing the cause of their problem. Other people were crucial participants in older people's coping strategies, to provide both technical support with the problem and emotional support in a wider context.

4.4.5   Sharing experience

A strong theme which emerged from the data analysis was the role of social benefits in older adults experience with technology. Focusing specifically on the Out-of-Box Experience (OoBE), participants mostly agreed that they prefer someone else to set up or install a new device whenever possible, as illustrated in Figure 4.7.
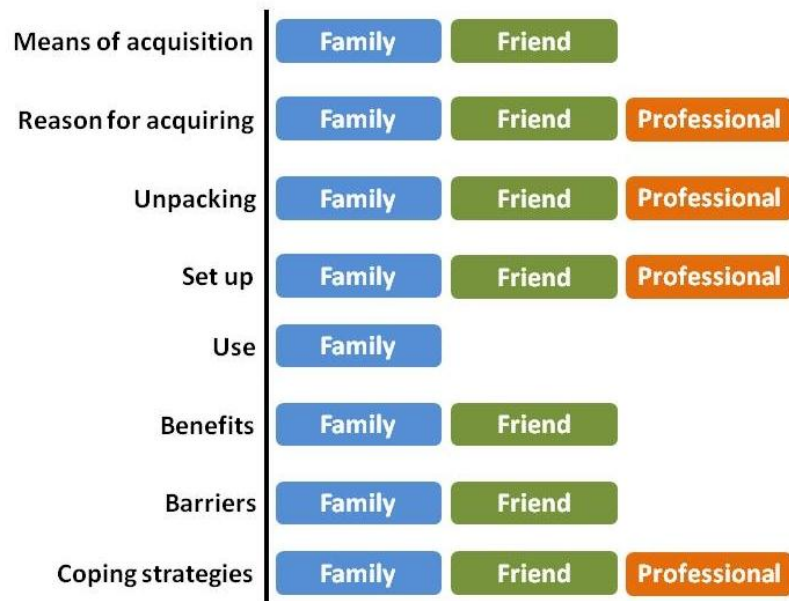
Figure 4.7 Other people involved in the OoBE

This desire to involve other people in product interactions corresponds to what Battarbee (2004) calls co-experience. Contrary to what might be expected, this attitude was not necessarily influenced by ability since a number of participants who viewed themselves as proficient with technology shared this view. No measure was employed in this study to determine participants' ability to use technology, therefore reported self-efficacy beliefs and computer anxiety were taken as meaningful indicators. Table 4.9 categorises participants based on confidence with technology and social engagement during the early stages of interaction with a new product.

Table 4.9 Types of personality regarding OoBE

	Lone Beginner	Lone Expert	Social Beginner	Social Expert
Self-efficacy beliefs	Low	High	Low	High
Computer anxiety	High	Low	High	Low
Involvement of others	Low	Low	High	High

Czaja et al. (2006) state that computer anxiety and self-efficacy beliefs regarding the use of computers are important predictors of technology use. Yet this study revealed that other people significantly affect the take up of technology by older people. Three main reasons were given for preferring to prefer company during the OoBE. Firstly, some participants mentioned that other people would set up the product faster and more effectively; this reason relates to issues of computer anxiety and self-efficacy beliefs already identified in the literature

(Czaja et al., 2006). This type of response occurred across the range of confidence to use technology, but was prevalent among Social Beginners who are less familiar with technology.

A second reason given by Social Beginners, but also by Social Experts, was that the presence of another person gave them an opportunity to learn by observing the process and asking questions. Lastly, participants identified as Social Beginners and Social Experts said that acquiring a new technological product provided them with an opportunity for social interaction. These findings strongly suggest that older adults gain social benefits from the OoBE of new technology.

Few participants would voluntarily engage with a new technological product on their own. However, with more and more older people living on their own, having someone present during the first stages of interaction with a new device is not always going to be practicable. This presents a design opportunity to create products or services that incorporate social benefits into the Out-of-Box Experience and consequently encourage the uptake of technology by older adults.

4.4.6   Critique of the study

In general, the Technology Biography was an effective method of eliciting information, as the participants were enthusiastic to share stories about the products they own. This correlates with findings by Blythe et al. (2003), who stated that this method provides an engaging way of opening up a dialogue with user groups that are difficult to research by other means.

Since participants were prompted to talk about favourite and least favourite technological products, they felt more comfortable to share negative feelings towards certain products but were also encouraged to reflect on the positive aspects of technology. The technology tour provided a valuable means of establishing rapport between the researcher and the participants because, by emulating the feeling of showing a friend round the house, the conversation was kept informal and participants were less likely to feel they were being evaluated. However, two participants were unable to fully perform the technology tour due to mobility issues. This exposes a potential limitation of using this method to conduct research with people who have certain disabilities or chronic illnesses.

Another possible drawback of this method is its intrusive nature. One participant was excluded from this study, because she did not feel comfortable enough to allow an unfamiliar person in her house and make recordings. It is therefore crucial to establish sufficient trust between the researcher and participants beforehand.

The sample for this study comprised people with post-secondary education or higher, a reasonable income and familiarity with ICT. For this reason, these findings may not be applicable to other populations. Nevertheless, it is argued that these findings provide relevant contextual information to improve the design of products and services for older people.

4.5 Conclusion

The combination of a rapidly ageing population and society's growing reliance on technology presents a significant challenge for designers to create products that meet the needs and expectations of increasingly diverse users. This study focused on understanding older adults' barriers and motivation to use new technology, with a view to uncovering opportunities for meaningful design interventions. The main findings from this study are:

- There are universal requirements from technology, which include sociality, efficiency, and entertainment or enjoyment. As with younger generations, technology can offer functional, emotional, cognitive and social benefits to older people.

- Although older people experience barriers to the use of unfamiliar technology, they do invest time and effort in overcoming them provided they perceive relevant benefits from using the new product.

- Product benefits, in particular those concerning older people's lifestyles and aspirations, must be clearly communicated to intended users. As a person's first experience of a new product, the OoBE has the potential to emphasise and enhance its benefits.

- Other people strongly influence the adoption of new technology by older people. Even people who have high computer anxiety and low self-efficacy beliefs will take up new technology when encouraged or recommended by family and friends.

- Older people often involve others in the OoBE. They actively seek advice from family, friends and professionals, and involve them in setting up the new product or service whenever possible.

- Reasons cited for involving other people in the set-up of new products include speed and effectiveness, which generally relate to self-efficacy and computer anxiety. However, some people like to involve others in this process as a means to learn and build their confidence for future interactions with the product.

- Older people sometimes use the OoBE of new technologies to fulfil non-product-related needs. Acquiring or setting up new products provides an opportunity to engage socially with other people. This has strong implications for Inclusive Design, as designing social benefits into the Out-of-Box Experience could encourage the uptake of technology by older adults.

- However, couple dynamics may prevent an older person from using technology. In some couples, a partner who is more confident with technology may play a more dominant role in its use and thus unknowingly dissuade the other partner.

5 Probing independence

This chapter describes the rationale, development and results of a probe study into older adults' perceptions of dependence and independence. Results indicate a complex interplay of factors affecting older people's feelings of independence which were used to construct a framework to identify how design can promote rewarding social experiences, particularly in relation to the use of new technology. Finally, the benefits and drawbacks of probe kits as an inclusive design research method are discussed.

5.1 Introduction

5.1.1 Background

Independence is one of the cornerstones of Inclusive Design and remaining independent is often listed as one of people's goals in later life. Older people value being able to make their own decisions and perform tasks for themselves. Nevertheless, findings from the previous study revealed there are situations when they enlist other people to participate in a task, regardless of their ability to perform it themselves. This hints at a disparity between the definition of 'independence' traditionally assumed in the Inclusive Design literature and older people's own perception of 'independence'.

For Keates and Clarkson (2003), independence is closely linked to a person's ability to perform key and instrumental activities of daily living (ADLs and IADLs) such as bathing, dressing, cooking, communicating with others and taking part in other aspects of communal life. Though the importance of being able to perform these activities cannot be disputed, this definition fails to address situations where people choose to involve others in their activities. Surprisingly, there was little information about subjective feelings of independence and how to foster them through design. Models that addressed

the factors affecting feelings of independence were found in social sciences literature on disability (Gignac and Cott, 1998; Reindal, 1999; Specker et al., 2003). Even though some analogies can be drawn with disability, the gradual decline in abilities brought about by ageing does not necessarily impede older people from leading healthy and active lifestyles. What is more, they are more likely to experience significant life events (e.g. retirement, chronic illness, bereavement), which have not been contemplated in these models.

In a review of the literature on the disability, Specker et al. (2003) confirm that independence is predominantly characterised by an absence of dependence on others to perform daily activities. The implication of viewing independence and dependence as antonyms, and therefore as conflicting positions, is that a person must be either fully independent or completely dependent in each domain of their life. In reality, a person's sense of independence often fluctuates and is shaped over time according to individual perceptions and experiences.

It has also been suggested that society's negative outlook on dependence and the resulting emphasis put on self-reliance appears to be strongly rooted in British and American ideology, and may not be valid for other cultures (Specker et al., 2003). This view is echoed by Wilcox (2009) who feels that researchers and designers might not be addressing the real life issues of today's multilayered ageing society.

Figure 5.1 illustrates a two-dimensional model of independence proposed by Specker et al. (2003), which separates individual feelings of independence from a person's reliance on others to perform certain activities. This model also accommodates variations across cultures, where dependence on others might be a desirable trait for older adults.
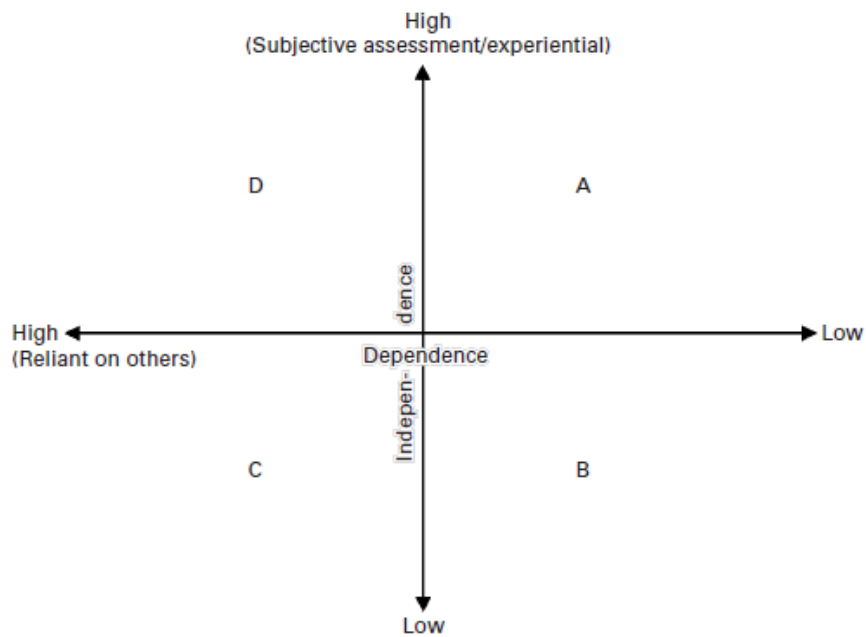
Figure 5.1 A two-dimensional model of independence (Specker et al., 2003)

If independence were to be conceptualised solely in terms of personal ability to perform tasks, the change in abilities which people experience as they age would almost certainly doom them to a steady and unavoidable loss of independence. Moreover, this would mean that a person whose disability requires them to have assistance for certain tasks is denied the right to ever experience feelings of independence. But it seems that independence is tempered by choice and maintaining a meaningful social identity and role (Specker et al., 2003). This attitude towards independence is shared by people with disabilities, whose emphasis is not on the ability to do things unaided but rather on socio-psychological decision making (Reindal, 1999). Departing from the traditional dependence-independence dichotomy, and recognising all human beings as vulnerable on some level, expands the definition of personal autonomy to incorporate interdependence.

Regarding the control that people have over their feelings of independence, Gignac and Cott (1998) identify four combinations of independence and dependence. Firstly, they suggest that individuals who do not need assistance and do not receive assistance are 'independent'; situations of 'imposed dependency' occur when a person does not need assistance but receives it nonetheless; 'not independent' refers to individuals who need assistance but do not receive it; and finally, a person is 'dependent' when they receive necessary

assistance. It is hypothesised that even though their model was developed for adults with chronic illness and physical disability, it may provide insights into the older population who experience a gradual and unpredictable change in their abilities over time. Figure 5.2 schematises the main elements of this model.
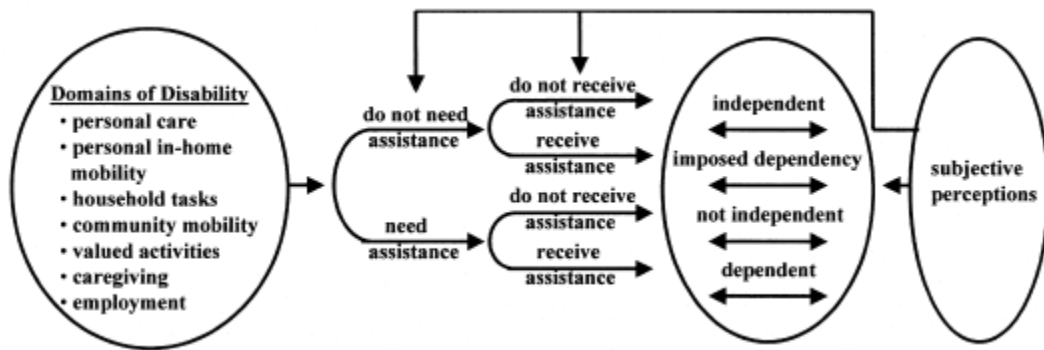
Figure 5.2 A model of independence which considers the role of personal perceptions (Gignac and Cott, 1998)

According to this model, feelings of independence are affected by factors like the difficulty of the task and the nature of the relationship between the individual and the person providing assistance. These should not be mistaken for causes of dependency, which could include sudden disability or illness, personality, and social or cultural expectations.

An issue that arises is whether coping strategies, like modifying the way in which a task is performed or reducing the amount of time spent on an activity, influence individual feelings of independence. Interestingly, Gignac and Cott (1998) found that the use of assistive devices may lead to feelings of increased dependency, despite the fact that the equipment enables certain tasks to be completed without relying on others. Contributing factors to this are feelings of resentment and loss of control, and the type of device which may be seen as stigmatising. Findings from the ELDer project support this view, as this research revealed several examples of older people who chose to radically alter their behaviours and lifestyles rather than use an assistive device (Hirsch et al., 2000). Conversely, there are situations where a person who requires and receives help maintains their feelings of independence, such as a person who is unable to do housework and hires someone else to do it for them.

The role of two-way relationships in creating feelings of independence is further explored by Payling (2003), who emphasises the importance of social networks and the sense of making a contribution to other people's wellbeing. In a study

conducted among people with experience of disability or of caring for a person with disability, the researcher observes how even the slightest sense of give-and-take positively affected participants' perception of independence. Furthermore, participants reported that the greatest barriers to independence were created by other people's expectations and attitudes.

More recent research, looking at the social context in which older people interact, has reached similar findings. For example, some participants in a study on how older adults cope with the difficulty of jar opening revealed that they use packaging as an excuse to engage socially with other people and to enable them to feel helpful (Yoxall, 2010). On a larger scale, the Networked Neighbourhood project in Berlin focuses on facilitating shared experiences through the use of Information and Communication Technologies (ICT), particularly among senior citizens (Gollner et al., 2010). This study identified a variety of neighbourhood services which were likely to be shared, ranging from the everyday, such as transport or home repair, to more specialised ones such as tutoring or computer repair. For Hirsch et al. (2000), this balance between independence and social engagement defines quality of life in later life. These two factors sit within the WHO broader framework of quality of life measurements, which includes the four dimensions: physical, psychological, social and environment (Skevington et al., 2004).

Chapter 4 established that, given the choice, older adults often decide to involve other people in the various stages of their interaction with new technology. On the surface, this finding seems at odds with the essence of Inclusive Design, which has always been an advocate for independent living. Yet maybe the problem lies with how 'independence' is defined – usually taken to mean a lack of reliance on others – and how it is actually perceived by the older population. As society changes, there is a need for the traditional concepts of Inclusive Design to be revised and redefined according to the current reality (Donahue and Gheerawo, 2009; Wilcox, 2009).

5.1.2 Aim and objectives

Despite its significant personal and social value, independence remains an ill-defined concept. As traditional assumptions from the Inclusive Design literature are being challenged and the concept of Inclusive Design evolves to address the

ever-changing realities of today, it is important for researchers and designers to ask themselves whether they are fully catering for modern day wants and needs. The aim of this study was to understand how older adults perceive independence, dependence and interdependence. To achieve this, the study was guided by the following questions:

- How do older adults define dependence and independence?
- What factors particularly foster a feeling of dependence or independence for older adults?
- What related factors influence the desire for social interaction?
- What are the implications of these findings for Inclusive Design, in particular for the design of the technology?

5.2 Study rationale

Issues pertaining to dependence and independence may be considered personal or sensitive, particularly among older people who are dealing with chronic illness, caring for a partner, or who have been recently bereaved. Accordingly, this study was divided into two stages of data collection. The first stage of the study used probe kits, thus handing control of data collection to the participants and permitting insights to be obtained in an unobtrusive way. The material generated through the probes provided inspiration and information, but also served to open up a dialogue on the issues under study. The second stage of the study was a follow-up interview with the participants to discuss responses to the probe kit activities.

5.3 Method

5.3.1 Overview

Probes are a user-centred design method through which people actively contribute to data collection. Typically they include materials that invite and provoke participants to document their experiences, thoughts and feelings. These probe kits are a departure from traditional ethnographic self-documentation techniques, which generally aim to be as inconspicuous as possible. The method was pioneered in the Presence project as 'cultural probes', where the focus was on creating a dialogue between designers and the senior citizens they were investigating (Gaver et al., 1999). The vague and fragmented

materials produced were viewed as a means to inspire designers to generate new ideas and thus no attempt was made by Gaver and his colleagues to formally analyse the results.

Since their origin as an artistic and experimental mechanism, probes have been tailored for new, often more analytical purposes. Crabtree et al. (2003) adapted the probes method for a research project that aimed to develop technologies to support groups with a range of needs. Even though the packs contained similar materials to those used in the Presence project (e.g. postcards, maps, disposable camera), here the primary purpose of the probes was to inform design rather than to inspire design. In the interLiving project, Hutchinson et al. (2003) took the concept of probes a step further with what they termed 'technology probes'. These researchers installed a technology into a real use context, observed how it was used, and reflected on this to gather information on its users and to inspire future designs. In essence, this type of probe seeks to gather information from social sciences, technology and design perspectives. Other examples of customised probes include 'empathy probes' (Mattelmaki and Battarbee, 2002), 'mobile probes' (Hulkko et al., 2004), 'photograph probes' (Nieminen and Mannonen, 2005) and 'urban probes' (Paulos and Jenkins, 2005).

A comprehensive survey of the evolution of this method is provided by Mattelmaki in her thesis Design Probes (2006). This author summarises the four reasons for applying probes as inspiration, information, participation and dialogue. Table 5.1 establishes the characteristics for the four purposes of the probe method (after Mattelmaki, 2006).

Gaver et al. (2004) express concern at taking a scientific approach to handling probe results, but to achieve any goal beyond inspiration it becomes necessary to interpret returned materials in some way. Mattelmaki (2006) agrees insofar as the collected materials are often subjective and unfocused, and therefore best applied during the fuzzy front end of the design process. According to Mattelmaki, it is essential to plan how probe materials will be handled by defining an interpretation model contingent on the purpose and context of the probes. So, if the probes are intended to provide information, the material can be compiled into summaries of the phenomenon under study; probes for participation often feed into future scenarios or concepts; probes aiming for

dialogue focus on creating a discussion throughout the entire probing process; probes for inspiration can be used as raw material to stimulate new ideas.

Table 5.1 Reasons for applying probes

	Inspiration	**Information**	**Participation**	**Dialogue**
Reason	• Inspire designers	• Frame challenges	• Empower users and innovate	• Involve organisations into dialogue
Scope	• Exploratory perspectives • Applying design skill • Orienting towards design	• Focus on individuals' contexts • Descriptive	• Predictive • Field of design interest focused	• Subjective perspectives • Orienting towards users' context
Special	• Self-documenting to trigger new views and opportunities • Designerly ideation	• Used together with other methods	• Prototypes and/or self-documenting to spark ideas and novel patterns of interaction	• Design team sessions for adjusting and sharing interpretations
Results	• Visual impressive material • Concept design ideas	• New questions • Focus to other approaches • Outlines	• Expression of needs • Design opportunities • Interaction patterns	• User representations • Design empathy • Collaborative learning

5.3.2 Materials and procedure

Traditional tools of self-documentation include diaries, disposable cameras, maps, open questions, collage and drawing tasks. The selection of the tools used in this study was influenced by a determination not to make the probes seem daunting and put people off participating from the outset. Another factor shaping the design of the probe materials was the desire to persuade participants to express themselves creatively, whether or not they perceived themselves as 'creative'. As a result, the kits comprised four clearly labelled elements: postcards, a map, a disposable camera and open questions. The packs also included a letter explaining what the study involved and working materials, such as pens and stickers. Participants were encouraged to do as much as they felt comfortable with and use whatever means of expression they enjoyed (e.g. words, poems, collages, drawings).

The design of the self-documentation tools was guided by the four levels of creativity described by Sanders and Stappers (2008): doing, motivated by productivity; adapting, motivated by appropriation; making, motivated by asserting an ability or skill; and creating, motivated by inspiration. This framework embraces and promotes the philosophy that all people are creative, but on different levels. Incorporating this philosophy into the probes use in the present study allowed people to respond at different levels, by using different probe tools. Table 5.2 identifies the tools used in this study, their purpose and associated level of creativity.

The first tool consisted of two postcards, which asked the participants:

- What comes to mind when you think of DEPENDENCE?

- What comes to mind when you think of INDEPENDENCE?

The second tool was a map with activities, to which participants had to add themselves (in the centre) and use the provided stickers to show who else participates in each activity. The proximity of each sticker to the centre of the map, i.e. the participant, indicates how often that person takes part in that activity; this means the further away a sticker is from the inner circle, the less that person takes part in the activity.

All six activities defined in this map were Instrumental Activities of Daily Living (IADLs), but some necessarily involved technology (choosing a computer, setting up a computer) and others could be facilitated by technology (cooking, shopping, banking, booking a holiday).
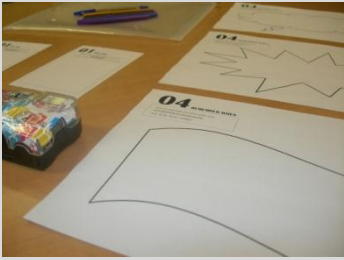
The instructions on the disposable camera requested participants to take photos of things that:

- they like doing with other people

- they like doing alone

- they need help doing

- they do with someone else even though they do not need to

- they like to help other people do

- they do the same way today as when they were younger

- they do differently now from when they were younger

- they used to do but do not anymore

- make them feel independent
- make them feel dependent

The participants were asked to write down the number of the exposure next to the sentence it corresponded to, enabling more than one example to be given and the photographs to be taken in any order.

Table 5.2 Elements used in the probe kit

Tool	Heading and purpose	Level of creativity
01. Tell Me postcards	**What comes to mind when you think of DEPENDENCE?** **What comes to mind when you think of INDEPENDENCE?** Determine what participants associate with 'dependence' and 'independence'.	• Doing
02. Social map	**Add yourself to the map in <u>the 'this is me'</u> circle. Use the stickers provided to show <u>who else</u> might take part in the activity with you.** Identify what types of activities are likely to be shared with other people, and who these people are.	• Doing • Adapting
03. Camera	**Please take photos that represent something suggested by the prompts on the back of the camera.** (full list of prompts pages 101-102) Gather examples of certain types of activities.	• Making • Creating
04. Remember When	**Give an example of a time when you <u>needed help but didn't ask for it</u>.** **Give an example of a time when you <u>asked for help even though you didn't need it</u>.** **Give an example of a time when you <u>provided help to someone else</u>.** Elicit examples of real experiences through storytelling.	• Creating

Forlizzi and Ford (2000) explain how stories provide a means to organise and remember experiences, in a way that enables them to be communicated to others. Storytelling is a natural technique for constructing and sharing experiential meaning. In this study, this technique was used to explore examples of what Gignac and Cott (1998) termed 'imposed dependency' and 'not independent'. A third question was designed to investigate whether perceptions of dependence and independence held true when providing help to others. The questions were further intended to facilitate conversation in the follow-up interview about the relationships with the people mentioned in the stories, their expectations and attitudes (c.f. Payling, 2003; Yoxall, 2010; Hirsch et al., 2000). The final tool in the probe kit comprised three sheets, soliciting example stories of when the participant:

- asked for help even though they did not need it
- needed help but did not ask for it
- provided help to others

The probe kits (see Figure 5.3) were piloted and hand delivered to nine participants. A brief explanation of the study was given to each participant when they received their probe kit. The researcher arranged to collect the materials, once the activities of the pack had been completed. After the photos had been printed and all materials had been provisionally analysed, the researcher followed up with a semi-structured interview to discuss the responses. A personal interview is a crucial part of the probing process, when the aim is to interpret the materials produced (Mattelmaki, 2006).

The follow-up interview was conducted in the participants' homes. The interview allowed preliminary findings to be validated and responses to be explored in further detail. For example, the photographs produced through the camera task were used as prompts to discuss reasons and feelings surrounding each example (see Appendix E for interview matrix).

Figure 5.3 Contents of the probe kits

5.3.3 Participants

Nine people took part in this study, four male and five female. The ages of the participants ranged from 52 to 83 years old. Table 5.3 summarises key demographic information on the participants in this study.

Table 5.3 Participant characteristics

	Age	Gender	Employment	Education	Marital status	Living arrangements	Health
P01	67	Female	Retired (school director)	University	Widowed	Alone	—
P02	52	Female	Teacher	University	Married	With partner	Breast cancer survivor
P03	83	Male	Retired (schoolmaster)	College	Widowed	Alone	Age-related visual and hearing decline
P04	62	Female	Translator	College	Married	With partner	—
P05	81	Female	Retired (teacher)	College	Married	Alone	—
P06	66	Male	Professor	PhD	Married	With partner	—
P07	52	Male	Retired (teacher)	University	Married	With partner	Cancer survivor
P08	60	Female	Retired (teacher)	University	Divorced	Alone	Early stage Parkinson's
P09	76	Male	Part-time Consultant	University	Married	With partner	Early stage Parkinson's

Participants were selected to provide insight into a variety of experiences (e.g. recently widowed, diagnosed with Parkinson's) that might give them very different personal views on dependence-independence. The findings were analysed in relation to the previous study, which provided specific examples of experiences related to acquiring and setting up new technologies.

5.3.4 Data analysis

The responses were reviewed as soon as the probe packs were returned, enabling the researcher to familiarise herself with the materials and make notes for discussion during the follow-up interview. The materials were photographed and all data were recorded in written digital format, using Microsoft Excel and Word.

This study primarily employed probes for information and the outputs were interpreted accordingly. After initial data reduction, two forms of data analysis were employed. First, a word cloud was created with Wordle (www.wordle.net) to display results of the postcards. A word cloud is a visualisation of a text, in which more frequently used words are emphasised in the representation. Although used only as a supplementary analysis technique in this study, the word clouds provided an overview of the main themes generated in response to associations with dependence and independence. The usefulness of word clouds as a tool for preliminary analysis of transcribed and written responses has been demonstrated by McNaught and Lam (2010), who also provide guidelines on how to obtain the best results using Wordle.

The main data analysis was conducted with affinity diagrams (Beyer and Holtzblatt, 1998). Affinity diagramming has been identified as an effective way for designers to consider the individual design implications of various types of data-driven insights (Hanington and Martin, 2012). In this process information is recorded on sticky notes that are placed on a wall; these notes are then moved around and clustered inductively into categories.

Different coloured sticky notes were used for different types of information. Guided by the research questions for this study, the following categories were identified: pink sticky notes were used for factors that create feelings of dependence; green sticky notes were used for factors that create feelings of

independence; and blue sticky notes were used for factors affecting desire for social interaction (Figure 5.4).
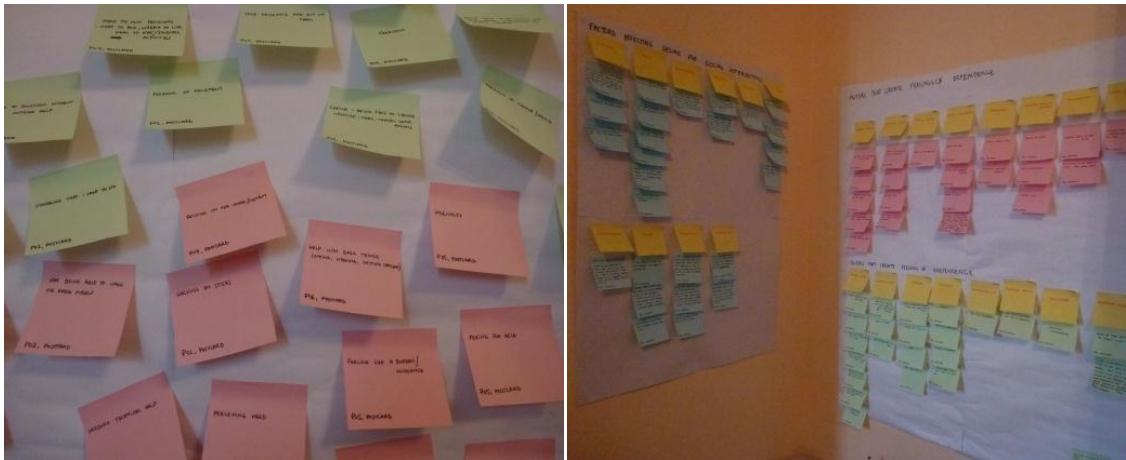
Figure 5.4 Affinity diagram

Each sticky note also contained a reference to the participant and the probe element the information came from. Yellow sticky notes were then used to label each cluster and make notes about design implications.

5.4 Results

The probes produced a large amount of information in written format, such as texts and poems, but also pictorial format, such as photographs and drawings. The collated and analysed data are presented cross-comparatively in the following sub-sections. First, participants' spontaneous descriptions of dependence and independence are presented, followed by the factors that particularly create feelings of dependence and independence. Then, reasons for sharing certain experiences with others are given. The last sub-section focuses on how technology affects older people's feelings of dependence and independence.

5.4.1 Perceptions of dependence and independence

When prompted for associations with 'dependence' and 'independence' via the postcards, participants produced mostly short and intuitive responses. Figure 5.5 and Figure 5.6 show the word clouds generated from the postcard responses.

Figure 5.5 Associations with 'dependence'

The key idea that participants associated with dependence was the need for help, particularly with personal care, or perceiving such a need. This difference between actual need and perceived need is illustrated by the following quote (P04, postcard):

> *Needing help with personal care: dressing, feeding, washing etc. Or perceiving such a need. Needing someone around for psychological/emotional support ('I can't live without XXX' when in fact you can, but don't want to). Or perceiving this need. Different from preferring to have someone else around.*

Responses also distinguished between physical dependence (e.g. 'needing someone's help to do things', P06, postcard) and emotional or psychological dependence (e.g. 'being unable to make the simplest of decisions without reassurance', P01, postcard). Other forms of dependence mentioned included relying on the state or system (e.g. P07, postcard) and needing technical help (e.g. P02, postcard).

Figure 5.6 Associations with 'independence'

Independence was strongly linked to ability, which again was divided into physical ability (e.g. 'being able to do all tasks oneself, without help', P08, postcard) and psychological ability (e.g. 'ability to reason', P07, postcard). Yet other ideas mentioned, such as freedom, choice, knowledge and accountability, indicate a more complex definition of this concept. Some responses suggested that absolute independence might be unattainable or even undesirable. In the words of one participant (P01, postcard):

> *True independence is probably only possible in certain political regimes. However, few people are truly independent or even want to be. Most of us want responsibilities that tie us down and we would not want it otherwise. Few have the courage to be a completely free spirit.*

Enabling decisions to be made and acted on, while included in descriptions of independence, also acknowledges the role of a supporting network (postcards of P05 and P06, respectively):

> *Having sufficient means to make decisions for myself. Most of what we do is inter-dependent - family, taxis, buses - a big web.*
>
> *Being able to do things oneself, often supported by other people.*

5.4.2   Breaking down the concept of 'dependence'

Collating the data from all the study elements revealed several factors that create feelings of dependence. These were grouped into external and intrinsic factors, as illustrated in Figure 5.7.
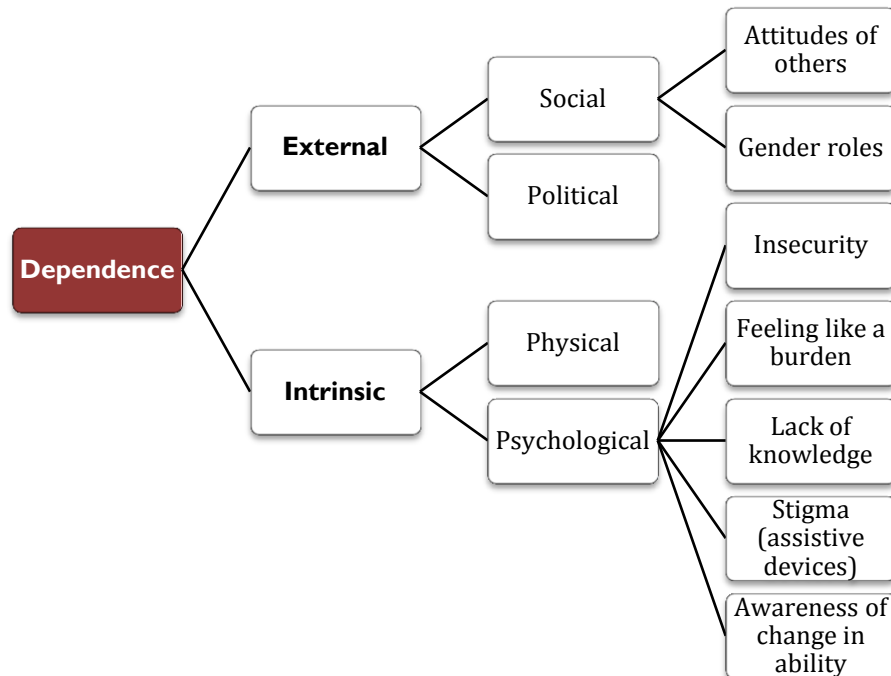
Figure 5.7 Factors that create feelings of dependence

Responses indicated that feelings of dependence could have an external influence, in particular political factors and social factors. Social factors were expressly linked to other people's attitudes, for example (P03, interview):

> *Someone telling me what to do.*
>
> *The attitude of the person of whom I have asked advice.*

Another interesting social factor pertained to traditional gender roles within the family unit. While discussing results of the Social Map, P09 said:

> *Cooking, if it wasn't for (my wife), I'd be very dependent on others to maintain the food and upkeep which I get at this moment – but that's the typical male-female relationship built up for people of my age. The male goes out and does what he can to get the pennies, brings them home, puts it on the table. The wife stays at home, supports the family environment.*

Intrinsic factors affecting people's feelings of dependence were associated with physical ability, but also with psychological factors. Having insufficient knowledge and a sense of insecurity regarding certain activities were cited as reasons to feel dependent, exemplified in the camera results by photos of technology or needing someone to fix things (Table 5.4).

Table 5.4 Camera result for 'something that makes me feel dependent'

Makes me feel dependent		
	Computer/technology	3
	Needing someone to fix things	1
	Spectacles	1
	Walking stick	1
	Medical care	1
	Long journeys	1
	(no response)	1

Some participants gave the example of an assistive device as something that made them feel dependent, even though this device enabled them to pursue activities without the assistance of others. P05 took a photo of her spectacles and P06 took a photo of her walking sticks as things that made them feel dependent (Figure 5.8).
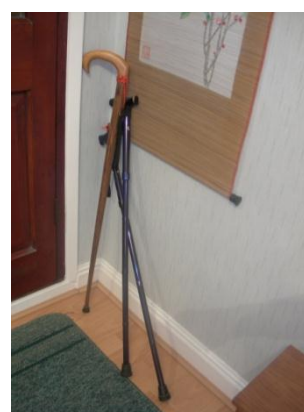
Figure 5.8 Assistive devices were 'something that makes me feel dependent'

Table 5.5 shows the photos taken to illustrate activities participants used to do but have stopped doing in recent years. Reasons given for no longer doing these activities generally related to a decline in abilities and a lack of time. This prompt was more meaningful for some participants than for others. P02 and P09 gave more than one example for this task. On the other hand, there were two participants (P03 and P07) who could not think of any relevant examples.

Table 5.5 Camera results for 'something I used to do but do not anymore'

Used to do but not anymore	Dancing	3
	Sports	3
	Collecting wild flowers	1
	Participating in politics	1
	Riding a bike	1
	(no response)	2

Discussing how participants have had to adapt their behaviour revealed discrepancies in terms of individual experiences of dependence. For instance, during the interview P03 mentioned awareness of his age-related decline in abilities as something that made him feel dependent:

> *Knowing that 50 years ago I wouldn't have needed to ask for help.*

But, for P05 (interview) this was a fact of life:

> *I think with all of these things, your ability to do them lessens, weakens – like playing the piano or hearing things so clearly and having the energy to do things – and, if you're sensible, you just say "Right, I can't do it anymore". It's no good getting yourself worked up over it. You've got to accept that you can't do that and do what you can do. Don't get agitated over it, because there's nothing you can do about it.*

Table 5.6 lists the examples given for things participants need help doing. Many of these activities are physical, like housekeeping, gardening and lifting heavy things.

Table 5.6 Camera results for 'something I need help doing'

Need help doing	Housekeeping	2
	Making a bed	2
	Solving computer problems	2
	Gardening	1
	Putting water in the car	1
	Lifting heavy things	1

Personal and emotional difficulties can present obstacles to asking for help. In response to 'Provide an example of a time when you needed help but didn't ask for it', P01 (Remember When) shared her experience of the death of her husband:

When tragedy strikes it is often difficult to think clearly, even to work out what help you need. It is often easier to act rather than think. Making complicated arrangements would usually be better done with expert advice and support from friends. I understand now that it would have made it less painful to get help with funeral/memorial planning but perhaps the auto-pilot state can be quite effective and in fact I made good decisions then which I can look back on with some satisfaction and some sort of pride. The moral of this story is that it may not always be better in every way to ask for help.

Other examples of participants needing help but not asking for it included needing help with a physical task, but attempting to do it themselves to save time or avoid being a burden to others. For some of these participants, feelings of dependence derived from their own sense of encumbrance when asking or receiving help from others. This was a significant factor for P05 (interview):

I don't like accepting lifts and things from other people. People are always offering me lifts and, before we moved here, I was forever carting other people about. (...) I'm not against it, I accept it but I feel awkward. I feel embarrassed at having to discommode people, make a nuisance of myself.

Crucially, psychological factors explain why a person's sense of dependence can fluctuate even when circumstances remain more or less unchanged. This idea was expressed by P08 (interview):

If you had asked me a year ago, the answers would have been different and I would have been much more dependent on other people. I obviously had Parkinson's then (...), but it was the mental attitude with the chronic fatigue that made me feel more dependent on other people.

5.4.3   Interpreting feelings of independence

As with the analysis of dependence, factors affecting feelings of independence were grouped into external and intrinsic factors. These are outlined in Figure 5.9.
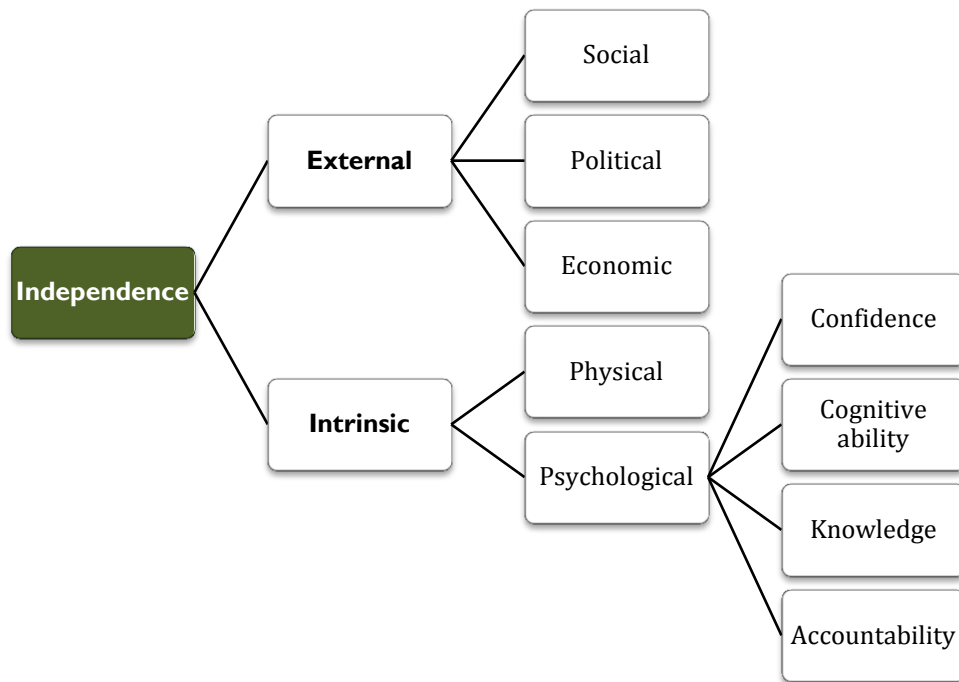
Figure 5.9 Factors that create feelings of independence

The camera task produced a variety of photos of things that made participants feel independent, with one participant giving two examples. These photos are summarised in Table 5.7.

Table 5.7 Camera results for 'something that makes me feel independent'

Makes me feel independent		
	Travelling	1
	Walking around the lake	1
	Driving	3
	Mobile phone	1
	Premium bonds	1
	Work	1
	Riding a bike	1
	Using a computer	1

Economic factors arose in addition to the social and political factors already mentioned for dependence. When discussing why she had taken a photo of premium bonds as something that made her feel independent, P05 explained:

Well, paying your bills is the crux of everything.

Some of these activities are evocative of the concept of 'freedom' mentioned in the postcards. As an example of something that makes her feel independent, P02 took a photo of a nearby lake where she likes to take walks (Figure 5.10).

Figure 5.10 Walking around the lake was 'something that makes me feel independent'

The most common example of something that gave participants a sense of independence was driving, captured in the photos of three participants. Again, this is an activity that represents freedom. P07, who took a photo of his bike as something that makes him feel independent, puts this idea of freedom into words:

> *I can go where I like, do what I want, stop where I like.*
>
> *(Riding my bike) is the only time I feel independent.*

The completed Social Maps show that other people are often involved in the specified activities (for example, Figure 5.11). For participants who were married or in relationships, the person most frequently involved in these activities was their partner. This is evident by stickers representing their partners being placed closer to the centre, as in Figure 5.12.

Participants who did not have partners primarily involved other family members, like sons, daughters and grandchildren. Examples of these maps are given in Figure 5.13. Other people mentioned by both types of participants include siblings, extended family and friends. P05 had a sticker to represent a large supermarket chain, which she uses for online shopping and home delivery.
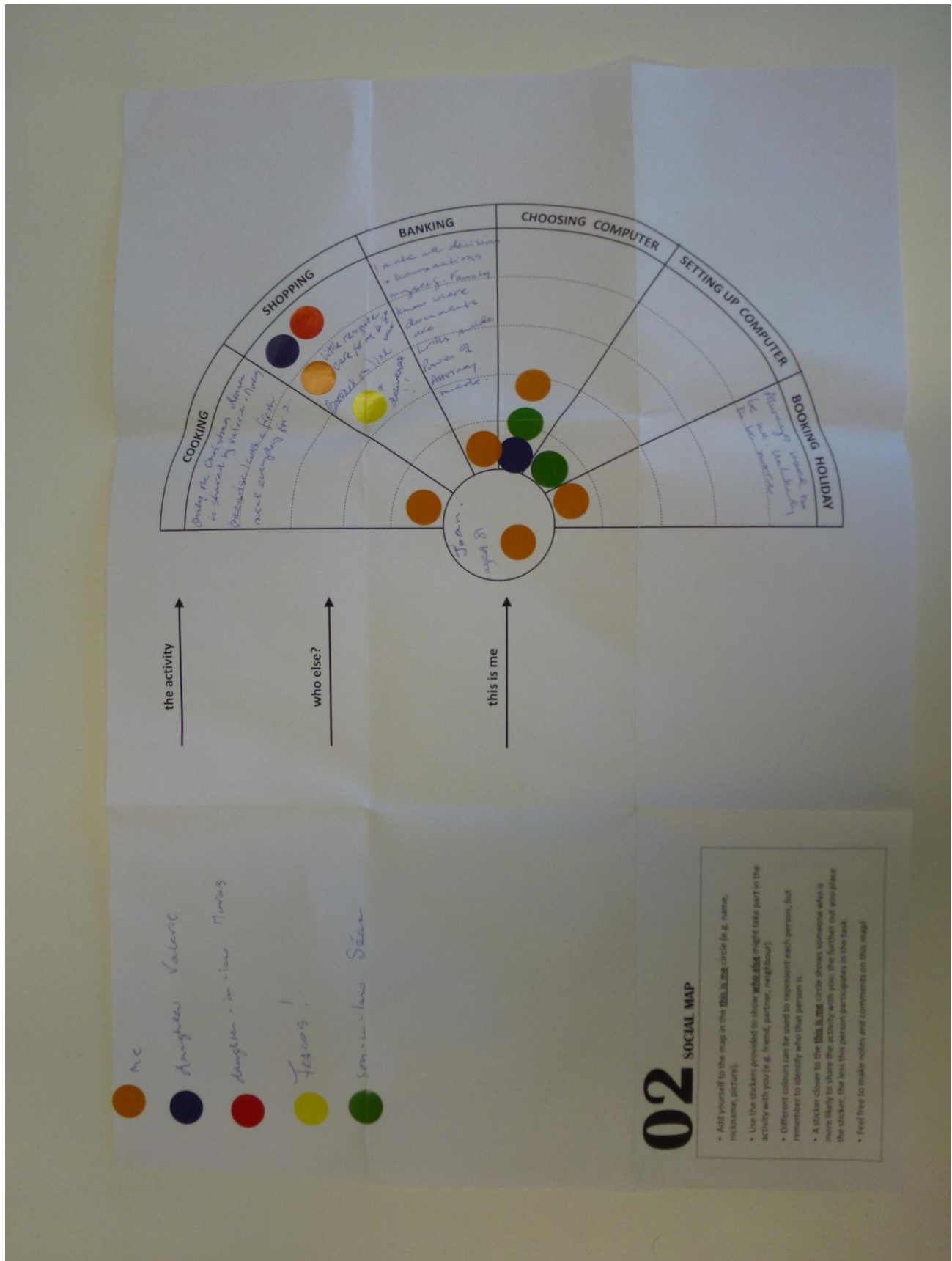
Figure 5.11 Example of a completed Social Map

● participant; ● daughter; ● daughter-in-law; ● Tesco; ● son-in-law

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Figure 5.12 Examples of Social Maps of participants who have partners
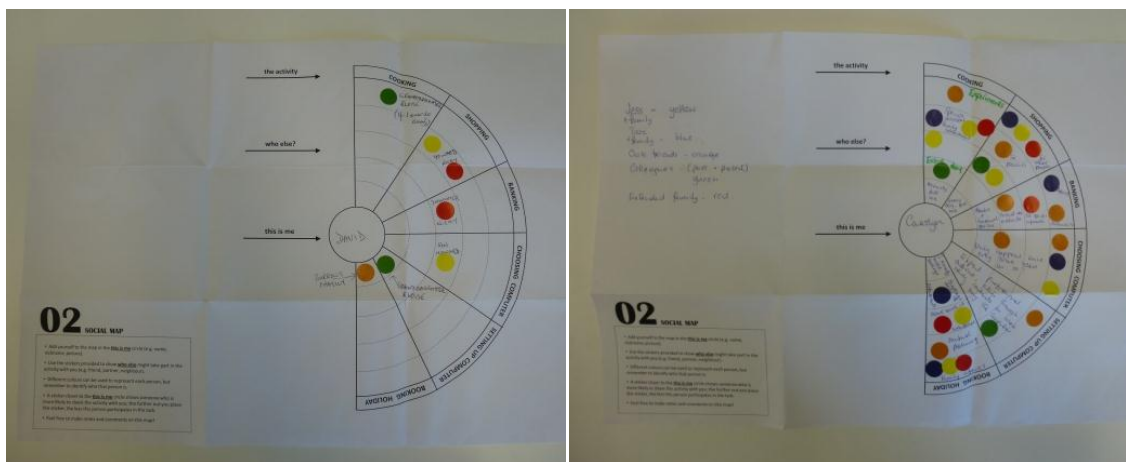
Figure 5.13 Examples of Social Maps of participants who do not have partners

During the follow-up interview, participants were asked to comment on how dependent or independent they felt in each activity. As participants' own definitions of dependence and independence varied, so too did their responses as to how they experienced these feelings in connection with shared activities. For example, even though P07 often cooks alone, upon reflecting on this activity he observed:

> *I should imagine the cooking bit is (quite dependent),*
> *because I'm dependent on people's reactions and feelings*
> *and sharing and taste and things. It matters. If I was very*
> *independent, I'd just be doing it and saying 'Get on with it.*
> *Yeah, I'm right!'*

Yet P05 felt that, even if her husband had been involved in certain activities, she felt she was in control and therefore retained a sense of independence:

The strange thing is that even though I was making all the actual transactions – if we needed to buy a piece of furniture or have something done to the house – it's very strange that I always deferred to him. I wouldn't do anything unless he said 'Oh alright, go on, get to it!' It's funny, it must be an old-fashioned sort of...the man has to make the decisions, you know, even though they were probably all my decisions, all my work. I think that was basically not to upset him, to make him feel he was valued enough to make the decisions.

In both these examples, the participants were capable of doing the activities alone but chose to involve other people. Uncovering the reasons for involving others contributed to understanding why people's feelings of dependence and independence vary.

5.4.4 Exploring the desire for social interaction

Analysis of factors that influence people's desire to delegate tasks or share activities with others revealed ten themes across the study elements. These were grouped into three main categories, represented in Figure 5.14 (photo taken by P04).
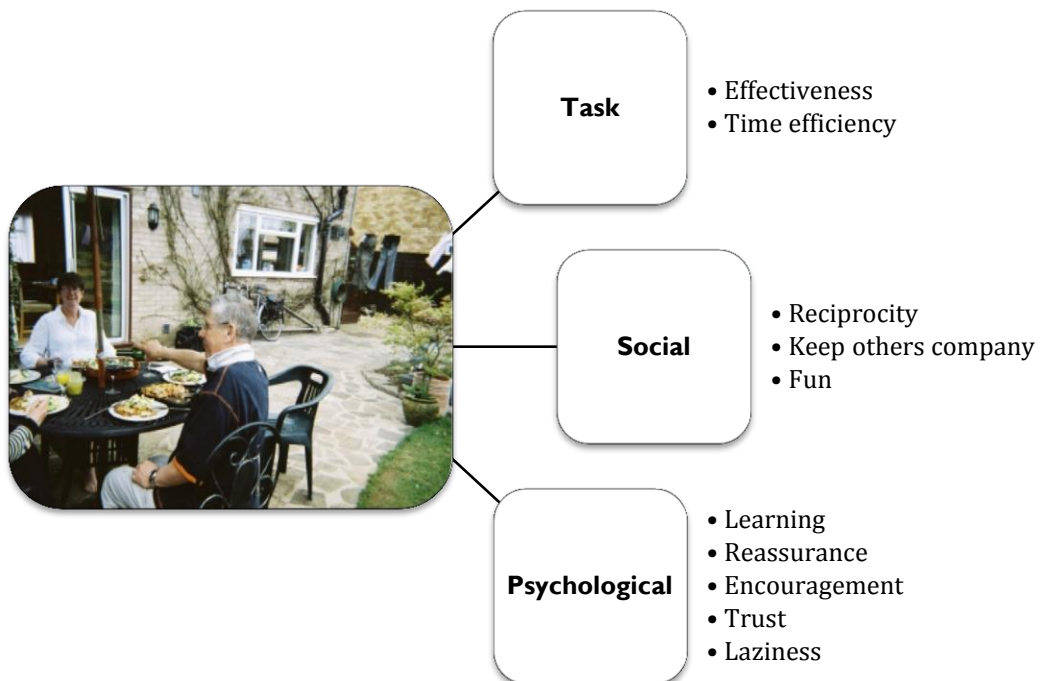
Figure 5.14 Reasons for involving other people

Some activities are social by nature and others are more of an individual pursuit. Comparing Table 5.8 and Table 5.9 underlines this difference, with 'eating and drinking' being a common example of something participants liked doing with other people and 'reading' being a common example of something participants liked doing alone.

Table 5.8 Camera results for 'something I like doing with other people'

Like doing with other people	Eating and drinking	3
	Walking the dog	1
	Crosswords	1
	Playing cards	1
	Taking classes	1
	Exercise	1
	Travelling	1

Table 5.9 Camera results for 'something I like doing alone'

Like doing alone	Walking the dog	1
	Going for coffee	1
	Crochet	1
	Work	1
	Playing the piano	1
	Reading	3
	Online shopping	1

Fun is a strong motivator for seeking interaction with other people, exemplified by the reason given by P03 for taking a photo of a crossword puzzle as an activity he likes to do with others:

It's fun, it leads to conversations and exchange of witticisms.

Figure 5.15 Doing a crossword puzzle was 'something I like doing with other people'

The photos taken as examples of activities people do with someone else even though they do not need to, listed in Table 5.10, illustrate other motivators such as reassurance (using a ladder, P03) and reciprocity (gardening, P08). This was generally perceived as the least meaningful prompt and, as a result, four participants did not respond to it.

Table 5.10 Camera results for 'something I do with someone else even though I do not need to'

Do with someone else even though not necessary	Clothes shopping	1
	Going for coffee	1
	Using a ladder	1
	Travelling	1
	Gardening	1
	(no response)	4

Reciprocation was further explored through discussion of the Social Maps; examples given in the Remember When sheets of a time when participants provided help to someone else; and the photos of things participants like to help others with, which are listed in Table 5.11.

Table 5.11 Camera results for 'something I like to help other people do'

Like to help other people do	Reading	2
	Gardening	2
	Listening to problems	1
	Homework and education	1
	Playing the piano	1
	Washing up	1
	Disability group support	1
	(no response)	1

Reciprocal actions were empowering experiences for participants in this study and, to some extent, mitigated feelings of guilt that could arise from asking people for help. For example, P08 explained how, as a result of Parkinson's disease, she needed to ask her father for help with the gardening. However, she was quite happy with this arrangement because she felt both she and her father gained benefits from the interaction. In her words (P08, interview):

> *It's nice to do it with dad, because he knows infinitely more than I do about gardening. And also, it makes dad feel good as well, I think.*

Washing up was an example given by P06 of something he likes helping someone else do (Figure 5.16). This echoes results presented in section 5.4.2 pertaining to gender roles and household responsibilities. In this case, his wife usually cooks dinner and he does the washing up.

Figure 5.16 Washing up was 'something I like to help other people do'

Sometimes involving other people in certain activities relates to fulfilling the task in the most effective and quickest way possible. This differs somewhat from laziness, a psychological factor mentioned by a couple of participants. While discussing the Social Map, P03 commented on why he never did any cooking:

> *I could if I had to, but I hate it! (..) See dependent is one of two things: if you're psychologically dependent or if you're dependent because you're bone idle.*

P07 makes a similar claim, when he explains his usual way of dealing with computer problems:

> *Laziness is one, I'd have thought. If I'm at home working on the computer and (my wife) asks me, I'll sort it out. If (my son) is here and I get stuck on something, I won't battle it.*

Reassurance and encouragement are similar confidence building mechanisms, but were divided into separate themes. As an example of reassurance, during discussion of the Remember When sheets, P03 stated:

> *I don't trust myself anymore, making any financial decisions. It usually turns out that what I was going to do was alright, but I'm not sure of myself.*

Encouragement was perceived as different in the sense that there was an element of fun to be gained from the activity being discussed. This was most evident in conversations about taking classes and doing exercise. P09 explained

the benefits he experienced from taking a Pilates class and how he had encouraged a fellow Parkinson's sufferer to join:

> *When you're encouraged to join a group, you're in the same boat. "Ooh, that hurts!" you laugh about it and that is the benefit you get from the social contact.*

Trust emerged as a theme that justified why some participants sought help from people, rather than using technology or doing something online. This was true for P05 (interview), whose Social Map revealed that she did shop online but preferred to book her holidays over the phone:

> *I always book holidays over the phone, so I've got somebody to talk to and ask about…I'd never be convinced that it had actually gone through online. I wouldn't trust it, I'd rather speak to somebody.*

5.4.5 The role of technology

Direct reference to technology was deliberately avoided in the probe kits, so any mention of technology by participants during this study was genuine and self-generated. Table 5.4 (Camera results for 'something that makes me feel dependent', page 112) shows that technology can create feelings of dependence for some people. Figure 5.17 contains the photos taken by P03 and P06, respectively, as examples of something that makes them feel dependent.

Figure 5.17 The computer was 'something that makes me feel dependent'

Then again, technology is given as an example of something that creates feelings of independence in Table 5.7 (page 115). This confirms that different people have different attitudes and experiences with regards to technology. P09

(interview) explains how crucial the computer is for him to remain active since being diagnosed with Parkinson's:

> *It's a tremendous advantage for me to have that ability to take thoughts, tap the keys, "Oh, I didn't mean that" and alter it very easily. Whereas, if the computer wasn't there, I'd probably give up.*

P08 (interview) also mentioned the importance of the computer and the internet as support mechanisms during periods of illness:

> *It does at the moment, particularly for the last couple of years, because – I don't think it has anything to do with my age – because of the Parkinson's, but more importantly when I had chronic fatigue, to be able to order presents for people and books from the internet when I couldn't walk more than 100 yards was very, very important.*

Comparison between Table 5.12 and Table 5.13 highlights how technology has changed the way in which people pursue certain activities, such as work, communication and leisure.

Table 5.12 Camera results for 'something I do differently now from when I was younger'

Do differently now from when younger	Entertaining	1
	Reading	1
	Laundry	1
	Playing the piano	1
	Participating in politics	1
	Listening to music	1
	Using a computer	2
	(no response)	2

Table 5.13 Camera results for 'something I do the same today as when I was younger'

Do the same today as when younger	Playing tennis	1
	Driving	1
	Washing up	1
	Reading	2
	DIY	1
	Socialising	1
	(no response)	2

Specific examples of activities which have changed due to developments in technology included using the computer (two participants), doing the laundry (one participant) and listening to music, which was a meaningful example for

P06, in Figure 5.18. Only two examples given (reading, P02, and playing the piano, P05) are directly associated with an age-related decline in abilities.

Figure 5.18 Listening to music was 'something I do differently now from when I was younger'

Most of the examples given in Table 5.5 (Camera results for 'something I used to do but do not anymore', page 113) are physical activities that could not be facilitated through the use of technology. Similarly seven examples of things participants need help doing (Table 5.6, page 113) are physical, whereas only two examples pertain to technology. P03 (camera) gave the computer as an example of something that made him feel dependent and something he needed help doing, whereas P08 (camera) gave the computer as an example of something that makes her feel independent even though it was also an example of something she needed help with.

5.5 Discussion

This study has exposed dependence and independence as complex and multilayered concepts. Intuitively they are seen as opposites, where one cancels out the other, but these findings have revealed that for some activities the participation of others does not affect an older person's sense of independence. In fact, sharing certain activities can make the overall experience more pleasurable. These results were compared with findings from the literature. While many of the findings are consistent with models of independence presented in section 5.1.1, this study has investigated what dependence and independence mean specifically for older adults. The following discussion reflects on the contribution of the concept of independence for older adults and

considers the implications for the design of inclusive and desirable future products. The discussion concludes with an analysis of the advantages and drawbacks of using probe kits in research with older people.

5.5.1   Mapping the concept of independence

The Tell Me postcards firmly confirmed the view of Keates and Clarkson (2003) that being able to perform key and instrumental activities of daily living (ADLs and IADLs) is vital for an older person's sense of independence. Nevertheless, this study produced a number of examples of activities that participants do with other people, with no detrimental effect to their sense of independence. Discussion of activities that participants shared or delegated to others revealed that dependence and independence are not absolute concepts, but rather co-exist on a scale. Moreover, feelings of dependence-independence are not fixed, they fluctuate in response to shifts in attitudes and perception.

Results showed that situations of apparent dependence do not always imply a self-perception of dependence. In this respect, the model produced by Specker et al. (2003, Figure 5.1 on page 97) appropriately differentiates between an observable reliance on others, which they term dependence, and a subjective self-assessment of independence. Likewise, the independence model proposed by Gignac and Cott (1998, Figure 5.2 on page 98) emphasises the key role of subjective perceptions. However, their distinctions between 'independent', 'imposed dependency' and 'not independent' may be more suited to observable dependence, since participants in this study did not discuss their experiences in these terms. These researchers' definition of 'dependence' (when a person needs and receives assistance) is not supported by this study, because the results showed consistent examples of people who needed and received help yet maintained a sense of independence.

Focusing on subjective independence, it emerged that feelings of dependence-independence are influenced by intrinsic factors and external factors. External describes political, economic and social factors, namely support networks, other people's attitudes, and family or gender roles. Intrinsic factors can be divided into physical factors and psychological factors; the latter include cognitive ability, knowledge, accountability, confidence and self-esteem. These are illustrated in

Figure 5.19. A common thread running through these factors was the crucial role of choice. Choice is experienced on an intrinsic level through the ability to make decisions, but can equally be supported externally through the provision of clear and feasible options. This aligns with the views found in the literature on disability (Reindal, 1999; Specker et al., 2003).
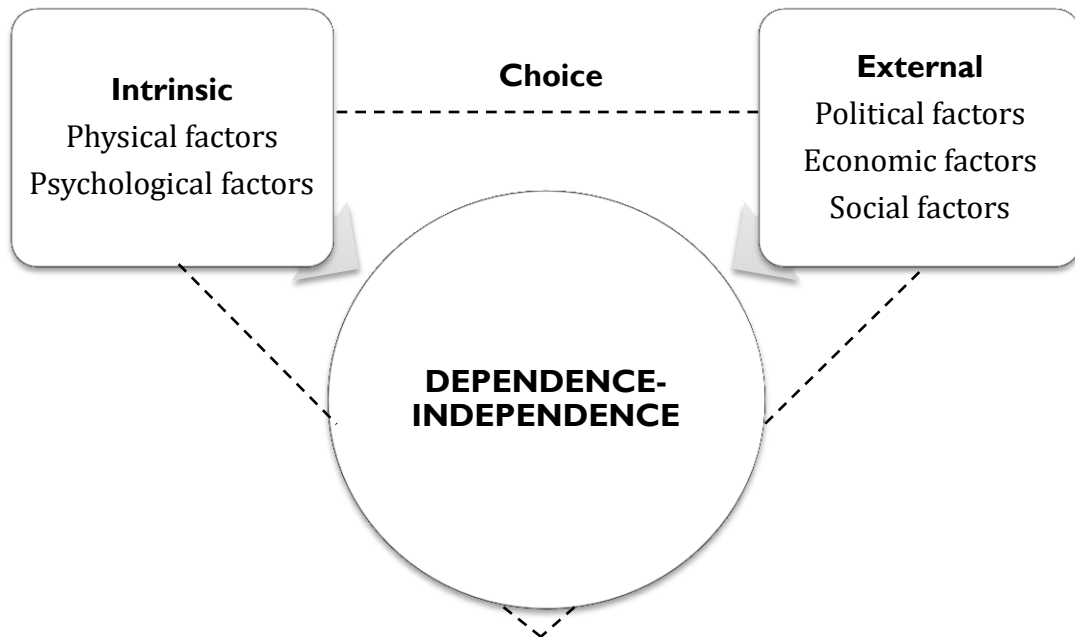
Figure 5.19 Factors affecting subjective dependence-independence

The study also confirmed that assistive devices create feelings of dependence for some people, in spite of enabling them to do tasks for and by themselves (Gignac and Cott, 1998; Hirsch et al., 2000). In these cases, assistive devices are perceived as physical reminders of a decline in abilities and do not deliver the benefits derived from human assistance. The benefits of having another person involved in an activity were: fun, a way of learning, reassurance, encouragement, effectiveness, time efficiency and trust. However, asking for and receiving help may generate feelings of guilt and encumbrance. An important way of compensating for these feelings was having a sense of reciprocity in the relationship. In other words, participants who felt that everyone involved in the activity gained some kind of benefit were generally more accepting of the situation, and even derived enjoyment from it. This firmly supports the findings of Payling (2003). Interdependence was the term used by many participants in

this study to define their interactions with other people, as well as being indicated as a desirable medium between dependence and independence.

5.5.2   Implications for design

Findings from this study, in line with Hirsch et al. (2000), emphasise the importance of achieving the right combination of social engagement and feelings of independence in later life. According to these authors, striking this balance is essential for a good quality of life. This has strong implications for Inclusive Design. The importance of a person being able to perform tasks unaided is undeniable, particularly ADLs and IADLs. However, this is not always practicable or desirable for older people. In these situations, having deeper insight into subjective dependence-independence allows designers to manipulate these external factors and counter internal factors in order to promote a sense of independence. Moreover, understanding the social benefits experienced by older people when they involve others in certain activities means designers can create new products and services that foster social interaction and are, therefore, more desirable. Some social benefits, such as learning, reassurance and encouragement, may actually boost the inclusivity of products and services by supporting new users in overcoming potential or perceived barriers.

Even though technology use by older adults instigated this study, the probes were designed to avoid leading participants into the topic of technology, because it was felt that a meaningful understanding of the issues that surrounded dependence and independence superseded technology-related tasks. Yet the photo tasks 'Take a photo of something that makes you feel dependent' and 'Take a photo of something that makes you feel independent' both produced photos of technology, albeit for different participants. This disparity is related to familiarity with technology, but is also the result of what technology is used for. In other words, technology used for work and perceived as a chore can create more negative attitudes than technology used to support lifestyle (for communication, leisure, etc.). This echoes findings from Chapter 4 and clearly illustrates the importance of choice in determining feelings of dependence or independence.

For some participants, technology actively supported their independence, both observable and subjective, as it enabled them to continue working and doing everyday activities for example during periods of illness. Incorporating social benefits into technology products and services has the potential to encourage their adoption by more reluctant older people, thus creating a more pleasurable and encouraging user experience. It is also anticipated that this could enhance feelings of independence.

5.5.3   Critique of the method

All participants used every element of the probe kit, but depth and mode of response varied between participants. The inconsistency of results produced posed a challenge during data analysis. For the Tell Me postcards and Remember When sheets, the most common mode of response was words. However, some participants produced concept maps (Tell Me postcards), drawings and even a poem (Remember When sheets). Figure 5.20 shows a drawing by P04 and the poem by P03. This corroborates the theory of Sanders and Stappers (2008) about allowing people to express themselves using various levels of creativity
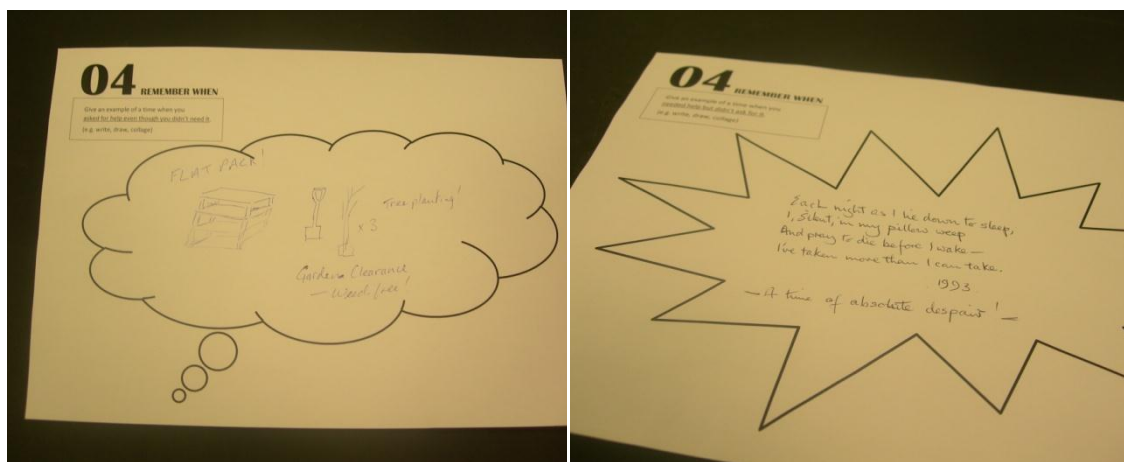
Figure 5.20 Drawings and a poem produced in the Remember When sheets

The most problematic element of the probe kits was the disposable camera. A few participants had difficulty using the camera, as they had never used a disposable one before. The label on which to write the number of the photo corresponding to the elicited task was sometimes considered too small. Also, the numbering of the photos generated some confusion ('Is it the order in which I took the photos or the number on the camera display?'). A frequent solution to

this was that participants wrote out a list of the elicited tasks along with a description of the corresponding photo. This proved to be a helpful strategy for the researcher when, due to the participants misuse of the camera (one participant) or problems developing the film, a few of the cameras produced unusable results. To overcome this problem, the researcher used the list as a guide to re-take the photos with a digital camera alongside the participants, during the follow up interview. However, it would have been simpler and more in keeping with the essence of this method to provide participants with a digital camera to capture these examples themselves. This would have also saved on development costs, because the photos can be viewed on the camera's screen or computer.

The camera was the most time consuming element for the participants, particularly because they were keen to give each task plenty of thought. This meant that it was sometimes returned separately from the other elements of the probe kit. The upside to this was that the photos produced were meaningful examples that might otherwise not have been communicated in an interview or survey. These photos were valuable prompts for discussion during the follow up interview, enabling the researcher to delve deeper into the issues and occasionally generating insightful life stories.

The social map produced interesting results and, contrary to what could be expected, participants had no difficulties completing this task. With regards to the four Ws regularly used for problem solving (Who, What, When, Why), the social map defined a priori the What by including a set list of activities. Participants would then identify Who else did these activities with or for them, creating their own labelling system using the coloured stickers provided. The follow up interview then used the finished maps to discuss When and Why these activities were likely to be performed with/by other people, further adding the question of How this affected the participants' feelings of dependence or independence.

As anticipated, the probe kits permitted more sensitive issues to be shared with the researcher. The Remember When sheets produced very personal stories relating, for example, to bereavement or caring for a spouse with dementia. P01 used this tool not only as a means of storytelling, but also took the opportunity

to reflect on these experiences by adding an observation entitled 'Moral of this story'. An example of one of her responses is given in Figure 5.21, with the moral of the story written in pink. For other participants, this type of more insightful narrative was obtained during the follow up interview.
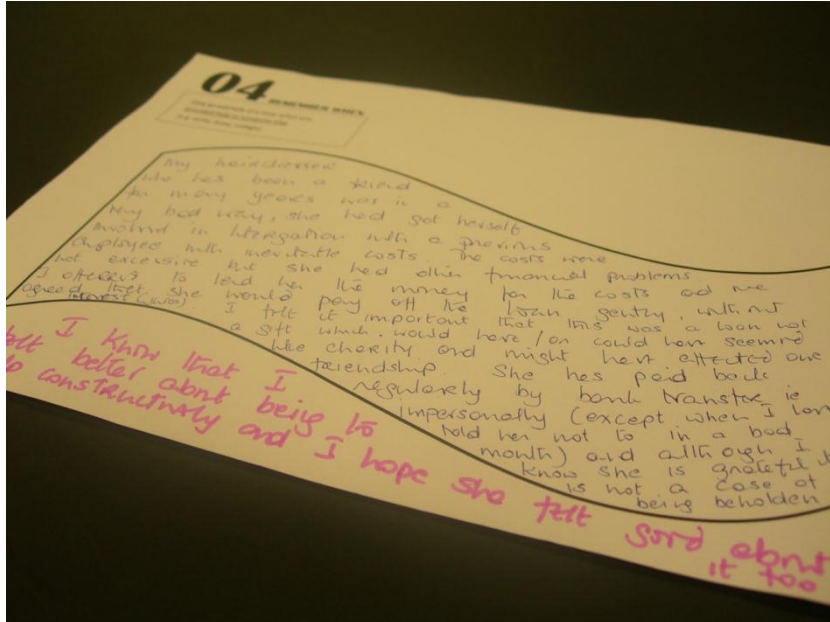
Figure 5.21 Participant's reflection on her own story

In general, participants enjoyed the probe kits. They felt enabled to share their experiences and feelings appropriately (P09, interview):

> *I don't like tick boxes, because they don't answer the questions really.*

Allowing participants enough time to respond and ponder their answers was another valued attribute of this method (P07, interview):

> *Hmm, you make people reflect on themselves as well. It's really good.*

This method also allowed the participants to feel some control over questions of a personal nature. As a result, sensitive issues surfaced naturally, which would probably not have occurred with face-to-face methods. The follow up interview was an important part of further investigating the complexity of these issues as they pertain to the conceptualisation of dependence and independence.

5.6 Conclusion

This chapter investigated the concepts of dependence and independence, through the insights and experiences of people over 50 years old. The

conclusions are not intended as generalisations for the entire population, but rather provide a rich understanding of these constructs with a view to contributing to the design of engaging products and services in the future. The main findings from this study are:

- Dependence and independence are not absolutes, they co-exist on a scale. Assessment of dependence-independence can be both observable and subjective, and may fluctuate over time.

- Observable dependence-independence is an objective assessment, generally equated with autonomy, in which physical and psychological abilities are determining factors.

- Subjective dependence-independence is how people perceive themselves on the scale, based on individual experience. Understanding the factors affecting subjective independence has significant implications for Inclusive Design because, even when a person needs help to perform a task, there is the potential to create a sense of independence through manipulation of these factors.

- Subjective dependence-independence is influenced by personal factors and contextual factors. Person-related factors can be physical or psychological; contextual factors can be social, political and economic. A crucial theme that pervades these factors is the existence of and capacity to make choices.

- For older people, often the most desirable state is one of interdependence. Interaction with other people provides several social benefits, including learning opportunities, confidence building and enjoyment. When these interactions are reciprocal, older people feel empowered and potential guilt of needing help is mitigated. An improved user experience through the inclusion of social benefits could generate more desirable products and services, while also addressing specific needs of an ageing population (e.g. accessibility, usability, etc.).

- Probes are an effective way of eliciting information of a personal or sensitive nature, but allowing participants to express themselves through various levels of creativity can produce inconsistent results and make data analysis more difficult.

- An effective way of compensating any misgivings and obtaining deeper insights into the data collected with the probes is to follow up with a semi-structured interview, where the completed elements are used as prompts for discussion.

6 OoBE personas

This chapter describes the development of four personas that communicate the findings from Study 1 (Chapter 4) and Study 2 (Chapter 5), with an emphasis on the social benefits older people derive from the Out-of-Box Experience. It begins with an overview of the use of personas in User-Centred Design, followed by a review of their strengths and limitations. The method used to create the personas is described and, to conclude, the final personas are presented.

6.1   Introduction

6.1.1   Personas in User-Centred Design

Personas are archetypal characters, which embody the needs and goals of real users. Alan Cooper's seminal book *The Inmates are Running the Asylum* (1999) popularised the term 'persona', although other authors have used comparable concepts to communicate users' characteristics. These include 'model user' (Nielsen, 1998 cited in Nielsen, 2004), 'user models' (Hasdogan, 1996; McGraw and Harbison, 1997) and 'user archetypes' (Mikkelson and Lee, 2000); for a comprehensive review of user representation techniques, see Adlin and Pruitt (2010, pp. 21-36).

Broadly, there are four approaches to personas in UCD literature. For Alan Cooper (1999), personas are a 'goal-directed design' method that provide a means of communicating user needs to designers and thus guide the design process. As the name indicates, the focus of these personas is on what they want to achieve from a product and the relationship they establish with that product. Each persona is a unique character rather than an average user and, as a result, is specific to that project.

Cooper's approach to personas attracted criticism from research teams at Microsoft, namely Mikkelson and Lee, and Grudin and Pruitt. The 'user archetype' model was proposed by Mikkelson and Lee (2000) in response to a perceived lack of clarity and consistency in the user descriptions. Grudin and Pruitt (2002) further developed the method by establishing an explicit link between personas and data, which according to them should have an equitable representation of quantitative and qualitative information. From this perspective, in addition to users' goals, personas can be used to communicate behavioural, usability and market research results to all people involved in a project. Crucially, these authors defend that this method cannot stand alone, but should be used alongside other methods.

Concerned by how designers can fully connect with a list-based description of users, Lene Nielsen (2004) developed a framework based on a theoretical understanding of how people engage with a character through reading. Engaging personas must contain a description of their physique, psyche, background, emotions and character. Personas are frequently used in conjunction with scenarios, which describe past, current or future use of a product or service (for an overview, see Carroll, 2000; Mitchell, 2005, pp. 38-61; Nielsen, 2013). Even though they are complementary, they are generally treated as separate methods. Scenario-based design and persona-based design differ mainly in terms of focus and speed of scenario generation (Floyd et al., 2008). Scenario-based design begins with an envisaged scenario that is discussed and developed. In contrast, in persona-based design the primary activity is generating the personas, which are then used as a tool for developing scenarios. As an example of this, Nielsen's model (2004, pp. 254) advocates that discussion of an engaging persona within a given design area should expose needs and situations. These subsequently provide a goal, with the potential to generate a scenario narrative. From this perspective, the use of personas promotes communication across the project team and fosters idea generation.

In contrast to these three data-driven approaches, a fictional persona is created based on intuition and assumptions. As a proponent of ad hoc personas, Don Norman (2004) feels that for some purposes designers can tap into their own experience to represent a target user group. Likewise, Adlin and Pruitt (2010)

state that assumption personas can be a quick and cost-effective way of articulating knowledge about a user group. Evidently this approach has a number of drawbacks regarding value and validity, and should therefore be used sparingly.

6.1.2   Why use personas

Persona-based design has established itself as a popular user-centred method amongst designers and companies, notably Microsoft, Philips and the BBC. Personas condense large amounts of information about how people behave, what they want to achieve and what they fear as users. As such, they are a manageable medium for creating empathy between designers and the real people who will be using their products and services (Mulder and Yaar, 2007). Personas thus humanise crucial usability and user experience data, maintaining a UCD focus throughout the design process.

Using personas in the design process also has the potential to encourage creativity and innovation (Cooper et al., 2007). Personas can prevent common design mistakes, including self-referential design, designing for an elusive 'average' user and designing for extreme cases (Cooper, 1999). This latter example, considered erroneous by Cooper, is in fact one of the goals of Inclusive Design, since it can contribute to countering design exclusion (Keates and Clarkson, 2003). It is therefore argued that personas that represent so-called extreme cases may be appropriate to inform the design of more inclusive products and services. Admittedly there are other ways of discussing user types but personas, with their recognisable faces and rich detail, tap into the inherently human capacity for empathy and social intuition (Cooper, 1999; Grudin and Pruitt, 2002).

Furthermore, personas entail a degree of flexibility and are frequently customised to suit various purposes. They are mostly cited as empathic and generative tools in design projects. However, designers value personas as a way to communicate information about users and UCD to people outside the design team (Matthews et al., 2012). On the one hand, effective personas should focus design efforts during the creative process, by facilitating dialogue and creativity. On the other hand, they can justify design decisions to stakeholders, by using a shared and meaningful language.

6.1.3 Critique of personas

Floyd et al. (2008) feel that the flexibility offered by personas is both their strength and their weakness. A lack of a consistent framework and terminology concerning personas means that this method is open to misguided and self-serving interpretation. Criticism of this method stems primarily from the variation in the data used to create the personas. Personas may even negate the user-centeredness they purport to encourage, particularly when they are not grounded in empirical data or are depicted as caricatures (Portigal, 2008). Matthews et al (2012) identify four reasons given by designers for not using personas in their own work:

- Personas are abstract, which means they are often perceived as lacking vital detail;
- Personas are impersonal, which means their details do not provide a sufficient sense of empathy;
- Personas' details mislead, in other words it is difficult to choose personal details that do not create false constraints on the design problem;
- Personas' details distract, in other words it is hard to concentrate on the features of the persona that are relevant to the design problem.

While pertinent observations, there are a number of measures that can be adopted to counteract these issues. Cooper (1999) clearly states that ethnographic user research must be the basis for persona development. While other authors may use a variety of sources of data (e.g. Grudin and Pruitt, 2002), there is consensus that the method warrants strict empiricism in order to be robust (Floyd et al., 2008). Keeping the number of personas small and selecting a primary persona facilitates design focus (Cooper, 1999; Goodwin, 2009). Grudin and Pruitt (2002) also recommend using multimodal and multifaceted mediums of communication, in an attempt to keep designers and stakeholders engaged with the personas.

6.2 Method

6.2.1 Persona creation process

A rigorous approach was taken to the development of the personas, after Goodwin (2009). This author, who builds on Cooper's goal-directed approach (1999), recommends an approximate sequence of nine steps. These are:

1. Divide interviewees by role, if necessary – these can be based on tasks, specialisation or responsibilities.

2. Identify behavioural and demographic variables for each role – these variables should be expressed as a continuum, from low to high or between a contrasting pair; typical behavioural variables are mental models, motivations and goals, frequency and duration of key tasks, quantity of objects, attitude toward tasks, technology and domain skill, and tasks people perform.

3. Map interviewees to variables – place participants in relation to each other along the aforementioned spectrums.

4. Identify and explain potential patterns – two or more people who occur together on at least a third of the variables might represent a pattern; outliers who otherwise fit the sample criteria may represent a separate persona.

5. Capture patterns and define goals – for products and services, these commonly include end goals and experience goals; more broadly, but seldom relevant to product and service design, there are basic human goals and life goals.

6. Clarify distinctions and add detail – turn each pattern into a persona by assigning characteristics from the data, such as demographic data, behaviours, frustrations, environment, skills and capabilities, feelings, attitudes and aspirations, interactions with other people, products and services.

7. Fill in other persona types as needed – sometimes additional personas are necessary when presenting a persona set to stakeholders, for example supplemental user personas and negative personas.

8. Group and prioritise personas – distinguish between primary personas, who represent the design target, and secondary personas, whose goals and needs can mostly be met by designing for the primary personas.

9. Develop narrative and other communication tools – these include realistic photos and quotes that will make the personas believable and sympathetic.

Goodwin also suggests limiting the number of final personas to between three and seven. Effective personas must have appropriate characteristics, such as a realistic first and last name, and photo. Using nicknames, cartoons or embellished photographs detract from the value of the personas by highlighting that these are not real people. In addition to these guidelines, Cooper (1999) lists as essential details for a persona: age; personal information; work environment; computer proficiency; technical frustrations; attitudes; motivation for using a product; and goals. Candid quotes are also encouraged to make personas feel real.

6.2.2 Procedure

Twelve behavioural variables were determined, in line with the objectives and findings of studies 1 and 2 (Chapters 4 and 5, respectively). These were: attitude towards new technology, motivation to use technology, self-efficacy beliefs, computer anxiety, having other people present during acquisition, having other people present during set-up, the desire to involve other people present in acquisition, the desire to involve other people in set-up, self-perception of independence, the effect of technology on feelings of independence, the desire to learn from others during the Out-of-Box Experience of new technology, and the experience of social benefits from the OoBE of new technology. The spectrums used for these variables, represented in Figure 6.1, were displayed on a long sheet of paper.

Education (primary/postgraduate) and occupation (full-time/retired) were also represented on the worksheet, to provide potentially relevant demographic data. Participants were not divided by role, since this step was not applicable to the data. Instead, different coloured sticky notes were used for each age group: green for 50 to 64 years old; orange for 65 to 75 years old; and pink for over 76 years old. This measure ensured that it would be immediately apparent if age

was a determining factor in older people's relationship with new technology, as is commonly believed.

Participants' names were written on sticky notes corresponding to their age group and these were placed along each of the spectrums (Figure 6.2). Data from studies 1 and 2 were reviewed, in order to inform the process of mapping the participants on the spectrum. The sticky notes facilitated a dynamic process, which evolved as other participants were added to the scale and through discussions with supervisors. For details on the participants whose data was used for the personas, please refer to Table 5.3 (page 106, in Chapter 5).

Attitude towards new technology (studies 1 and 2)
Negative --- Positive

Motivation to use technology (studies 1 and 2)
Low --- High

Self-efficacy beliefs (studies 1 and 2)
Low --- High

Computer anxiety (studies 1 and 2)
Low --- High

Others during acquisition (studies 1 and 2)
Nothing --- Everything

Others during set-up (studies 1 and 2)
Nothing --- Everything

Desire to involve others in acquisition (studies 1 and 2)
None --- High

Desire to involve others in set-up (studies 1 and 2)
None --- High

Self-perception of independence (study 2)
Dependent --- Independent

Technology makes them feel (study 2)
Dependent ---Independent

Desire to learn from others during OoBE (studies 1 and 2)
Low --- High

Social benefits from OoBE (studies 1 and 2)
Low --- High

Figure 6.1 Behavioural variables with indication of the studies that informed them
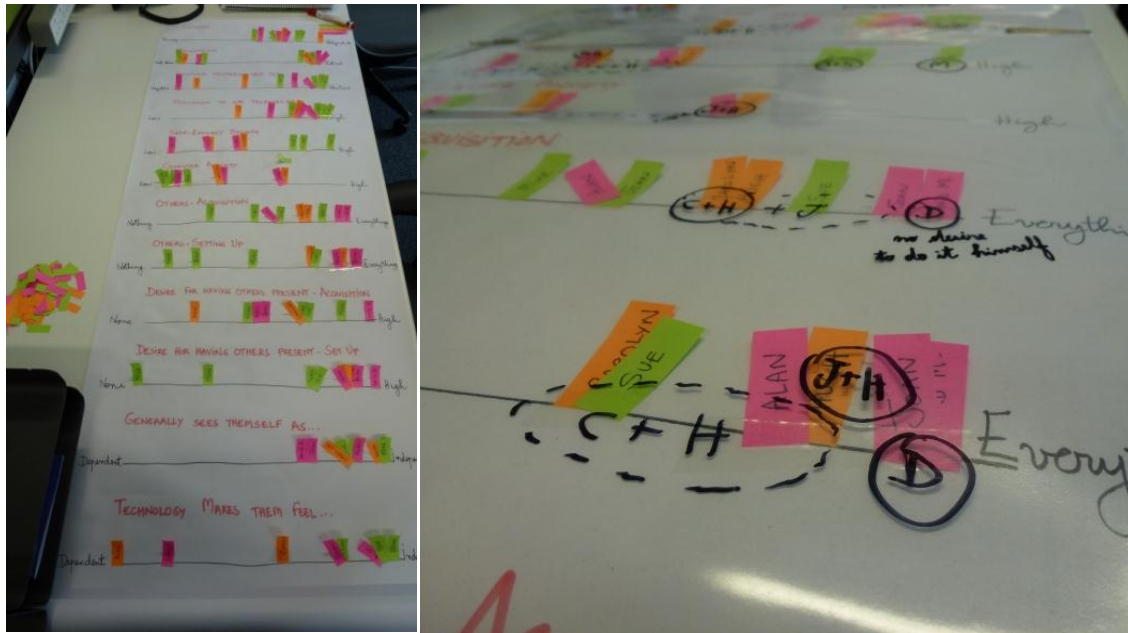
Figure 6.2 Persona development worksheet

After all participants had been added to the continuums, a clear plastic film was placed over the worksheet for taking notes. Obvious co-occurrences were encircled, while more tenuous links were marked with a dotted circle. Comments and explanations about the patterns were written beside the circles.

6.3 Results

This mapping technique facilitated an immediate identification of patterns between participants. However, some patterns were deemed more relevant than others, owing to the purpose of the envisaged personas and explanations emerging from the data. The following section presents these results and the rationale for the final personas.

6.3.1 Similarities between participants

Goodwin (2009) likens the technique of mapping participants to using a Likert scale and advises that each continuum be split up into five zones. The continuums were divided accordingly and assigned a value ranging from - - for very low/negative to ++ for very high/positive. Table 6.1 shows the values listed for each variable and participant.

Table 6.1 Mapping similarities between participants

	P04	P07	P08	P02	P01	P06	P09	P03	P05
Attitude towards new technology	++	++	++	+	+ –	–	++	––	+
Motivation to use technology	++	+	++	++	+	+–	++	+–	+
Self-efficacy beliefs	+	++	+	+	+–	–	+–	––	–
Computer anxiety	––	––	––	–	+–	+	––	+–	+
Other people involved in acquisition	+–	+–	–	+	+	+	+–	++	++
Other people involved in set-up	–	––	+–	+	+	++	++	++	++
Desire for other people in acquisition	+	+	+–	+	+	–	+–	++	+–
Desire for other people in set-up	+	––	–	+	+	+	+	++	+
Self-perception independence	++	++	+	+	+	++	+	+–	+–
Effect of technology on feelings of independence	++	+	++	++	+–	––	++	–	+
Desire to learn from others (OoBE)	+	++	+	–	+–	–	+	––	+–
Experience of social benefits from OoBE	+	––	+–	–	–	–	+	++	++

++ very positive/very high; + positive/high; +– neutral/medium; – negative/low; –– very negative/very low; ▪ 50-64 years old; ▪ 65-75 years old; ▪ over 76 years old

A crucial step to identifying patterns is to note how often participants occur together on each of the variables. Table 6.2 summarises the similarities between participants, recorded in accordance with the aforementioned system.

Table 6.2 Counting similarities between participants

	P04	P07	P08	P02	P01	P06	P09	P03	P05
P04	-	5	6	5	2	2	8	0	1
P07	5	-	2	1	2	1	3	0	2
P08	6	2	-	4	1	0	7	0	1
P02	5	1	4	-	6	4	4	0	2
P01	2	2	1	6	-	3	3	1	3
P06	2	1	0	4	3	-	2	2	4
P09	8	3	7	4	3	2	-	1	3
P03	0	0	0	0	1	2	1	-	4
P05	1	2	1	2	3	4	3	4	-

A pattern exists when there are two or more people who occur together on at least a third of the variables (Goodwin, 2009). In this case, for a pattern to exist, two or more participants must have the same values on a minimum of four variables.

It is interesting to note that commonalities between P04, P07, P08 and P02 seem to suggest that people's feelings towards technology may be age related. Overall, this group reports a more positive attitude to new technology, a high motivation to use technology, high self-efficacy beliefs and low computer anxiety. However, in the over 76 age group, P09 has a similar pattern for these variables. All of these participants also report that technology has a positive effect on their feelings of independence. Referring back to the demographic data in Table 5.3 (page 106), a common factor between P04, P02 and P09 is that they are still employed and use technology for work. P08 and P09 both have Parkinson's disease and mentioned that technology enables them to remain autonomous and active.

Also in the oldest age category, P05 reports feeling positive towards new technology, is fairly motivated to use technology and, importantly, feels technology has a positive effect on her sense of independence. These data discredit beliefs that age negatively influences people's interest in and benefits from technology.

6.3.2   Final personas

The aim of these personas was to communicate older people's attitudes to the OoBE of new technology, with a focus on the social benefits experienced during this process. Looking at 'desire to learn from others during the OoBE' and 'social benefits from the OoBE' suggested there were four critical behaviours: P04 had a *high desire to learn from others* during the OoBE and a *good experience of social benefits* from the OoBE; P07 had a *very high desire to learn* from others during the OoBE but *did not experience social benefits* from the OoBE; P06 had a *low desire to learn* from others during the OoBE and a *hardly experienced social benefits* from the OoBE; P03 had a *very low desire to learn* from others during the OoBE but a *very strong experience of social benefits* from the OoBE. Patterns were registered between each of these participants and at least one other participant, as indicated in Table 6.2. Specific participant attributes informing each persona can be inferred by comparing the characteristics recorded in Table 6.1 and Table 6.3.

The first persona, named Peggy, represents a person who has a high desire to learn from others during the OoBE (+) and experiences social benefits during

this process (+). This persona combined data from P04 (all 12 listed characteristics), P08 (6 characteristics), P02 (5 characteristics) and P09 (8 characteristics).

Even though P07 shared five variables with P04, he often occurred alone at extremes of the spectrums. He was classed as an outlier but, because he fit the overall sample criteria and presented interesting characteristics, his data was used to create the second persona, named Felix (shares all listed characteristics with P07). Felix represents a person who has a very high desire to learn from others during the OoBE (++), but does not experience any social benefits from this process (--).

Table 6.3 Characteristics of final personas

	Peggy	Felix	Warren	Olive
Attitude towards new technology	++	++	–	––
Motivation to use technology	++	+	+–	+–
Self-efficacy beliefs	+	++	–	––
Computer anxiety	––	––	+	+–
Other people involved in acquisition	+–	+–	+	++
Other people involved in set-up	–	––	++	++
Desire for other people in acquisition	+	+	–	++
Desire for other people in set-up	+	––	+	++
Self-perception independence	++	++	++	+–
Effect of technology on feelings of independence	++	+	––	–
Desire to learn from others (OoBE)	+	++	–	––
Experience of social benefits from OoBE	+	––	–	++

++ very positive/very high; + positive/high; +– neutral/medium; – negative/low; –– very negative/very low

The third persona, named Warren, was based on P06 (12 characteristics), supplemented with data from P05 (4 characteristics) and, to a lesser extent, P01

(3 characteristics). Warren represents a person who has a low desire to learn from others during the OoBE (-) and experiences few social benefits from this process (-).

The fourth persona, named Olive, was based on P03 (12 characteristics) and informed by data from P05 (4 characteristics). Olive represents a person who has no desire to learn from others during the OoBE (--), but she experiences significant social benefits from this process (++).

The final personas were presented in A4 and A3 format. Each persona was given a fictional name and surname, and photo taken from Corbis[19]. Their age, occupation and home life were based on the participants' background information. The persona sheets were fleshed out with a short description of their feelings and habits regarding technology, along with an actual quote taken from the data that summed up their attitude towards the OoBE. Three goals and two frustrations from the OoBE were assigned to each persona. Most of this data was represented in scales that formed the personas' Technology Profile. Additionally, a diagram of their technology support network was created specifically for these personas, to identify who usually assists them with technology related issues. The final personas are shown below (for larger versions, see Appendix F).

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[19] www.corbisimages.com

Peggy Brennan

"I don't mind having a go at setting up a new device, but if it's completely unfamiliar technology I feel more confident watching someone else do it."

Age: 57 years old
Occupation: part-time teacher
Home life: married, lives with husband

Peggy thinks technology is quite fun, though more importantly it supports her in her everyday life. She has had some health problems recently, but the computer and the internet have enabled her to continue working from home.

When Peggy buys new technology, she often reads up on it and appreciates advice from her children or husband. She may try to set up a new product, but prefers having someone else around to answer any questions and help out.

Technology support network
— primary
--- secondary

Peggy
husband — tech sup
son — daughter

Goals for the Out-of-Box Experience (OoBE)
- Set up a new product quickly and efficiently
- Avoid getting frustrated
- Learn how to set up the product or troubleshoot in the future

Frustrations from the OoBE
- Feeling like technology has gotten the better of her
- Feeling she is imposing on people for help when they are busy

Technology profile

Attitude towards technology
Negative ——————— Positive

Motivation to use technology
None ——————— High

Desire for other people (acquisition)
None ——————— High

Desire for other people (set up)
None ——————— High

Desire to learn from others (OoBE)
None ——————— High

Experience of social benefits (OoBE)
None ——————— High

Figure 6.3 Persona – Peggy

Felix Chase

"I like to get my hands on new gadgets and know how they work, but the last thing I turn to is the instruction book."

Age: 52 years old
Occupation: lab technician
Home life: married, lives with his wife

Felix is naturally curious about technology. He usually researches products and will seek other people's opinion before buying something new. He buys technology magazines to keep up to date with new developments.

For Felix, setting up a new device is fun. He enjoys the challenge and exploring the product's functions. If he has problems at this stage, he is most likely to ask his son or a friend for help because they will show him what to do.

Support network
— primary
--- secondary

Felix
wife — tech sup
son — friend

Goals
- Learn about the technology
- Explore functions and options
- Get the most out of a new technology product or service

Frustrations
- Not being able to set up a product by himself
- Having to use the instruction manual or contact technical support

Technology profile

Attitude towards technology
Negative ——————— Positive

Motivation to use technology
None ——————— High

Desire for other people (acquisition)
None ——————— High

Desire for other people (set up)
None ——————— High

Desire to learn from others (OoBE)
None ——————— High

Experience of social benefits (OoBE)
None ——————— High

Figure 6.4 Persona - Felix

Warren Fletcher

"I sometimes find it a struggle to get to know a new device."

Age: 66 years old
Occupation: civil engineer
Home life: married, lives with his wife

Warren has to work with computers every day and, as a result, he resents having to use technology when he gets home. In spite of this negative attitude, Warren uses technology frequently to pursue his hobbies.

Choosing and buying the devices he owns makes him feel empowered. He sees set up as a one off step in using a new product, so he is not interested in learning about it and is quite happy to let someone else do it for him.

Support network
— primary
--- secondary

Warren
wife — tech sup
son — friend

Goals
- Decision making about technology
- Avoid or reduce setting up a new technology product or service
- Use a new device intuitively

Frustrations
- Having to re-enter data or repeat setup procedures
- Receiving unsympathetic technical support

Technology profile

Attitude towards technology
Negative | Positive

Motivation to use technology
None | High

Desire for other people (acquisition)
None | High

Desire for other people (set up)
None | High

Desire to learn from others (OoBE)
None | High

Experience of social benefits (OoBE)
None | High

Figure 6.5 Persona – Warren

Olive Hadley

"I don't want to have anything to do with setting up new technology, it doesn't interest me whatsoever. I am only interested in what it can do for me."

Age: 81 years old
Occupation: retired
Home life: widowed, lives alone

Olive is not especially interested in technology, even though she uses it everyday to stay in touch with friends and family.

Her children and grandchildren often tell her about new technology products and services that would make her life easier. Olive also relies on others to buy and set up new devices for her, but she is quite happy about this because it means she can spend time with them and have a chat.

Technology support network
— primary
--- secondary

Olive
daughter — grandkids
son — friend

Goals for the Out-of-Box Experience (OoBE)
- Spend time with other people
- Avoid decision making about technology products and services
- Get the hang of meaningful functions and features

Frustrations from the OoBE
- Having to set up a new device by herself
- Learning new processes and vocabulary that she sees as unnecessary in her daily life

Technology profile

Attitude towards technology
Negative | Positive

Motivation to use technology
None | High

Desire for other people (acquisition)
None | High

Desire for other people (set up)
None | High

Desire to learn from others (OoBE)
None | High

Experience of social benefits (OoBE)
None | High

Figure 6.6 Persona - Olive

7 Design for social benefits

This chapter describes the rationale, development and results of persona-based workshops carried out with design students. These workshops were designed to understand whether the construct of social benefits influences the design of inclusive Out-of-Box Experiences of new technology for older people. The study generated five design concepts that employed different strategies for involving other people, thus confirming that social benefits can be incorporated into the OoBE. The discussion of these results focuses on outlining the foundations of a framework of attributes for OoBEs that foster social interaction.

7.1 Introduction

7.1.1 Background

The use of interactive consumer devices has social consequences, whether because they facilitate some kind of interaction or perhaps they impede others. The rapid diffusion of technology, and personal computing in particular, brought about an interest in understanding the relationship between people and computers, embodied by Human-Computer Interaction (HCI) research. The field of HCI has transitioned from the First Paradigm, where interaction is a form of man-machine coupling, to the Second Paradigm, where interaction is the exchange of information, and finally to the Third Paradigm (Harrison et al., 2007). In the Third Paradigm of HCI, interaction is approached from a phenomenological stance; in other words, the construction of meaning is fundamental and contingent on the physical and social setting in which the interaction occurs.

From a design perspective, these concerns fall within the scope of interaction design. Interaction design is popular yet somewhat ambiguous term, but is commonly perceived as the process of specifying the attributes of interactive systems with a focus on their qualities of use (Löwgren, 2001). Buchanan (2001, pp. 11) takes a broader view, which is especially relevant to the study described in this chapter:

> *We call this domain 'interaction design' because we are focusing on how human beings relate to other human beings through the mediating influence of products. And the products are more than physical objects. They are experiences or activities or services, all of which are integrated into a new understanding of what a product is or could be.*

Shifting the focus from objects and tasks to experiences propels the user into a broader and more holistic system. This system comprises the user, the product and the context of use, as well as the emotions produced through this interaction. The studies described in chapters 4 and 5 helped paint a rich picture of older people's interaction with technology and the context in which these interactions occur. It emerged that the OoBE of new technologies provides a pretext for older people to engage in social interaction. In other words, older people actively seek to involve others in the OoBE of the interactive consumer products they acquire. Battarbee (2004) labels this social use of products and ensuing shared construction of knowledge as collaborative experience, or co-experience. She argues that social interaction not only expresses the context of use, but motivates people to create their own interpretations of technology. The earlier studies of the present thesis found that, for older people, social interaction during the OoBE also motivates the adoption of new technology and supports coping strategies. Essentially, older people derive social benefits from the co-experience of the OoBE of new technology (for details, see Figure 5.14, page 119).

Designers face many hurdles when designing for user experience, not least of which is the fact that people are free to do and feel whatever they please. While designers are unable to predict how products are used and experienced, a

perceptive understanding of their users will enable them to influence user experience through design (Sleeswijk Visser, 2009). Put differently, they can facilitate a desired experiential outcome by incorporating the relevant affordances and constraints into their designs. In HCI and interaction design, this notion of facilitation has found expression in the search for a framework that encompasses tangible interaction user interfaces (Hornecker, 2005). Hornecker (2005, pp. 26) provides the following definition of facilitation:

> *We can interpret systems as spaces or structures to act and move in, thereby determining options and behaviour patterns. They enforce social configurations and direct user behaviour by facilitating some movements and hindering others. Thus, they shape the ways we can collaborate; they induce us to collaborate or make us refrain from it.*

Hornecker puts forward three concepts related to embodied facilitation, which can be interpreted simultaneously as design guidelines and challenges to generate systems and interfaces for collaborative use:

- *Embodied constraints*, which are the system's setup or configuration of space and objects that ease certain actions and restrict what people can easily do. The associated design guidelines are to explore constraints that require groups to distribute the task, help each other out and coordinate action; and to provide a shared transaction space.

- *Multiple access points*, which refers to providing alternatives means to access and actively manipulate relevant objects and systems. The associated design guidelines are to provide multiple points of interaction; to allow for simultaneous action; and to give equal access.

- *Tailored representations*, which means allowing straightforward access on the basic level of interaction yet enabling a more complex interaction style over time. The associated design guidelines are to build on the experience of the group and its members; to make the interaction intuitive enough for easy access; and to allow the semantics to rely on specific knowledge.

This framework is, by the authors own admission, still only a proposal. Furthermore, as it focuses on tangible interaction, it does not address the OoBE

holistically. The guidelines lay the groundwork to provoke reflection on forms of facilitation, yet they cannot replace actual design exploration.

7.1.2 Aim of the study

The user researcher stages of this thesis, which comprised a Technology Biography study (Chapter 4) and a Probe study (Chapter 5), revealed that people over 50 years old experience varying degrees of social benefits from the OoBE. Social factors not only motivate older people to take up technology, but also encourage people to overcome barriers they may encounter during the initial stages of interaction with new products. Since it was also the aim of this research to contribute to the design of engaging OoBEs for older people, these findings were used to create a set of four personas (Chapter 6) to be used in design workshops. These personas were divided into two groups: primary personas, which represent the main focus the product or service is being designed for; and secondary personas, who represent requirements that were not incorporated into the primary personas but that still need to be addressed. In this case, Peggy and Olive were selected as primary personas owing to the fact that they experience social benefits from the OoBE.

The aim of this workshop study was to evaluate the effect of the construct of social benefits, communicated through personas, on the design of Out-of-Box Experiences of new technology for older adults. To achieve this, the study was guided by the following questions:

- Are personas a meaningful and effective tool for communicating with designers when designing for the OoBE?
- Can the construct of social benefits be operationalised within the design of the OoBE?
- Does the construct of social benefits impact on the design of inclusive OoBEs?

7.2 Pilot

The materials used in this study were tested with a group of three participants, comprising two PhD students and a lecturer from Loughborough Design School. The pilot study consisted of the following steps, supported by a PowerPoint presentation:

- a brief explanation of the Out-of-Box Experience;

- brainstorming what factors generally create good and bad OoBEs of new technology;
- brainstorming what factors specifically create good and bad OoBEs of new technology for older people;
- introduction of the four personas;
- presentation of the design brief;
- ideation and concept generation;
- feedback and discussion.

The brief was to generate a design concept for a smart home monitoring system that would support and engage Olive during the Out-of-Box Experience. In line with Robson (2002), who states that in flexible designs pilot studies can be incorporated into the main study, the design concept produced in the pilot was included in the results and discussion sections of this chapter.

The pilot study was recorded in MP3 format to facilitate the development of the workshop materials and procedure, based on feedback from this session. The first issue that arose from the pilot study was the need to further clarify the OoBE, by breaking it down into smaller components and providing examples for each. Participants also struggled to distinguish between the primary and secondary personas. However, the design brief, which was fairly fuzzy and open-ended, did not present significant challenges. This feedback was used to improve the structure of the workshop and supporting presentation, as well as refine the prior knowledge questionnaire. The pilot also served to determine an appropriate length for each activity and the best means to capture data.

During the pilot, it became apparent that group discussion might not be sufficient to record the views of all participants in a larger group. Lilley (2007), who conducted a design workshop with nine Master's students, found that some participants were reluctant to offer their opinion in a group forum and therefore designed a follow-up email survey. However, there was concern that an email survey might generate a poor response rate for the study described in this chapter. Accordingly, a feedback questionnaire was designed and piloted, to be distributed and completed during the concept presentation stage of the

workshop. The main adjustments made as a result of the pilot are summarised in Table 7.1.

Table 7.1 Modifications made to the workshop materials and procedure

Challenges identified	Modification(s) made
Understand the concept of 'OoBE'	• Break up the various steps of the OoBE into separate slides • Provide an example of each step
Differentiate between primary and secondary personas	• Focus on one persona • Activity for empathising with that persona
Record everyone's views	• Design and pilot a feedback questionnaire

7.3 Method

7.3.1 Overview

The outputs of design ethnography studies provide the building blocks for generative research and concept development (Hannington and Martin, 2012). Correspondingly, this study consisted of a workshop with integrated discussion and design activities, based on findings from the previous studies.

Design workshops condense the early stages of the standard design process to produce new concepts and scenarios. The outputs of these workshops can vary widely, depending on the focus of the brief and the composition of the design teams. Escobar-Tello (2010) used design workshops iteratively to develop and refine a 'Design for Happiness' workshop framework, which could be effectively implemented in the future. Lilley (2007) used design workshops with students to understand what research and development strategies are employed to generate final concepts, with a view to developing a framework of attributes for behaviour changing devices. Sustar (2011) investigated the significance and feasibility of involving older people as co-creators of digital devices, by conducting creative workshops with teams of young designers only, teams of older people only, and teams with a combination of these two groups.

Within Inclusive Design, Julia Cassim (2010) has been championing the workshop model for over a decade. Since its origin as an Inclusive Design Challenge at the Royal College of Art in 2000, the process has grown both in terms of procedure and context of application. These Inclusive Design Challenges were initially documented in a publication called innovate (Cassim, 2001; 2002; 2003; 2004), which was later replaced by an annual publication called Challenge (Cassim, 2005; 2006; 2007; 2008; 2009; 2011). An adaptation of this workshop model has been incorporated into The Methods Lab[20] as an educational tool to introduce students to inclusive and participatory design. In this version, teams of students work on a general theme in close collaboration with an older or disabled creative partner. During the workshop, the teams learn about and reflect on the daily lives of their creative partner to propose a meaningful design intervention.

However, the present study aimed to draw on the personas developed in Chapter 6 rather than to co-design with older people. Elizondo (2011) developed multicultural personas and used them in design workshops in the UK and Mexico. She found that designers' empathy towards people with different needs and from different backgrounds is enhanced through the use of data-driven personas. Sleeswijk Visser (2009) conducted multiple workshops with design students and business stakeholders, to identify useful tools and techniques for communicating user experiences to designers. Among the many tools used, such as cardsets, storyboards and personas, she found that those that represented users as individuals elicited greater empathy. Moreover, this researcher makes five recommendations for effectively communicating rich experience information to designers, which are:

- To make a good communication plan;
- To represent real individual people;
- To sensitise designers;
- To stimulate designers to address their own experiences;
- To make communication participatory.

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[20] For more details see http://designingwithpeople.rca.ac.uk/home/the-methods-lab

The workshops described in the present study complied with these recommendations and borrowed empathy strategies used by Elizondo (2011). Initial materials were piloted and reviewed, thus producing a tailored workshop structure. The final materials and procedure are described in the subsequent sections.

7.3.2 Participants and sampling strategy

The envisaged participants for this study were students with a design background, with limited or no previous knowledge of social situated product use. In order to achieve this, the study focused on postgraduate students, and participants were recruited early in the academic year. Information sheets on the workshop were distributed to students on the following Master's programmes at Loughborough Design School: Industrial Design and Technology, Interaction Design, and Design and Innovation for Sustainability. See Appendix G for the workshop information sheet.

7.3.3 Materials and procedure

The core materials of this workshop were the personas described in Chapter 6. Olive and Peggy were selected as the primary personas (Cooper, 1999; Goodwin, 2009), because these personas experienced social benefits from the OoBE of new technology (see Table 6.3, page 145). These two persona sheets were modified for the workshop, in line with recommendations that support empathy and immersion with personas (Elizondo, 2011). To adapt the personas, the goals for and frustrations from the OoBE were left blank. Instead, the modified sheets (Appendix H) contained additional quotes taken from the data, to provide clues for discussion of what the personas might want to achieve from the OoBE and what would negatively affect their OoBE. Elizondo (2011) found that, even when a primary persona is appointed, designers may still generate an 'average user' based on the set of personas they were given. To avoid this, each group was assigned a single persona to work with.

The first part of the workshop was held on 30 October 2012 and divided into two sessions, one in the morning and the other in the afternoon. Each session had two groups of three or four participants. Groups A and B attended the morning session, and groups C and D attended the afternoon session (Table 7.2).

Table 7.2 Allocation of groups and personas

	Olive	**Peggy**
Morning session	Group A	Group B
Afternoon session	Group C	Group D

Each session followed the same structure and lasted approximately two hours. During this time, the concept of Out-of-Box Experience was presented and framed within the User Experience paradigm, factors of the OoBE were discussed, and the personas and design brief were introduced. No explicit information was given regarding Inclusive Design. Table 7.3 outlines the steps of the workshop and their approximate duration.

Table 7.3 Workshop schedule

Phase	Aim	Duration
Introduction	Present the structure of the workshop and explain the concept of Out-of-Box Experience.	15 min
Brainstorming exercise	Determine what factors are perceived as important for good and bad OoBE in general, and for older people in particular.	25-30 min
Personas	Introduce the concept of social benefits and present the secondary personas (Felix and Warren).	15 min
Empathy exercise	Groups discuss the goals and frustrations of the OoBE for their persona and present to everyone for shared discussion.	25-30 min
Design brief	Present scenario and design brief; facilitate preliminary group ideation.	30-40 min

All groups were given the same brief, which was *to generate a design concept for the Out-of-Box Experience of a smart home system that would support and engage [the persona] during the initial stages of interaction*. The smart home monitoring system[21] was selected because, according to information gathered during the previous studies, it is not widely owned by older people but represents a relevant product that they might want to own in the future. This product also

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[21] Example taken from www.alertme.com, 15 September 2012

entails some level of complexity, such as setting up an online account, configuring the system and connecting it to the household broadband. The standard kit includes a hub that plugs straight into an existing broadband router, a status lamp, two motion sensors, two alarm sensors, three door/window sensors, three keyfobs, and a button that can be used as a doorbell.

Figure 7.1 Photos of the workshop

The presentation of the final design concepts was held on 8 November 2012, in a single session with all the groups. In addition, this session was attended by two lecturers of Loughborough Design School[22] who gave feedback on the design concepts. Each group gave a presentation of up to five slides to illustrate their OoBE concept. Students were encouraged to comment on their experience of using personas, as well as discuss the proposed concepts in relation to the individual personas and the relevance of these concepts to the wider population. Additional materials included a prior knowledge questionnaire (Appendix I), which was distributed to participants in both the pilot and the main workshop; and a feedback questionnaire (Appendix J), which was developed following the pilot and distributed to the workshop participants after the presentation of design concepts. The feedback questionnaire was used to clarify and record all participants' feelings about designing for the personas and incorporating social benefits into their designs. The questionnaire contained rating scales about the use of personas and the construct of social benefits for design. Open ended questions also featured, to gain deeper insight into the factors affecting participants' choices in the rating questions (Robson, 2002).

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[22] Dr Val Mitchell and Colette Nicolle

7.3.4   Data analysis

Cross (2011) identifies the following methods for evaluating the thought processes of designers:

- Performance tests in which participants are asked to conduct specialised tasks under laboratory conditions, while their actions are recorded and analysed;
- Protocol studies in which the researcher records participants' thinking-aloud process while they perform a specified design activity;
- Case studies, which within design typically involve simultaneous or post-hoc observation of the process and development of a specific design project.

Even though the aim of this study did not directly address the designers' thought processes, a design case study approach was selected as the most appropriate form of analysis for the concepts produced. The researcher was present and able to observe students' work processes and discussion during the ideation phase, within the initial workshop. All workshop session were captured in audio MP3 format and partially transcribed to extract verbatim descriptions of the concepts. This measure helped to overcome any misinterpretation that may occur when analysing visual data without the participant present (Lilley, 2007). Various other types of data were captured (e.g. through brainstorming, questionnaires and persona empathy exercise), which required a flexible analysis strategy.

This study employed the general framework for conceptualising data analysis proposed by Miles and Huberman (1994) and indicated as particularly appropriate for case studies (Robson, 2002). This framework consists of three concurrent procedures: data reduction, data display and conclusion drawing. According to Miles and Huberman, there are two main formats for displaying qualitative data: matrices, which are organised in rows and columns; and networks, which use several interlinked nodes. Data from this study were mainly presented in matrices, as these facilitated the summarisation and comparison of findings within and across data sets. Excel spreadsheets were used to facilitate this stage of data analysis.

7.4 Results

This study produced data in a range of formats, including images, audio recordings and various written outputs. The following subsections present these results in an approximate chronological sequence that corresponds to the order in which activities were conducted in the workshop. This sequential structure allows the workshop to be followed as a process, beginning with participants' initial assumptions about the OoBE through to the design concepts generated in response to the personas. The final subsection presents participants' feedback on the personas and the construct of social benefits.

7.4.1 Participant characteristics

Including the pilot, a total of 16 people took part in this study. Participants were aged 21 to 38 (M=25.44 and SD=4.93). The sample comprised four male participants and twelve female participants, with different backgrounds (Brazil, China, Colombia, Lithuania, Mexico, Spain and the UK). Table 7.4 shows the group allocation of participants, with the results of their self-reported familiarity with Inclusive Design, Experience Design and Personas.

Table 7.4 Participants' prior knowledge

Group	Participant	Inclusive Design	Experience Design	Personas
Pilot	D01	Moderate	Moderate	Moderate
	D02	Limited	Limited	Limited
	D03	Moderate	Moderate	Moderate
A	D04	Moderate	Extensive	(no answer)
	D05	Moderate	Extensive	Extensive
	D06	Moderate	Extensive	Extensive
	D07	Limited	No knowledge	No knowledge
B	D08	Limited	Limited	Limited
	D09	No knowledge	Moderate	Limited
	D10	Moderate	Limited	No knowledge
C	D11	No knowledge	Limited	Moderate
	D12	No knowledge	Moderate	Limited
	D13	Limited	No knowledge	No knowledge
D	D14	Limited	Moderate	Moderate
	D15	Moderate	Limited	Limited
	D16	Limited	Moderate	(no answer)

7.4.2 Initial perceptions about the OoBE

Before the introduction of the personas, participants were asked to brainstorm what factors they felt contributed to good and bad OoBEs of new technology. They were also asked to consider what factors would specifically create good and bad OoBEs of new technology for older people. These results are summarised in Table 7.5 and Table 7.6, respectively.

Table 7.5 Results for factors that create good and bad OoBEs

	Good OoBE		Bad OoBE	
Purchase	Clear/sufficient product information	3	High price	1
			Delivery time	1
	Good customer service	1	Not seeing the product before buying	1
	See product before buying	1		
	Trusted provider	1		
	Convenience	1		
Packaging	Easy to open	4	Difficult to open	2
	Organised/labelled	1	Disorganised packaging	1
	Few materials/layers	1	Product not sufficiently protected	1
	Attractive	1		
	Identification/information	1	Unsafe	1
			Not ecological	1
Set-up	Plug and play	1	Download software/sign up to service	2
	Simple instructions	2		
	Diagrams	1	Long and inaccessible instructions	2
	Logical steps/guide the user	2		
	Product intact/not broken	1	Batteries not included	2
			Complex assembly	2
			Easy to damage	1
			Hidden functions	1
Assistance	One-to-one assistance	1		
	Open return policy	1		
	Extended service	1		
Other	Surprise	1	Product does not meet expectations	1
			Not enjoyable	1

Table 7.6 Results for factors that create good and bad OoBEs for older people

	Good OoBE for older people		Bad OoBE for older people	
Purchase	Access to product	1	Unfriendly shopping experience	1
	Home delivery	3	Security	1
Packaging	Easy to open	1	Difficult to open	2
	Big font	2	Small font	1
	Safe	1		
	Portable	1		
Set-up	Clearly detailed procedure	2	Too many steps	1
	Plug and play	1	Too much information	2
			Not enough information	1
			Technical language	2
			Constant updates	1
			No tolerance for error	1
Assistance	One-to-one assistance	2	Bad support service	1
			Paying for professional assistance	1
Other	Gift	1	Unfamiliarity	1
			Feeling excluded because of age	1

These results indicate that designers feel a positive OoBE requires good usability and simplicity of the packaging, instructions and set-up procedure. Additional consideration must be given to accessibility, such as using a big font or making the package easy to transport, when designing an OoBE for older people. Several groups felt that home delivery would improve the OoBE for older people. Other aspects of service design that were mentioned as positive factors of the OoBE include attentive customer service during purchase and when assistance is needed. In terms of emotional aspects, 'surprise' was mentioned as something that would contribute to a good overall OoBE, as would attractive packaging. Similarly, it was suggested that a 'gift' would enhance the OoBE for an older person acquiring and setting up an interactive consumer device.

A negative OoBE was mostly perceived as resulting from the opposite factors, for example difficulty with the packaging, long instructions and a complicated set-up procedure. An expensive device or one that did not contain batteries included in the packaging were also considered negative factors of the OoBE. Regarding factors that would negatively affect OoBEs for older people, participants mentioned too much information, as well as not enough information; technical language; a lack of tolerance for error; and security during acquisition, among others.

7.4.3 Empathy with the persona

The participants were introduced to the personas of Felix and Warren, who do not experience particular social benefits from the OoBE. The persona sheets of Felix and Warren contained their photos, biographical information, technology support network, technology profile, goals for and frustrations from the OoBE. Each group was then given a modified persona sheet for either Peggy or Olive, which did not contain the goals for and frustrations from the OoBE. Instead, these persona sheets contained real quotes from the previous two studies, to provide clues about the goals for and frustrations from the OoBE. The groups were given a few minutes to discuss what these goals and frustrations were, before presenting their persona and conclusions.

Figure 7.2 Group A presenting their persona

The proposed goals for and frustrations from the OoBE were compared to those identified by the researcher in Chapter 6, and discussed with all participants. Participants were very successful at identifying these goals and frustrations, and occasionally added other correct alternatives. Group A felt Olive would feel frustrated by (verbatim):

> *Not having support or someone to ask about something she doesn't understand.*

Also regarding frustrations from the OoBE, Group B felt that Peggy would appreciate if (verbatim):

> *Broken product does not easily occur –*
> *instructions/packaging prevent wrong construction.*

This frustration relates to 'Feeling like technology has gotten the better of her' from the original persona, but provides a specific example of how this might be prevented in an improved OoBE. It was interesting to see how some groups continued to grow their personas during concept development. For example, in their presentations, Group B included fabricated quotes to tell Peggy's story (Figure 7.3) and Group D incorporated a breakdown of Peggy's needs (Figure 7.4).

the story

Peggy Brennan

'I've purchased a home security solution from the internet and I want to set it up with my daughter; its nice to spend some quality time with her.'

'I want to be able to do the setting up myself but I'm always worried I've done something wrong.'

'I want to be confident when I set up new products; especially those that are really important to my welfare.'

'It's nice to be able to have some fun and a few laughs but also get the device correctly set up at the same time.'

'Sometimes the only quality time I get to spend with my family is when I have a new product I need to set up; I wish they could enjoy the experience as much as I enjoy their company.'

Figure 7.3 Quotes created by Group B to tell Peggy's story

Figure 7.4 Peggy's needs analysis produced by Group D

7.4.4 Design concepts

A total of five OoBE concepts were produced in this study, including the pilot. The slides produced by the students for the main workshop can be viewed in Appendices K, L, M and N. Participants were given the freedom to decide in which and how many stages of the OoBE to intervene, from purchase decision and acquisition through to set-up and assistance. Consequently, this study

produced concepts that varied in scope and depth. Analysis of these concepts revealed a range of strategies for incorporating social benefits into the OoBE of a smart home system. These are presented as design case studies in the following subsections, with illustrations produced by the participants.

7.4.4.1 Pilot: Hosting an event

The pilot group envisaged an OoBE for Olive in which the online purchase procedure would gather specific personal information about the end user, such as her age, whether it is the first time she will use this system, and whether she will set up the product alone (Figure 7.5). This step can be undertaken by Olive, or anyone else who wants her to have a smart home monitoring system. Based on this information, the company can deliver her a personalised OoBE. Olive receives a package that appears to be a gift, it looks fun and not intimidating. On the outside of the box is a message that reads 'This is my party! Congratulations Olive, this box contains a smart home system and invitations for you to organise a set-up party', as well as the invitations and instructions for hosting her party (Figure 7.6). Olive fills out the invitations and puts them in the post. Then she must host a party for the people she invited, who will in turn help her to set up the smart home system.

Inside the box is a book with a questionnaire for friends and family to fill in with Olive (Figure 7.7). This questionnaire elicits important information for setting up the system, but is also a way for the guests to connect with Olive by learning more about her life. After the system has been set up, Olive fills out feedback forms about the people who helped her and sends them to the company. The company rewards these people, perhaps with vouchers or points that they can redeem against future purchases.

Participants in the pilot felt that this OoBE concept could appeal to a wider audience, as there was some flexibility in terms of the type of event to be hosted. For example, they suggested that Peggy might prefer to host a cocktail party and Felix might prefer to have a barbeque. Moreover, the personal information gathered when ordering the product would allow the company to deliver the most appropriate OoBE.
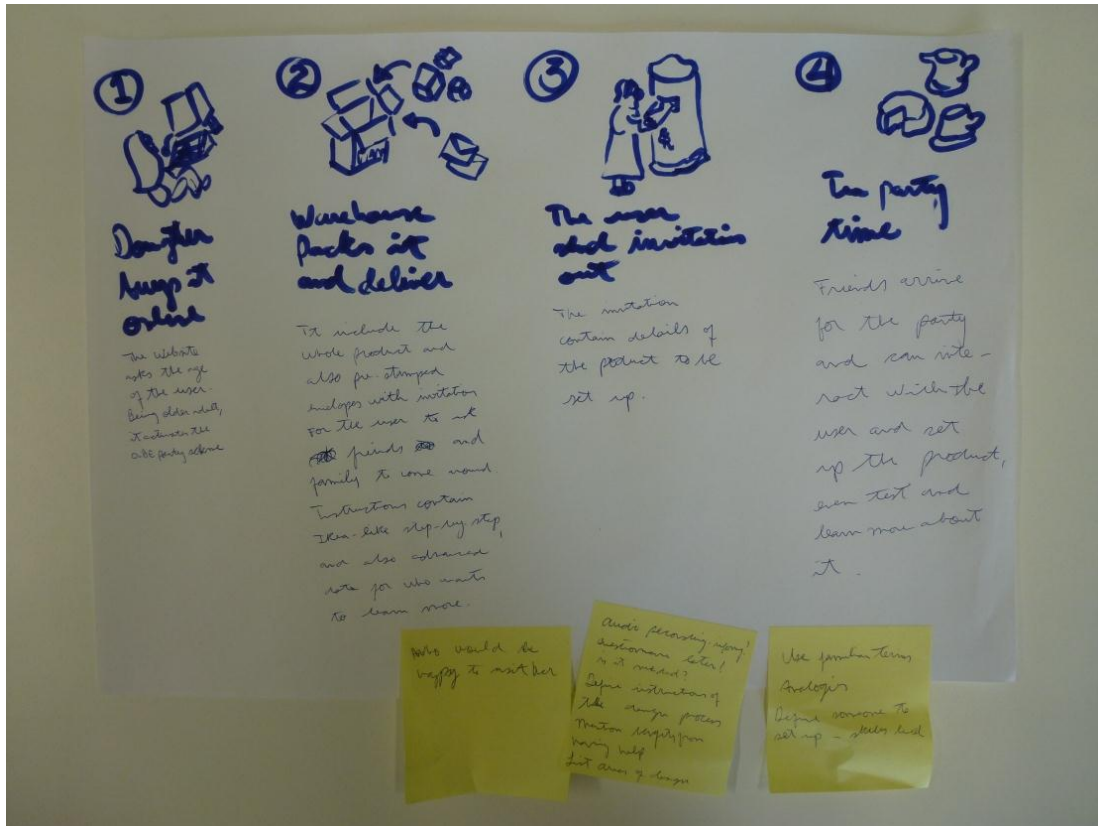
Figure 7.5 Ordering online facilitates a personalised OoBE

Figure 7.6 The smart home system is packaged as a gift for Olive
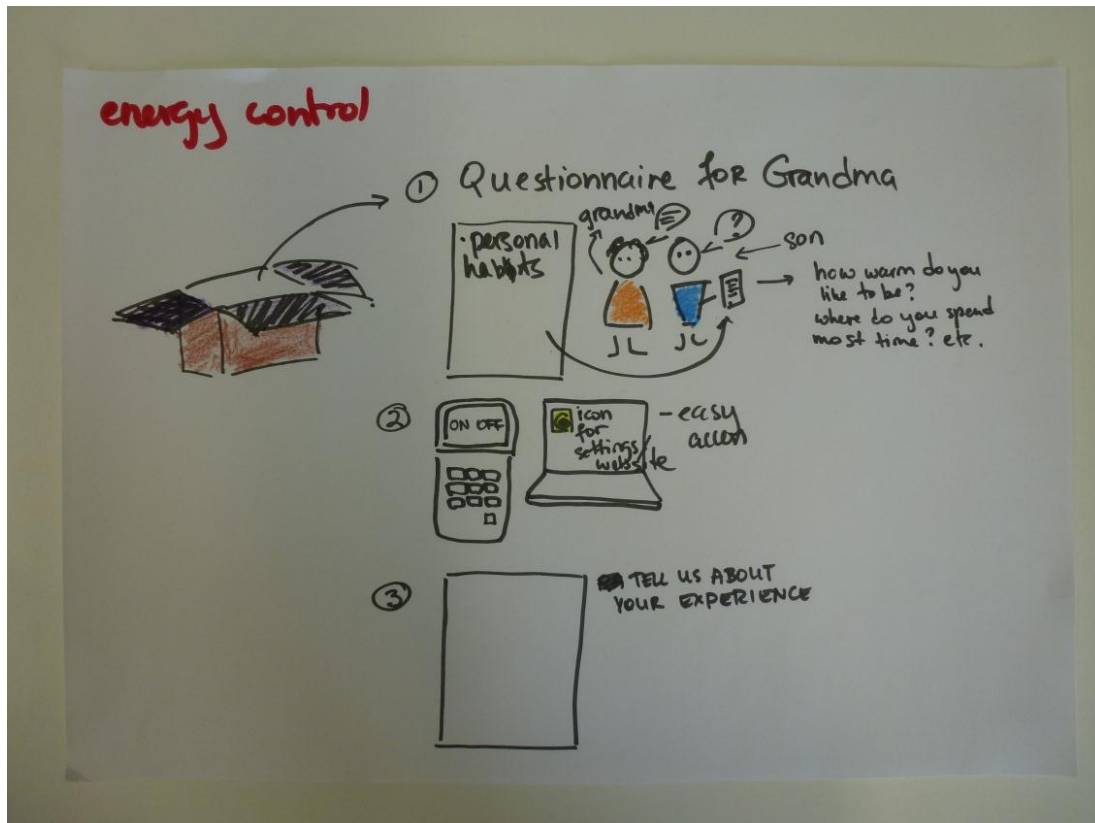
Figure 7.7 A questionnaire helps others customise the system for Olive

7.4.4.2 Group A: Encouraging messages

Group A was designing for Olive and their presentation looked at packaging, set-up, first use and assistance. They focused on encouraging Olive to open the box herself, designing packaging that can be opened easily by tearing along a dotted line. Figure 7.8 shows the initial instructions are on the outside of this tear-away section, which is intended to tempt Olive into taking these first steps. This section has a calendar on the other side in order to prevent them from being thrown away. The outside of the packaging also contains motivational messages to persuade Olive to open the box, e.g. 'Open it now!!! This is not just a box, it's a gift' or 'Find a great gift for you inside!!'
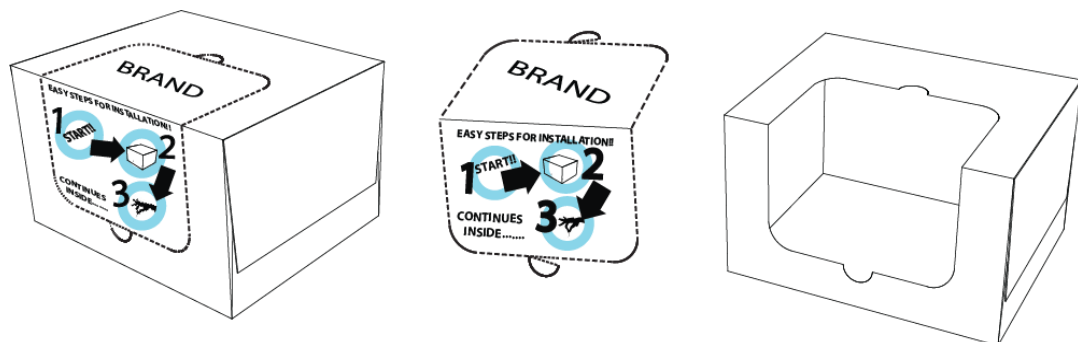
Figure 7.8 Easy to open packaging proposed by Group A

This concept seeks to empower Olive during the OoBE and, with this in mind, contains prompts for family members to leave her encouraging messages. Likewise, there is a Thank You note in the information booklet, which Olive can fill in and give to the person who helped her during the OoBE (Figure 7.9).

Figure 7.9 Family members are prompted to leave encouraging messages for Olive

The information booklet contains simple tips that can be torn out and stuck to a wall or fridge. Additionally, it contains a section with common solutions to help Olive or her family solve ordinary problems. Of the three people who presented this concept, two felt their concept would appeal to younger people and the third felt it would depend on the desirability of the product.

7.4.4.3   Group B: Playing a game

Group B was designing for Peggy and their concept addressed packaging, the possibility of an extra gift, and an app that would help install the system. They proposed packaging that would guide Peggy through each step of the process. This was achieved by creating a multilayered box with only one element of the system per layer. In addition, each layer contains a number, label, instructions and a QR code that can be scanned for further assistance.
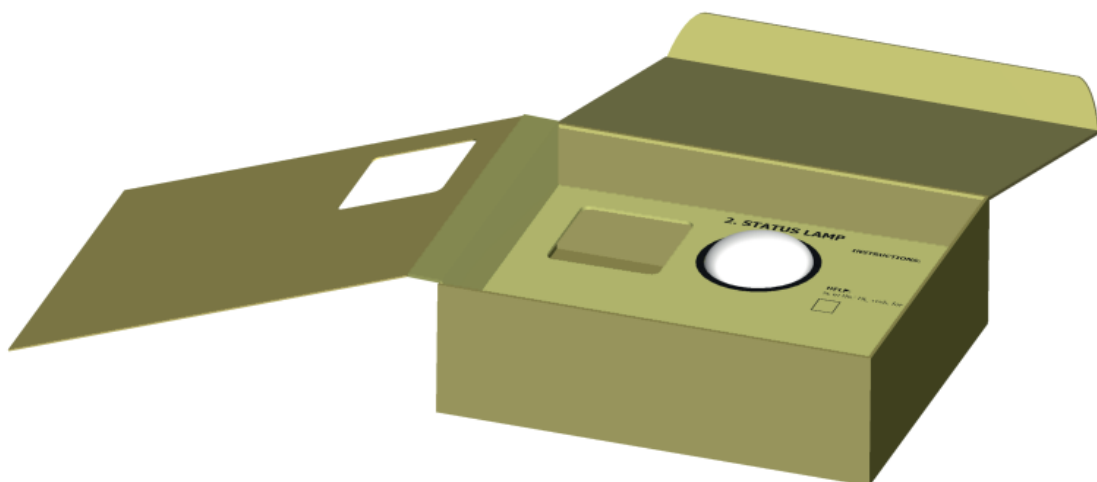
Figure 7.10 Multilayered packaging concept proposed by Group B

This group suggested that the system could include an extra electronic device as a gift, to scan the QR codes and access information. Alternatively, Peggy or whoever set up the system could use their smartphones for this. Once the system is in place, there is a QR code on the box to scan. This links to a free game app that can be downloaded and installed (Figure 7.11). This is a multiplayer game, which aims to help customise the system settings and test if it has been installed properly by simulating a break in. As a result, Peggy is able to participate in the set-up process but also enlist the help of others in a mutually beneficial way.

All members of this group felt that this concept would appeal to younger people, particularly because 'the game part of the experience is fun for younger people' (D10, feedback form).
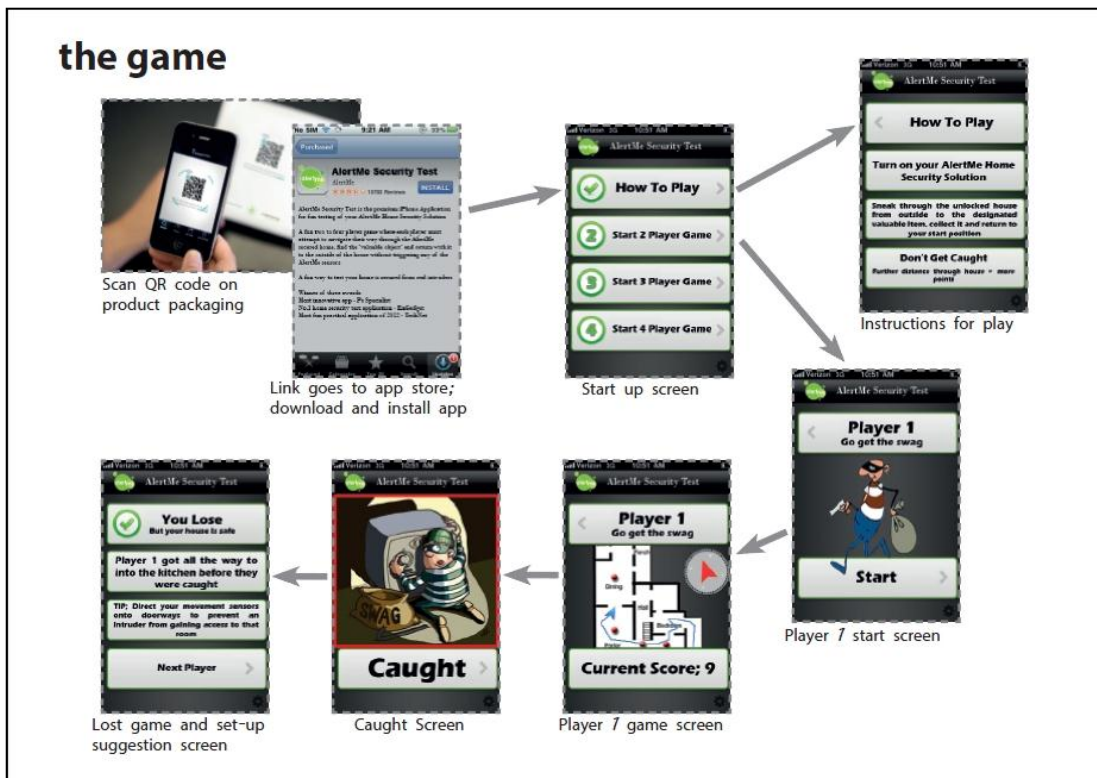
Figure 7.11 Game to help customise and test the system

7.4.4.4 Group C: Inaccessibility

Group C was designing for Olive and their design intervention focused on the packaging. Somewhat provocatively, they proposed an OoBE that would appeal specifically to younger, more technology oriented people. In their words, their aim was to 'provide an excuse for her to ask for help and to communicate with

others'. In the presentation, they set out the following goals for their OoBE concept (verbatim):

> a) design a package which is out of her level and ability to set up. It may be more suitable for young people.
> b) add a little tip on the package: Help your mother to set up.
> c) make the design more innovative, not specialized for elderly.

To achieve this, they designed a minimalist box embellished with technology inspired graphics. It opens easily, like a book, and the elements of the smart home system are displayed within the 'book'. There is a heart-shaped 'bookmark' in the top right corner with a reminder to help older people set up this new system. This group acknowledged that their design would probably be more suitable for younger people.

Figure 7.12 Deliberately inaccessible packaging proposed by Group C

7.4.4.5   Group D: Creative hobby

Group D was designing for Peggy and their presentation covered acquisition, packaging and unpacking, set-up, and assistance. They envisaged that Peggy would purchase her smart home monitoring system online and that she would

pay for it on delivery. The outer packaging is made from hemp and has wheels to make it easy to transport. The inner packaging is made from paper, decorated with an origami flower. Both the outer and the inner packaging were designed to be reused, respectively as a trolley and as decoration.

Figure 7.13 Craft-inspired packaging concept proposed by Group D

The instruction booklet would also have a crafts feel to it, for instance by featuring a paper cutting element. Each step is presented as an activity that must be completed before moving on to the next. The artisanal nature of the packaging and instruction booklet is intended to appeal to Peggy, but also to present the OoBE as a creative activity that could be shared with someone else.

Figure 7.14 OoBE as a creative activity to share with others

Each element of the system is tagged with an electronic monitoring system, linked to a software program. This software can be accessed by inserting a DVD into the computer, which will test every element of the system via Wi-Fi. If a problem is detected, the program will provide two options depending on its

complexity: an online tutorial or, for more specialised problems, contacting technical support and sending an online problem report.

This group stated that, while some of these elements might appeal to younger people, the concept should be modified to become desirable for younger people.

7.4.4.6   Summary of OoBE features

The pilot and workshops generated a variety of concepts and strategies for incorporating social benefits into the OoBE, some of which can be adapted to other types of technology. Among these, some interesting features that companies could explore in the OoBE of their products and services are:

- Personalising the OoBE to suit individual preferences and characteristics, achieved by gathering relevant information during online purchase;

- Creating an event around the set-up of the new product or service, explicitly turning it into an enjoyable and social occasion;

- Providing mechanisms that foster reciprocity, such as thank you notes, vouchers or rewards for people who help set up a new product or service;

- Presenting packaging as patently easy to open and inviting, through the use of encouraging and informative messages;

- Designing multilayered packaging that guides the user through the set-up process, by using each layer to present only the necessary elements and instructions for each step;

- Supplying optional games that facilitate a light-hearted way to set up a product or allow the user to test that the system is operational.

It is acknowledged that these features are contingent on the type of product or service, and that there are products for which they would be less desirable. Overall, perhaps the most important characteristic for the OoBE is allowing the user to make choices about how and how much they are involved in the process.

7.4.5   Feedback

7.4.5.1   The use of personas

Twelve participants attended the presentation workshop and responded to the feedback questionnaire. Figure 7.15 illustrates the responses to the scales questions regarding use of the personas. It shows that the participants largely found the personas an effective and engaging tool for designing for the OoBE.
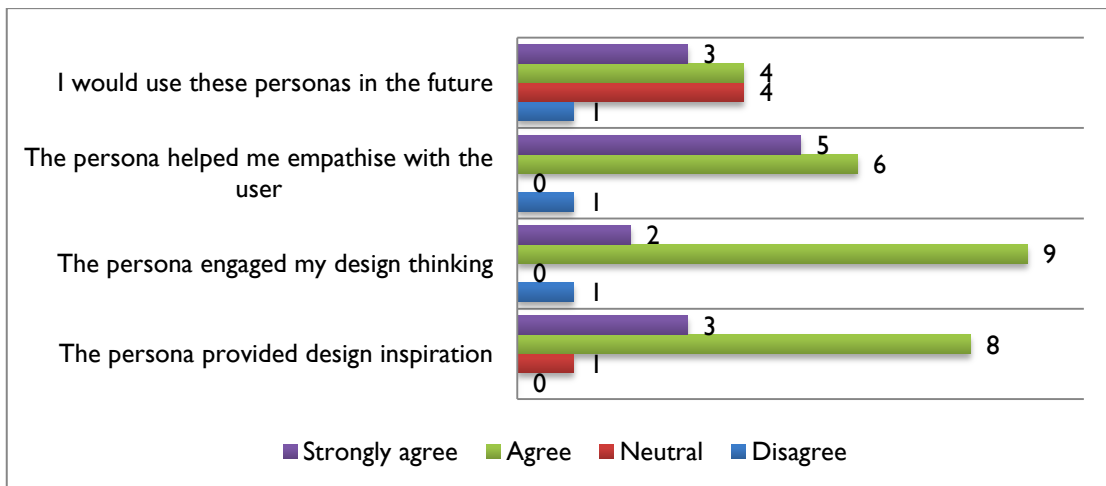
Figure 7.15 Results to Q1 of the feedback questionnaire

Most participants found that the persona helped them to empathise with the user. The persona provided a lens to guide design thinking, for example D06 wrote in the open ended section of the questionnaire:

> *I may think about many elements that I want to design through this person.*

It also prevented self-referential design, as D08 wrote:

> *I designed something that the persona would want, not just what I would want.*

There was an overwhelmingly positive response to whether the personas fostered engagement of design thinking and inspiration. For instance, when asked if the persona had affected the design solution, D05 wrote:

> *Definitely, identifying her needs and thinking was the first step for starting a design concept.*

The participant who felt that the persona had not engaged their design thinking also felt neutral regarding the persona providing design inspiration. This participant (D13) did not respond to the open ended questions, so it is not possible to determine what factors influenced these views.

7.4.5.2 *The construct of social benefits*

Although twelve participants completed the feedback questionnaire, only eleven valid responses were recorded for the question about the construct of social benefits. These responses are presented in Figure 7.16.
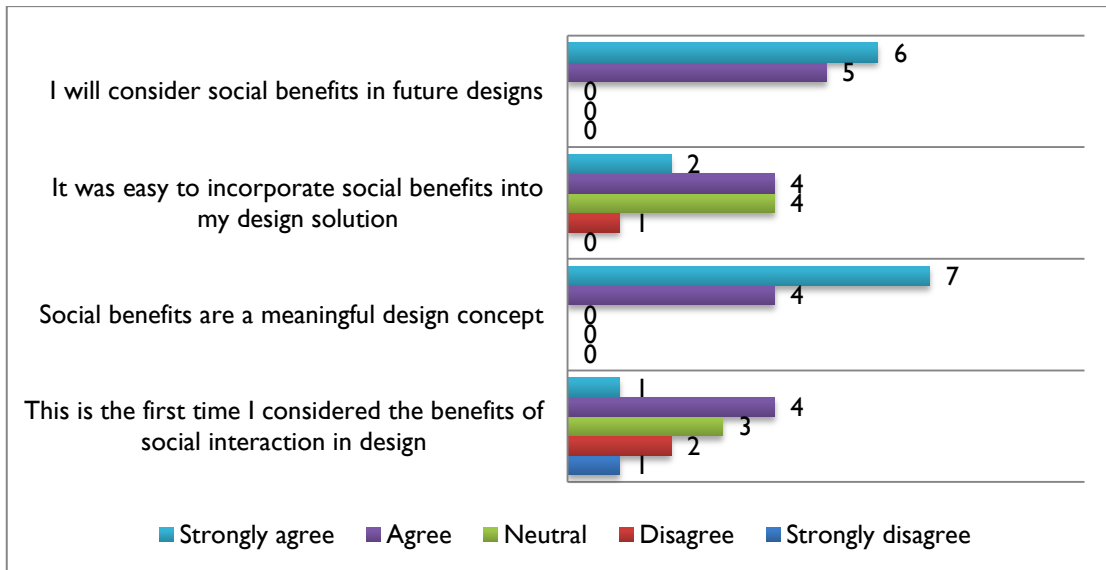
Figure 7.16 Results to Q5 of the feedback questionnaire

Responses to whether participants had considered the benefits of social interaction in design before this workshop varied quite widely. Just under half were unfamiliar with this idea, but three participants reported this was not the first time they had thought about it in a design context. All participants stated that they would consider social benefits in future design initiatives. Likewise, social benefits were perceived as a meaningful design concept. However, some participants felt unsure as to how to incorporate social benefits into their design solution.

7.5 Discussion

While it has been established that designers cannot prescribe an actual user experience, they can endeavour to facilitate experiences by understanding what constitutes meaningful use and design accordingly. This study generated five OoBE concepts for a smart home monitoring system, which exposed various ways of designing for social benefits. These concepts were contrasted with findings from prior studies described in this thesis. The following sections provide a discussion of the meaningfulness and effectiveness of the personas generated in the previous chapter, as well as a reflection on the construct of social benefits in Inclusive Design.

7.5.1 Evaluating the design outputs against the personas

The reasons identified in Chapter 4 for involving other people in the OoBE were further explored in Chapter 5, broadening the scope beyond the OoBE. Findings

indicated that older people's desire for co-experience was explained by task-related, social and psychological factors. The concepts generated in this study were not sufficiently developed to evaluate task-related factors, i.e. effectiveness and time efficiency.

Furthermore, the involvement of others in the OoBE means that effectiveness and efficiency vary depending on opportunity. At this stage, it is fair to suggest that the concept proposed by Group C (Inaccessibility) would be the most time efficient, provided another person was available to help set up the smart home monitoring system. In contrast, the concept proposed by the Pilot group (Hosting an event) would be the longest process because of the preparation required, i.e. sending out the invitations. Table 7.7 indicates whether the design concepts addressed the factors that affect the desire for social interaction (see section 5.4.4), with the exception of the psychological factor 'laziness'. Red shows the groups that designed for Olive, and orange shows the groups that designed for Peggy.

Table 7.7 Linking the concepts to the reasons for co-experience

		Pilot	Group A	Group B	Group C	Group D
SOCIAL	Reciprocity	✓	×	o	o	o
	Other company	✓	×	✓	✓	✓
	Fun	✓	×	✓	×	✓
PSYCHOLOGICAL	Learning	o	✓	✓	×	✓
	Reassurance	o	o	✓	o	✓
	Encouragement	o	✓	o	×	o
	Trust	✓	o	o	o	o

The concept generated in the pilot directly facilitated reciprocity in three ways. Firstly, Olive would host a party, thus providing refreshments for whoever she chose to ask for help. Secondly, the questionnaire provided to help customise the system for Olive would allow her helpers to connect with her. Finally, after the system had been set up, Olive could send feedback about those people to the company and they would receive some form of reward, such as discount vouchers or points to be redeemed against future purchases. This concept also endeavoured to make the OoBE a fun experience, as well as to facilitate trust by

giving Olive control over her party (e.g. when it will take place, who she will invite). Learning, reassurance and encouragement were not directly addressed in this concept, but may occur naturally depending on how involved Olive decided to be in the process. This concept is pertinent to Olive's persona because she experiences strong social benefits from the OoBE, but has very low desire to learn from others during this process.

Conversely, the concept proposed by Group A (Encouraging messages) is not especially relevant to Olive's persona because they focused on persuading her to undertake the OoBE on her own. In fact, this concept is more suited to Peggy's persona, as she is quite keen to learn during the OoBE and does not like to feel like a burden to others. This apparent failure of the persona can be explained by the overall prior knowledge of this group, with three out of the four participants reporting a moderate knowledge of Inclusive Design. This suggests that designers with a stronger background in Inclusive Design may be more reluctant to design for co-experience, due to the focus on promoting autonomy through design. Group A was concerned with how Olive would cope if she had to set up the system alone. They hinted at this even during the empathy exercise when they mentioned 'not having support or someone to ask about something she doesn't understand' as an additional frustration. However, the encouraging messages they envisaged as part of the OoBE may offer a trigger for desired behaviour (Fogg, 2009), in this case to embark on the OoBE unassisted.

Groups B, C and D did not directly address reciprocity or trust in their concepts, even though it can be argued that these would arise naturally from the shared activities. Groups B and D both designed for Peggy, and directly addressed her key wants from the OoBE: to learn from others during the OoBE and to spend time with other people. The concept proposed by Group B (Playing a game) leveraged social interaction from the OoBE through the app, which was intended as a multiplayer game. Moreover, this game would provide reassurance to Peggy that she had successfully set up the system since it was also designed to test the system. Likewise, the concept proposed by Group D (Creative hobby) facilitates social interaction through the craft-based activities, and the DVD that tests the system provides reassurance that it has been set up correctly.

The concept envisaged by Group C (Inaccessibility) meets Olive's expectations from the OoBE, which are to spend time with other people and avoid decision making about technology-related products and services. It also counters her frustrations from the OoBE, which are setting up a new device on her own, and learning new processes and vocabulary that she feels are unnecessary to her daily life. This concept would make it hard for Olive to set up the system herself, if nobody was available to help her, but this concern was not communicated in the persona sheet. Creating an opportunity to spend time with others is the only criterion that has been directly addressed in this concept, which means the persona was a successful tool for communication even if the concept may cause some debate.

In conclusion, the personas were effective tools for communicating with designers, since the concepts generated by and large fulfil their individual goals for the OoBE. Nonetheless, the fact that Group A focused on encouraging their persona to engage in the OoBE rather than responding to her goals for and frustrations from the OoBE cannot be disregarded. This group was concerned with how Olive would cope in the absence of family or friends to assist her and, consequently, their design concept sought to empower her to undertake the OoBE alone. This preoccupation was apparent during the empathy exercise when Group A mentioned they thought Olive would be frustrated by not having the support she wanted. Concerns about autonomy appeared to prevail over designing for Olive's desirable experience, even though this group also had the strongest background in Experience Design. This suggests that being mindful of inclusivity might prevent designers from incorporating social benefits into their products and services. Consequently, the workshop structure adopted in this study may need to be modified for this situation. Escobar-Tello (2010) and Sustar (2011) may hold a solution for this problem, as their design workshops incorporated incubation stages to foster divergent thinking and encourage designers to let go of previous assumptions.

7.5.2   Inclusive Design tensions

Looking at these concepts from an Inclusive Design perspective, one of them leaps out as clearly not meeting the requirements for an inclusive OoBE. Group C exploited inaccessibility as a mechanism to engender social interaction. This

strategy is a form of embodied constraint, in other words physical restrictions condition what people can do and thus facilitate certain behaviours (Hornecker, 2005). Comparing this concept to the one proposed by Group A, who also designed for Olive, leads to an interesting discussion about the merits of User Experience versus Inclusive Design. While Group C ignored Inclusive Design requirements and focused solely on facilitating a desirable User Experience for Olive, Group A produced a more inclusive yet probably more unsatisfactory OoBE. An inaccessible OoBE is not ethically feasible, because it is unreasonable to assume all people will be able to recruit someone to help them. What is more, there is a proportion of the older population who want to unpack and set up a product for themselves (see Felix, section 6.3.2). It is therefore likely that an inaccessible OoBE would alienate a number of potential users of a product or service. Ironically, an inclusive but undesirable OoBE may have a similar effect, because User Experience is a decisive factor in the success of a product or service (Pine and Gilmour, 1999). This dilemma boils down to the fact that it is not possible to design for the wants and needs of the whole population or, to put it simply, what works for some may not work for others.

The OoBE concepts generated by groups B (Playing a game), D (Creative hobby) and the pilot (Hosting an event) sit somewhere in between these two opposing perspectives. These groups managed to propose concepts which incorporate strategies to facilitate social interaction, but also permit a single person to unpack and set up the system. Group B actually devised a layered box that would break down the set-up process into more manageable steps. Considering no concrete steps were taken to communicate Inclusive Design considerations through the personas or the workshop presentation, it was interesting to see that this workshop provoked the designers to think about the needs and abilities of the older population. This is consistent with personas working to create empathy between designers and the real people who will be using their products and services (Mulder and Yaar, 2007).

Moving beyond the personas, it is important to consider whether these concepts would be relevant to the wider population. While the craft-based activities proposed by Group D are appropriate for Peggy, it is foreseeable that they would only appeal to a niche market. At first glance, the concept put forward by

the pilot group seems to be more suitable for people who seek co-experience from the OoBE and less so for people, like the personas of Warren and Felix, who do not. Participants in this group felt that this concept could suit a wider audience, because there is some flexibility regarding the type of event hosted; for example, they mentioned it could be a tea party, cocktail party or a barbeque. Moreover, this group envisaged that the OoBE would be personalised according to the information submitted when placing the order online. This means that users who just want to unpack and set up the system could receive a more straightforward OoBE. The game app proposed by Group B would probably appeal to various age groups, given the growing popularity of gamification (Deterding et al., 2011). The game serves a functional purpose in the OoBE (to customise and test the system) but is not essential to setup and could, therefore, be bypassed.

This study has shown that the construct of social benefits, communicated through the personas of Olive and Peggy, need not detract from Inclusive Design. In fact, the personas sensitised participants to think about what older people might require from the OoBE, even though no concerted efforts were made to convey these considerations. The key to achieving a balance between Inclusive Design and designing for co-experience appears to be providing optional strategies to facilitate social interaction. This resonates with the findings reported in Chapter 5 that choice and control are determinant factors in people's self-perception of independence.

7.5.3 Meaningfulness of the personas and the construct of social benefits

Analysis of the OoBE concepts established the design value of the personas and the construct of social benefits. It was interesting to supplement these findings with feedback from the designers. The majority of participants in the main workshop felt the personas had helped them to empathise with the user, further confirming that they are a useful tool in this respect. What is more, there was overall consensus that the personas had engaged design thinking and provided design inspiration. These findings were consistent with some groups building on their personas, even during the concept development phase. Responses regarding the usefulness of the personas for future projects differed the most, with just over half the participants stating that they would consider using them

again. This does not represent a failure of the personas, since they are often specific to a project (Cooper, 1999).

Only a few participants reported familiarity with the benefits of social interaction in design, but they all felt social benefits are a meaningful design concept. As a result, all participants agreed that they would consider social benefits in future projects. Although some participants felt that incorporating social benefits into the design solution was not necessarily simple, the concepts produced generally managed to provide a mechanism to facilitate social interaction.

7.5.4 Critique of the study

The brief given in the workshops was to generate a design concept for the OoBE of a smart home system that would support and engage [the persona] during the initial stages of interaction. Focusing on other types of technology may have produced different design outputs. However, it was beyond the scope of this study to evaluate standalone design concepts. The significance of these concepts is drawn from comparing them against the personas and the factors that determine the desire for co-experience, as well as reviewing their inclusivity.

An obvious criticism of this study is the small number of participants. It is anticipated that more participants would have produced a greater variety of design outputs, but this sample size was adequate to respond to the research questions and was consistent with other workshop studies (e.g. Lilley, 2007; Sleeswijk Visser, 2009; Sustar, 2011). It would have been interesting to see the design concepts developed into physical prototypes. This would have enabled the study to enter an iteration phase, where concepts were evaluated by people from various age groups, which would have contributed to establishing the marketability of co-experience in the OoBE. Nevertheless, these attributes are contingent on the product and beyond the scope of this study.

During the main workshops, it was observed that the participants were fixating on packaging and a certain amount of prompting was required to encourage them to consider other OoBE elements. This can be gleaned from the concepts produced, especially when compared the one proposed in the Pilot. This difference may be explained by the relative lack of experience of the younger designers. It also transpired that none of the groups expressly encouraged social

interaction beyond the circle of people identified in the persona's technology support network.

7.6 Conclusion

This study builds on the previous studies, which found that some older people derive social benefits from the OoBE of new technology and therefore actively seek this co-experience quality. Specifically, this chapter investigated the effect of the construct of social benefits, communicated through personas, on the design of Out-of-Box Experiences of new technology for older adults. The main findings from this study are:

- The personas were an effective tool for communicating with designers when designing for the OoBE. They directly contributed to the design of OoBE concepts that could facilitate social interaction.

- Designers whose backgrounds are rooted in Inclusive Design may be reluctant to design for co-experience. In this case, a more immersive workshop procedure is required to stimulate divergent thinking and persuade designers to put aside restricting assumptions.

- The construct of social benefits can be operationalised within the design of the OoBE. However, designers may struggle to understand how they can be incorporated into their concepts. They may also require prompting in order to produce a more holistic OoBE concept, akin to service design.

- It is possible for an OoBE to be inclusive, whilst simultaneously facilitating co-experience. The key to achieving this balance is to allow the user to choose whether to make use of the strategies for social interaction.

- The designers perceived the personas as a meaningful communication tool for designing for the OoBE. The personas stimulated creativity and contributed to building empathy between the designers and potential users.

- The construct of social benefits was also perceived as relevant to design. There was consensus among the designers that they would consider social benefits in future projects.

8 Discussion

This chapter presents a discussion of the main topics that emerged from this research project. It begins by presenting the variability of the older population as grounds to look beyond usability when designing for this age group. It then reflects on how the OoBE can be improved through co-experience and the subsequent implications for Inclusive Design. Finally, the chapter discusses the approach and specific methods used to conduct this research.

8.1 Overview

This research set out to investigate the Out-of-Box Experience (OoBE) of interactive consumer products for older adults and to apply these findings to improve the user experience of a product, through manipulating factors of the OoBE. To achieve this, the research comprised a survey of the literature as well as three main empirical studies. This thesis provides five main theoretical and practical areas for discussion, which are:

- The heterogeneity of the older population as a target user group and the design opportunities this represents;
- The involvement of other people offering the potential to enhance some product interactions, such as the OoBE of new technology, for older adults;
- The balance between incorporating social benefits into a product or service and maintaining independence;
- The implications of these findings for Inclusive Design;
- The methodological challenges and lessons of this research.

8.1.1 Thesis summary

The first study, described in Chapter 4, had the aims of investigating older adults' attitudes towards technology and getting a glimpse of their initial experiences with new interactive products, commonly referred to as the Out-of-Box Experience. The findings highlighted the richness of attitudes and experiences among this sector of the population. It also transpired that older people were experiencing various types of social benefits from the OoBE, with other people being key motivators in their adoption and use of technology. This finding warranted further investigation, in particular to understand how co-experience affects older people's sense of independence.

Chapter 5 then focused on determining what factors create feelings of dependence and independence for older people, with a view to establishing the compatibility of co-experience with Inclusive Design. It emerged that co-experience does not necessarily affect an older person's sense of independence, subject to a complex interplay of intrinsic and extrinsic factors. In addition, this study added richness in terms of why older people actively seek to involve others in certain activities. Data from these two studies were used to create the four personas described in Chapter 6, who differed principally in terms of social benefits from and desire to learn during the OoBE. Of these personas, Felix and Warren do not experience particular social benefits from the OoBE, with Felix being keen to learn during the OoBE and Warren much less so; in contrast, Peggy and Olive experience social benefits from the OoBE, with Peggy having an interest to learn during the OoBE and Olive not at all.

The final study, reported in Chapter 7, consisted of design workshops to evaluate the construct of social benefits within the OoBE, communicated through the personas of Peggy and Olive. This study demonstrated that the construct of social benefits is meaningful and can be operationalised within the design of the OoBE. The proposed OoBE concepts illustrated that co-experience need not detract from a person's sense of independence and can therefore be incorporated into the Inclusive Design paradigm.

The following sections combine and expand on the themes discussed separately in each study chapter.

8.2   Designing for older people is about more than usability

A preliminary survey of the literature painted a very negative picture of older people and technology. The message seemed to be that designing technology-based products and services for older people was about increasing the size of the physical components and reducing the complexity of the interaction. While well-intentioned, this approach felt simplistic and somewhat patronising. In everyday conversations, it was apparent there is no fixed age when a person becomes 'old' and wants a phone with only four buttons. That is not to say there is no market for simple and easy to use technology, but reducing a significant part of the population to their capabilities overlooks the wealth of attributes afforded to other age groups. To some extent, it was the starting point for this research: to delve deeper into older people's relationship with technology and to understand what (if any) benefits they experienced from technology. Designing an OoBE for a person who is motivated to use the product is not the same as designing an OoBE for someone who is not. This was a timely approach because, as the Baby Boomers creep into the 'older' category, researchers and designers need to rethink their assumptions about what it means to be old. This shift in attitude has commenced slowly but surely, with interest moving towards recognising the older population as a heterogeneous group (Lahteenmaki and Kaikkonen, 2004). The study detailed in Chapter 4 contributed towards understanding this diversity of the older population, specifically with regards to technology adoption and use.

8.2.1   As diverse as any other age group

This thesis in no way undermines research that has gone into understanding how the age-related decline in abilities affects technology use. In fact, it is acknowledged that many products and services require further ergonomic research in order to be improved both in general and for the older population. Specifically, it emerged in Chapter 4 that older people still struggle with usability, unfamiliar language and complicated instructions (in concurrence with Goodman et al., 2003; Czaja et al., 2006), but misconceptions about technology and the presence of people who are more technology-confident also hinder technology adoption by older people. Ageing does bring forth additional design challenges, but the questions of relevance and desirability remain.

Chapter 4 established that there are common reasons for using interactive consumer devices, namely sociability, efficiency and entertainment. The reported benefits of technology were functional, emotional, cognitive and social. This confirms that universal requirements exist across generations (Monk, 2004). While participants aged 50 to 75 were more likely to be impulsive in their acquisitions and were generally more critical of technology, participants over 76 years old weighed up the cost and relevance of the technology before deciding to acquire it. As a result they owned fewer interactive consumer products, but were relatively committed to learning how to use relevant features by attending courses, reading books and asking other people. This is consistent with Melenhorst (2002) who found that that older people are willing to invest in using new technology, provided the expected outcomes are perceived as being obviously beneficial.

The findings reported in Chapter 4 concerned British participants with a minimum of post-secondary education, so it was not possible to determine their generalisability. However, even considering the sample limitations, this study highlighted the diversity of older people in terms of attitudes towards technology and their experiences of it. Across the age range and within the context of technology, there were examples of the various types of product relationship proposed by Battarbee and Mattelmaki (2004): Meaningful Tool, Meaningful Association and Living Object. This indicates that the value of technology for older people can stretch from the functional to the emotional, thus presenting a design opportunity to promote stronger feelings of affinity with technology.

8.2.2 Designers cannot determine behaviour, but...

Understanding users and their context of use goes a long way towards facilitating behaviour through design (Sleeswijk Visser, 2009). The issue of facilitating user experiences was touched on in the Literature Review (Chapter 2) and taken up again in Chapter 7 of this thesis. A necessary first step in improving the OoBE of technology for older people was, therefore, to understand their current practices of the OoBE. This investigation began with the Technology Biography study (Chapter 4), which revealed that other people often play a key role in the OoBE of technology for older people. In terms of the

OoBE, there were those people who actively sought to involve others and those who did not. Moreover, other people were often cited as motivators to take up new forms of technology. A later study by Lim (2012) also found that other people played a significant role in motivating older people's adoption and use of technology, although this study did not specifically investigate the OoBE. It was important to determine that involvement of others was not necessarily contingent on self-efficacy beliefs and computer anxiety. When combining these data with the desire for company during the OoBE, four types of personality emerged:

- Lone Beginners, who have low self-efficacy beliefs and high computer anxiety, but rarely involve others;

- Lone Experts, who have high self-efficacy beliefs and low computer anxiety, generally choosing not to involve others;

- Social Beginners, who have low self-efficacy beliefs and high computer anxiety, actively seeking to involve others;

- Social Experts, who have high self-efficacy beliefs and low computer anxiety, yet prefer to involve others.

These findings contributed to establishing older people's desire for Co-experience (Battarbee, 2004) during the OoBE of new interactive consumer devices. This issue was explored further in Chapter 5, which confirmed the value of co-experience for older adults and shed light on the types of social benefits obtained. This knowledge lays the groundwork for designers to generate Triggers (Fogg, 2009) to facilitate desired behaviour.

8.3 Enhancing the OoBE through the involvement of other people

Chapter 4 established that some older people actively seek co-experience during the OoBE of new technology. A few other examples of co-experience surfaced in the Inclusive Design literature. For instance, a study on how older adults cope with the difficulty of jar opening revealed that they use this as an excuse to engage socially with other people and to feel helpful (Yoxall, 2010), and the Networked Neighbourhood project seeks to facilitate shared experiences among older people through the use of ICT (Gollner et al., 2010). The studies reported in chapters 4 and 5 of this thesis contributed new knowledge of the social

benefits that older people derive from co-experience in general, and from the OoBE of new technology in particular.

8.3.1 Social benefits of the OoBE

Around the same time the second study was concluded, Desmet (2012) identified six basic sources of positive emotions in human-product interactions: the object, the meaning of the object, the interaction with the object, the activity facilitated through this interaction, oneself, and the others involved in the interaction. In the latter case, products influence or facilitate interaction with other people and this, in turn, generates positive emotions. The present thesis revealed this to be true with the OoBE of interactive consumer devices for older people, since social interaction emerged as a natural and desirable by-product. Three main explanations were given for this. Firstly, it was mentioned that other people would set up the product faster and more effectively; this relates to issues of computer anxiety and self-efficacy beliefs, identified in this study and in the literature (Czaja et al., 2006). A second reason, given by Social Beginners and Social Experts, was that the presence of another person gave them an opportunity to learn by observing the process and asking questions. Both groups of Social participants also said that acquiring a new technological product provided them with an opportunity for social interaction. What is more, when barriers are encountered, other people provide technical and emotional support to overcome them.

The scope was broadened in Chapter 5 to product interactions in general. In addition to the aforementioned task-related factors (i.e. effectiveness and time efficiency), older people cited social motives (i.e. reciprocity, keeping others company and fun) and psychological motives (i.e. learning, reassurance, encouragement, trust and laziness) for seeking co-experience. Considering the challenges of designing for the older population, an understanding of the benefits of social interaction during product use may inform the design of more meaningful and inclusive solutions. The benefits of designing for co-experience of the OoBE are represented in Figure 8.1.
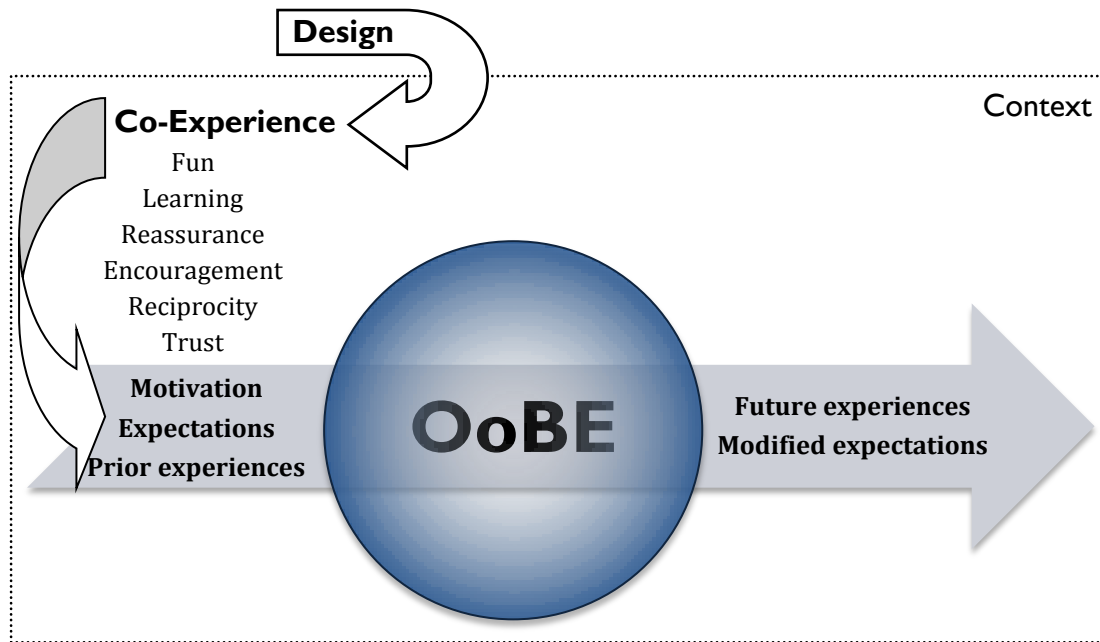
Figure 8.1 Framework for inclusion of social benefits in the OoBE

The final study (Chapter 7) demonstrated that social benefits are a meaningful design construct, with all designers stating that they would consider them in future projects. Social benefits were operationalised within the design of the OoBE, but incorporating them into design solutions was perceived as tricky by a few designers. Furthermore, designers with significant knowledge of Inclusive Design may resist designing for co-experience. These findings suggest that, while the construct of social benefits is relevant to design, the workshop procedure employed in this study needs to be tailored according to designers' backgrounds. Future workshops would benefit from an incubation stage to foster divergent thinking and encourage designers to let go of previous assumptions (Escobar-Tello, 2010; Sustar, 2011).

8.3.2 A fine line between motivators and barriers

A point of tension was identified regarding the involvement of other people in technology adoption and use. The previous section clearly lays out the benefits of social interaction for older people, both during the OoBE and general product interaction. However, section 4.3.3 highlighted a perverse side to the involvement of other people. In older couples, sometimes one partner feels more confident with technology and takes on a dominant role in its use. The danger of this is that the other partner may adopt a more passive role or avoid using technology altogether. The theme of other people acting as barriers surfaced again in section 5.4.2 when a participant explained that, if his wife did

not prepare the meals, he would be very dependent on other people. This is a fascinating and complex issue that requires a greater understanding of the psychology behind couple dynamics. While it was beyond the scope of this research to undertake such an investigation, the following sections discuss how a balance can be achieved between involving others in the interaction and retaining a sense of independence.

8.4 Co-experience and inclusivity: having the cake and eating it

Among the findings from the first study, older people's desire for co-experience during the OoBE of interactive consumer products was both unexpected and intriguing. This topic resonated with people who, in everyday conversations, were quick to share their own anecdote about an older relative or acquaintance behaving in a similar way. However, when emerging results from this study were presented at the doctoral consortium of the CWUAAT 2010 conference, opinions were divided. The main critique raised was that involving other people in the OoBE defies one of the core values of Inclusive Design: independence. This debate shaped the subsequent study, described in Chapter 5, which aimed to understand how older adults perceive independence, dependence and interdependence. Surprisingly, there was little information about subjective feelings of independence and how to foster them through design. Models that addressed the factors affecting feelings of independence were found in social sciences literature on disability (Gignac and Cott, 1998; Reindal, 1999; Specker et al., 2003). Even though some analogies can be drawn with disability, the gradual decline in abilities brought about by ageing does not necessarily impede older people from leading healthy and active lifestyles. What is more, they are more likely to experience significant life events (e.g. retirement, chronic illness, bereavement), which have not been contemplated in the aforementioned models. Chapter 5 therefore contributed specific knowledge on factors that affect older people's feelings of dependence and independence.

8.4.1 Independence is in the eye of the beholder

In the field of Inclusive Design, a study conducted by Payling (2003) among people with disability and their carers revealed that that the greatest barriers to independence were created by other people's expectations and attitudes. The

purpose of the probe study (Chapter 5) was to enable older people to express their own views and experiences of dependence and independence, using various creative mediums. Importantly, it established that dependence and independence are not absolutes that cancel each other out, but rather they co-exist on a dependence-independence scale.

The study also served to underline the difference between observable and subjective assessments of dependence-independence. Observable dependence-independence is a more objective assessment, often associated with autonomy and influenced by the person's physical and psychological abilities. However, it is within a person's subjective perception of independence that design opportunities lie. Subjective dependence-independence is influenced by *intrinsic factors*, which can be physical or psychological, and *external factors*, which can be social, economic or political. A significant theme underpinning these factors was the existence of and capacity to make choices. Understanding and manipulating these factors for intended contexts of use holds the key to fostering a sense of independence through design.

8.4.2 Independence meets social interaction

For older people, often the most desirable state is interdependence. Social interaction during product use contributes to learning and confidence building, but is also a source of enjoyment. A sense of reciprocity during these interactions contributes to older people feeling empowered and mitigates potential feelings of guilt or dependence.

On the surface, involving other people in the OoBE can be interpreted by outsiders as dependence. Yet for some older people, identified as Social Beginners and Social Experts, the social benefits of co-experience outweigh the drawbacks of observable dependence. The final study of this thesis (Chapter 7) used the personas developed in Chapter 6 to evaluate how the construct of social benefits affected the design of the OoBE. The concepts generated in this study ranged from inclusive but not desirable for the persona (section 7.4.4.2), to desirable for the persona but not inclusive (section 7.4.4.4). Three of the concepts (sections 7.4.4.1, 7.4.4.3 and 7.4.4.5) illustrated that it is possible to create an OoBE that facilitates social interaction while simultaneously encouraging a sense of independence.

Even though no additional measures were taken to influence Inclusive Design thinking, some inclusive strategies emerged through empathy with the persona (e.g. packaging the product in layers that reveal one element of the system at a time, thus making set-up a less daunting task). Some concepts also explored the possibility of reciprocal action, such as hosting a party for the friends that help you set up the product or rewarding them with discount vouchers.

The overarching principle to achieving a balance between Inclusive Design and designing for co-experience is to make the strategies that facilitate social interaction an optional component of the OoBE. This means that the OoBE can be undertaken individually, whether by choice or necessity; yet the option to instigate co-experience exists and respects the factors affecting subjective independence.

8.5 Future of Inclusive Design

In light of this research, independence remains a core component of the Inclusive Design paradigm. In agreement with Keates and Clarkson (2003), it is fundamental for an older person to be able to perform key ADLs and IADLs. What this thesis has done is emphasise the difference between *objective independence* and *subjective independence* for older people. User Experience is recognised as a decisive factor in the success of a product or service (Pine and Gilmour, 1999) and is equally promoted in Inclusive Design in the form of desirability (University of Cambridge, 2011). The gap filled by the current research was to establish older people's desire for co-experience and explain how to reconcile this need with the core principles of Inclusive Design. While well-meaning researchers and designers often prescribe objective independence, there are missed opportunities to create more meaningful product interactions for older people through the incorporation of social benefits. In response to the need to keep up with societal changes (Donahue and Gheerawo, 2009; Wilcox, 2009), the Inclusive Design paradigm needs to embrace a sensitive understanding of the factors that affect this desire for social interaction and the factors that foster subjective feelings of independence

8.6 Reflections on the methodology

This research was not based on the box elements of the Out-of-Box Experience, but on the experience. In other words, it was not concerned with the physical aspects of the OoBE as much as with the motivations, perceptions and emotions surrounding them. This premise presented a set of methodological challenges from the outset. First and foremost, experiences are notoriously hard to investigate because of their complex, subjective and transitory nature (Sleeswijk Visser, 2009). This led to another significant issue, which was to understand what it feels like to be old. The researcher embraced the dilemma of empathy throughout the project, but the issue was at the forefront during the workshops with designers (Chapter 7). These were young design students, with little and sometimes no familiarity with Inclusive Design. A review of relevant design ethnography methods was conducted in Chapter 3, guided by the challenges of researching older people's experiences with technology.

Forlizzi (2007) proposed the Product Ecology framework as a means to identify appropriate qualitative research methods to investigate how products elicit social behaviour. While that theoretical framework provides a thorough review of the variables and relevant research questions, two limitations were identified in relation to the approach adopted in this thesis. Firstly, the Product Ecology is a product-centred framework, but the present research had an Inclusive Design mindset and was therefore necessarily user-centred. Secondly, the focus of this research was not on products that elicit social interaction; social interaction emerged naturally as a by-product of the OoBE during the first study.

The methodological framework of this thesis comprised established research methods, modified to suit the purposes of each study. Specifically, the Technology Biography method (Bailey and Benyon, 2001) was used to investigate older adults' initial experiences with new technology; cultural probes (Gaver et al., 1999) were used to investigate older adults' perceptions of dependence and independence; findings from these two studies were used to create personas (Cooper, 1999), which were used in workshops with designers. The process of customising these methods produced new research tools, the most innovative of which was the Social Map included in the probe kits (for details see section 5.3.2, on page 102). The Social Map was used by participants

to identify who else was involved and to what extent in the pre-specified activities (examples of this are provided in Figure 5.12 and Figure 5.13, on pages 118). The unique value of this research tool was as a prompt for self-reflection and discussion about the effects of involving others on feelings of independence.

From a personal perspective, this framework and the manual approach taken to analyse the data facilitated empathy with the older adults' experiences. Despite the fact that in their original form cultural probes were not meant to be analysed (Gaver et al., 1999), the overwhelming quantity and variety of materials generated in this study would have made them an ineffective mechanism for empathy. The process of compiling and comparing these data to create the personas (Goodwin, 2009) enabled the researcher to become immersed in them and, as a result, the final personas proved to be successful empathy tools. These personas and the workshop procedure (Chapter 7) could be applied in an educational context, seen as the students who took part in this study found that the personas engaged and inspired their design thinking. The OoBE concepts generated in response to the personas incorporated some key social benefits for older adults, thus providing a compelling argument for using the personas to inform real life OoBEs of interactive consumer products. However, their transferability to other design contexts needs careful consideration since personas are specific to project goals.

9 Conclusion

This chapter brings together the overall conclusion from the previous chapters, by reviewing the general aim and objectives of the thesis. It offers a critical reflection on the limitations of this research and discusses its contribution to knowledge. Finally, the chapter considers opportunities for future work.

9.1 Revisiting the aim and objectives

This research has set out to contribute to the design of engaging Out-of-Box Experiences of new technologies for older adults. Specifically, the aim of this research has been to investigate the Out-of-Box Experience (OoBE) of interactive consumer products for older adults and to apply these findings to improve the user experience of a product, through manipulating factors of the OoBE.

A review of the literature pinpointed a gap in current knowledge, in addition to providing the background for the first user research study. It was the intention of the researcher to be guided by the steps of the Inclusive Design waterfall model (Clarkson et al., 2007). However, owing to the flexible nature of the research design, the findings of each study conditioned the focus of the following study. The resulting empirical work of this thesis comprised two user research studies with older adults, four data-driven personas and an exploratory design study. The following subsections describe how these research activities met the objectives outlined in Chapter 1.

1. To understand current practices and aspirations of the OoBE of interactive consumer products for older adults.

In particular, the researcher set out to determine (a) what characteristics of the OoBE engage older people in the use of interactive consumer products and (b) which ones typically present barriers to use. This objective was in part achieved through the literature review (Chapter 2), which revealed several barriers experienced by older people during the OoBE of new technologies. The lack of knowledge regarding what older adults need and want from the OoBE justified the first user research study. Accordingly, the study reported in Chapter 4 investigated older adults' attitudes towards technology, but also explored their current OoBE practices and aspirations. It emerged that social interaction was a strong motivator for older adults to adopt and use new technology, a theme that was further explored in the subsequent user research study (Chapter 5).

2. To develop and implement a resource that can be used to inform the design of engaging OoBEs for older adults.

An integral part of the research aim was to produce a meaningful output that could be used to improve the design of the OoBE of interactive consumer products. This was achieved in Chapter 6, by translating data from the previous user research studies into four personas. These personas were then evaluated in a workshop study with designers, reported in Chapter 7. Overall, the designers felt these were meaningful tools, which also engaged their design thinking and inspired their final design concepts.

3. To explore how the Inclusive Design paradigm can expand through the integration of UX considerations.

The final objective was to review the implications of the research findings for future developments in Inclusive Design. In Chapter 4, it emerged that social benefits during the OoBE had a positive effect on technology adoption and use by older adults. The following study, reported in Chapter 5, then established that the involvement of other people in product interaction does not necessarily impair an older person's sense of independence. Finally, the study reported in Chapter 7 illustrated that co-experience need not detract from a person's sense of independence and can therefore be incorporated into the Inclusive Design

paradigm. Chapter 8 discussed how Inclusive Design needs to evolve in the light of these findings, in order to continue to respond to genuine wants and needs.

9.1.1 Main findings

This research has addressed a gap in the knowledge on how to create an OoBE of interactive consumer products that is both inclusive and desirable for older adults. The first step in identifying how to improve the OoBE for older adults was to investigate what their current practices are, as well as to define what older adults want from the OoBE. This research recognises the challenges presented by the decline in abilities that occurs naturally with ageing and acknowledges the substantial contribution of empirical studies that have investigated how design can help to overcome them. However, as the current research stands at the crossroads of Inclusive Design and User experience, the focus has been on experiential factors such as attitudes, motivations and aspirations. Detailed conclusions of each empirical study are presented at the end of the respective chapter. The following conclusions represent the overarching conclusions of the thesis, combining knowledge from the literature and findings from this research:

- Researching User Experience brings forth a variety of challenges, not least of which is how to faithfully capture the holistic and ephemeral aspects of an experience. This type of research must elicit knowledge on the superficial level of what people *say and think*, progressing towards the deeper levels of what people *do and use*, and finally what people *know, feel and dream* on a tacit and latent level.

- Older adults are as heterogeneous as any other age group in terms of socio-demographic factors and psychosocial factors, such as self-efficacy and wellbeing. Moreover, life experience and the age-related change in abilities increase the diversity of this sector of the population. It is therefore a mistake for designers to focus solely on differentiating factors such as ability, because for the most part older people want to be perceived and feel like their younger counterparts.

- Although older people experience barriers to the use of unfamiliar technology, they will invest time and effort in overcoming them as long as they perceive relevant benefits from using the new product. Product benefits,

in particular those concerning older people's lifestyles and aspirations, must be clearly communicated to intended users. The OoBE, as a person's first experience of a new product, has the potential to emphasise and enhance its benefits.

- Other people strongly influence the adoption of new technology by older people. Even people who have high computer anxiety and low self-efficacy beliefs will take up new technology when encouraged or recommended by family and friends. Consequently, older people often involve others in the OoBE.

- Combining the desire for social interaction during the OoBE with self-reported confidence in using technology, as expressed through computer anxiety and self-efficacy beliefs, revealed four types of personality: Lone Beginners, Lone Experts, Social Beginners and Social Experts.

- Reasons cited for involving other people in the set-up of new products include *speed* and *effectiveness*, which generally relate to self-efficacy and computer anxiety. Some people like to involve others in this process as a means to *learn* and build their *confidence* for future interactions with the product. Finally, older people sometimes use the OoBE of new technologies to fulfil non-product-related needs. Acquiring or setting up new products provides an opportunity to *engage socially with other people*.

- It is important to acknowledge that while co-experience can be a strong motivator for older people to adopt and use new technology, couple dynamics can sometimes mean that one partner adopts a more passive role or avoids using technology altogether.

- Dependence and independence are not absolutes, they co-exist on a scale. Assessment of dependence-independence can be both *observable*, which is generally equated with autonomy and considers physical and psychological abilities as determining factors; and *subjective*, which is how people perceive themselves on the scale, based on individual experience, and may fluctuate over time.

- Understanding the factors affecting subjective independence has significant implications for Inclusive Design because, even when a person needs help to perform a task, there is the potential to create a sense of independence by

manipulating these factors. Specifically, these include *intrinsic factors*, which can be physical or psychological; and *external factors*, which can be social, political and economic. A crucial theme that pervades these factors is the existence of and capacity to make *choices*.

- For older people, often the most desirable state is one of *interdependence*. Interaction with other people provides several social benefits, including learning opportunities, confidence building and enjoyment. When these interactions are reciprocal, older people feel empowered and potential guilt of needing help is mitigated.

- The construct of social benefits can be operationalised within the design of the OoBE. However, inexperienced designers may need support to understand how social benefits can be incorporated into their concepts and prompting to produce a holistic OoBE concept, akin to service design. Designers whose backgrounds are rooted in Inclusive Design may be reluctant to design for co-experience, which may be countered through an immersive workshop procedure.

- The construct of social benefits was perceived as relevant to design and designers reported that they would consider social benefits in future projects. The designers felt the personas generated in this thesis were a meaningful communication tool for designing for the OoBE, which stimulated creativity and contributed to building empathy between the designers and potential users.

- It is possible for an OoBE to be inclusive, whilst simultaneously facilitating co-experience. The key to achieving this balance is to allow the user to choose whether to make use of the strategies for social interaction. If the paradigm of Inclusive Design is to keep up with real user wants and needs, it need to embrace a sensitive understanding of the factors that affect this desire for social interaction and the factors that foster subjective feelings of independence.

9.2   Limitations of the research

Overall, this has been a successful research project that contributed to a rich understanding of older adults' current practices and aspirations from the OoBE of interactive consumer devices. Nevertheless, as with any research, there were

some limitations that need to be acknowledged. Individual study limitations were addressed in the respective chapter, within the critique of the method. The following subsections discuss the overarching limitations of the research.

9.2.1 Applicability of the findings

This research set out to explore the contextual aspects, rather than the physical elements of the OoBE. Accordingly, the research followed a flexible and qualitative design. The studies were performed with relatively small samples, which were obtained through non-probability sampling. Participation numbers were a concern throughout the studies and ultimately limited the transferability of the findings. While this does not necessarily mean the findings are not representative of the population, no assumptions can be made regarding their generalisability. This limitation was acknowledged from the outset and was discussed in section 3.4.3 (page 56), along with provisions made to address threats to validity. Although the samples fit the needs of each study, larger and more diverse samples would naturally have benefited the empirical work.

9.2.2 Methodological gap

A fair criticism of this work would be its lack of observational user research. It was an issue that the researcher initially debated and, even though some examples of older people undertaking an OoBE were observed and recorded, this element was ultimately discounted. The pros and cons of this method were discussed in section 3.3.4 (page 50), but it was felt that the researcher's presence might unduly influence participants behaviour and invalidate the results. In hindsight and given the resources available, the researcher stands by this decision. This dilemma not only reinforces the difficulty of capturing rich contextual UX data, but also the need to employ cunning research methods that provide a glimpse into people's genuine practices.

9.2.3 Data analysis

A manual approach was taken to analyse the data. On the whole, this was a fruitful decision because it enabled the researcher to become truly immersed in the data and facilitated the intended empathy. However, the thematic analysis carried out in the first study (Chapter 4) was a long-drawn-out process, particularly for a PhD project where time is of the essence. It is hard to evaluate

whether using data analysis software packages would have garnered better results yet, given the amount of transcribed data and the nature of the method, the researcher would consider using them for similar situations in the future.

9.2.4 Design concepts

There are a number of frequently identified constraints in PhD projects, such as time, resources and finances. In this case, had there been more time, it would have been interesting to develop the design concepts from the third study (Chapter 7) to the point of iteration with older people. This would have implied recruiting a new sample of older adults and developing a strategy to categorise them according to the four personality types represented by the personas. To some extent, this would also have evaluated the representativeness of the personas and the meaningfulness of construct of social benefits for the older population. The next logical step would have been to involve business stakeholders to determine the commercial viability of designing to facilitate social benefits. However, these additional steps were not necessary to respond to the research questions guiding the study and are perhaps grounds for future work.

9.3 Contribution to knowledge

This research has explored uncharted common ground between the fields of Inclusive Design and User Experience. Table 9.1 and Table 9.2 outline the main contributions of this thesis, organised according to these two key areas of influence.

It is important to consider the triangulation that occurred across the studies, when viewing these contributions. As a result, one particular contribution is attributed to more than one chapter. The construct of social benefits was uncovered in the study reported in Chapter 4, yet was built up in the subsequent empirical chapters (chapters 5 and 7).

Table 9.1 Contributions to the field of Inclusive Design

Chapter	Contribution	Type
2	Articulation of existing knowledge on older adults to establish the diversity of this population	theoretical
4, 5, 7	Development of the construct of social benefits as a way to engage older adults in product interaction	empirical
5	Development and application of creative tools to investigate dependence and independence	methodological
5	Model of dependence-independence for older adults	empirical
6	Translation of user requirements into an educational resource for empathy and design inspiration	empirical, methodological
8	Discussion of how to extend the Inclusive Design paradigm by embracing the construct of social benefits	theoretical

Table 9.2 Contributions to the field of User Experience

Chapter	Contribution	Type
2	OoBE conceptual framework	theoretical
3	Critical review of relevant methodology	theoretical
4	Insights into motivation and current behaviours regarding the OoBE of interactive consumer products	empirical
7, 8	Development of OoBE framework through integration of strategies that facilitate social interaction	empirical
7	Preliminary identification of strategies that facilitate social interaction during the OoBE	empirical, implementation

9.4 Recommendations for future work

This thesis has contributed to the growing fields of Inclusive Design and User Experience. But it has also opened up some new avenues for further research about social benefits, in particular regarding *transferability*, *feasibility*, and *integration* into Inclusive Design thinking.

9.4.1 Transferability of the construct of social benefits

This research has established the meaningfulness of social benefits when designing for the OoBE of interactive consumer products for older adults. The study samples were justifiably small and comprised only British participants. It would therefore be interesting to investigate whether this construct is transferable to the wider population. For instance, future research could focus on older adults with different socio-demographic characteristics, such as level of education or cultural background, and younger generations. Another line of enquiry could focus on understanding what types of product- and service-interactions are improved through social benefits, and which ones are not.

9.4.2 Feasibility of designing for social benefits

A practice-led project with an industry partner could be developed to investigate the commercial viability of incorporating social benefits into the OoBE of interactive consumer products. By prototyping OoBE concepts that facilitate social interaction, it would also be possible to iteratively evaluate the construct of social benefits with a variety of users, including older adults. This type of enquiry would therefore contribute to understanding the transferability of this construct to the wider population, as well as bridging the gap between theoretical research and real-life applications.

9.4.3 Persuading inclusive designers to consider social benefits

The workshop structure developed and implemented in this thesis may not be sufficient to persuade designers with a strong Inclusive Design mindset to incorporate social benefits into their solutions. This remains a grey area that warrants further investigation. This research would first have to determine how resistant these designers are to the construct of social benefits. If this is a pervasive issue, then future work could focus on developing more compelling tools and a more immersive workshop structure for this target group.

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Appendix A

Study 1 - Participant information sheet

Ergonomics and Safety Research Institute (ESRI)
Loughborough University
Ashby Road, Loughborough LE11 3TU

Out-of-Box Experiences: factors that encourage and inhibit the uptake of interactive consumer products by older adults

Participant Information Sheet

Main investigator: Alison Burrows, a.b.burrows@lboro.ac.uk, tel. XXX

Supervisors: Val Mitchell, v.a.mitchell@lboro.ac.uk, tel. XXX

Colette Nicolle, c.a.nicolle@lboro.ac.uk, tel. XXX

My name is Alison Burrows. I am a PhD student at Loughborough University and I would like to invite you to take part in our research study. Before you decide if you want to take part or not, please read this explanation about why the research is being done and what you can expect if you take part. Please ask me if you have any questions or if you want more information before beginning.

What is the purpose of the study?

It seems that while technology is becoming increasingly more widespread it is not necessarily any easier to use. Nevertheless, we cannot deny its growing use and usefulness in our everyday lives. The aim of this study is to investigate older adults' attitudes to and use of technology.

The results of this research will be described in student reports and a final PhD thesis submitted to Loughborough University. We may want to publish results in scientific papers or use them to create tools for designers. Please be assured that you will not be identified in any report or publication.

What is involved?

The study involves an interview which will take place in your own home at a time to suit you. You will be asked to take me around your home and to describe your experience with products and appliances that you own.

The visit will take approximately 1.5 hours.

Once I take part, can I change my mind?

Yes! After you have read this information and asked any questions you may have we will ask you to complete an Informed Consent Form; however, if at any time before, during or after the sessions you wish to withdraw from the study

please just contact the main investigator. You can withdraw at any time, for any reason and you will not be asked to explain your reasons for withdrawing.

What personal information will I be expected to give?

During the interview you will be asked your date of birth, level of education, employment status, living arrangements and about products that you own.

Will my taking part in this study be kept confidential?

The information will be kept in a secure location, accessible only to the researchers. All of the data (audio-tapes, video recordings, and raw data) will remain the property of Loughborough University and will be destroyed after the findings have been published.

Your responses will be confidential. However, anonymous excerpts may be used when the results are published.

What if I am not happy with how the research was conducted?

The University has a policy relating to Research Misconduct and Whistle Blowing which is available online at http://www.lboro.ac.uk/admin/committees/ethical/Whistleblowing(2).htm.

You may also contact my supervisors if you are either unhappy or you have any further questions.

Thank you for reading this information sheet!

Please don't hesitate to contact me if you have any questions…

Best wishes,

Alison Burrows.

Appendix B

Study 1 - Consent form

Out-of-Box Experiences: factors that encourage and inhibit the uptake of interactive consumer products by older adults

INFORMED CONSENT FORM

The purpose and details of this study have been explained to me. I understand that this study is designed to further scientific knowledge and that all procedures have been approved by the Loughborough University Ethical Advisory Committee.

I have read and understood the information sheet and this consent form.

I have had an opportunity to ask questions about my participation.

I understand that I am under no obligation to take part in the study.

I understand that I have the right to withdraw from this study at any stage for any reason, and that I will not be required to explain my reasons for withdrawing.

I understand that all the information I provide will be treated in strict confidence and will be kept anonymous and confidential to the researchers unless (under the statutory obligations of the agencies which the researchers are working with), it is judged that confidentiality will have to be breached for the safety of the participant or others.

I give my consent to photo/ video/ audio recordings (delete as appropriate) during the course of the study, as long as my identity is not disclosed, to be used for academic research/ presentations/ publications (delete as appropriate).

I agree to participate in this study.

Name (printed) _____

Signature _____

Date _____

Signature of investigator _____

Are you willing to be contacted to participate in future studies?

Yes ☐   No ☐

Appendix C

Study 1 - Semi-structured interview

SECTION 1

1.1 Do you feel positive or negative towards acquiring new technology (interactive consumer products)?

1.2 Generally speaking, how do you feel about using new technology (interactive consumer products)?

SECTION 2

2.1 What is the <u>most recent </u>interactive consumer product you acquired?

2.2 Approximately how long have you had this product?

2.3 How did you acquire it? *(Shop, internet, gift?)*

2.4 Did you choose it or did someone choose it for you? *(If gift, was it a surprise?)*

2.5 Why did you buy this product? *(If applicable)*

2.6 How did you feel about acquiring this product?

2.7 Who usually uses this product?

2.8 And roughly how often?

2.9 Why don't you use this product? *(If applicable)*

2.10 What did you expect would be the best thing about owning this product?

2.11 Have you achieved what you expected with this product? Why?

2.12 What are your favourite functions of this product?

2.13 What do these functions enable you to do?

2.14 Where were you when you first opened the box? *(At home, at the shop?)*

2.15 Were you alone?

2.16 Did someone unpack it for you? Why?

2.17 Would you like to have unpacked it yourself? Why? (*If applicable*)

2.18 Did someone help you set up/install the product? Why?

SECTION 3

3.1 What is your <u>favourite</u> interactive consumer product?

3.2 Approximately how long have you had this product?

3.3 How did you acquire it? *(Shop, internet, gift?)*

3.4 Did you choose it or did someone choose it for you? *(If gift, was it a surprise?)*

3.5 Why did you buy this product? *(If applicable)*

3.6 How did you feel about acquiring this product?

3.7 Who usually uses this product?

3.8 And roughly how often?

3.9 Why don't you use this product? *(If applicable)*

3.10 What did you expect would be the best thing about owning this product?

3.11 Have you achieved what you expected with this product? Why?

3.12 What are your favourite functions of this product?

3.13 What do these functions enable you to do?

3.14 Where were you when you first opened the box? *(At home, at the shop?)*

3.15 Were you alone?

3.16 Did someone unpack it for you? Why?

3.17 Would you like to have unpacked it yourself? Why? *(If applicable)*

3.18 Did someone help you set up/install the product? Why?

SECTION 4

4.1 What is <u>your least favourite</u> interactive consumer product?

4.2 Approximately how long have you had this product?

4.3 How did you acquire it? *(Shop, internet, gift?)*

4.4 Did you choose it or did someone choose it for you? *(If gift, was it a surprise?)*

4.5 Why did you buy this product? *(If applicable)*

4.6 How did you feel about acquiring this product?

4.7 Who usually uses this product?

4.8 And roughly how often?

4.9 Why don't you use this product? *(If applicable)*

4.10 What did you expect would be the best thing about owning this product?

4.11 Have you achieved what you expected with this product? Why?

4.12 What are your favourite functions of this product?

4.13 What do these functions enable you to do?

4.14 Where were you when you first opened the box? *(At home, at the shop?)*

4.15 Were you alone?

4.16 Did someone unpack it for you? Why?

4.17 Would you like to have unpacked it yourself? Why? (*If applicable*)

4.18 Did someone help you set up/install the product? Why?

SECTION 5

5.1 Is there a product that you don't currently own, but would like to? Why?

5.2 What kind of benefit do you envisage technology to have for you in the future?

5.3 Can you describe a product that you hope will exist in the future?

Appendix D

Study 1 - Table of codes

Category	Code	Description
1. Initial feelings	IF-POS	Feels positive
	IF-ACQ-POS	Feels positive about acquiring
	IF-ACQ-EXC	Feels excited about acquiring
	IF-ACQ-HPY	Feels happy about acquiring
	IF-USE-POS	Feels positive about using
	IF-USE-EXC	Feels excited about using
	IF-USE-HPY	Feels happy about using
	IF-NEG	Feels negative
	IF-ACQ-NEG	Feels negative about acquiring
	IF-ACQ-APH	Feels apprehensive about acquiring
	IF-ACQ-NRV	Feels nervous about acquiring
	IF-USE-NEG	Feels negative about using
	IF-USE-APH	Feels apprehensive about using
	IF-USE-NRV	Feels nervous about using
	IF-CUR	Feels curious
	IF-E	Expectation
	IF-E-POS	Has positive expectations
	IF-E-NEG	Has negative expectations
	IF-WOT	Says one thing but thinks another

Category	Code	Description
2. Means of acquisition	ACQ-SLF	Self-purchased
	ACQ-SLF-I	Impulse purchase
	ACQ-SLF-C	Considered purchase
	ACQ-SLF-SHP	Bought from a shop
	ACQ-SLF-NET	Bought online
	ACQ-OTH	Bought by someone else
	ACQ-GIF	Acquired as a gift
	ACQ-FRE	Acquired as a freebie

Category	Code	Description
3. Reason for acquiring	RSN-CUR	Curiosity
	RSN-PXP	Past experience
	RSN-UPG	Upgrade
	RSN-UPG-NEC	Necessary upgrade
	RSN-UPG-FUN	Upgraded for enjoyment
	RSN-AGE	Age-related decline in abilities
	RSN-FCT	Functions
	RSN-DES	Design
	RSN-TRT	Trust in brand or company
	RSN-HOB	Hobby
	RSN-REC	Recommendation
	RSN-REC-FAM	Recommendation from family
	RSN-REC-FND	Recommendation from friend
	RSN-REC-PRO	Recommendation from professional
	RSN-E-BEN	Expected benefits
	RSN-NOT	Reason for not acquiring
	RSN-NOT-CST	Not acquired because of cost
	RSN-NOT-REL	Not acquired because not relevant
	RSN-NOT-ENV	Not acquired because needless pollution

Category	Code	Description
4. Experience	XP-POS	Positive experience
	XP-FUN	Fun experience
	XP-NEG	Negative experience
	XP-GRR	Frustrating experience
	XP-E	Experience meets expectations
	XP-MOR-E	Experience exceeds expectations
	XP-LES-E	Experience does not meet expectations

Category	Code	Description
5. Use	U-INT	Intended or typical use
	U-INV	Innovative or atypical use
	U-SLF	Used by the participant
	U-SLF-FRQ	Frequently used by the participant
	U-SLF-OCC	Occasionally used by the participant
	U-SLF-SPO	Sporadically used by the participant
	U-SLF-NEV	Never used by the participant
	U-OTH	Used by others
	U-OTH-FRQ	Frequently used by others
	U-OTH-OCC	Occasionally used by others
	U-OTH-SPO	Sporadically used by others
	U-HAS	Use is a necessity or a chore

Category	Code	Description
6. Benefits	BEN-FCT	Functional
	BEN-FCT-EOU	Ease of use
	BEN-FCT-UPG	Improved functionality on previous product
	BEN-FCT-LNK	Connectivity with other devices
	BEN-FCT-TUL	Tool or means to an end
	BEN-FCT-TMP	Useful for a particular period of time
	BEN-EMO	Emotional
	BEN-EMO-FUN	Fun or enjoyment
	BEN-EMO-AES	Aesthetics
	BEN-EMO-CRT	Outlet for creativity
	BEN-SOC	Social
	BEN-SOC-COM	Keeping in touch with others
	BEN-SOC-ACT	Facilitates social activities
	BEN-SOC-SHA	Experience shared with others
	BEN-SOC-MBR	Other people have/do it
	BEN-COG	Cognitive
	BEN-COG-LRN	Learning
	BEN-COG-AGL	Remaining mentally agile
	BEN-REL	Relevance
	BEN-REL-HOB	Relevant to or supports a hobby
	BEN-REL-LIF	Relevant to lifestyle

Category	Code	Description
7. Barriers	BAR-USB	Usability
	BAR-CST	Cost
	BAR-UNF	Unfamiliarity with the device/technology
	BAR-INS	Instructions
	BAR-LNG	Language
	BAR-MIS	Misconception
	BAR-MIS-CST	Misconception about the cost
	BAR-MIS-FCT	Misconception about functionality
	BAR-MIS-TIM	Misconception about time required
	BAR-SLF	Self-efficacy beliefs
	BAR-REL	Relevance of product to lifestyle
	BAR-EFF	Effort necessary
	BAR-SOC	Someone else does it for them
	BAR-SOC-FAM	A family member or spouse does it
	BAR-SOC-FND	A friend does it

Category	Code	Description
8. Coping strategy	CS-SLF	Coped alone
	CS-SLF-INS	Coped alone by reading instructions
	CS-SLF-TRY	Coped alone by trial and error
	CS-SLF-BUK	Coped by research and reading
	CS-OTH	Had help from others
	CS-OTH-FAM	Had help from a family member
	CS-OTH-FND	Had help from a friend
	CS-OTH-PRO	Had help from a professional
	CS-UNI	Took a class on the subject
	CS-NOT	Did not cope or gave up

Category	Code	Description
9. **Out-of-Box Experience**	OBE-DEC	Choosing the product
	OBE-DEC-SLF	Chose the product
	OBE-DEC-FAM	A family member chose the product
	OBE-DEC-FND	A friend chose the product
	OBE-DEC-PRO	A professional chose the product
	OBE-ACQ	Acquiring the product
	OBE-ACQ-SLF	Self-purchased
	OBE-ACQ-FAM	Bought by a family member
	OBE-ACQ-FND	Bought by a friend
	OBE-UPK	Unpacking
	OBE-UPK-SLF	Unpacked product them self
	OBE-UPK-FAM	A family member unpacked the product
	OBE-UPK-FND	A friend unpacked the product
	OBE-UPK-PRO	A professional unpacked the product
	OBE-STP	Set-up
	OBE-STP-SLF	Set up product them self
	OBE-STP-FAM	A family member set product up
	OBE-STP-FND	A friend set product up
	OBE-STP-PRO	A professional set product up
	OBE-AVD	Avoided the Out-of-Box Experience (OoBE)
	OBE-AVD-OTH	Others could do it quicker and better
	OBE-AVD-CS	Learned from someone else during OoBE
	OBE-AVD-SOC	OoBE as an occasion for social interaction

Appendix E

Study 2 - Follow-up interview

1. Tell Me postcards

(maybe show these at the end of the interview so participants can reflect on their original/intuitive definitions of dependence and independence)

2. Social Map

a) WHY?

    Why do you do these activities alone?

    Why do you do these activities with other people? (e.g. social reasons, need help, other)

b) WHEN?

    When do you do these activities alone?

    When do you do these activities with other people?

c) Why do you involve these particular people?

    Who wouldn't you feel comfortable involving?

d) Are there activities that you would like to do alone/with others but don't?

    Why?

e) Does technology ever play a role in this activity?

    How do you feel about using technology to perform this activity?

f) Rate how dependent/independent this activity makes you feel.

    Does using technology for this activity make you feel more dependent or more independent?

g) Could you use technology for this activity in the future?

    Would you like to use technology to perform this activity in the future?

    How would this affect your feelings of dependence/independence?

3. Camera

Something I like doing with other people: Why?

Something I like doing alone: Why?

Something I need help doing: What sort of help do you need?

    How does it make you feel?

    Do you think technology could improve this activity for you?

Something I do with someone else even though I don't need to: Why?

Something I like to help other people do: Why?

Something I do the same way today as when I was younger:

Something I do differently now from when I was younger: How does it make you feel?

Do you think technology could improve this activity for you?

Something I used to do but don't anymore: Why don't you do it anymore?

How does it make you feel?

Do you think technology could enable you to keep doing this activity?

Something that makes me feel independent: What about this makes you feel independent?

Something that makes me feel dependent: What about this makes you feel dependent?

4. Remember When sheets

Time when you asked for help even though you didn't need it: Why did you ask for help?

Time when you needed help but didn't ask for it: Why didn't you ask for help?

Time when you provided help to others: How did it make you feel?

Appendix F

Personas

Peggy Brennan

"I don't mind having a go at setting up a new device, but if it's completely unfamiliar technology I feel more confident watching someone else do it."

Age: 57 years old
Occupation: part-time teacher
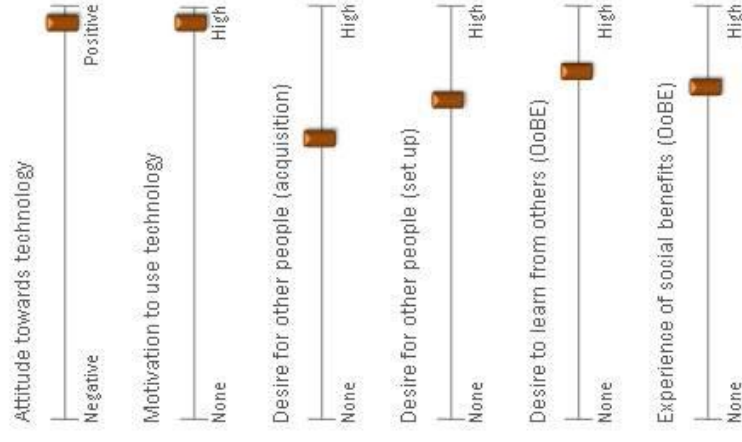**Home life**: married, lives with husband

Peggy thinks technology is quite fun, though more importantly it supports her in her everyday life. She has had some health problems recently, but the computer and the internet have enabled her to continue working from home.

When Peggy buys new technology, she often reads up on it and appreciates advice from her children or husband. She may try to set up a new product, but prefers having someone else around to answer any questions and help out.

Technology support network

— primary
--- secondary

```
          Peggy
        /   |    \
  husband  (tech sup)
       \    |
       son  daughter
```

Goals for the Out-of-Box Experience (OoBE)

- Set up a new product quickly and efficiently
- Avoid getting frustrated
- Learn how to set up the product or troubleshoot in the future

Frustrations from the OoBE

- Feeling like technology has gotten the better of her
- Feeling she is imposing on people for help when they are busy

Technology profile

Attitude towards technology
Negative ————————————— Positive

Motivation to use technology
None ————————————— High

Desire for other people (acquisition)
None ————————————— High

Desire for other people (set up)
None ————————————— High

Desire to learn from others (OoBE)
None ————————————— High

Experience of social benefits (OoBE)
None ————————————— High

Felix Chase

"I like to get my hands on new gadgets and know how they work, but the last thing I turn to is the instruction book."
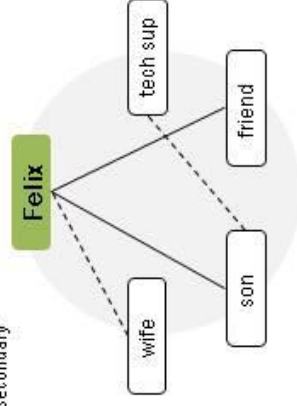
Age: 52 years old
Occupation: lab technician
Home life: married, lives with his wife

Felix is naturally curious about technology. He usually researches products and will seek other people's opinion before buying something new. He buys technology magazines to keep up to date with new developments.

For Felix, setting up a new device is fun. He enjoys the challenge and exploring the product's functions. If he has problems at this stage, he is most likely to ask his son or a friend for help because they will show him what to do.

Support network

--- primary
--- secondary

Felix
tech sup
friend
wife
son

Goals

- Learn about the technology
- Explore functions and options
- Get the most out of a new technology product or service

Frustrations

- Not being able to set up a product by himself
- Having to use the instruction manual or contact technical support

Technology profile

Attitude towards technology
Negative — Positive

Motivation to use technology
None — High

Desire for other people (acquisition)
None — High

Desire for other people (set up)
None — High

Desire to learn from others (OoBE)
None — High

Experience of social benefits (OoBE)
None — High

Warren Fletcher

"I sometimes find it a struggle to get to know a new device."
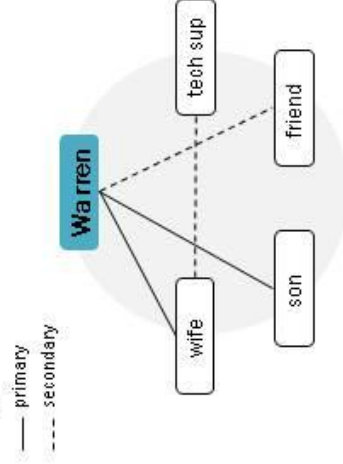
Age: 66 years old
Occupation: civil engineer
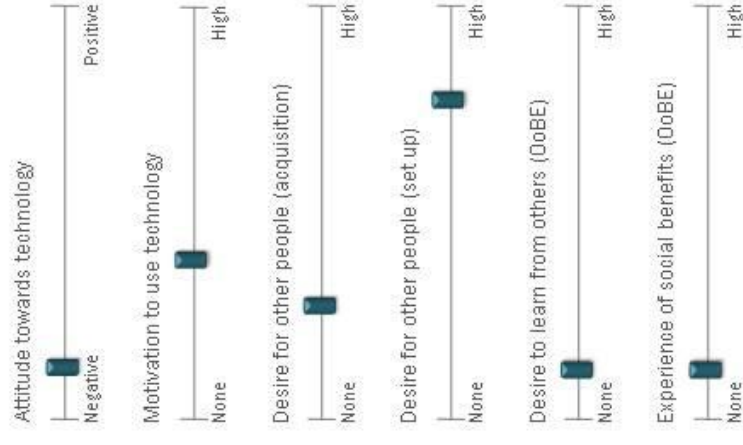**Home life**: married, lives with his wife

Warren has to work with computers every day and, as a result, he resents having to use technology when he gets home. In spite of this negative attitude, Warren uses technology frequently to pursue his hobbies.

Choosing and buying the devices he owns makes him feel empowered. He sees set up as a one off step in using a new product, so he is not interested in learning about it and is quite happy to let someone else do it for him.

Support network

- primary
--- secondary

Goals

- Decision making about technology
- Avoid or reduce setting up a new technology product or service
- Use a new device intuitively

Frustrations

- Having to re-enter data or repeat setup procedures
- Receiving unsympathetic technical support

Technology profile

Attitude towards technology	Negative — Positive
Motivation to use technology	None — High
Desire for other people (acquisition)	None — High
Desire for other people (set up)	None — High
Desire to learn from others (OoBE)	None — High
Experience of social benefits (OoBE)	None — High

Olive Hadley

"I don't want to have anything to do with setting up new technology, it doesn't interest me whatsoever. I am only interested in what it can do for me."
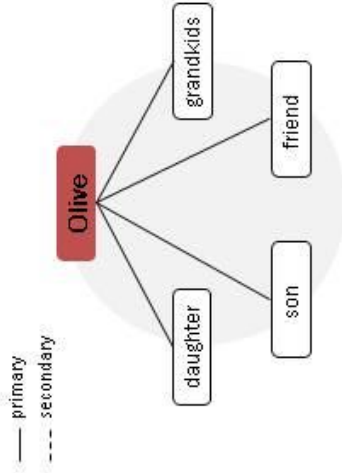
Age: 81 years old
Occupation: retired
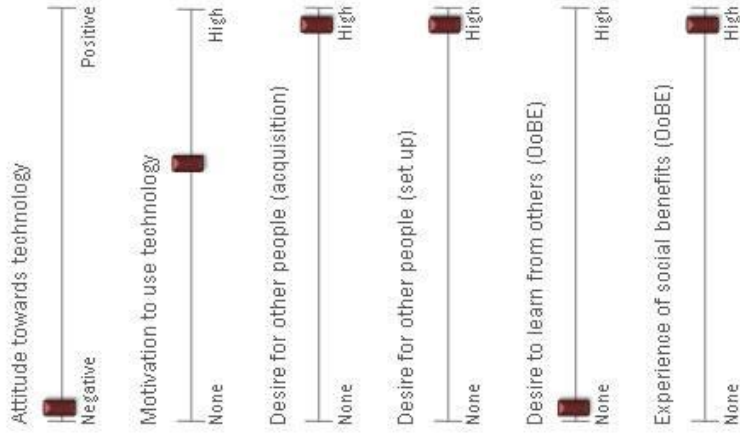**Home life**: widowed, lives alone

Olive is not especially interested in technology, even though she uses it everyday to stay in touch with friends and family.

Her children and grandchildren often tell her about new technology products and services that would make her life easier. Olive also relies on others to buy and set up new devices for her, but she is quite happy about this because it means she can spend time with them and have a chat.

Technology support network

— primary
--- secondary

Olive
- daughter
- son
- grandkids
- friend

Goals for the Out-of-Box Experience (OoBE)

- Spend time with other people
- Avoid decision making about technology products and services
- Get the hang of meaningful functions and features

Frustrations from the OoBE

- Having to set up a new device by herself
- Learning new processes and vocabulary that she sees as unnecessary in her daily life

Technology profile

Attitude towards technology
Negative — Positive

Motivation to use technology
None — High

Desire for other people (acquisition)
None — High

Desire for other people (set up)
None — High

Desire to learn from others (OoBE)
None — High

Experience of social benefits (OoBE)
None — High

Appendix G

Study 3 - Workshop information sheet

Out-of-Box Experience workshop

30 October 2012

The Out-of-Box Experience (OoBE) for a new product typically includes:

- purchase decision
- packaging and unpacking
- set-up or installation
- assistance

Scenario

Peggy is getting a smart home monitoring system. In the box there is:

- a hub that plugs straight into an existing broadband router
- a status lamp
- two motion sensors
- two alarm sensors
- three door/window sensors
- three keyfobs
- a button that can be used as a doorbell

Plugs can be added to the smart monitoring system to remotely view and control each home appliance individually. The whole system is run via a website which allows the home's status to be monitored online or on a smart phone, as well as receive alerts.

Design brief

Your goal is to generate a design concept for the Out-of-Box Experience of this smart home system that would support and engage [*persona*] during the initial stages of interaction.

When designing this OoBE, you should think about:

- ❖ How is [*persona*] acquiring this product? In a shop? Is it going to be delivered?
- ❖ Is she setting the system up by herself?
- ❖ Who could help her set up and learn about the system? How?

Presentation of design concepts

Presentation of final concepts will take place on 8 November, at 2pm in room 2.33. Please prepare up to 5 PowerPoint slides to illustrate your design concept. During this session you will have the opportunity to get feedback on your concept, see other groups' ideas and discuss the outcomes of this workshop.

Appendix H

Study 3 - Modified personas
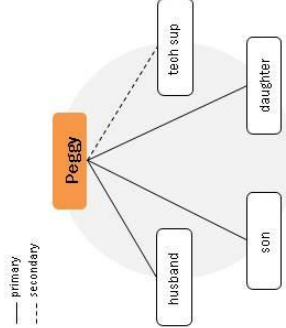
Peggy Brennan

"I don't mind having a go at setting up a new device, but if it's completely unfamiliar technology I feel more confident watching someone else do it."

Age: 57 years old
Occupation: part-time teacher
Home life: married, lives with husband

Peggy thinks technology is quite fun, though more importantly it supports her in her everyday life. She has had some health problems recently, but the computer and the internet have enabled her to continue working from home.

"When I was ill, being able to order books and presents for people online when I couldn't walk more than 100 yards was very, very important for me to still feel independent."

When Peggy buys new technology, she often reads up on it and appreciates advice from her children or husband. She may try to set up a new product, but prefers having someone else around to answer any questions and help out.

"I sometimes ask for help and realise I could have done it myself, but not with the confidence that it would be done so well."

"When I decided to get my first computer, I did a short computer course because I didn't know anything about computers. It was nice to be around other newbies! I sometimes worry that I'm being a burden when I ask my family for help, because I know they're so busy."

Technology support network

— primary
--- secondary

- tech sup
- Peggy
- daughter
- husband
- son

Technology profile

Attitude towards technology — Negative ... Positive
Motivation to use technology — None ... High
Desire for other people (acquisition) — None ... High
Desire for other people (set up) — None ... High
Desire to learn from others (OoBE) — None ... High
Experience of social benefits (OoBE) — None ... High

Do you know Peggy?

In groups, discuss what you think makes a good OoBE of a new technology product for Peggy. Write down three possible goals and two possible frustrations that she might have from the Out-of-Box Experience.

Goals for the Out-of-Box Experience (OoBE)

- _____
- _____
- _____

Frustrations from the OoBE

- _____
- _____

Olive Hadley

"I don't want to have anything to do with setting up new technology, it doesn't interest me whatsoever. I am only interested in what it can do for me."

Age: 81 years old
Occupation: retired
Home life: widowed, lives alone

Olive is not especially interested in technology, even though she uses it everyday to stay in touch with friends and family.

"This is where I think you only get involved in new technology when you need it. I think I am making more of an effort, gradually, to use the computer and learn a little bit more about it as I go along."

Her children and grandchildren often tell her about new technology products and services that would make her life easier. Olive also relies on others to buy and set up new devices for her, but she is quite happy about this because it means she can spend time with them and have a chat.

"I don't see having to ask somebody else about something that I don't understand as a loss of independence. I like people to feel needed and appreciated."
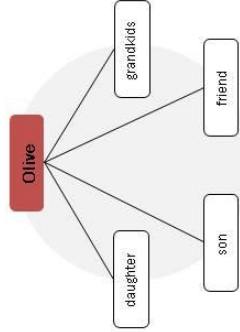
"I didn't order, unpack or set up my computer. I knew what I wanted to be able to do, but it would have taken me a lot longer and probably I'd have messed things up. I reckon that we all have things we can do and we should do those and let other 'experts' to do their things!"

Technology support network

— primary
- - - secondary

daughter — Olive — son
grandkids
friend

Technology profile

Attitude towards technology
Negative ———————— Positive

Motivation to use technology
None ———————— High

Desire for other people (acquisition)
None ———————— High

Desire for other people (set up)
None ———————— High

Desire to learn from others (OoBE)
None ———————— High

Experience of social benefits (OoBE)
None ———————— High

Do you know Olive?

In groups, discuss what you think makes a good OoBE and bad OoBE of a new technology product for Olive. Write down three possible goals and two possible frustrations that she might have from the Out-of-Box Experience.

Goals for the Out-of-Box Experience (OoBE)

• _____
• _____
• _____

Frustrations from the OoBE

• _____
• _____
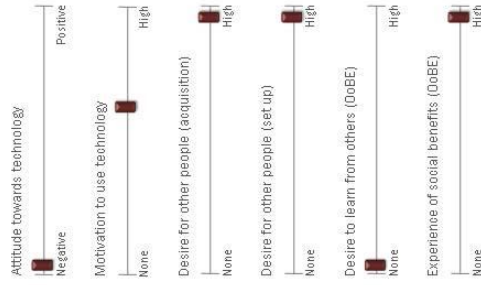
Appendix I

Study 3 - Prior knowledge questionnaire

Prior Knowledge Questionnaire

Age: _____ (years)   Sex: ☐ Male   ☐ Female   Date: _____

Please indicate the highest level of education you have completed (tick one):

☐ High school   ☐ Bachelor degree   ☐ Master degree   ☐ PhD   ☐ Other

Current occupation: _____   Nationality: _____

Read each item carefully and select the option that best corresponds to your response. Please only select one response per item.

1. Knowledge of Inclusive Design:

    ☐ Extensive knowledge (I understand this concept and have experience working in this area)

    ☐ Moderate knowledge (I understand this concept, but have no experience working in this area)

    ☐ Limited knowledge (I have heard about it)

    ☐ No knowledge

If applicable (at least limited knowledge), please provide a brief description of Inclusive Design.

_____

_____

2. Knowledge of Experience Design:

    ☐ Extensive knowledge (I understand this concept and have experience working in this area)

    ☐ Moderate knowledge (I understand this concept, but have no experience working in this area)

    ☐ Limited knowledge (I have heard about it)

    ☐ No knowledge

If applicable (at least limited knowledge), please provide a brief description of Experience Design.

_____

_____

3. Knowledge of <u>Personas</u>:

☐ Extensive knowledge (I understand this concept and have experience working in this area)

☐ Moderate knowledge (I understand this concept, but have no experience working in this area)

☐ Limited knowledge (I have heard about it)

☐ No knowledge

If applicable (at least limited knowledge), please provide a brief description of <u>Personas</u>.

_____
_____

Appendix J

Study 3 - Feedback questionnaire

Feedback Questionnaire

Age: _____
(years)

Sex: ☐ Male   ☐
Female

Group:
_____

Please indicate the persona you designed for (tick one):
   ☐ Olive   ☐ Peggy

1. Please circle the number that represents how you felt about <u>designing for the persona</u>.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
The persona provided design inspiration	1	2	3	4	5
The persona engaged my design thinking	1	2	3	4	5
The persona helped me empathise with the user	1	2	3	4	5
I would use these personas in the future	1	2	3	4	5

2. What would help you empathise more with a persona when designing?
_____
_____
_____
_____

3. Do you think this persona affected your design solution? In what way?
_____
_____
_____
_____

4. Do you think that your design concept would be desirable for younger people? Why? Why not?

_____
_____
_____
_____

5. Please circle the number that represents how you felt about <u>designing in social benefits</u>.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
This is the first time I considered the benefits of social interaction in a design	1	2	3	4	5
Social benefits are a meaningful design concept	1	2	3	4	5
It was easy to incorporate social benefits into my design solution	1	2	3	4	5
I will consider social benefits in future designs	1	2	3	4	5

Appendix K

Study 3 - Slides for Group A

OUT OF THE BOX EXPERIENCE
Persona: Olive Hadley

Fengjie Chen

Yusi Huang

Susana Islas Hernández

Melissa Verastegui
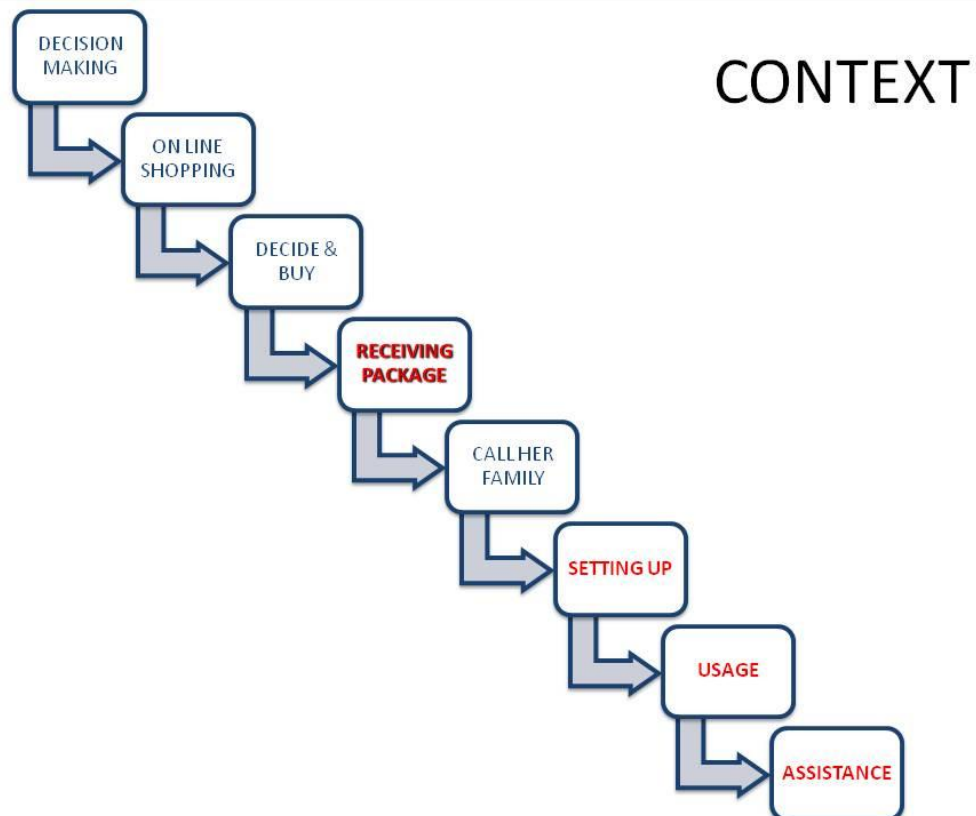
CONTEXT

- DECISION MAKING
- ON LINE SHOPPING
- DECIDE & BUY
- RECEIVING PACKAGE
- CALL HER FAMILY
- SETTING UP
- USAGE
- ASSISTANCE
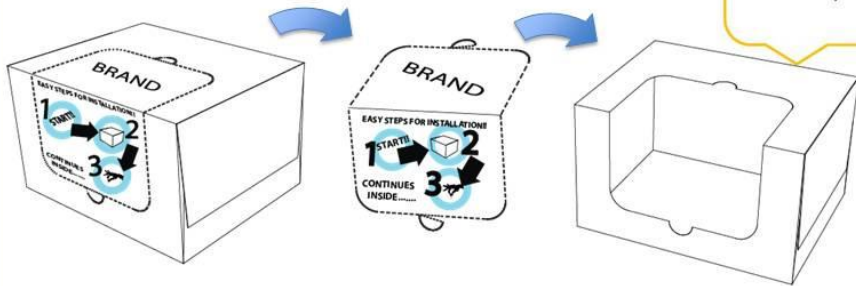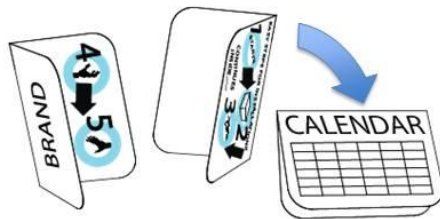
USAGE

Booklet
- Tips

Sticker

Thank You!
****
****
****

Sticker

Esay to Start...

1	2	3
Turn on	Turn on	Turn on

4	5	6
Turn on	Turn on	Turn on
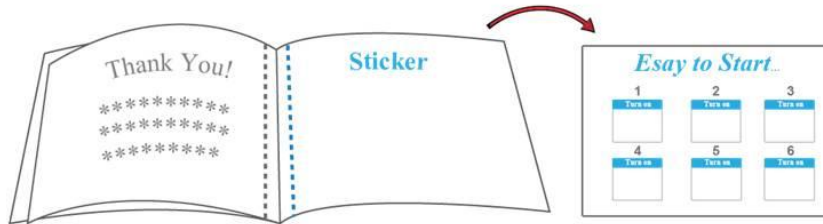
You can tear off the usage tips and stick it
on the wall(as well as assistance number)

ASSISTANCE

Booklet
- Telephone number
- Solutions for common problems
- Application for her family

✓ **FREE Estimates**
✓ **FREE Damage Assessments**
Call 256-615-1673

24-Hour Emergency Roof Service
Call 256-615-1673

Proud Members Of:
✓ The National Home Builder's Association
✓ The Better Business Bureau
✓ The Morgan County Chamber of Commerce

Common Solution Sheet
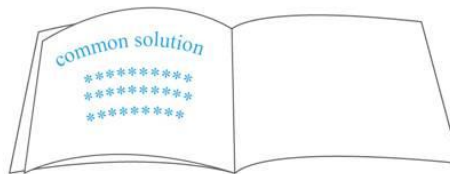
common solution
****
****
****

Which can help thefamily to
solve the common problems

Appendix L

Study 3 - Slides for Group B

Out of Box Experience Workshop

Yiru Zhao
Tim Davison
Silvia Lopez de Lacalle

---

the story

Peggy Brennan

'I've purchased a home security solution from the internet and I want to set it up with my daughter; its nice to spend some quality time with her.'

'I want to be able to do the setting up myself but I'm always worried I've done something wrong.'

'I want to be confident when I set up new products; especially those that are really important to my welfare.'

'It's nice to be able to have some fun and a few laughs but also get the device correctly set up at the same time.'

'Sometimes the only quality time I get to spend with my family is when I have a new product I need to set up; I wish they could enjoy the experience as much as I enjoy their company.'

the alarm system

1. hub

2. status lamp

3. sensors

2 alarm sensors

2 motion sensors

3 window sensors
3 door sensors

4. 3 keyfobs
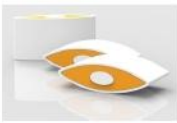
5. doorbell button

---

packaging

- box made of layers
- one element on each layer
- instructions and help
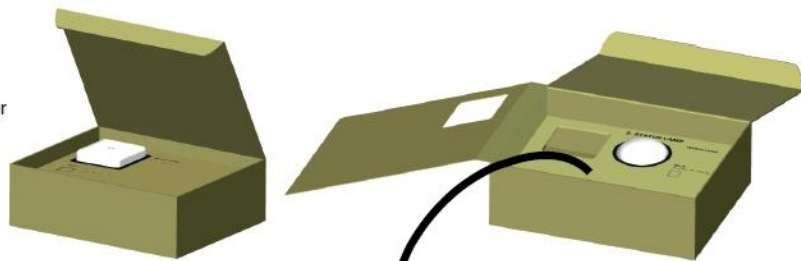
hole for the element of previous layer

highlithed hole for element of current layer

2 STATUS LAMP

INSTRUCTIONS:
switch on (on/off button
underneath). The lamp
lights up in different
colours depending on its
status:
blue: not activated
red: activated

HELP:
scan this HQ code
with the given
devide for help

instructions

help scan code

extra gift. eletronic device

scan the HQ code on the
box with the device

the device recognises the
item

select the option you want

---

the game

Scan QR code on
product packaging

Link goes to app store;
download and install app

Start up screen

Instructions for play

Player 1 start screen

Player 1 game screen

Caught Screen

Lost game and set-up
suggestion screen

Appendix M

Study 3 - Slides for Group C

Out-of-Box Experience workshop

- Persona: Olive Hadley
-   Age: 81 years old
-   Occupation: retired
-   Home life: widowed, live alone

- Needs:
- She don't think asking other people is a loss of independence. In contract, she is expecting a kind of package which could make people feel she is in need and appreciate.

- We will focus on designing a kind of package for the aged, like Olive. She needs people give her more attention and help. It will provide an excuse for her to ask for help and to communicate with others.

- So, the GOALS for the OoBE is:
-   design a package which is out of her level and ability to set up. It maybe more suitable for young people.
-   add a little tip on the package: Help your mother to set up.
-   make the design more innovative, not specialized for elderly.

this part is for people to pull out
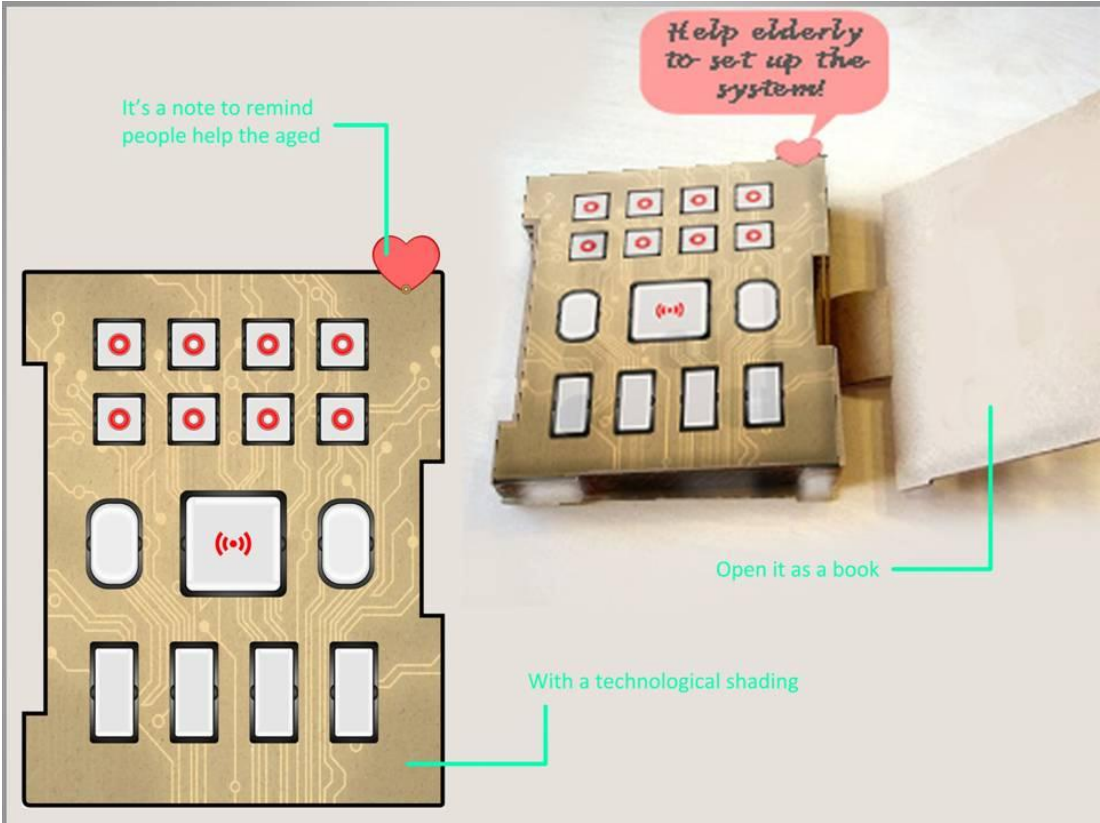
Appendix N

Study 3 - Slides for Group D

Peggy: 57-year old

part-time teacher, married, lives with husband

Packaging and Unpacking

Front

Top

Outer packing

Useing hemp material and flower to decorate it, with tow wheels underneath to help her move big product. The package could be reused for other purpose.

Inner packing

Inside packing is made of paper with the concept of flower and it can be used as a decoration on the wall. Paper–cutting art
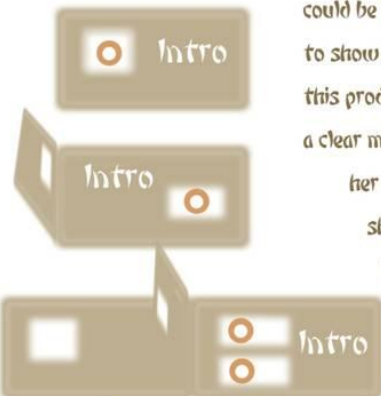
OoBE

Peggy: 57-year old

part-time teacher, married, lives with husband
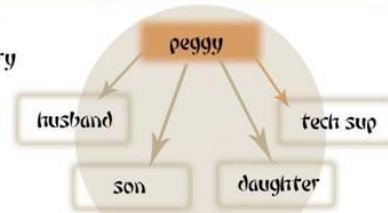
Set-up or Installation

Scenario

Intro

Intro

Intro

In side introduction could be like a kind of game to show every detail step of this product and let the user have a clear mind of every step and help her to sep up. She could not know the next step unless she she has finished the first step. And she also could do this 'GAME' with her family member.

primary
secondary

peggy

husband

tech sup

son

daughter

SOCIAL BENEFITS

OoBE