

**A sensitising tool for smart home
designers: Based on user-oriented
product design research into the home life
of older adults in the UK**

A thesis submitted for the degree of Doctor of Philosophy

By

Hsueh-Pei Wang

School of Engineering and Design

Brunel University

Sept 2009

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Abstract

Focusing on the needs of users, design can leverage new product development process by offering insightful knowledge of those needs.

This research investigates the technology development of smart homes. Design is utilised as a product research tool to identify key insights of the home life of the older adults living in the UK, and for the purpose of informing the front-end of the new product development process.

The review of the literature in the field of smart homes suggests that the developments have lagged by a technology-push approach, the lack of appropriate concepts from users' perspectives as well as the lack of development strategy, which has consequently been reflected in consumers' reluctance towards smart homes. As a result, this doctoral research aimed to '*develop a user-oriented product design research tool that improves the understanding of the home life of older adults.*'

To achieve the aim, this research employs qualitative methodology to develop a research process that utilises the cultural probe, semi-structured interview and video tour. Informed by ethnographic tradition, this research establishes its trustworthiness and credibility by employing a thorough process of analysis (qualitative analysis with computer-assisted software NVivo 8 and peers debriefing) and evaluation (creative workshop and evaluative interview) with practitioners from the field of product design, design management and design education. The result of the field investigation is presented as ten personas and taxonomy of nodes, which form the contribution of this research, a sensitising tool and process.

This research contributes a sensitising tool - a design-led, user-inspired and participatory product design research that offers insightful knowledge of those older adults and their relationships with their homes living in the UK. This sensitising tool is developed for the smart home designers for the purpose of

generating new product ideas and challenges designers' preconception of users and smart homes, and provokes reflections on the practices of user-centred and user-participatory design, as examined in the creative workshop.

In addition, this research also contributes to the growing debate surrounding the issues relating to ethnographic user research and the use of cultural probe for the design of new smart homes.

Acknowledgments

I would like to express my deepest gratitude to my mother, *Shu-Yun Lai*, with her unconditional and un-deterred love and support over the years. I would also like to thank my family, in particular, *my father, sister, and Phil Skins*, for their unreserved encouragement.

I would like to thank my three supervisors, *Dr. Ray Holland, Dr. Busayawan Lam* and *Dr. Peter Evans* for their professional guidance as well as generous friendships, and especially for Ray, who has inspired and encouraged me during my PhD supervision, and whom I owe the most.

Finally, my gratitude also has to go to my grandmother, who inspires me with her intelligence and artistic flare, and in loving memory of my grandfather, who, I believe, has looked over me.

Without them, I would not be able to develop my career on this creative but challenging path.

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CHAPTER 1 INTRODUCTION

1.1 Research background

This research investigates developments in the field of smart home technology. Design is employed as a strategic tool to leverage the technology development.

The purpose of this research is to address some of the most challenging development opportunities as well as obstacles faced for developing smart homes today; in particular, the existing and older housing stock in the UK and the lack of development strategy. More importantly, this research intends to contribute to the growing debate surrounding the issues relating to user research in and for the design of new technology for the home.

This thesis presents the result of PhD research on the subject of smart homes. It demonstrates a qualitative methodology and ethnographic focus research and its process, and more uniquely, the employment of the research tool cultural probe and the link to the new product development process. The result of this research is a design-led, user-inspired and participatory design research that offers insight and knowledge of older adults living in older homes through a sensitising tool.

1.1.1 Introduction

This chapter introduces the background of this research and how it is motivated. Fundamentally, this research is a response to, firstly, the call to invest in research that builds on the impact of design in the broader context of innovation, as stressed in The Cox Review proposed by Sir George Cox (HM Treasury, 2005).

The second response is to address, more urgently, the growing social and economical opportunities of the markets of older adults in the UK, as reflected, for example, in the cross-council (five UK research councils – ESRC, EPSRC, BBSRC, MRC and AHRC) research programme, the ‘New Dynamic of Ageing’ in recent years (NDA, 2009).

Reflecting the enthusiasm encouraged by the first call, this PhD research begins by investigating the background of the role of design in technology research and ‘front-end’ user-oriented research relating to new technology development (1.1.2 Design in technology research. The second part of the research background outlines more specifically, the emerging computing and information technologies for the domain of the home (1.1.3 Technology for the home). This relates to the central topic of the smart home this research aims to investigate, and explains why the home has become an important site for technology development. The third part of the background research illustrates the market of older adults (1.1.4 The ageing society); the response to the growing demands for products and services for the ageing society in the UK.

In short, the introduction of these three domains (1.1.2 Design in technology research; 1.1.3 Technology for the home; 1.1.4 The ageing society) explain the background of this research.

1.1.2 Design in technology research

The first domain, ‘design in technology development’ introduces the fundamental focus of this research – design. Design plays a significant role in creating innovative products and services (HM Treasury, 2005). More importantly, it is “in a uniquely creative position to leverage technology development” (Design Council, 2005).

Definition of design

The territory of design is vast (Lunenfeld, in Laural ed., 2003), describing a wide range of activities (Walsh, Roy, Bruce, and Potter, 1992) and covering various disciplines (Cooper and Press, 1995). The term ‘design’ also means different things to different people (Walsh et al., 1992, op. cit.). It means to ‘designate’ to draw’ in Latin or “a plan, project, intention, process” or “a sketch, model, motive, décor, visual composition style” in English, depending on the context (Borja de Mozota, 2003). Therefore, it is difficult to illustrate a definitive meaning (Lunenfeld, op.cit.).

Cooper and Press (1995) outline several roles of design; for instance, design as art that follows emotions and communicates values, as a goal directed problem-solving activity (Archer, cited in Cooper and Press, 1995, p.16), as a creative act, or family of professions that includes skills of people from a wide range of disciplines (Gorb, cited in Cooper and Press, 1995, p.25), as an industry as well as a process.

To define design holistically, the International Council Societies of Industrial Design (ICSID) offers the definition that,

“Design is a creative activity whose aim is to establish the multifaceted qualities of objects, process, services, and their systems in whole life cycles. Therefore, design is the central factor of innovative humanisation of technologies and the crucial factor of cultural and economic exchange.”
(ICSIC, 2003)

Design in technology research

Design is also linked to the description of ‘cultural appropriation of technology’ (Gagnon, cited in Lunenfeld, in Laurel ed. 2003) and it has a strong partnership with technology (Design Council, 2005) to leverage competitiveness and success. In the context of innovation, design also relates to management of innovation (Borja de Mozota, 2003), new product development (Walsh, Roy, Bruce, and Potter, 1992; Cooper and Press, 1995; Borja de Mozota, 2003) and, more importantly, user-oriented development (Veryzer and Borja de Mozota, 2005). The ‘plan’, ‘the intention’ and ‘the process’ of design is often employed by companies to improve quality of goods and services, increase competitiveness (Design Council, op. cit & 2008), market share and open up new income streams (Design council, *ibid*). In many ways, design helps by shaping ideas for the users or customers through a deep understanding of their needs (Design Council, *op.cit.*), aspirations and values (NESTA, 2005). More significantly, the focus of design, on the needs of users, often leverages technology development (Design Council, 2005) and it can “push researchers to think not just about the invention but the people who will use it and so help turn technology into saleable products.” (*ibid*, 2005, p. 22)

Front-end user oriented research

Researching people's needs, tastes and preferences is vitally important in shaping new products and services" (NESTA, 2008, p.6). Designers today increasingly seek intelligence about emerging needs of future markets as the result of the growing demands by their clients (ibid). The so-called "front-end" research into technological development, market trends, and consumer needs is now a staple in the design industry operation (NESTA, 2005; also cited in Design Council, 2008). It vitally serves to underpin future design and product development activity. The employment of user-centred, user-informed design research methods informs the development of products and services from the beginning of the investigation (Borja de Mozota, 2003) to the concept development forward (Laurel, 2003).

'Front-end' research is evidently important in some of the larger design agencies who engage in user-oriented research to raise their profile, visibility, and credibility in target markets (NESTA, 2005).

The use of 'design' in this research

This research is a response to demonstrate the importance of user-oriented design research for new technology development. The scope of the research discusses not only how to identify the existing problems in the field of the smart home and provide a solution, but also to articulate the impact of design on both technology, and business performances in the context of innovation, as stressed in Sir George Cox's review (HM Treasury, 2005).

The use of 'design' in this research describes a creative research process involving a range of activities to address particular problems in the development process of smart homes. More crucially, design is seen as a research tool to strategically leverage knowledge in such development processes and contribute to the understanding of users.

1.1.3 Technology for the home

The first domain articulated the role of design in technology. ‘The home environment’ is introduced secondly, to articulate an important domain for ‘design’ in technology development.

The development of computing and information technology in the past twenty years has had a large impact on the discipline of design. The background of this Design and designers, now holding also, the role of research, are demanded for generating knowledge to not only solve problems, but, on a more significant level, to “improve our relationships with each other, with the communities, cultures and democracies” (Lunenfeld, in Lural ed., 2003, p.14). This impact has been in the growing interest of research for and in the home.

Home has become an important site for technology innovations (Venkatesh, 1996). Information and communication technologies have become in increasingly part of the world (Silverstone, Hirsch and Morley, 1991) and in particular, part of the home today. Early computing technologies in the home were introduced in the 1980s for the purpose of work (Venkatesh, 1996). Derived from industrial applications and migrated from the workplace, these applications were considered by consumers as job-oriented technology and were not well received in the context of the home because they lacked the social, cultural, individual and pleasurable qualities of a real home.

Developers today recognise the need to design new technologies for the home, not only because of the mass adoption of computing technology by consumers in their everyday lives (Hindus, 1999), but also for the reason that home is where, as many technologists believe, new technologies can realise their full potential (Venkatesh, 1996). Unlike domestic technologies, this new genre of computing technology is designed purposefully for the home to support life outside of work.

1.1.4 The ageing society

The ageing population

Previous domains (sections 1.1.2 and 1.1.3) contextualised the background and scope of this research from economical, political and technological perspectives. The third domain identifies, most crucially, an important trend - the ageing population, that said to influence significantly the development of technology, from a socio-cultural perspective. The discussion here is to address this growing social and economical opportunities of the markets of older adults in the UK.

The ageing society plays an influential role in shaping the development of technology and the strategy of design. As Coleman (2003, in Clarkson, Coleman, Keates, and Lebbon, eds., 2003, p.121) stresses, they are “the only consumer sector with real growth potential”.

The world is growing older. “By 2020 close to half the adult population of the UK will be over 50 years old” (Coleman in *ibid*, p.121), and by 2033, twenty-three percent of the population will be aged 65 and that will overtake the younger generation aged 16 and younger by five percent (Office for National Statistics, 2009). This shift towards an ageing population demonstrates a growing need for the consumer market to cater for more mature audiences.

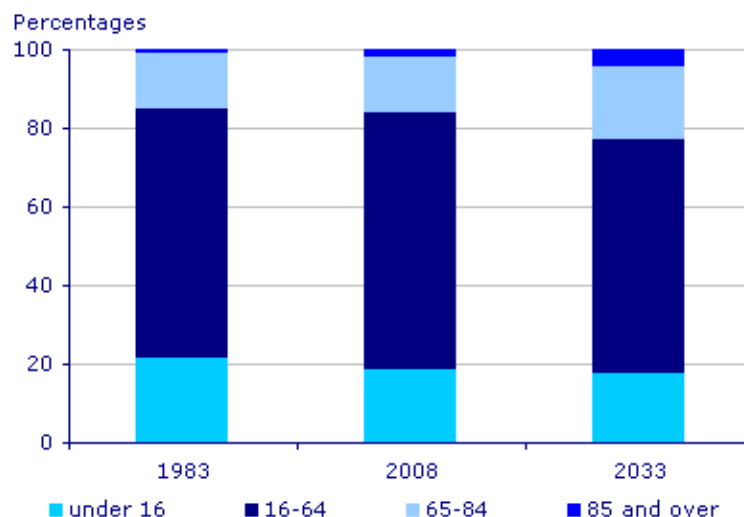


Figure 1.1 Population by age, United Kingdom (Source: Office for National Statistics, 2009)

To understand this phenomenon at a closer distance, Huppert (2003 in op. cit., p.32) describes ‘older users are us’ and ‘if you are over 50, you are classed as an older user or ‘if you are under 50s, you are on your way to becoming an older user.’ The need to provide solutions for a healthier and sustainable ageing society is vital if not urgent.

An important aspect of the social change in the ageing society is the ‘baby-boomers’ generation. The baby-boomers generation describes a particular generation born between the years of 1946 to the early 1960s. “It is commonly applied to the surge in births that occurred in much of Europe, Australia and North America following the end of World War II” (Dalley, Falkingham, Hancock, Lewism, Means, and Phillipson, 1997, p.206). Not only are they likely to continue to use information and communication technology, (Newell in Clarkson, et al., eds. 2003), they also present a potential market for new digital and information technology demanding new focus on wellness, simplicity, personalised service and connected convenience-and that will benefit everyone (Coughlin, 2007).

Issues of ageing in a developed society, such as the UK, have also attracted huge interest from diverse sectors like public health and social care, design disciplines or information and communication technology, to name a few. In recent decades, researchers have begun to work in collaboration with charitable organisations, government bodies, industry or academia, to address many issues, as well as opportunities which have arisen from this phenomenon. For instance, the ‘New Dynamic Ageing’ programme, a large scale cross-council research programme funded between ESRC, EPSRC, BBSRC, MRC and AHRC, on ageing in the UK.

The definition of the older adults and the selection of the research sample are discussed further in (Section 3.3.3 Research sample of chapter 3 Research methodology)

1.1.5 Summary of the research background

To summarise, three domains, design in technology research, technology for the home and the ageing society explains the background of this research. Design, as discussed in the first section, is a vital key to leverage technology development. Design, in partnership with technology, focuses on understanding the needs of the users in the domain of the home. The growing concern of the ageing population highlights the growing market of older users or customers and, more critically, addresses a socially significant context for new technology design.

Following the introduction of the backgrounds this research aims to investigate, the next section presents five obstacles deriving from the field of smart homes. This introduces the obstacles that formulate the foundation, as well as influences that drive the design thinking and strategy of this research.

1.2 Research motivation

This research is motivated by five fundamental issues relating to the development of obstacles in the field of smart home; namely, 1) technology-push approach to development, 2) difficulty in translating smart home concepts, 3) the need for an appropriate strategy towards research in the home, 4) the consumer's reluctance towards new technologies and 5) older housing stock in the UK. This section highlights some of the most fundamental issues that influence this research.

The development of new technology is often challenged not only by the lack of development strategy and technology-push attitudes towards development, but also, more problematically, by consumer's reluctance and the existing constraints of older homes. Although progress has been made towards identifying the real potential of such technologies, in particular, from the perspective of technological advancements, little research has been able to convince consumers how such new technologies can benefit their existing way of living. As a result, the promises of those new technologies have not been able to make a real and positive impact, socially, economical and environmental or culturally.

1.2.1 Technology-push approach

The notion of living in a so-called “smart home” is becoming increasingly plausible (Harper, in Harper ed. 2003). Recent visions of smart home describe characteristics as invisible (Marzano, in Aarts and Marzano eds., 2003 and Tolmie, Pycock, Diggins, MacLean, and Karsnty, 2002), unobtrusive, ubiquitous (Abowd and Mynatt, 2002), unremarkable (Tolmie et al., 2002), adaptive (Mozer, 1998; 2005), aware (Kidd, Orr, Abowd, Atkeson, Essa, MacIntyre, Mynatt, Stamer, Newstetter, 1999), experience (McCarthy and Wright, 2004), intelligent and smart (Addington and Schodek 2005) for computing technology for the everyday environment.

Despite the extensive literature and the hype of organisations in developing products and services at the beginning of the smart home development, “there have been only limited progress towards introduction of ‘smart home’ technology” (Barlow and Gann, 1998). Major obstacles identified in these earlier decades remain today, such as older housing stock and consumer’s reluctance towards new technology. As a result, a number of challenges remain before the smart home concept can be moved into reality (Edwards and Grinter, 2001).

Technology-push

One of the major obstacles is caused by the technology-push approach (Moran, cited in Hughes, O’Brien, and Rodden, 1998; Gann, 1995;1999; and Hindus,1999) towards product development. As observed earlier by Moran (1993, cited in Hughes et al., 1998), none of the technology focus approach in three major actors (US, Europe and Japan) of electronic homes has been able to provide effective and underlying progress in the development of the electronic home.

First of all, there has been a lack of development for the home sector. The development of computing technology for the home was not only derived from the work place (Venkatesh, 1996), but also had more focused on applications for the purpose of work. Although some efforts have been made towards developing new applications for domestic use, it has been primarily focused on the technical possibilities (Alrich, in Harper ed., 2003). Only until recent decades, developers realised the true potential of computing technology in the home.

Secondly, the eagerly anticipated technology-push developments, such as the 'Aware home' by Georgia Institute of Technology, 'Smart Home Project' by Samsung and 'MS Home' by Microsoft, seemed to focus on transforming the physical and technical features of the home (Taylor, Harper, Swan, Izadi, Sellen, and Perry, 2007) rather than addressing the social needs of the home inhabitants (Crabtree and Rodden., 2004). As a result, they failed to take an adequate account of user needs (Gann, Iwashita, Barlow, and Mandeville, 1995).

However, the majority of new products, such as those mentioned above, have often been challenged by spatial, economical, and social constraints within the existing environment. By acknowledging, solely, the technical possibilities of systems, those technology-push applications were designed without consideration of the real contexts of the home environment (Luff and Heath 1993 cited in Hughes, O'Brien, Rodden, Rouncefield, and Viller, 2000). When, in fact, consumers rarely adopt new products and services based solely on the technical advancement, their purchase decisions are need-driven.

Thirdly and most importantly, those technology-push developments often focus on applications of control, organisation and problem solving. Those implications borrowed from the workplace suggested a lack of understanding of the home environment. Without understanding the underlying needs and desires of the home inhabitants, technology-push products based their designs on the presumption that consumers need technology to transform their homes. In fact, "transforming powers" of technology seem to leave the social organisation of the home "resolutely unaffected" (Hughes et al., 2000). The potential applications of smart home are therefore more likely to be ignored in this technological hyped-up scenario.

What was fundamentally wrong was that "design of the technology that requires people to behave in machine-centred ways, ways for which people are not well suited." (Norman, 1993, p.11). "Unless people start to respect the full range of values that make us human, the technologies we build are likely to be dull and uninteresting at best, and de-humanising at worst" (Gaver, 2001). Instead of

relying on the 'push' of technical abilities, technology development should be "pulled" by the needs of the users (Hindus, 1999).

1.2.2 Difficulty in translating smart home concepts to real smart homes

The second obstacle in the development of the smart home is derived from, within the development process of smart home technology. Although it was said (Hughes et al., 1998) that new network facilities for the home will "have significant impact". However, "what is less clear is what form these systems will take and the impact they will have on domestic environments" (ibid, p.248).

The development of smart homes is supported with the existing and new technologies (Aldrich, 2003, in Harper ed. 2003). The conceptualisation of the smart home has also been supported with a considerable amount of research. Despite the extensive research and developments in the last decades, "there has been only limited progress towards the introduction of smart home technology" (Barlow and Gann 1998, p.3) and the vision of a smart house described "a combination of home computers, consumer electrical goods, video services, and home security systems, even in a "smart house", wired with heating and lighting sensors...hardly add up to a revolution in ways of living" (Foster,1989, p.224, cited in Barlow and Gann, 1998). There was also a bias in research towards the automated home according to Intille (2006). Consequently, few smart home concepts have been successfully moved to smart homes (Davidoff, Lee, Zimmerman, and Dey, 2006).

Some research, such as Harper (2003), suggest that much of the sociological research into domestic life is too theoretical to guide the design of technology or is not entirely suitable for generating implications for new technology (Dourish, 2006).

Others, such as Hanington (2003, p.17), suggest that "the failure can be attributed to the inherent difficulty in translating results from other research disciplines into an adequate language for application with in the design process". As a result, little

agreement has been made about what a smart home might look like, in particular, from the users' point of view (Randall in Harper ed., 2003).

1.2.3 The need for an appropriate strategy

The third obstacle illustrates a need for an appropriate strategy (Dewsbury, 2000; Intille, 2002; Mozer, 2005); a strategy will help to identify 'special resources' (Woudhuysen, 2007), clarify development directions and take the full potential of new technologies.

This special resource needs to take into account not only the needs of the consumers by asking what they want, but also explore possibilities for new technologies from consumers' point of view, and in a multidisciplinary manner (Norman, 1998; Alrich, in Harper ed., 2003; Marzano, in Aarts and Marzano eds. 2003).

Development in the area of the smart home has spurred into various directions; from residential control; communication and entertainment; working at home and self-learning; health and well-being; for the purpose of energy conservation as well as for more specialised care sectors for disabled and elderly users. While developments in this area have been contributed from various disciplines across academia and industry, few attempts have been made to address how these research strategies were and can be incorporated to suffice in the new product development process. However, it is clear that the user-centred or user participatory approach to innovation has been much emphasized through emergent methods and disciplines in user research.

1.2.4 Consumers' reluctance

The fourth obstacle outlines a more problematic and urgent issue illustrating the consumer's attitude towards smart home. The consumers also have mixed feelings about smart homes (Eggen, Hollemans and van de Sluis, 2003). Their reluctance has been reflected in their purchase decision of such technology as well as adaptation of them in their existing homes.

The attitude towards purchasing new consumer electronic products is quite different from the purchase of new smart homes. For domestic technologies, such

as a washing machine or refrigerator, they are considered as part of the everyday fabric of the household and seen as doing a fundamental job. They are only replaced when broken and updated when there are clear benefits in using new technologies (Hughes, O'Brien and Rodden, 1998). For other electrical brown goods such as home entertainment systems or personal computers, consumers can see clear benefits with these products and there are fewer demands for the initial investment and upgrade. To compare smart home technology with domestic white and brown goods, most of the consumers have doubts about the benefits of a smart home and concern about not only the initial investments of purchase, but also the further investments required to maintain and upgrade systems after the point of sale (Wang, Ariyatun, Holland and Evans, 2009).

Consumers' reluctance towards new smarter technology also reflects their concerns with their existing systems. Consumers are generally satisfied with the existing interfaces (Mozer, 2005) and believe computers are more likely to make their life more complex (Intille, 2002). The integration of new products and services faces demands to co-exist with the existing standards and technical abilities of the older products and the existing homes (Edwards and Grinter, 2001). In addition, it is difficult for the consumers to conceptualize the benefit and usage of the smart home when the products do not yet exist or only exist in the niche markets (Alrich, in Harper ed. 2003). What is unclear, more importantly, is how smart home will impact their everyday lives (Leads, 2008).

1.2.4.1 Cost

The technology-push approach to development also fails to recognise the user's perceptions of benefit versus cost (Mozer, 2005). Cost is one of the major obstacles in consumer take-up of smart home technology.

Not only are the available smart home technologies expensive, they tend to be aimed at middle and upper income homeowners (Barlow and Gann 1998; Dewsbury, 2000). Most fundamentally, the possibility of adopting such new technologies is also determined by whether, in the first place, consumers can see a comprehensive package of benefits in adopting a smart home that is substantially larger than the costs (Barlow and Gann, 1998, *op. cit.*).

1.2.5 Consumers' perception towards smart home

The consumer's reluctance is also a reflection towards the design of new interfaces. Firstly, the consumer's perception of the smart home is unclear. Most of the adults' responses were inflected by "an aura of detachment, humour, awe, and mild repulsion" (Venkatesh, 2001). Consumers generally have mixed feelings about the smart home (Eggen, Hollemans, and van de Sluis V, 2003). Research of Venkatesh (op. cit.) and Barlow and Gann (1998) indicated a fundamental problem when researching the smart home. When the technology does not yet exist, or has not yet reached its maturity in the mass marketplace, it is difficult for consumers to offer detailed opinions about it. As James Woudhuysen (2007) suggests:

"It is always a good idea to ask people whether they would like this or that gadget or services, yet many cases the answers people give are unlikely to be too revealing. People have very little experience of what they may encounter in the next few years. The investigation of future customer and user needs, and of future user requirements in terms of usefulness and usability, demands special resources." (Woudhuysen, 2007)

The consumer's expectation of what new technology can offer is not only limited to what they think will be technically feasible (Eggen et al., 2003) but also what they have experienced (Ulwick, 2002, p.92). "They cannot imagine emergent technologies or new materials and the like when they do not know about them". Moreover, they are often unable to step out of their current experiences beyond their personal computers (Laurel, 2003).

Secondly, the obstacles to understand new interface is high (Mozer, 2005). Stewart (2003) suggests that consumers face problems learning new information and communication technologies. They also have limited knowledge and skills in use and purchase of technology.

Thirdly, in an earlier study by Venkatesh (1996), consumers expressed worry about the loss of control in smart home technologies. They are concerned about their ability to manually override the smart home automation should the need

arise. People's desire for control actually contradicts the autonomy that smart products tend to offer (Rijsdijk and Hultink, 2003; Eggen et al., 2003).

Finally, the study conducted by Rijsdijk and Hultink (2003; 2009) has further suggested several issues regarding consumer's perceptions towards the so-called 'autonomous' products. The term 'autonomous' in their research is associated with the intelligence and smartness of products that are equipped with information and communication technology. Their result indicates that consumers perceive highly autonomous products as more risky and complex than autonomous products. And more problematically, "there is no clear relationship between product autonomy and relative advantages" (ibid, p. 212). The advantage of adopting new smart interface seems to be unclear to the consumers and, at worst, risky.

However, it is not to say that people are not interested in the benefit of technology (Eggen et al., 2003). They are attracted to the potential convenience that the home of the future can offer (Venkatesh, 2001).

1.2.6 Older homes

The older housing stock (older homes) in the UK posed challenging issues for the development of smart home as the majority of consumer depends largely on older housing stock (Aldrich, in Harper ed. 2003). This obstacle illustrates finally a more pressing issue faced by developers today. Older homes are one of the biggest obstacles for development in the UK today. This issue poses not only a critical challenge, but also a potential opportunity, from the perspective of this research.

Older homes represent the largest consumer housing market in the UK. The term older homes describe homes that are standing today (Leads, 2008). Older homes or older housing is defined in this research as dwelling of a single household that have already been built today (Department for Communities and Local Government, 2009). The UK Green Building Council (2008) suggests that 80 percent of the homes we will be living in by 2050 already exist today. Those include the eighty six percent of housing in England today that were built before

1985 (Department for Communities and Local Government, 2008); periods before personal computers were widely available to the general public. In other words the 86 percent of older homes standing today have very little or no consideration for computing technology; and, by 2050, eighty percent of the consumers will be living in those homes.

Although the rest of the 20 percent of the new homes have opportunities to be built purposefully for new technologies, there is currently an undersupply of new homes regardless of their considerations for new technologies such as the smart homes.

1.2.6.1 Retrofitting

Developers today recognise the need to ‘retrofit’ new technologies in older homes or refurbish existing dwelling to cater for new technologies. Understanding this pressure, manufacturers and suppliers across Europe have been urged to find a solution to this problem (Barlow and Gann, 1998). However, instead of seeing this market as an opportunity for development, technologists often consider older homes as a barrier to the success of their technologies. From the perspective of consumers, retrofitting of older homes is not only costly, but also messy and stressful (Hughes et al 1998).

1.2.6.2 Older people and older homes

The ageing population will also influence adaptation and improvement of older housing.

“The ageing society poses one of our greatest housing challenges. By 2026 older people will account for almost half (48 per cent) of the increase in the total number of households...”– Lifetime Homes, Lifetime Neighbours: A national strategy for housing in an ageing society (Department for Communities and Local Government, 2005)

The ageing population will not only influence the physical adaptation and improvement of older housing, but also affect associated designs and services for providing ‘lifetime homes’ (Department for Communities and Local Government Department of Health and Department of Work and Pension, UK, 2008). This

involves economical, social and environmental and political efforts to help individuals, such as older adults, to make the right choices and commitments about their homes. For instance, government agencies have helped to set up dedicated services for older people's housing such as The Housing and Older People Development Group (HOPDEV), which was formed in 2001 by the Department for Environment, Transport and the Regions and the Department of Health. Its members include services and information about housing providers, voluntary organisations, local authorities, and other experts on older people's housing.

To create a lifetime home for older adults, such dedicated services mentioned above do not focus solely on the improvement of the physical features of the house. Other factors were also considered in order to achieve a 'lifetime' home. From this perspective, this research suggests that the concept of older homes should be challenged. Furthermore, in the context of smart home, development of new technology may also include factors outside of the 'retrofitting'. Other services that are related to, but not limited to new technologies, should also be investigated.

There is clearly a big gap between the adaption of the old installation and creation of the new ones (Bieber, 2003, in Clarkson et al. eds., 2003). Furthermore, there is also, clearly, a big gap between the perceptions towards older housing markets and the newly emergent needs of the older adults. For example, the demands for retrofitting new technology, such as smart homes, may not necessarily reflect the needs of consumers as they are satisfied with their existing interface (Mozar, 2005).

To cater for the market of 'older housing', research needs to explore areas beyond retrofitting new technologies in the physical space of those homes. From the perspective of this research, new technology developments can benefit from research of areas that are outside of retrofitting, adaptation and improvement of the physical environment.

1.2.7 The motivation of this research

This research is motivated by five obstacles faced in the development of smart homes. Previous sections discussed problematic issues relating to the approach (1.2.1 Technology-push approach), process (1.2.2 Difficulty in translating smart home concepts to real smart home) and strategy (1.2.3 Need for an appropriate strategy) of the field. However, the existing older housing stock (1.2.5) and consumers' attitude towards smart homes (1.2.4) have posed the main challenges and difficulties.

Thus, the research is motivated by three key issues. **1)** There is a need for *user-oriented design research*. The technology-push approach clearly has not yet convinced consumers and presented clear benefits of adopting smart homes; **2)** Secondly, issues related to the lack of development strategy indicates a need to *develop a strategy that can identify special resources from the consumer's point of view*. This may not only provide an opportunity to clarify concepts for real smart homes, but also, more significantly, to identify user-oriented knowledge that can be used to leverage the development as well as the adoption of smart homes; **3)** Although older housing stock seems to place a considerable strain in the integration of new technologies, *there is a need to explore opportunities beyond retrofitting*. The adoption of new technology is not based on the adaptation of the physical space alone, therefore the other issues relating to the concept of 'older home' need to be explored.

1.3 Aim and objectives

With the recognition of the role that design can play in introducing human-centred values in technology development for the home, this research further focuses on the growing market of older adults. The five obstacles discussed previously indicate the following: 1) *a need to create for user-oriented design research* that can help to 2) *strategically identify development resource from consumer's point of view*, with the emphasis to 3) *explore opportunities in the domain of older homes*. The aforementioned research gap therefore raises the research question – *How to improve the understanding of existing home life of older adults from the consumers' perspectives, and for the purpose of designing for smart homes*.

In order to address the research question, this research therefore aims to:

To develop a user-oriented product design research tool that improves the understanding of the home life of older adults

In order to fulfil the aim, the following research objectives are considered:

- Objective 1:** To explore the background and review smart home related research
- Objective 2:** To review development methodologies and methods in the field
- Objective 3:** To identify user-oriented research methodology and methods
- Objective 4:** To develop a user-oriented and –participatory research method and process
- Objective 5:** To investigate, using the developed tool and process, the lives and homes of older adults in the UK
- Objective 6:** To analyse and evaluate the outcome of the investigation
- Objective 7:** To develop a strategic tool, informed by the user-oriented and participatory method and process, for designers of new smart home technology

1.4 Research contributions

The main contribution of this research is the sensitising tool informed by an ethnographic-informed and cultural probe inspired process.

Based on the background research and the literature, qualitative methodologies and methods, namely the home probe (a version of the research tool adopted and inspired by cultural probe), semi-structured interview and video tour, were devised to investigate the field of the home with 18 older adults living in the UK.

The result of the field investigation includes ten personas. The personas are the findings of this research eliciting insights identified from the field investigation. The main questions address topics of ‘the home’, ‘changes over time’ and ‘sensorial experiences’. Each persona was drawn based on the textual, visual as well as audio/video information generated from the three research methods during the study. Each persona illustrates insights relating to the concepts and meanings of their homes, as well as unique sensorial, personal experiences and life history.

The ten personas are joined by the taxonomy of nodes to support the process of the proposed sensitising tool. These two stimuli were both analysed and evaluated in the creditable process of the ethnographic-informed methodology.

Uniquely, this research also suggests a process of translating qualitative raw data for the purpose of ideation in the new product development process (Figure 1.3), through the use of the sensitising tool (Figure 1.2). In the process through the stimuli persona and the stimuli taxonomy of nodes, the sensitising tool (as presented in chapter 7 and as evaluated in chapter 5, section 5.4.2 Evaluation of the creative workshop) assists designers to **1**) understand the home life of the older adults participated in the study, **2**) reflect on their understanding of the older adults, who potentially are the users of new technology such as smart applications and smart homes, and **3**) to generate ideas based on the qualitative inspirations / information for the purpose of design (as discussed in section 7.3 The value of the sensitising tool). The sensitising tool is unique because it uses the real life stories of those older adults, their needs, value, aspirations to sensitise designers at the

front end of the innovation process. More critically, it can be used to challenge preconceptions of the older users and their existing and older homes. The result of this research therefore contributes, more significantly, a tool that assists strategic design direction for the future design of smart products and services for the home.

The Sensitising Tool

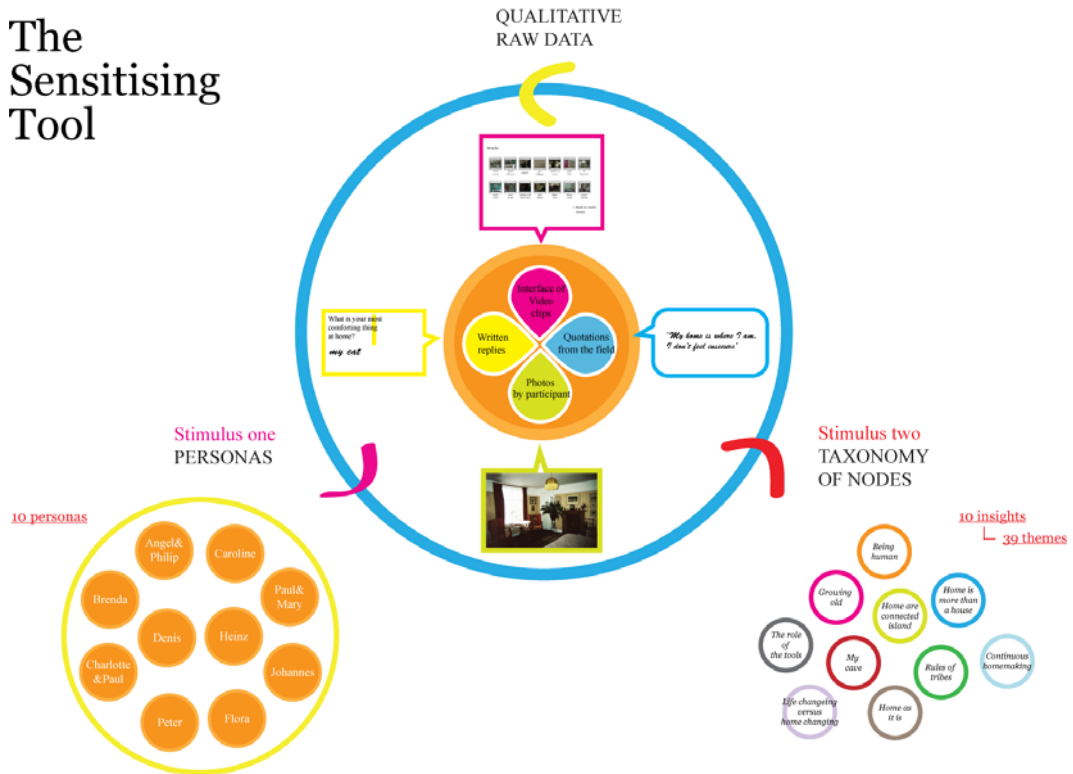


Figure 1.2 The sensitising tool (Detail of the sensitising tool is explained in chapter 7)

The sensitising process

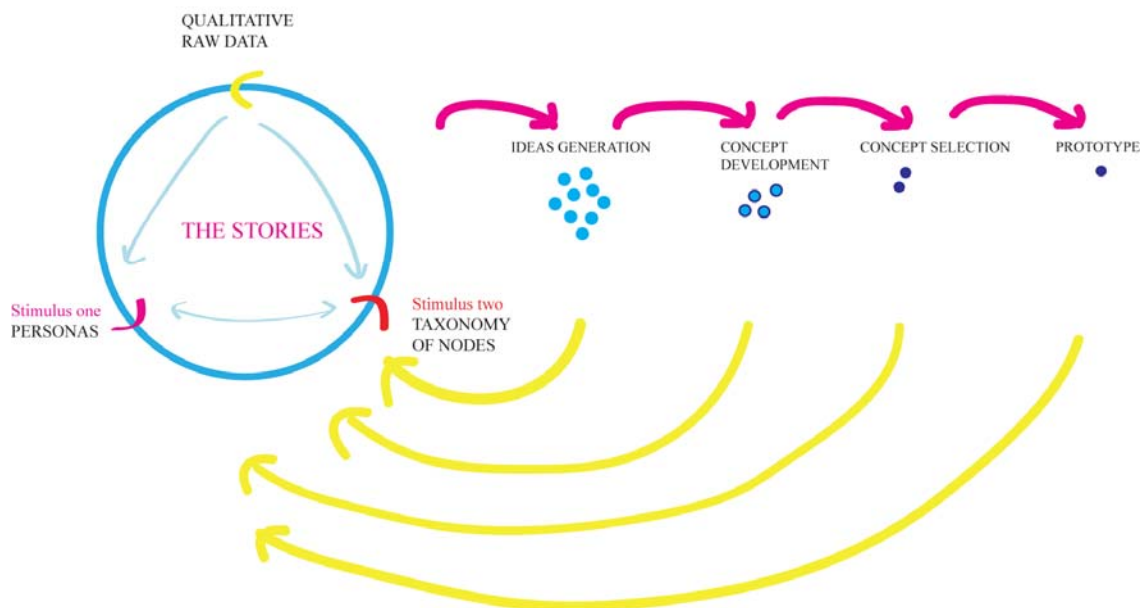


Figure 1.3 The sensitising process (Detail of the sensitising process is explained in chapter 7)

The trustworthiness of the sensitising tool and process was established in an evaluative process of a creative workshop, which was participated by two multidisciplinary teams of product designers, design managers, academic lecturers and design researchers. More critically, the creative workshop was also utilised to inform and test the formulation of a new design tool – the sensitising tool.

Home probe

The research method- home probe contributes fundamentally to the growing debate of the validity and credibility of ‘probe’ related research in HCI. This research stresses that the value of qualitative approach (i.e particularity, trustworthiness and credibility) should not be evaluated from the perspective of the quantitative tradition of validity and reliability. The value of the ‘probe’ or related method should, more appropriately, be examined from the perspective of qualitative tradition in terms of the trustworthiness and credibility (Lincoln and Guba, 1985). The inspirations generated from the home probe were crystallised (Richardson, 1994, cited in Janesick, Denzin and Lincoln, 2000), with the second

(semi-structured interview) and the third (video tour) qualitative research methods to create a deep, complex, thoroughly partial, understanding of the topic.

1.5 Structure of the thesis

This thesis describes the full research process of the formulation of the sensitising tool, details of the research designs and process and the field research findings. It consists of eight chapters:

Chapter 1: Introduction. This chapter explains the background, the motivation and the contribution of this research; in particular, it states the research aim and responding objectives. This chapter addresses part of objective one of this research ‘To explore the background of smart home related research’.

Chapter 2: Literature review. This chapter provides a review of the field relating to the development of smart homes. Addressing the research objective one and two ‘To review smart home related research’ and ‘To review development methodologies and methods in the field’, this chapter more specifically reviews three research areas: smart homes, the importance of the home in technology research and the cultural probe.

Chapter 3: Research methodology. This chapter discusses the strategy, methodology and methods selected in order to achieve the research aim. This includes the discussion of qualitative methodology, qualitative methods selected for this research, namely, the cultural probe, semi-structured interview and video tour, and the sampling strategy. This chapter addresses objective three of this research ‘To identify user-oriented research methodology and methods’.

Furthermore, this chapter discusses the strategy of research, evaluation and data representation.

Chapter 4: Method design and data collection. This chapter addresses objective four and five of this research ‘To develop a user-oriented and –participatory research method’ and ‘To investigate, using the developed tool and process, the lives and homes of older adults in the UK’. It presents the detail design of each

qualitative methods and implementation process, illustrating how each method was deployed into the field and the approach of the author.

Chapter 5: Data analysis and evaluation. This chapter addresses objective six of this research, 'To analyse and evaluate the outcome of the investigation'. It describes the analysis and evaluation of the data collected from the field, which includes the discussion on the analysis of qualitative data with computer-assisted software (NVivo 8) and the result of the analysis. The second part of this chapter discusses the design of a creative workshop, which was employed to evaluate the process of this research.

Chapter 6: Research finding. This chapter describes findings of the research including ten personas and Taxonomy of nodes.

Chapter 7: The sensitising tool. This chapter illustrates the development of the sensitising tool. It addresses objective seven of this research 'To develop a strategic tool, informed by the user-oriented and participatory method and process, for designers of new smart home technology'.

In particular, it describes the formulation of the tool using the outcome of the qualitative analysis (Taxonomy of nodes) and the personas. This chapter also describes the value, and the contribution, as well as the limitation of the tool.

Chapter 8: Conclusion and future work. The research is summarised and concluded in this final chapter. This chapter also concludes the contribution of this research and its limitations. Recommendations for the potential future work are also discussed here.

Chapters	Key contents
Chapter 1 Introduction	Research background Research motivation Aim and objectives Research contributions Structure of the thesis
Chapter 2 Literature Review	Smart home The importance of home in technology research Cultural probe
Chapter 3 Research Methodology	Research methodology Research design
Chapter 4 Method design and Data collection	Home probe Qualitative interview Video ethnography
Chapter 5 Data analysis and Evaluation	Qualitative analysis with NVivo 8 Creative workshop
Chapter 6 Research Findings	Ten personas
Chapter 7 The sensitising tool	The sensitising tool and the process
Chapter 8 Conclusion and Future work	Research summary Research findings and contribution Limitations Future research directions

Figure 1.4 The Research map

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

This chapter discusses the review of research in the field of the smart home. It addresses the research objective one and two 'To review smart home related research' and 'To review development methodologies and methods in the field'. Three clusters illustrate the main scope of this research. These are 1) the smart home, 2) the importance of home in technology research, and 3) the cultural probe.

The first cluster of this review discusses the concept of the smart home and, more specifically, recent developments in the area of user research for the smart home relating to ethnographic informed studies. This section, in particular, frames three points that motivate this research; the points signify that 'homes are already smart', technology design should be 'socially and culturally aware' and emergent directions 'homo luden' (playful human).

The second cluster of this review discusses the importance of the home in technology research. This section discusses the use of ethnography for research in human-computer interaction (HCI) and the three phases of ethnographic investigation in HCI in comparison to a laboratory study. In particular, the employment of ethnographic methods emphasizes the importance of user research in HCI and the study of the home.

The third cluster of this review discusses, in particular, a research method (cultural probe) emerged within the field of HCI. The cultural probe (Gaver, Dunne and Pacenti, 1999) has generated much research debates in ethnographic related issues. These emergent methods more significantly encourage a participatory approach to user research. It is recognised as a significant move to open up new and playful possibilities for technology design beyond the purpose of work.

This chapter presents a review of literature that formulates the foundation of this research and, more importantly, illustrates the motivation of this research. The literature review is used to inform the design of research methodology and methods (Chapter 3 and 4). In the next section, the first scope of this research, the smart home, is discussed.

2.2 Smart home

2.2.1 The world is not a desktop

“The world is not a desktop”, as Weiser (1994) distinctively described. The potential of computing and information technology goes beyond desktop or personal computers. Technologists, such as Weiser (1991;1994), Araya (1995), Mozer (1998), Abowd and Mynatt (2000), Tolmie, Pycock, Diggins, MacLean, and Karsnty (2002), Lindwer, Marculescu, Basten , Zimmermann, Marculescu, Jung, and Cantatore (2003), Weber (2003), Larson, Intille, McLeish, Beaudin, and Williams (2004) and McCarthy and Wright (2004), envisioned the use of technology at work and in the home. Their visions described invisible, unobtrusive, ubiquitous, unremarkable, adaptive, intelligent, aware and experience-based designs for computing technology for the everyday environment.

2.2.1.1 Smart home

The smart home is a vision closely associated with computing and information technology for the home (Harper, 2003). It generally describes a network of interactive and automated technologies. In many cases, the term ‘smart’ describes the character of a technologically networked environment capable of sensing, responding and reacting to the inhabitants’ everyday needs through personalized assistances and services.

The smart home is also seen as part of a smart environment from a broader perspective. A smarter environment includes home, cars, clothing, work and public space enabled by advanced technology (Marzano, in Aarts and Marzano eds., 2003)

Early visions, such as the computer home (Mason and Jennings, 1983, cited in Barlow and Gann, 1998), electronic house (Mason, 1983, cited in *ibid*), the electronic home (Moran, 1993, cited in Hughes et al., 1998), and the smart house (National Association of Home Builders, 1984, cited in Alrich, in Harper ed. 2003), discussed the use of computers for the home and illustrated eagerly many opportunities opened up by them. The concept of a computer networked home not only reflects a growing trend in domesticating technologies, but also growing interests in the roles technology can play in the home.

The concept of the smart home also includes functions such as conveniences, efficiency and comfort that domestic appliances provide, but is said to advance by multifunctional services for communication, work, education, healthcare and entertainment...etc. The benefit of these proposed multiple services promise to “release us from a host of mundane activities and leave us time to lead more fulfilled lives” (Marzano, in Aarts and Marzano eds., 2003).

Recent developments in computing technologies for work or for the home focus on designs which are invisible, unobtrusive, ubiquitous, unremarkable, adaptive, intelligent, aware and experience-based.

Invisibility is in the sense that technology, such as computing and information systems, is embedded into the fabric of the home, into the furniture, furnishings, walls and ceilings (Marzano, in Aarts and Marzano eds., 2003) and, more significantly, into the routine of everyday life. The seamless integration becomes “invisible in use” (Weiser, 1994) and, as a result, it is not at the centre of the attention of the users. The interfaces disappear into the environment and become indistinguishable from the physical, social and technological spaces of the home. Increasingly, this vision has also been associated with new developments in material science, such as smart materials and textiles (Addington and Schodek 2005).

A smart home is also adaptive. It can sense and adapt to the surrounding environments and the needs of the inhabitants (Mozer, 1998; 2005) with the use of, for instance, sensor technology. The intelligence of the home lies in its

“awareness” (Kidd, Orr, Abowd, Atkeson, Essa, MacIntyre, Mynatt, Stamer, Newstetter, 1999) of the system. This concept is closely associated with the ubiquity and everydayness (Abowd and Mynatt, 2002) of computing. The everyday computing describes the seamless integration within the flow of the everyday routine regardless of time or location. The system “providing continuous interaction moves computing from a localised tool to a constant presence” (ibid, p.29). This version of computing for the home focuses on the development of natural interfaces that are context-aware and have the ability to capture and access information of the surrounding automatically. A natural interface implies the natural ways which human beings interact with the world, through speech, gesture and writing utensils.

The concept of ubiquitous computing is also related to the concept of the ‘remarkable’ (Tolmie, Pycock, Diggins, MacLean, and Karsnty, 2002) of computing. To articulate the possibility of “invisible in use” (Weiser, 1994), Tolmie and his colleagues suggested that the perceptual of visibility and invisibility of computing is not as same as invisibility in use. They further suggested that the challenge is to go beyond the perceptual qualities of devices to embed computational resources into routine and augment action into the real home environment.

2.2.1.2 The definition of smart home in this research

The concept of ‘smart’ in this research also has close association with the characters previous research identified. Departing from the conventional concept of ‘smart’ as a technologically networked environment capable of sensing, responding and reacting to the inhabitants’, *the term ‘smart’ in this research focuses strongly on the human-centred approach to the design of the everyday environment.* Through ‘invisible’ (Weiser, 1994), ‘resourceful’ (Wakkary and Maestri, 2008), and ‘diverse yet inclusive’ (Bell and Dourish, 2007) products and services, the users / the everyday designers (Wakkary and Maestri, op. cit.) play a critical role in informing and inspiring the design of their homes.

The concepts ‘homes are already smart’, ‘socially and culturally aware’ and ‘homo luden’ are discussed in the next section to further explain the ‘smartness’ this research intended to emphasize.

2.2.2 Designing for the home

Many researchers have responded to the challenge of developing the truly ‘smart’ and ‘intelligent’ home environment in response to the obstacles namely, the technology-push approach to development, cost and older housing stock and lack of strategy faced in the development process (discussed in chapter 1). Researches in the field have taken on a multidisciplinary strategy to research, and, in particular, to collaborate with social scientists to understand the needs of users and their real home environment as well as potential for new smart technologies in the home environment. As a result, various pragmatics, such as ethnography, ethnomethodology and participatory design, have been implemented in response to the call for a deep understanding of the home (Edward and Grinter, 2001; Tolmie et al., 2002).

The discussion here mainly illustrates examples of studies informed by ethnographic related field research. Primarily, the discussion drawn here is to illustrate three framing points that influence the motivation of this research. The issues and cases illustrated here emphasize several important milestones that have arisen from the push towards user-centred and user participatory research in response to the call for a deeper understanding of the home.

2.2.2.1 Homes are already smart

The first framing point is derived from a common understanding that the goal of new technology, such as smart home, is to make people smart (Intille, 2006). Originated from the earlier developed in the areas of ubiquitous computing, the concept of everyday (Abowd and Mynatt, 2000) and unremarkable computing (Tolmie et al., 2002) were influenced by ethnomethodological-informed ethnography to produce an understanding of everyday routine. Recent works, such as Wakkary and Maestri (2008) or Taylor, Harper, Swan, Izadi, Sellen, and Perry (2007), made strong recommendations that the existing infrastructure, the

resources (Wakkary and Maestri, 2008) and the ecology of surface (Taylor et al., 2007) provided an already smart system of the home.

The research conducted by Wakkary and Maestri (2008) suggested that users are the everyday designer. They proposed that designers can learn from the everyday systems users create. This everyday system described the “doing and undergoing” act of appropriating their artefacts and surroundings. Technology should value and adapt to the existing resources and interactions of the everyday designer in the home.

The study conducted by Taylor et al (2007, op. cit.) also suggested a similar notion, that “homes are already smart, smart not in terms of technology, but in terms of how people conduct their lives in the home” (ibid, p. 384). The home inhabitants already developed their unique ecology of interactions in their home. These interactions, founded within the routine of the everyday environment, are valuable in informing design of systems.

For example, the study by Taylor and colleagues had a particular focus on material artefacts in the home such as the surface of a fridge door. Their interest of research lied in the “ecology of surfaces” in the household and how the interactions associated with these surfaces interplay in the everyday routine. By observing the interplay, such as the messages displayed on the fridge door, one could begin to understand how existing intelligence of the households is emerged from these thoughtful interactions.

In a sense, Taylor et al (2007, op.cit.) visualise Weiser’s (1994) vision of technological invisibility by embedding technology in the meaningful surfaces. By combining digital artefacts with physical artefacts that users valued, the notion of invisibility was achieved not only on the level of physical integration in the material artefacts, but also in the social interactions already existing in the domestic household. Technology, in this context, should offer resources that allow people to think and act according to what users consider as appropriate.

Much emphasis is placed upon the routine of everyday life and how elements participated in this routine are worked upon, interplayed and constructed in the home environment by the inhabitants. This framing point of research is to reflect on the first milestones of pragmatics that influences research in HCI for the home, and how these ethnographic informed researches open up new spaces that challenge design thinking of smart and ubiquity.

2.2.2.2 Socially and culturally aware

The previous genre of research, such as the work of Tolmie et al (2002), Wakkary and Maestri (2008) and Taylor et al. (2007, *ibid*), devoted their interest towards the flow (Csikszentmihalyi and Halton, 1981) of everyday life and how social actors produced and engaged in those meaningful interactions.

The second framing point of this review is to point out that the home environment is also defined by the social, cultural and emotional boundaries of individuals or family that are beyond the concerns of spatial, technical arrangements or routine of housework. Computing objects, therefore, crucially needed to “extend beyond the mathematical world and into the physical and social as well” (Dourish in Erickson and McDonald, 2008). Research influenced by ethnographic methods has attempted to address broader issues between technical and social relationships relating to the concept of computing design for the home.

“Home is a feeling. Feeling good is an important part of the home experiences” (Eggen, Hollemans and van de Sluis, 2003). The home experiences involve individuals, families and domains outside of the physical boundaries of the house. Individuals differ greatly with different aspirations, desires and sensual needs, unlike the office workers. Homes also differ greatly. Neither of the user(s) of their homes is alike, even in the same culture (Bell, Blythe and Senger, 2005).

Home is often associated with family life (Randall, Harper and Rouncefield, 2007). Family is not an isolated unit in the society and it embodies complex and sometimes ambiguous relationships within the home, as well as outside of the household. For instance, rules do not always agree and household chores can be

ambiguous (Davidoff et al., 2006). A majority of research has focused on studying how new technology can support family functions of, for instance, privacy, communication (e.g. Hindus, Mainwaring, Leduc, Hagström, and Bayley, 2001; Swan and Taylor, 2008) and intimacy (e.g. Vetere, Gibbs, Kjeldskov, Howard, Mueller, Pedell, Mecoless, and Bunyan, 2003).

These few examples of ethnographic informed findings are to emphasize that the aim of these investigations is to sensitise designs (Dourish, 2006; Randall, Harper and Rouncefield, 2007), not only to report ergonomic activities of the home but also to challenge preconceptions towards it. Despite a clear purpose of “fieldwork-for-design” (Randall, Harper and Rouncefield, 2007) approach to conduct ethnographic research, it is safe to say that these insights reflected some critical view on family life and how the domestic environment should be perceived from those implications.

This second point, more importantly, is to frame a critical perspective in the development of ubiquitous computing and associated smart home. A critical reminder of that the agenda of ubiquity and smart are also closely tied with much neglected issues such as multi-generational living, the politics of domesticity, high density housing - “the messiness of everyday practice” Bell and Dourish (2007) within and relating to the broader implications of home in the society.

The designers of technology can benefit from a critical reflection on domestic life (Bell, Brooke, Churchill, and Paulos, 2003) and social and cultural variations of the domestic environment. In comparison to previous genre of research approach, less emphasis is placed upon capturing everyday interactions in the home. The need to provide a deeper understanding of home life in this context also includes an understanding of the intangible social, cultural, and more importantly, individual perceptions towards the home.

In addition, a large proportion of ethnographic studies in the home have focused on moving away from research subjects, such as productivity, efficiency and utilitarian, that is commonly emphasized in the workplace. As a result, it is understandable that new methods, disciplines and attitudes towards research have

been shifted from the traditional ‘problem-solving’ attitude of the work-related study, towards identifying valuable home ‘experiences’.

2.2.2.3 Homo luden

The third framing point of this research illustrates the emerging notions associated with the human nature of ‘play’ (Anderson, 1994). Anderson (ibid) and the work of Gaver and colleagues (1999; 2001; 2004) stresses the importance of ethnography beyond the observation of routine and work in the home. The inclusion of this alternative dimension, in particular the playful, pleasurable and ambiguity of the home life, reflects a growing realisation that home is not only about family and the mundane activities. The role of ethnography in this third framing point serves the purpose of sensitising designers (Dourish, 2006; Randall, Harper and Rouncefield, 2007) and, more importantly, opening up possibilities for play (Anderson, 1994).

Domestic technology should explore possibilities that “reflect all aspects of home life not only those that seem unproblematic and optimistic” (Bell, Blythe and Sengers, 2005, p. 168) and “design should explore a greater range of human experiences” (Dunne and Raby, 2001), instead of focusing on only simplistic and positive emotions and relationships.

Much development has been focused on computers as tools for specific situations in order to accomplish certain tasks (Hallnäs and Redström, 2001) or solving certain problems. Yet, technology also has the potential to act beyond the traditional ‘fast’ and efficiency oriented role (e.g. Slow technology, Hallnäs and Redström, ibid); using slowness to give people time to think and reflect, and to supply time to do new things.

These emerging philosophies not only view technology provocatively as a way to make aesthetic, social and cultural interventions (Moggridge, 2007), but also to encourage production of new user experiences of aesthetic, beauty (Norman, 2004), affective (Picard, 2003), and ludic (Gaver, 2002; Gaver, Bouher, Pennington, and Walker, 2005) towards engagement, enchantment (Chonchuir and McCarthy, 2008), and fulfilment (McCarthy and Wright, 2004). Technology,

as experience, can be seen as “our selves, our culture and our lives” (McCarthy and Wright, 2004, p.42).

In other words, human interactions with computers involve more than rational and intellectual aspects. It also involves emotional and sensual aspects of working with technology that “may lead people to use certain systems more than others” (Smith, in Erickson and McDonald, 2008, p.144). Computational design should enhance human experiences, both intellectually and emotionally (ibid).

This emerging notion reflects and challenges the role of technology and also highlights an important aspect of design for the home today. The third framing point is to emphasize the need to open up new possibilities for ‘playful’ experiences in the home. These playful attitudes address not only the social and cultural interventions that technology can bring to the home, but also, more importantly, reflect on existing meanings and values of the role of technology in our everyday life. The point illustrated here is also to emphasize that the development of new technology can also act as a critique of its own values (Dunne and Raby interviewed in Moggridge, ibid) by exploring a broader range of possibilities outside of the norm, such as ‘tool-for-work’.

In order to move away from the traditional problem solving attitude and open up new design spaces, technology can also serve to create new experiences, pose new questions, and ask both designers and users to reflect on their perceptions and attitudes towards the everyday.

To summarise, the purpose of this discussion is to review field studies of the ‘home’ and to indicate several important and interesting implications relating to the motivation of this research.

Homes are already smart

This framing point of the research is to reflect on the first milestones of pragmatics that influences research in HCI for the home and how these ethnographic informed researches open up new spaces that challenge design thinking of smart and ubiquity.

Socially and cultural aware

This second point is to frame a critical perspective in the development of ubiquitous computing and associated smart home that the agenda of ubiquity and smart are also tied up with much neglected issues such as multi-generational living, the politics of domesticity, and high density housing for instance, in the words, “the messiness of everyday practice”.

Homo luden

The third framing point is to point out emerging perspectives on human experience of ‘play’ in the domestic environment. The playful attitude suggests exploration of a wider range of human experiences and meanings, such as ‘aesthetic and beauty’ and ‘ludic’. This framing point illustrates a critical realisation that a wider range of human experiences requires, fundamentally, a very different approach to research and development of routine and housework. Therefore, new methods and tools that encourage exploration of new experiences are required.

The first and the second framing points emphasize current understanding and reflection in the field of HCI design for the home. They acknowledge significantly, milestones in developing user-centred, social and cultural inclusive philosophies for design. The third framing point furthermore illustrates the up take of new research methods for pleasure- and experience-based design for the home. It is an important milestone to stress the need for user-inspired development as opposed to technology-push smart homes.

2.2.3 Summary of smart home

This research cluster demonstrates a review of the development of smart home technologies. The smart home is associated with new computing and information technology. Although there has been considerable effort in developing such interfaces, little progress has been made towards realisation of smart home concepts in the real domestic environment. More problematically, the consumers are reluctant to take up such new concepts due to the technology-push approach towards development, cost and challenge of older housing stock.

As a result, researchers suggested that there is a need for an appropriate strategy for new product development, in particular, a user-centred and -inspired strategy. The review of the smart home in this section is to illustrate some of the most fundamental milestones developers faced in creating new products.

Examples discussed here have also shed new light on the unique role of ethnographic methods in such technological developments. Although the domain of ethnographic inquiry in the home has just begun to encompass a substantive body of ideas and practices (Randell, Harper and Rouncefield, 2007), it has been a common strategy employed to informed design.

In the next cluster, the development of research methods for the home is discussed. This section discusses development and adoption of ethnographic research in HCI for study in the home.

2.3 The importance of home in technology research

A decade ago, Silverstone, Hirsch and Morley (1991) pointed out that information and communication technologies have becoming increasingly part of the world. More recently, such technology has become, in particular, part of the home today. Early computing technologies in the home were introduced in the 1980s for the purpose of work (Venkatesh, 1996). They were also considered by consumers as job-oriented technology. Derived from industrial applications and migrated from the workplace, these applications were considered by consumers as job-oriented technology and were not well received in the context of the home because they lacked the social, cultural, individual and pleasurable qualities of a real home.

Developers today recognise the need to design new technologies for the home, not only because of the mass adoption of computing technology by consumers in their everyday lives (Hindus, 1999), but also for the reason that, home is where, as many technologies believe, new technologies can realise their full potential (Venkatesh, 1996). Unlike domestic technologies, this new genre of computing technology is designed purposefully for the home to support life outside of work.

Consequently, the priority for researchers of new technology shifts from studying computers in the workplace towards the home.

Home has become an important site for technology innovations

Home has become an important site for technology innovations (Venkatesh, 1996). Hindus (1999) suggested that research for the home is fundamentally different from research for the workplace. Firstly, “Homes are not workplaces”, the home environment is not designed specifically to cater for technology and the users of the home are not always healthy and professional adults.

Secondly, “Consumers are not knowledge workers”. Consumers’ purchase decision does not depend solely on practical functions of technology. They think about technology in terms of how it will fit into their private home setting, in relation to their individual lifestyle, aspirations, aesthetics and values...etc.

Thirdly, “Families are not organisations”. Families are complex and have different values, relationships and priorities to the workplace.

Many methodologies and methods have been developed specifically for studying computers in the work setting. Although these approaches have been established and successful in the field of computer supported cooperative work (CSCW), they are not applicable outside of the workplace, as Hindus (ibid) argues. These fundamental differences consequently instigate several methodological concerns relating to research in the home, and the most immediate step is to move research from the control room of the laboratory into the field.

2.3.1 Ethnography for HCI

Ethnography is an emergent method for the research community of engineering and system designs (Button, 2000). Over the past two decades, there has been a growing realisation of the need to adapt traditional social science techniques in product development management in order to understand how people work and live. These realisations are derived from the critical call for the research of CSCW and HCI in recent decades (Ackerman, 2000).

To relate ethnography to the product development process, Rosenthal and Capper suggest (2006, p. 215) that, “Ethnography research, carefully planned and implemented, is an effective method for providing user-centre perspective early in the product innovation cycle”.

The root of ethnography can be found in several traditions of research in both anthropology and sociology. The branch of ethnographic theory ranges from Symbolic Interaction (Goffman, 1974, Dourish and Button, 1998), ethnomethodology (Garfinkel, 1967, cited in *ibid*) and ethnography. Ethnography, to sum up, is grounded in the study of understanding the lives of other people (Geertz, 1973, cited in Silverstone, Hirsch, and Morley, 1994). It was firstly introduced to study urban life at the beginning of the 20th century by a group of social scientists at Chicago School. This method generally describes the ‘*in situ*’ (field) investigation of an individual, group or community. Researchers participate in the researched environment and develop their understanding of the field over an intensive period.

As mentioned previously (Hindus, 1999), research methods have been established successful to study computers in the workplace. They are not applicable in the home as techniques to study the workplace are developed to understand the nature of work and systems that will support it (Button, 2000). Hindus’ (*op. cit.*) observation also applies to ethnography for the home. “The development of suitable methods, tools and techniques represents in itself a research challenges for future designers. It is essential that these techniques and tools are based on an understanding of home environments” (O’Brien, and Rodden, 1997, p.251).

2.3.2 Laboratory study

Many early developments of computing technology for the home took place in the controlled environment of laboratories (Mateas, Salvador, Scholtz, Sorensen, 1996). The aim was to simulate the domestic setting that allows developers to test new devices in ‘living labs’ (Rodden, Crabtree, Hemmings, Koleva, Humble, Akesson, and Hansson, 2004). To articulate the introduction of ethnographic in HCI, first of all, the study in the laboratory setting should be examined. The purpose of including this discussion is to differentiate several fundamental

approaches between the study in the laboratory and in the real environment of the home.

The laboratory approach is derived from a traditional software development model (Dourish, 2006). Laboratory setting is employed to simulate the domestic environment. This type of study is oriented towards a technology-push research environment and is conducted mainly to test the design of systems in a 'living lab' (Rodden et al., 2004). The examples are the Adaptive House (Mozer, 2005) and (Intille, 2002) by the Massachusetts Institute of Technology, the Aware Home by Georgia Institute of Technology (Kidd et al., 1999), or the Home Lab by Philips Research.

Experimental research studies that take place in the laboratory setting have some common characteristics. They are in purpose-built environment and are prefabricated for installing new technologies. The environments are created to simulate a domestic household with standard facilities such as a kitchen, bedroom, and living room and so on. Researchers have the opportunities not only to integrate their design before the house is lived but also to design the spatial structures and arrangements of the house specifically to the requirements of their technology. In other words, the laboratory environment is created according to the designers' perceptions of what they consider as a real environment of an ordinary household.

In this setting, participants are invited to live in the prefabricated house over a period of time. They are asked to carry out their daily routine in the environment created by the designer. In general, through living in this space, participants interact with the new technological interface and provide feedback through use. Participants are more likely to be involved in usability testing that yields feedback on product efficiency, effectiveness and satisfaction (Rosenthal and Capper, 2006). These laboratory sessions serve to contribute to the later stage of the design cycle, after the initial prototypes are designed. The participants' main role is to give feedback on the technology. Although certain degree of observational research takes place in the laboratory setting, this is only limited to the controlled

environment created by the designer. Information generated from this setting can only be offered by the task at hand.

In relation to the position of the researcher, they tend to observe at a distance in a control room. They observe the use of technology and monitor each given task. The researcher is not interested in knowing the lives of the participants. Their task is focused on the usability, ergonomics and the interfaces of the technology. In comparison to traditional ethnographic research, the researcher in a laboratory setting plays little role in the research process of developing the field. They only interfere at distance, behind the glass window of the control room, and through their designed interface.

The laboratory setting is a valid and valuable approach. It helps to establish control over variable and achieve balance between rigour and relevance (Hanington, 2003). However, the aim of conducting research in this setting is different from researching in the field of real households. The laboratory setting is not created to inform design in the early phase of the development, mainly, it is created to test design at a later evaluative stage. The benefit of conducting research in this setting is that the outcome of the study yields clear implications for design. This is useful and effective for system designers to gain immediate feedback on the success or failure of the product.

Unsurprisingly, the laboratory approach is often aligned with the ethnography approach (Button, 2000). In contrast to the specific problem a controlled laboratory study can solve, ethnography “provides different sorts of answers to different sort of questions” (Dourish, 2006, p.543). More specifically, ethnography provides realism through the member’s point of view which is advantageous over laboratory studies (Hanington, 2003).

Dourish (2006, p.543) elaborates that “...the reason to adopt ethnographic investigation methods is not that they will generate quite different kinds of understandings from laboratory investigation, but rather than laboratory approaches are methodological unsuited to the target domain”. It is not to say that the laboratory approach is not useful for informing design. Nonetheless, the

laboratory setting is unsuitable if the ultimate goal is to use ethnographic research to inform user-centred design in the first place.

In contrast to the laboratory studies, the use of ethnographic methods would mean that research of new technology is a “move out from the control room” (Hughes, King, Rodden, Anderson, 1994) in order to gain potential insight that was not identified in the laboratory setting. This effort is linked particularly to the recognition of user research in the early stage of the product development process (Sander, cited in Hanington, 2003). Instead of user testing for the later stage of design and in the laboratory setting, it is critical for “members to immerse themselves in the user’s world” when the user group and its tasks are unknown to the development team (Hanington, 2003, p.11).

As a result, a large proportion of computing related research for the home has employed ethnography as part of their development process. Although some early research have moved out of the control room and into the field, in an attempt to test their product prototype in the real environment, the main purpose of conducting the observation or any ethnographic technique is limited to inform the use and the interface of the product, not the needs and desires of the users.

2.3.3 Three phases of ethnographic investigation association with HCI

2.3.3.1 Adoption of ethnography in HCI

The fruition of ethnographic techniques in HCI can be described in three phases. The previous section describes the first phase of the emergent use of the ethnographic technique in the field of HCI. In this phase, some exercises of social research techniques, such as observation or the traditional interview, are employed to articulate how design prototypes are used by the participants in real homes. In particular, the researcher takes an overt approach (Walsh, in Seale ed., 2004) to observation as a complete observer, in their control room. Users participate passively. Little explanation is placed on the sampling of the participants’ population. Little emphasis is placed on the role of the researcher and how he or she interprets the field. Also, little interaction takes place between the researcher and the participants; participants live in the prefabricated home lab and the researcher observes in a separated control room over a period of time.

2.3.3.2 Adapted ethnographic approach

In the second phase, ethnography is used as an informative tool. It has been considered as a source for knowledge production for HCI (Hughes, et al., 1998; Boehner, Vertesi, Senger, and Dourish, 2004). The designers adapted traditional ethnographic approach to derive information to inform their system design. A clear distinction is that when ethnography is used to inform, technology is not necessary the centre topic of the field. The use of ethnography argued that, through daily participation in everyday life, one could come to understand their actions (Dourish, 2006). More emphasis is placed upon the participants, how they interact and carry out their daily routine in the context of their domestic environment. Often, a trained social scientist is involved in such work (Hughes, O'Brien and Rodden, 1998).

The designer participates through observation. In comparison to traditional ethnography, the designer has limited time in participating in the field although participants are more aware of the field relationship with the designer. However, the main difference between this approach and the previous phase is that the designer recognises the benefits of ethnography and employs them specifically to elicit naturalistic information about the field. They have also paid more attention to the conduct of ethnographic research including the selection of participant sample and the location of the field. This may be done through collaboration with an external ethnographer. In this phase, ethnographic information generated is more likely to be introduced earlier in the concept development stage, before prototypes are constructed.

2.3.3.3 Innovative approach

In the third phase, ethnography is employed in an explorative manner. In particular, the use of ethnographic data is associated with the possibilities of play (Anderson, 1994). When ethnography is used in a more creative and innovative manner, its aim is to “uncovering needs and desires that may be unknown even to the user, and that are difficult to articulate when probed for using traditional methods (Dandavate, Sanders and Stuart, 1996, cited in Hanington, 2003, p.15).”

In recent decades, this particular genre of research approach can be exemplified by the cultural probe (Gaver, Dunne, and Pacenti, 1999). The design of the research tool can be described as a set of ethnographic technique developed to open up space for HCI design. More importantly, this trend is influenced by the Participatory Design movement which originated from the Scandinavian School of Design (e.g. Ehn and Kyng, 1987 cited in Muller, 2003; Bjerknes and Bratteteig, 1995; Beck, 1996,). The philosophy was firstly introduced to CSCW to involve users in the development process.

‘Probology’ (Gaver, Boucher, Pennington, and Walker, 2004) encourages ethnography tradition in a new light, an alternative way to elicit and enhance the user’s knowledge. Most distinguishably, participants are involved in a co-creating process of knowledge production. A distinct contribution is derived from the researcher, who plays a centre role in provoking and opening up directions for design. Their aim is to discover new directions and possibilities that are otherwise hidden from traditional laboratory and ethnographic research. Both designer and participants participate actively. Designers also play the role of the research choreographer (Janesick, in Denzin and Lincoln eds., 2000) who not only acknowledges his or her role in the research process, but also uses it as an advantage to provoke designs.

In this phase, more significantly, ethnography is not only a way to examine the role technology domestic settings and its patterns of use, but has also played a more active role in provoking design. This active role, opened up by ethnography, provides what Anderson (1994) calls, the ‘play of possibilities’ for design. He suggests that:

‘What ethnography may offer designers concerned with productivity is not just detailed description of work routines and daily life with which to fix the features of the design, but an opportunity to open up the overall problem-solution frame of reference in the context of some proposed solutions to specific identified problems.’

Anderson further argues that the real value of ethnographic research in system design lies in the ‘play of possibilities’. He suggests that if the strength of ethnography research is understood, utilised and translated in the appropriate

context and for appropriate purposes of design, ethnography can help system designers to “tease out” design requirements in the early phase of problem definition of design.

Anderson’s argument derived from a deep methodological concern for the adoption of ethnography in both CSCW and HCI. Understanding that home has become increasingly a challenging site for research, his argument therefore supports a more urgent need to question the presuppositions superimposed by the systems of workplace onto the organism of home. Ethnography for the home may offer designers sensibilities that will cause them to “question the presuppositions of their conventional outlooks” (Anderson, 1994, p. 179).

From this perspective, Rosenthal and Capper (2006, pp.232-233) suggest that this questioning caused by ethnography research may “call attention to design opportunities that were not obvious at the outset but that arose instead by through appreciation of unconscious concerns or desires of the consumer. Accepting the notion of initial ambiguity helps ensure such studies incorporate a broad coverage of potential kinds of issues plus some time for serendipitous learning.” Such approach to knowledge production can very effective for providing a user-centred perspective in the Front End of innovation.

In the next section, the method cultural probe (Gaver, Dunne and Pacenti, 1999) is discussed. This method, in particular, reflected the debate in the field of ethnography research for Human Computer Interaction on the methodological level. The cultural probe explored the role and possibilities of research for the development of new technology. Abided to Anderson’s argument (op. cit.), their intention was to embrace the approach of the “play of possibilities” and ambiguity of the ethnographic process in order to explore design opportunities outside of the traditional problem-solving and end-user requirements framework.

Moreover, the cultural probe was also introduced strategically to the field of interaction design to articulate the importance of design sensitivity in the development process of new technology. In relation to ethnography, the probe

further emphasized the role of the designer in interpreting research responding to the challenge of design ethnography in a new light.

From the perspective of this research, the cultural probe was also an important example towards demonstrating a play of exploring possibilities. The next section discusses the development of ‘probology’ (Gaver, et al. 2004) and its association to ethnographic research.

2.4 Cultural probe

The cultural probe influenced a large proportion of recent research in the field of Human Computer Interaction. It evolved from an artist-designer approach of investigated ideas for new technology development. The philosophy of the probe method also reflected the growing trend of designing for *homo luden* (playful human) – Ludic design (Gaver et al. 2004).

The use of probes varies depending on the nature and the purpose of the research design. In this section, the philosophy of the probes is introduced. This discussion identifies the role and association of the ‘probe’ approach to this research.

2.4.1 Background

The cultural probe (Gaver, Dunne, and Pacenti, 1999) is a tool developed to investigate the opportunity for new technology development to increase the presence of the elderly in their community. The cultural probe engages a ‘participatory’ strategy, a design movement originated from Scandinavian design school, as well as a ‘sensitising’ nature of ethnographic research.

The study was designed for part of a European Union-funded project, called, ‘The Presence Project’. It was carried out in a district of Oslo, a large planned community in Amsterdam, and in Peccioli, a small village outside of Pisa (Gaver, Dunne and Pacenti., 1999).

In order to understand the lifestyles of older adults in diverse communities, the designers of the cultural probe, based in the UK, experimented with novel

investigation techniques such as postcards, disposable cameras and booklets. Their aim was to probe into the community cultures of Oslo, Amsterdam, and Pisa.

More uniquely, the philosophy of employing ‘design’ as a method of research in ‘The Presence Project’ is to identify new cultural experiences that are outside of the needs and desires of what is known. The designers of the probe intended to discover new understanding that not only supports their creative approach to research, but also, more importantly, support the playful desires of the local residents in their community.

The cultural probe consisted of eight to ten postcards (Figure 2.1). Each postcard contained questions posed by the designer; a map of the area where the elderly resides (Figure 2.2); a disposable camera with instructions to take pictures; a photo album that requested the residents to use any meaningful photos from their life to describe stories of themselves; and a media diary which asked the participants to document their usage of television and radio.



Figure 2.1 This figure is listed here to give an example of the design of the postcard

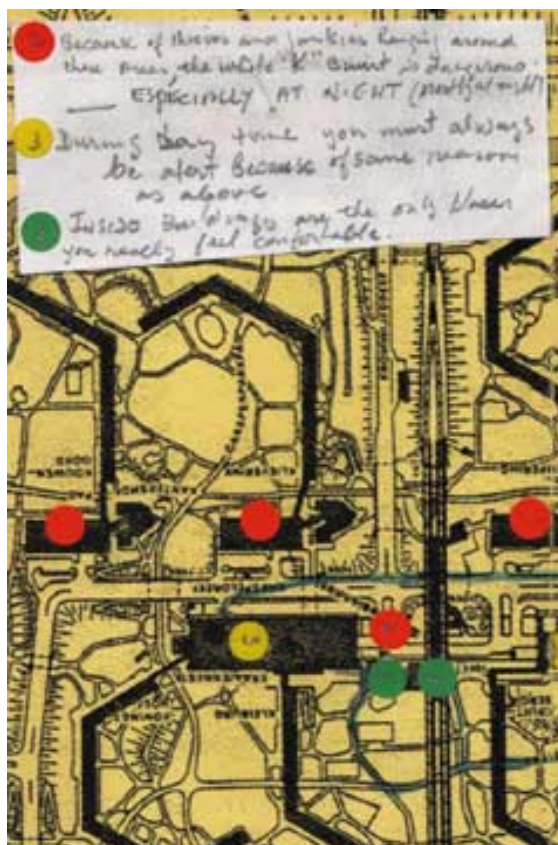


Figure 2.2 This figure is listed here to give an example of the design of the map.

These probes were packed into a folder (Figure 2.3) and given to the elderly residents in person by the design team.

The probes were designed to be ambiguous. The questions were open-ended; for example, “please tell us a piece of advice or insight that has been important to you.”; “What place does art have in your life?”; “your home”; or “something desirable”. The main concerns of the probe were the attitude, cultural environment and technology of the researched sites.

The concerns were addressed by posing ambiguous questions and imageries coupled with carefully chosen formats of media such as postcards, or maps. The designers spent their first year collecting ‘inspirations’ and the second year developing prototypes to be tested in the sites, over a two year period.

The nature of the project was diverse, with three different research sites across European countries and eight research partners contributing to this European

Union's supported initiative. The task of the designers was to better understand the particularities of different sites including their own.



Figure 2.3 This figure is listed here to give an example of the pack of the cultural probe

2.4.2 The philosophy of cultural probe

'Particularity' (Creswell, 2009) is a keyword in the qualitative approach. The diverse cultures of each of the research sites of 'The Presence Project' required a unique approach to capture the life of elderly people in these communities. Instead of employing traditional quantitative approach to generate representative lifestyles of those communities, Gaver, Dunne and Pacenti (1999) addressed 'The Presence Project' with a particular qualitative approach, from artist-designers and for the purpose of design.

2.4.2.1 Cultural probe versus conventional research methods

The logical, systematic and controlled approach in a traditional laboratory setting often leaves out subjective feelings, emotions, and social interactions (Norman, 1993). What differentiates the cultural probe from conventional research is that the 'probe' did not intend to focus on generating specific information for the purpose of problem solving. The use of a non-scientific approach to the design of

the probes and the use of the returned probes were aimed at opening up new space for discussion and reflection.

Unlike conventional methods, which are employed to generate, analyse and evaluate data that is scientifically credible, the cultural probe set out to address social, cultural and emotional implications of community lives that often emerge from un-scientific sources, for example, the memories of the elders or individual experiences of the local community or the popular press materials of the community (Gaver, Dunne and Pacenti, 1999).

2.4.2.2 Cultural probe celebrates qualitative approach

The cultural probe not only embraces, but also celebrates the qualitative approach. The key that differentiates cultural probe from conventional research methods is that the cultural probe celebrates uncertainty, subjectivity and meanings in the process of qualitative research, from the perspective of design. It reflects a growing trend of the *poststructuralist* approach to study the diversity, complex relation and the instability of human life.

The qualitative approach of the cultural probe began addressing issues with few presumptions or theory about the life of the researched community. It was intended to embrace open-ended responses stimulated by open-ended questions. The design of the probe also utilised resources inspired by conceptual arts such as Situationists and Surrealist (Gaver, Dunne and Pacenti, 1999). Artist-designers used these conceptual ideas, firstly, to break the distance between the researcher and the researched by engaging in a reflective process in a collaborative manner; secondly, to confront the stereotype of the conventional ideas that are associated with 'research' and, most importantly, to break the barrier of commercial and consumer culture existing in those communities.

These were done by, firstly, introducing the components of the 'cultural probe', an unconventional and non-scientific design of a research pack that assembled everyday items such as postcards and disposable cameras. The probes posed ambiguous questions which were designed to stimulate responses about the life stories, lifestyles and participants' attitudes towards their community.

“Unlike commercial design, we don’t focus on commercial products, but on new understandings of technology. This allows us- even requires us – to be speculative in our design, as trying to extend the boundaries of current technologies demands that we explore functions, experiences, and cultural placements quite outside the norm.” (Gaver, Dunne and Pacenti, 1999, p. 25)

Design research, in the words of the ‘probe’ creator, is not a tool for identifying opportunities for new products only. More importantly, design research was used as a tool to reflect actions, to challenge perceptions, and to empathise with particular human values. This new way of thinking, encourages qualitative investigation of what is unknown and asks how to create new ideology beyond modernist’s standpoint of productivity and efficiency - a machine-driven way of living. Leahu, Thom-Santelli, Pederson, and Sengers (2008) further articulated the adoption of the Situationist’s approach in the field of Human Computer Interaction. They stressed that adoptions of Situationist art practice have somewhat lacked the underlying sensitivity of reflection and improvisation. They argued that this art approach, if use appropriately, can open up possibilities for genuine innovation. To adopt Situationist’s approach in a science and engineering process is more likely to generate confusing results and at worst, confusing research in the first place.

2.4.2.3 Inspirations, not problems

Design research, in the relation to the ‘The Presence Project’, is also to open up new space for technology design. Gaver et al. (2004) suggest that “Designing for pleasure demands a different approach from designing for utility”. For designers, it is inspirations, not information that can stimulate imagination for the purpose of opening up new space for design.

For ‘The Presence Project’, the scientific approach to collecting information was not considered an appropriate way to stimulate imagination. The objective, logic and systematic approach to collection of information often leave out subjective feelings, emotions, and social interactions (Norman, 1993). In response to the

scientific approach, the ‘probe’ was created purposefully to capture inspirations in the imaginative and emotional feelings of life in those elderly residents.

The outcome of the probe was invaluable to the probe creator in helping the designer to crystallise the detailed texture and culture of the communities in Oslo, Amsterdam and Peccioli. The probe helped the designers to familiarise with the site in a way that was appropriate for artist-designers. The material generated from the probe provided them with rich and colourful materials that inspired their design process.

2.4.2.4 Cultural probe emphasizes the role of the research designer

The difference between the cultural probe and conventional research instruments is that the designer of the probe was also positioned as a prime research instrument. From this position, they are able to provoke inspiration from a design point of view. Therefore, the probe was not intended to diagnose problems and was, thus, unlike the traditional doctor-patient’s relationship. The probe was designed to provoke new directions that are otherwise hidden from the view of the outsider.

For instance, if the attempt is to find out about the problem that a patient has encountered, the doctor, naturally, will ask about the symptoms of the problem. However, as Gaver suggest, designing for pleasure ‘demands’ a different approach to designing for utility. What the probe was investigating was the pleasurable experience existing in the community, rather than the already existing problems about the community. By employing a ‘non-doctor’s’ attitude, the designers are more likely to have the opportunity to explore new domains. Designers therefore position themselves somewhere outside of the traditional problem-solving position.

In the case of the probe, the designers participated in the field. Their presence is demonstrated through the designed probes, their communication with the elderly participants and, subsequently, reflected in the interpretation of the probe and the design prototypes.

“The probe is part of the strategy of pursuing experimental design in a responsive way...We want to lead a discussion with the groups toward unexpected ideas, but we didn’t want to dominate it.” (Gaver, Dunne and Pacenti, 1999, p.22)

Each individual participant had time and private space to participate and interpret the probe in their unique way and with their individual experiences of the community.

2.4.2.5 Designer’s interpretation

The cultural probe values subjectivity, interpretation and expression. In this research it is regarded a critical process to open up space for new design thinking. It has been argued that most researchers seek to employ rigorous procedure in order to minimise the ambiguity and subjectivity produced by layers of interpretation and expression. The cultural probe simply wanted to embrace it (Gaver et al., 2004).

Moreover, it was not the researchers’ intention to claim that the probe is a tool for generating a ‘truthful’ account of the users. Rather, it emphasized the space and layers of interpretation and expression (As suggested by Gaver et al (2004) in Figure 2.4). Instead of producing a closed-end summary of the phenomenon learned, they chose to open up interpretation and their understanding of the probe through the channel of design prototypes. In a sense, they felt that their responsibility as designers was to demonstrate what they learned from the probe and shared it with the participants after the probes were interpreted, through the prototypes, instead of making an assumption or judgement that concluded the lives and likes of the participants.

“The probes were not designed to be analysed, nor did we summarize what they revealed about the sites as an explicit stage in the process. Rather, the design proposals we produced reflected what we learned from the materials.” (Gaver, Dunne and Pacenti, 1999, p. 27)

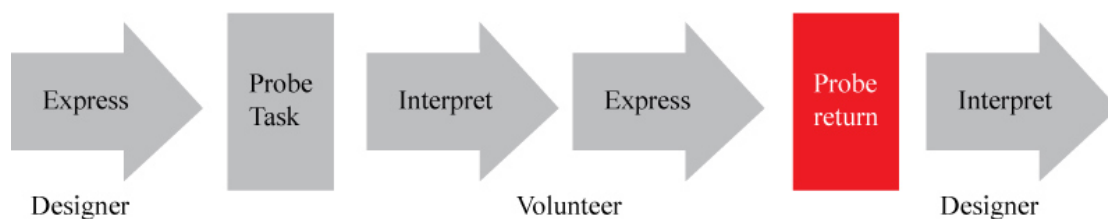


Figure 2.4 Probe results are derived from a multi-layered process of expression and interpretation (Gaver et al., 2004, p.55)

2.4.2.6 Cultural probe focuses on particularity and produces particularity

Ambiguous and open-ended forms of engagement can also produce inspiring results. For Gaver, Dunne and Pacenti (1999), the results of cultural probe were articulated in their design prototypes. Each prototype reflected a particular understanding of their field research. Instead of producing results in the form of a report, the probe designers used design prototypes as channels to communicate their interpretations and understanding of the communities. Those design prototypes were also used to continue the discussions with the elderly residents which were started by the probe.

Traditional research instruments are designed to elicit objective information about a research problem. The results are often represented in a formal, objective and uninspiring manner because the aim of scientific research is to produce valid and reliable information.

Since the core philosophy of the ‘probology’ did not concern the objective and scientific approach of producing results and, more fundamentally, did not aim to represent social ‘facts’ or ‘information’, it is therefore understandable that the ‘probe’ designers approach their ethnographic research differently to that of the quantitative researchers. Consequently, the approach to make sense of their data has a huge qualitative influence to it.

More fundamentally, the skills of artist-designers play an important part in influencing the approach to represent what they learned from the field. Rather than using a technique that would naturally be recognised as scientific, such as

‘analysis’ of data, the probe designers used their artist-designer skills to make sense of what they learned from the field and used design proposals to speculate on what they learned.

The validity, reliability and objectivity were not the concern of the ‘probe’. Particularity of a new understanding and new perceptions were the goals of the cultural probe, and the goal of design.

2.4.3 Review of cultural probe in HCI

Gaver, Dunne and Pacenti (1999) created the probe and suggested that ‘probology’ (Gaver et al., 2004) can be used to inspire design. The cultural probe has been adopted and proliferated widely in the Human Computer Interaction (HCI) community.

The emergence of new methods and related ethnographic methodology has remained challenging for designers of new technology designed for outside the workplace. Consequently, there have been many attempts to adopt and adapt cultural probes for various research purposes. In this section, variation of probes and the integration of the probe in the design of research are reviewed. The use of various probes is discussed in the next section.

The design of the cultural probe and the subsequent development of the domestic probe (Gaver et al., 2004) involved a range of artist-designer skills. Each probe was governed by form, functions and aesthetic properties developed by the group of designers who worked on the project (Hemmings, Crabtree, Rodden, Clarke, Rouncefield, 2002). The design of the tasks and the association between tasks were also carefully choreographed to elicit different forms of responses.

2.4.3.1 Domestic probe (Gaver et al., 2004)

The domestic probe was designed to elicit inspirational information about people in their domestic environment. It consisted of a disposable camera, dream recorder, photogram, a listening glass and a friend and family map. These probes were designed to provoke feelings about the home environment.

The domestic probe was also developed by the same group of designers who developed the cultural probe. It also carried similar philosophy and approaches to the design of artefacts, formulation of the probe package and approach to collected information.



Figure 2.5 The pack of the domestic probe



Figure 2.6 The domestic probe –a disposable camera



Figure 2.7 The domestic probe – the listening glass



Figure 2.8 The domestic probe – The dream recorder

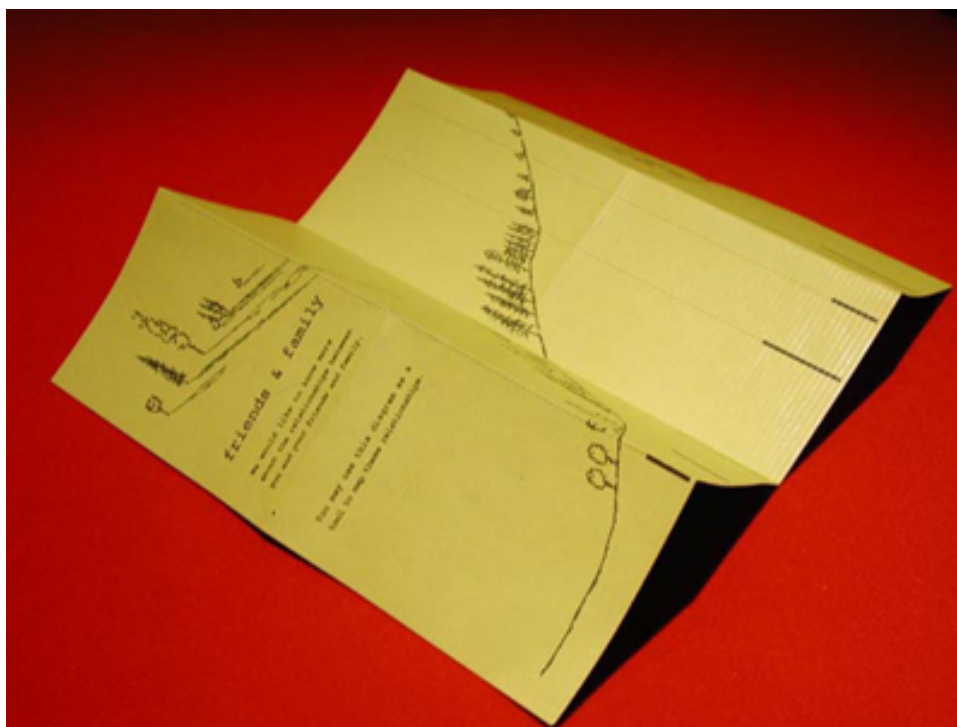


Figure 2.9 The domestic probe – friends and family map

2.4.3.2 Technology Probe (Hutchinson, Mackay, Westerlund, BedersonDruin, Plaisant, Beaudouin-Lafon, Convey, Evans, Hansen, Roussel, Eiderbäck, Lindquist, and Sundblad, 2003)

The technology probe was designed to investigate the ‘communication’ pattern and technology needs of multi-generational families. It was one of the most well-known probe approaches using low-fi technology as probes (Boehner, Vertesi, Senger, and Dourish, 2007). The deployment of the probe was to inform design of prototypes and identify better ways of communication and better opportunities for design.

Technology probe was developed for the European funded ‘interLiving’ project. One important aim for this project was to involve users in the design process of new technology. The strategy was to utilise technology artefacts as probes. Probes such as ‘messageProbe’ or ‘videoProbe’ were created as assistive tools to document communicational behaviours, patterns and potential opportunities of new interface for multi-generational families. Technology, in the case of the ‘interLiving’ project, has moved into the centre of the focus as not only a subject of study, but also to participate as a research probe in its own right.

In comparison to cultural probe, the focus of technology probe shifted from the use of everyday artefacts as probes towards more unfamiliar artefacts such as touch-screen interfaces, created specifically for the project. The purpose of deploying the technological artefacts in the field was not to test the prototypes as Hutchinson et al. (2003) stressed. The artefacts were designed for the families to participate in the design process of the 'interLiving' project and contributed by using those unusual devices over a period of time. The researchers were interested in observing how these alien probes changed family patterns and methods of communications; and more uniquely, they were interested in using such tool as a method for data collection in a participatory manner. Their design goal was to inspire users and designers to rethink the role of technology and how it can support needs and desires.

To summarise, the technology probe was about problem solving and visualising technological possibilities. The research suggested that the technology probe reveals practical and playful needs of humans, facilitated materials in interview and workshop discussions, and encouraged the user to think of technology in more creative way in the participatory design workshop.

2.4.3.3 Informational Probes (Crabtree, Hemmings, and Rodden, 2003)

The informational probe was designed to probe into the lives of older, disabled people and formal psychiatric patients who live at home. Their aim was to gather information about unique needs for care. The probe technique was employed to investigate subject matters that are sensitive and difficult to uncover in a traditional research setting, for instance, in face-to-face interviews or ethnography.

Crabtree et al. (ibid) also emphasizes the main feature of the informational probe was designed to elicit information not inspiration. Their argument was to supply information based on the presumption that this modest and more traceable approach, in comparison to the cultural probe, could also inform design. "...while inspiration would undoubtedly be a bonus, our prime concern is informational – a matter of gaining insights into how people live their lives, their everyday circumstances, their routines and rhythms, their practical concerns..." (op. cit.,

p.4) The return of the informational probe was treated as resource, rather than reflection, and provided further analysis, materials and development for the user workshop.

Crabtree et al. (ibid) suggested, informational probe has enabled users to participate in their design process and to discuss design based on their practical circumstances and needs.

2.4.3.4 Perspective probe (Berkovich, 2009)

The perspective probe was developed with a similar purpose to the Informational probe. It was designed for the company Google to gather information about a particularly sensitive topic of finance. The researcher designed seven probing tasks with the aim to compose a holistic perspective of their customers.

Perspective probe also shared similar characteristics with other probes. For Berkovich, not only was it a way to probe into topics that were difficult to discuss in a normal setting, but also the probe was also seen as a rapid and convenient way to conduct research in a cost and time efficient manner.

The results of the seven probe activities were used to inform the basis of the interview. A team workshop was also organised to assist the analysis of the material. Berkovich explained that the perspective probe serves as a way to ‘dip one’s toe’ into explorative research, before embarking on more time and cost consuming research internationally.

2.4.3.5 Probes for technology

The openness, playful and participatory approach of the cultural probe has attracted various research interests. However, as Gaver et al. (2004), stressed, a lot of research seems to be unsatisfied with the nature of the outcomes and attempted to ‘take full advantage of the Probes’ in their own analytical way, such as using the informational probe and the perspective probe.

For example, Haines, Mitchell, Cooper, and Maguire (2007) also attempted to rationalise inspiration generated from the Probe ‘in a meaningful way’, to be used

in the setting of technology focus research, and for ‘technologists who prefer informative rather than inspirational guidance’ (ibid, p.350).

Recognising the need for pragmatic methods for data collection in the home, Haines et al. (ibid) intended to place the political and methodological concerns of data collection in the home into the hands of the participants. The cultural probe met this need.

The goal of the project was to produce reliable, rigorous and insightful results about the consumers’ perception towards smart home technology and to identify what people value in their home. This aimed to inform their technological partners about values shared in these homes.

Haines et al. (2007) asked participants questions concerning technologies in the home. The main questions concerned time-saving, safety and security, information display and sharing in this environment. The context of their probe was informed in advance and in conjunction with the interest of the technology partners, as well as in the focus group organised.

Content analysis was the key analytical tool to translate information generated from the field into product requirements. The result reportedly showed key values such as comfort relaxation and sentiment people appreciated at home.

2.4.3.6 Probing intimacy

The cultural probe approach is also employed to investigate intimacy. Kjeldskov, Gibbs, Vetere, Howard, Pedell, Mecoles, Bunyan (2004) and Vetere et al. (2005) suggest that intimacy is a relatively different and unexplored area of research for Human Computer Interaction. The use of the probe is to look into sensitive issues surrounding intimacy of close family, for understanding how technologies are used in supporting intimacy as well as to support development of interactive technologies for intimacy.

This research also employed contextual interviews to develop issues identified in the probe. It helps to “record fragments that were used during interviews to

prompt memory, seek explanation, and encourage reflection” (ibid, p.108). Six researchers were involved in the study. They carried out four interviews before, during and at the end of the probe study. The returned materials were analysed iteratively through out the project, in brainstorming sessions, design workshops...etc. The findings were presented as prototypes.

2.4.3.7 Empathy probe (Mattelmäki and Battarbee, 2002)

The empathy probe valued the importance of personal experiences and private life. The aim of the empathy probe was to gain a holistic understanding of people who exercise for wellbeing. “Design empathy means that people are seen and understood from where they stand, not as test subjects but as persons with feelings” (Mattelmäki and Battarbee, 2002).

The empathy probe was designed for user research before the concept development stage. It was an alternative form of user research in comparison to tradition methods (Gaver., 2001 cited Mattelmäki and Battarbee, 2002). It was used to probe into possible areas and to find directions for future design before the task of developing new products were carried out.



Figure 2.10 “On the left, examples of probes task: illustrated cards with open questions such as ‘I reward myself’. ‘Technology and me?’, and ‘I control myself?’/ On the right, company experts are getting familiar with the data for interpretations.” (Mattelmäki and Battarbee, 2002)



Figure 2.11 Empathy probe

The researchers of the empathy probe were also in a similar position as Haines et al. (2007) – as a consultant and in between the participants of the study and the client company. What was different was that the purpose of the empathy probe research was to facilitate insights for designers, instead of providing information only for a technological focus project. Their aim was to communicate their findings in an inspiring and empathetic way while being usable and motivating.

The probe was sent to the participants to document their feelings, attitudes, expectations...relating to exercise and wellbeing. Other ethnographic research techniques, namely interview and workshop, were also introduced. The empathetic probe team used original words and stories to link to the analysis of their research. The outcome of the empathy probe was presented in a report together with supporting collages. The result of the study suggested that this approach was able to identify new perspectives and, after the study, more defined questions and development directions can be formulated.

In particular, the following work of Mattelmäki (2005) linked the cultural probe method to the ideation stage of a new product development process. The collection of inspiring data moved towards “holistic understanding”, as suggested in their research conducted with seven design companies.

2.4.3.8 Other probes

Other probes have been developed for different research purposes, such as the value probe (Voida and Mynatt, 2005), exploration probe (Jung, 2007) or urban probe (Paulos and Jenkins, 2005). They shared some attributes with previously described probes but offered no additional features of value to the research.

2.4.3.9 Summary of the review

There are some common purposes for adopting the ‘probe’. The context which probes were deployed was often in the sensitive and private realm. The aim of deploying probes was to engage participants of the study in the participatory design process for new technology development. The packet of probes generally involved a few of the original probes, such as postcards and diary. The process of probing often involved a combination of other research techniques such as interview and design workshop. The common outcome of the probe was ‘implications for design’ (Dourish, 2006).

In general, ‘probology’ received a positive reception in the community of HCI as one of the new exploratory and experimental methods for researching for ‘play’ (Anderson, 1972). The cultural probe has encouraged debates in new research methods for HCI. Criticisms are discussed in the next section.

2.4.4 Discussion

The probe has been adapted as an alternative account of knowledge production in HCI (Boehner et al., 2007) in both academic and industrial environments, and design companies. Research have explored, for instance, topics of private (domestic) and public spaces; of family values, close family communication and intimacy; or of more sensitive settings such as disabled and formal psychiatric patients in the community.

The design of probes also ranged from the original proposal of artist-designer approach to more scientific and systematic approach to research design. This depended largely on the nature and the aim of the research. Adoption of the cultural probe has also received considerable support, as well as criticism not only in the approaches of design of ‘probes’, but also, more fundamentally, in the approach to ethnographic research in the field of Human Computer Interaction in general.

In relation to the original cultural probe, the criticism is rooted from several perspectives.

Firstly, as Gavers et al. (2004) point out, many adapted probes seemed to be dissatisfied with the subjective nature of the probe and attempted to make sense of it with a rigorous process of analysis and representation. The emphasis of using the ‘probing’ technique seemed to ignore the process of interpretation and expression as an alternative opportunity to learn about the participants and participate in the researched environment. Instead, they set out to develop a convenient and systematic process in order to rationalise the subjective data and, more purposefully, to find solutions. The ‘probe’ was merely a method for eliciting information, not inspirations. In their later response to the negative perceptions towards ‘subjective and interpretation’, Sengers and Gaver (2006) suggested the value of interpretation and how multiple interpretations can open up opportunities for design.

Moreover, the researchers, rather than playing a participatory role in the probing process, instead distanced themselves from the core of the value of qualitative information by adopting a scientific procedure to interpret the probe. The process

of exploration and opening up possibilities was therefore lost in this approach (Boehner et al., 2007).

Secondly, the diverse role and position of the probe also reflected not only the researcher's uncertain attitude towards the qualitative and subjective outcome of the probe, but also their attempts to improve validity and reliability of their contribution; for instance, to combine other research methods, such as interview or focus group, to fill up the 'gaps' in the ambiguous data. As a result, the field of research seemed to be confused about the design and purpose of ethnographic research itself in the first place and attempted to adjust their purpose of adopting 'probes' in their research design.

Thirdly, criticism also arose from the approach to data representation; for instance, some researchers remained convinced by the use of design prototypes as a way to reflect their understanding (Domestic probe) of the field or employed ethnographic writing to report their qualitative findings. However, some were more confused about the use of the probe returns and reported their findings in the format of 'implications for design'; in other words, design suggestions for developing new technologies. The quality of the probe and its ethnographic nature was consequently lost in a scientific attempt to represent data.

Finally, criticism also arose from the area of traditional ethnographic research. From a perspective of an ethnographer, the adoption of the cultural probe was often mistaken for a sufficient way to collect information. Dourish (2006) argues that the probe lacks certain methodological and analytic concerns for technological research. On the empirical level, the probe certainly helped to explore and signify what happened in the field. However, if it is viewed in the context of scientific research, the ambiguous result of the 'probe' would not satisfy the scientist's need for clarified and objective information. Other research, such as Crabtree et al. (2002), also explored the use of the 'inspiration' approach of the original cultural probe and the 'informational' approach of ethnographic tradition in a comparative study.

Undoubtedly, the variation of ethnographic research and the design of probes depend largely on the nature as well as the aim of the research. When the ‘probe’ is adopted with the aim to elicit information for the technologist, such as the research of Haines et al. (2007), naturally the design and the approach to analysis of the probe returns takes on a more systematic and analytical manner. When the adoption of the probe is aimed to elicit ‘feelings’ or emotions, such as the work of Mattelmäki and Battarbee (2002), and to generate ideas (Mattelmäki, 2005) the probe is naturally designed with a different aim than a scientific one, to elicit qualitative information for inspirations.

Dourish (ibid) has debated extensively from the point of ethnographic research in the field of Human Computer Interaction. He also relates the cultural probe as an example for articulating the role of ethnographic research. He identifies with many ‘informational’ probe approaches in the field and argues that the cultural probe lacks certain analytical concern in technology research. From his perspective, ethnography becomes merely a method for data collection and can “fail to capture the value of ethnographic investigation” (op. cit., p.549). Opposed to his argument, Boehner et al. (2007) points out that it is quite self-evident that probes are simply not to be used to generate ‘data’, therefore the ethnographer’s analytic procedure of research is not, in a sense, appropriate to evaluate the use of ‘probes’ in the first place.

Regardless of the continuous arguments derived from differences of these research traditions, what is common in these two perspectives is that, as Dourish (ibid) points out, the problem of adopting the cultural probe is neither in the approach in design of the probe nor the lack of analytical procedure. Rather, what are fundamentally lacking are the theoretical methodological concerns of the role and the use of ethnography in technology research today, and, more significantly, the role of the interpreter in probes, ethnographic and participatory research (Boehner et al., 2007).

2.4.5 Summary of cultural probe

The examples discussed here are some of the prominent issues and arguments regarding the adoption of probes and ethnographic methods. This chapter has

identified new methods, such as the cultural probe, in the field of HCI as an important milestone to elicit possibilities for new technologies in the directions of play and pleasure. Nonetheless, it is important in this research to understand the methodological concern of ethnographic research beyond a purpose of collecting empirical data, especially in the domain of academic research.

In the next chapter, the discussion begins by addressing methods of this research from a methodological perspective. The strategy is derived from a concern about the nature of qualitative research and the use of ethnographic data, as stressed by Dourish (2006).

2.5 Chapter summary

This chapter reviews three important research clusters, namely, ‘smart homes’, ‘the importance of home in technology research’ and ‘cultural probe’, that influenced the motivations of this research.

The first cluster discusses the concept of smart home and recent development in the area of user research for smart home. In particular, the discussion focuses on the much-debated ethnographic influenced studies to date. The outcome of the first research cluster identifies three points that frame the foundation of this research. 1) ‘Homes are already smart’. This framing point suggests that the everyday systems created by the home inhabitants are already smart. The everyday system, in particular, describes the actions and interactions that are embedded within the flow of the daily routine. This is seen as a valuable resource that contributes to the notion of ‘invisible computing’. 2) The second framing point introduces the idea that computing and information technologies should be socially and culturally aware, and relates to the broader implications of home in the society. Ethnographic informed study plays not only the role of reporting the ergonomics activities of the every routine but also sensitise designers and challenges preconception about the subject studied. 3) The third framing point identifies an emerging and growing notion of the ‘play’. The notion of *Homo luden* (playful human) has led new directions into the development of computing technologies and smart homes. Dunne and Raby (2001) suggest that “design

should explore a greater range of human experiences”. Computational design should enhance human experiences, both intellectually and emotionally.

The second research cluster emphasizes the importance of home in technology research. Following the discussion presented in the first cluster, the second cluster articulates the pragmatics of development of computing-related technologies; the methodologies and methods that move studies outside of the controlled laboratory. The discussion focuses on ethnography; the root of ethnography, the use of ethnographic techniques in relation of research for and in the home, and lastly, innovative approach to ethnography in association with the ‘play of possibilities’ (Anderson, 1994). The emphasis stresses a more creative and innovative approach to uncover user needs and desires that are otherwise difficult to elicit with traditional methods. This approach also leads to the discussion of ‘cultural probe’ in the next research cluster.

The third research cluster discusses the ‘cultural probe’ (Gaver, Dunne and Pacenti, 1999); a well-known research method that was used to engage users in the development process of new technology. ‘Probology’ (Gaver et al., 2004) describes a research philosophy that emphasizes on user-participatory approach to research design and user-inspired approach to elicit knowledge of the field. The aim of the ‘probe’ and various probe related research focus on generating inspirations or information using a combination of design research methods and ethnographic informed techniques, such as media diary, maps, disposable camera and postcards. More importantly, it stresses the importance of a subjective and interpretative process of field research and suggests a strong connection between the design researcher and the users through the process.

The three research clusters investigate important issues relating to the development of smart homes and new technologies. The first research cluster presents three important framing points of this research (1) Homes are already smart, 2) Socially and culturally aware and 3) *Homo luden*) that indicate important and interesting findings from previous research. This review helps to frame a foundation of issues that motivate this research. The second research cluster discusses the methodologies and methods (ethnography) relating to

research for and in the home. This cluster further articulates ethnographic-informed techniques that help to establish the methodological concerns relating to user research in the field of human-computer interaction (HCI), as well as to the strategy of this research. The third research cluster specifically discusses the background, use and development of the ‘cultural probe’. This discussion helps to address emerging research techniques in HCI and also help to inform the design of this research.

In the next chapter, the discussion begins by addressing the methodological concerns of this research, in particular, the nature of qualitative research and the use of ethnographic data concerned in HCI research, as stressed previously by Dourish (2006). The next chapter therefore presents the methodology and methods employed to response to the issues identified in the literature review and the strategy designed to develop the potential contribution of this research.

CHAPTER 3 RESEARCH METHODOLOGY

3.1 Introduction

Designers of consumer products today have paid considerable attention to the study of human life. As addressed in the previous chapter, home environment has become a prime target for businesses to create new markets. Design of products, systems or services for the home involves a more human-centred way of thinking, departing from the tradition of the technology-push approach.

In this chapter, the methodology of this research is discussed. It addresses objective three of this research ‘To identify user-oriented research methodology and methods’. This chapter discusses, firstly, the design of the research and, more specifically, the qualitative approach to research in the social world. Secondly, this chapter addresses issues of subjectivity and quality in relation to qualitative data, and the role of the researcher in this interpretive process. The adoption of the method cultural probe (Gaver, Dunne and Pacenti, 1999) is discussed. This research particularly employs semi-structured interviews and video ethnography to triangulate the phenomenon of life of older adults in older housing and finally, the ‘trustworthiness’ and the ethic of the research are explained.

3.2 Research Methodology

The design of research is informed by a researcher’s worldview assumptions about a research problem and his or her strategy, procedure and methods to solve it. This process includes not only the theoretical, political and philosophical backgrounds (Robson, 2002) of the research problem but also the detailed methods of data collection, analysis and interpretation (Creswell, 2009). In this research, the design in particular addresses the third objective of the research, which is to identify appropriate research methodology and methods for the study of older adults in older housing.

There are three types of research designs; qualitative, quantitative and mixed methods. Qualitative research generally emphasizes the use of language. Questions are open-ended so the researcher can explore meanings of specific individuals or social groups. Quantitative research generally emphasizes the use of numbers. This approach employs close-ended questions and often investigates variables for the purpose of theory testing. Mixed methods combine both the qualitative and quantitative approaches. This approach aims to produce results supported by the strength of both qualitative and quantitative methods (Creswell, 2009). The overall strategy and detailed methods employed in the design of research indicates the type of approach used. Further comparison of qualitative and quantitative methodology is discussed later (Section 3.2.3. Qualitative methodology).

In the next section, the philosophical and methodological view of this research is explained. This discussion consists of four parts; (i) the background of the research methodology, (ii) the application of research problem to the key research question and (iii) qualitative methodology, and (iv) the role of the researcher. The first part explains the approach of qualitative research methodology and, in particular, the application of the research methodology to the key research question this research employed.

In the second part of this chapter, research methods are discussed. This includes the criteria for methods, selection of research methods and formulation of methods. This section is followed by the discussion of sampling strategy and technique of this research. In the third part of this chapter, the analysis of data and representation are discussed. This part illustrates the methods of analysing and generation of the research findings. In the last part of this chapter, evaluation of research analysis and findings are discussed. This process aims to address the ‘trustworthiness’ of this research. The figure below (Figure 3.1) illustrates the design of the research.

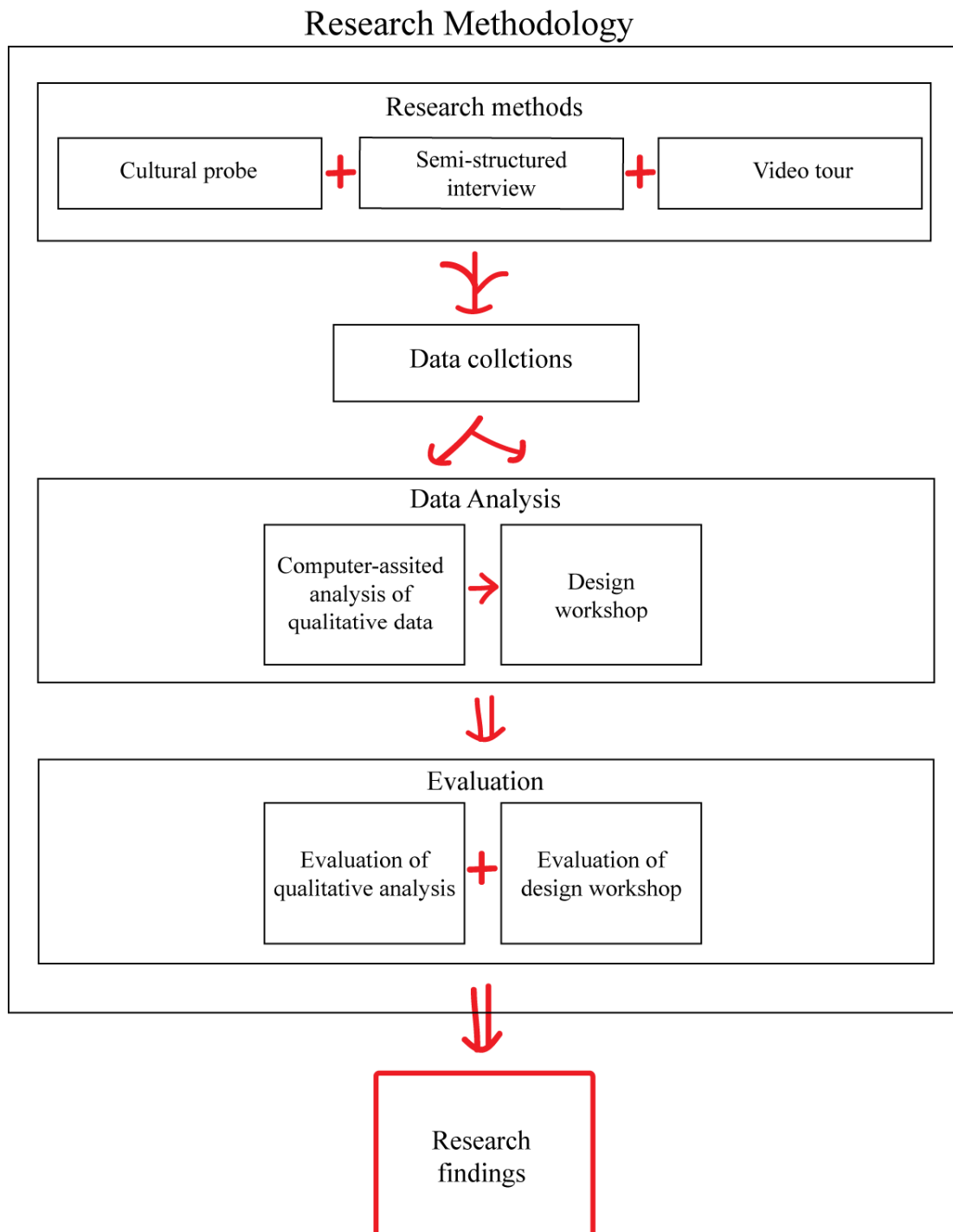


Figure 3.1 Research design

3.2.1 Background of research methodology

The home environment has become one of the most significant areas in the study of human life. It is considered a micro-social unit of the social world. The science of studying the social world has been implemented in the study of the culture of

homes for many decades, as discussed in the previous chapter. In this section, the methodological approach to studying the home environment is discussed. This addresses the philosophical worldview of the research and influence on the approach of this research.

Naturalists versus interpretivists

There are two distinct approaches to interpret the social world. In one, the so-called naturalists such as Durkheim believed that the methods of natural science are models for social science. Natural science means, for instance, the study of physics, chemistry or biology. Social science refers to the study of, for instance, economics, sociology, psychology or politics.

For the naturalists, the social world is composed of facts that can be and should be studied by scientific methods. In Durkheim's view, the social facts are the general regularities of characteristics throughout society, although independent of individuals. Therefore, the social world should be studied *without* preconceptions of the regularities and *with* objectivity and rigour toward subjective matter. In other words, naturalists gather characteristics of the social facts with scientific rigour and reconstruct their theory based on the facts they observed.

A researcher who approaches the production of knowledge with scientific and naturalist methods is also called a positivist (Burn, 2000). The positivist believes that the objectivity and rigour observation of social facts can be achieved by 'discrete and distinct' steps to investigate subject and it is the best way of discovering truth which they observe.

In contrast, interpretivists such as the philosopher Charles Taylor believe that social life cannot be reconstructed by 'brute data alone', (Taylor, 1994, cited in Lazer in Seale, ed. 2004) as "human beings are far more complex than the inert matter...(and they) can interpret and respond...in an active way" (Burns, 2000, p.12). The essential point of social science is to grasp meanings and the complexities of meanings. The focus is the *meaningfulness* of the subject matter instead of facts, and they consider that it is the meanings that distinguish human beings from inorganic matters.

3.2.2 Research approach and purpose

Research can be done in many ways and entail various approaches. The previous section illustrates the philosophical differences between naturalist and interpretivist. This section discusses the inductive approach this research adopted and the purpose of this study.

3.2.2.1 Deductive or Inductive approaches

Deductive

The naturalist approach implies a more **deductive** approach to research. Before the research takes place, a hypothesis of the theory is constructed (Nachmias and Nachmias, 1996). Empirical research is employed with the aim to test the theory (Spicer, in Seale ed., 2004).

Inductive

In contrast to ‘theory-then research strategy’ (Nachmias and Nachmias, 1996, p.46) the **inductive** approach derives theory from research, a ‘research-before theory’ strategy (ibid, p.46) that allows new problems or phenomenon to emerge from empirical research. The theory is ‘grounded’ in empirical data.’ (Spicer, in Seale ed., 2004p.295)

The principle aim of this research is ‘*To develop a user-oriented product design research tool that improves the understanding of the home life of older adults*’ based on three motivations of this research: 1) to provide user-oriented design research, 2) to identify new resources from consumer’s perspective and 3) to explore opportunities beyond retrofitting. The nature of this research is therefore oriented towards an inductive, research-then theory approach that allows exploration on the subject of older adults and their existing home, in particular, exploration from user’s perspectives. The **inductive** approach is adopted to allow new understanding or new ideas to emerge from empirical research.

3.2.2.2 Purpose of Research

“The purpose of research may be organized into three groups based on what the researcher is trying to accomplish – explore a new topic, describe a social phenomenon, or explain why something occurs.” (Neuman, 2006, p.15)

The aim of this research (as discussed in chapter one, pp.7-17) is to improve understanding of the home life of older users. It neither attempts to describe an accurate picture of a social phenomenon nor does it attempt to explain or test a hypothesis of a theory. This research is thus directed towards addressing a research question and generating new understandings and new ideas about the home life of older adults. The purpose of this research is therefore **exploratory**.

Three dominant purposes of research (Exploratory, Descriptive and Explanatory) are illustrated in Table 3.1 to outline some of the key differences of each purpose.

Table 3.1 Purpose of Research

Exploratory	Descriptive	Explanatory
Become familiar with the basic facts, setting, and concerns	Provide a detailed, highly accurate picture	Test a theory's predictions or principle
Create a general mental picture of condition	Locate new data that contradict past data	Elaborate and enrich a theory's explanation
Formulate and focus questions for future research	Create a set of categories or classify types	Extend a theory to new issues or topic
Generate new ideas, conjectures, or hypotheses	Clarify a sequence of steps or stages	Support or refute an explanation or prediction
Determine the feasibility of conducting research	Document a casual process or mechanism	Link issues or topics with a general principle
Develop techniques for measuring and locating future data	Report on the background or context of a situation	Determine which of several explanations is best

(Source: Neuman, 2007, p.15)

3.2.3 The application of research methodology to the key research question

The home environment embodies meanings that reflect the choices of lifestyle of the inhabitants. It is an environment where the individual fosters their unique experiences of human existence and their relationship with the outside world (Miller, 2001). Hence, in order to improve the understanding of the lives of older adults in their existing home environment, it is important to explore meanings in this environment.

Knowledge production for the purpose of design

For designers, “Understanding the consumer – getting into the head of the consumer – is important for designers, in order that they can develop a conscious and subconscious understanding of consumer needs, and translate that understanding into design features” (Cooper and Press, 1995, p.152). To design for users other than designers themselves, it is therefore important to understand the users from both outsiders’ and insiders’ points of view; from the outset, to understand the population of the potential users as a whole; from within to empathise and identify with users’ values. To achieve this, the nature scientist’s approach to generating statistical facts alone would not be sufficient and insightful enough to represent meanings and life histories of individual users.

More importantly, the designer needs information as well as inspiration to generate ideas. They are more likely to be influenced by ‘soft’ and non-statistical information. This is because researchers find words or other resources, such as photographs of certain events, allow them greater access to meaning than statistical trends (Lazar, in Seale, 2004).

Thus, for designers, the use of data generated by social research is not articulated for the purpose of generating or identifying facts of social theory. Although numerical data maybe fundamentally useful for informing knowledge of a representative group of users, the context from which statistic data is derived may be more useful for creating ideas or solutions for the real world.

3.2.4 Qualitative methodology

Qualitative methodology is employed in this research to identify meanings in relation to older homes in the life of older adults. Qualitative paradigm generally implies an *inductive* and *process-oriented* approach through which *exploration* of research grounded understanding of certain phenomenon can be generated. Generally speaking, in the process of qualitative investigation, empirical research is conducted and analysed before the potential theory or new ideas can be generated.

To follow the previous discussion of naturalist and interpretivist approaches, qualitative methods have a stronger connection to the interpretivist's approach to the study of human life. It is under this banner of qualitative method that the movement away from scientific approach to data collection, analysis and theory testing is described. Qualitative methods emphasize data exploration, interpretation and theory generation.

Strauss and Corbin (1990, p.17) suggested that qualitative research means “any kind of research that produces findings not arrived at by means of statistical procedures or other mean of quantification.” It can refer to research about persons' lives, stories, behaviour or interactional relationships, for instance, or to study individuals, groups and organisations.

Qualitative research implies a more inductive and exploratory approach to research. Qualitative researchers use narratives, life histories and ethnographic prose to produce a first person account of the phenomenon (Denzin and Lincoln, 2000). This approach tends to avoid assumptions about a theory before the actual data are collected. This means that the purpose of data collection is to inform the generation of a theory instead of testing of a theory. Qualitative research allows rooms to work innovatively. This also allows individuals to explore creatively with various forms of research methods.

In contrast to qualitative research, quantitative research implies a more deductive approach. Researchers use mathematic models, statistical tables and graphs, and usually produce reports in an impersonal, and from a third person's, perspective.

Generally speaking, the theory and possible variables are already identified before data collection. The purpose of data collection and analysis is to collect evidence to test the assumptions of the theory.

Table 3.2 The difference between qualitative and quantitative research

Qualitative paradigms	Quantitative paradigm
Concerned with understanding behaviour from actor's own frames of reference	Seeks the facts/causes of social phenomena
Naturalistic and uncontrolled observation	Obtrusive and controlled measurement
Subjective	Objective
Close to the data: the 'insider' perspective	Removed from the data: the 'outsider' perspective
Grounded, discovery oriented, exploratory, expansionist, descriptive, inductive	Ungrounded, verification oriented, reductionist, hypothetico-deductive
Process-oriented	Outcome-oriented
Valid: real, rich, deep data	Reliable: hard and replicable data
Ungeneralizable: single case studies	Generalizable: multiple case studies
Holistic	Particularistic
Assumes a dynamic reality	Assumes a stable reality

(Source: Blaxter, Hughes, and Tight, 2006, p.65)

However, it is noted that ‘the underlying philosophical positions (of quantitative and qualitative methodology) are not necessarily as distinct as the stereotypes suggest.’ (Blaxter, Hughes, and Tight, 2006, p.65). While qualitative methods generally imply inductive and exploratory approach to theory generation, it can also be used to test hypotheses and theories. Qualitative data may also include quantification (ibid, 65).

Qualitative inquiry

The movement toward a qualitative method was first leveraged by people’s interest towards more literacy and interpretive approach to human inquiry; a reaction of the ‘scientific’ push approach before and during the Second World War. Before the war, qualitative methods only played a small role in the social

survey limited to the occasional open-ended question in the structured interview. It is not until the anthropological work of Chicago School in the 1920s and 1930s that the qualitative inquiry became established in the human disciplines (Denzin and Lincoln, 2000).

Towards the end of the 1960s, traditional forms of knowledge production were again challenged by anti-racist or feminist movements; in particular, the reaction towards inequality of differences in identity, gender, ethnicity and sexuality that directly argues against the positivist's approach. As a result, the movement raised several issues. Ali, Campbell, Branley, and James (in Seale ed., 2004, p.24) suggests that "social research should not exclude the diversity of social experience. It (social research) should not reproduce the value of an oppressive society...In other words, it should contribute to setting people free from oppressive social relations...(It is) for this reason we need to find new models of social research itself."

Take Stanley and Wise's study in the area of feminist research as an example, the new social movement questions the role of the researcher in the research process. They reject the notion that researchers should treat theory as superior to experience. For instance, if one wishes to understand the oppression of women, one should start from the point of view of a woman. In other words, this approach suggests that the experience from the researched point of view can be as valuable as the theory itself. Instead of producing accurate knowledge of social facts with scientific methods, *How* instead of *what* research is produced became increasingly important and challenging in the context of social research (Ali et al., in Seale ed., 2004). This means that the acknowledgement and understanding of the presence of the researcher reflected *during* and *at the end of* the research process has become increasingly important in the field of the post-positivist approach. The researcher is no longer at a distance and participates in the research process by actively reflecting on how they conduct research.

To follow on the notion of reflection, the term reflective or reflexive can be described as 'ways of seeing which act back on and reflect existing ways of seeing'. (Clegg and Hardy, cited in Alvesson and Skoldberg, 2000) Renato

Rosaldo (1989, cited in Lazar, in Seale, ed. 2004) also agrees with the idea that researcher cannot be left behind when carrying out research. He argues that emotion or experiences about the subject can also be used as resources of knowledge.

3.2.5 The role of the researcher

Denzin and Lincoln (2000) continue to argue the position of a qualitative researcher.

“The qualitative researcher is not an objective, authoritative, politically neutral observer standing outside and above the text... Qualitative inquiry is properly conceptualised as a civic, participatory, collaborative project. This joins the researcher and the researched in an ongoing moral dialogue.” (Denzin and Lincon, 2000, p.4)

The researcher interprets the research subject with his or her judgement, intuition and has the ability to ‘see’ things (Alvesson and Skoldberg, 2000). The participatory approach of feminist research is also shared by the emancipatory paradigm. The emancipatory approach described originally the movement against the perception of social ‘norm’ and for people with disability. For instance, research focuses on the idealised (normal) nuclear family of a mother, a father and two children, and ignores any other kind of family of different structures, ethnicity, classes that are outside of the norm. This movement therefore celebrates the empowerment of people by giving control of the research back to them; ‘to ensure individuals’ voice can be heard’ (Ali et al. in Seale ed., 2004).

The view of Denzin and Lincoln, Stanley and Wise or Alvesson and Skoldberg can also be related to what designers of modern products intend to take. To relate the practice of design, the designer cannot be left alone when carrying out user research. Part of the designer’s professional practice is constructed by their prior knowledge and experiences of the world (Cooper and Press, 1995) and this knowledge can also be used to interpret and understand meanings of the individual user, community or society. Designers now have the opportunity to involve users at the centre of their research process and empower them with the

appropriate tools to not only to reflect on the meaning of everyday life but also to contribute to making their life better.

Traditional quantitative research, such as the questionnaire survey, often puts the researcher or designer at a distance, seeking to understand people objectively. However, in order to apply this positivist's attitude to user research, designers are likely to ignore the values of experiences that they share with the users if they position themselves at a distance. This poses a disadvantage for designers by disconnecting the opportunity to understand, empathise and co-create meaningful values.

To summarise, the political standpoint of this research aims to empower the user's understanding of their world and to create a collaborative process in which users' voices can be heard. This approach therefore suggests that the qualitative approach of the social researcher can bring valuable lessons to the design of user research in the context of homes, particularly when the goal of research is to empower the user by involving them in a human-centred approach.

3.2.6 The types of qualitative data

Generally speaking, qualitative data refers to data that is gathered by a variety of means such as observations, interviews, secondary or historical documents, and video tapes. The data also can be derived from field notes of observations during ethnographic work, visual images or transcripts of conversations (Seale, 2004). The need for qualitative methods is beginning to develop especially in certain disciplines because researchers have become more convinced by the inductive approach to identifying certain social problems. Today, qualitative methods are also used in conjunction with quantitative methods depending on the nature of the research.

In relation to research conception, more fundamentally whether qualitative or quantitative, the use of methods should relate to a particular research problem or subject (Creswell, 2009). The selection of methods therefore depends on the research problem and object which the researcher intends to understand.

3.3 Research Design

Research designs are the plan and the procedure in which a research question is addressed. This includes design of methods for data collection and analysis (Creswell, 2009). In the previous section, qualitative methodology is identified as an appropriate approach to the study of human life. In this section, the design of research methods and process of qualitative research including data collection and analysis, are discussed.

3.3.1 Triangulation technique

Triangulation can also be described as an attempt to achieve an in-depth understanding of the phenomenon in the field of qualitative research. There are four types of triangulation; data triangulation, investigator triangulation, theory triangulation and methodological triangulation (Denzin and Lincoln, 2000). Data triangulation implies the use of various data sources to triangulate a same result. Investigator triangulation implies ‘the use of different researchers or evaluators’. The technique of methodological triangulation suggests the use of multiple methods to investigate a single problem as employed in this research (Figure 3.2). For theory triangulation, this employs different perspectives to examine a single set of data.

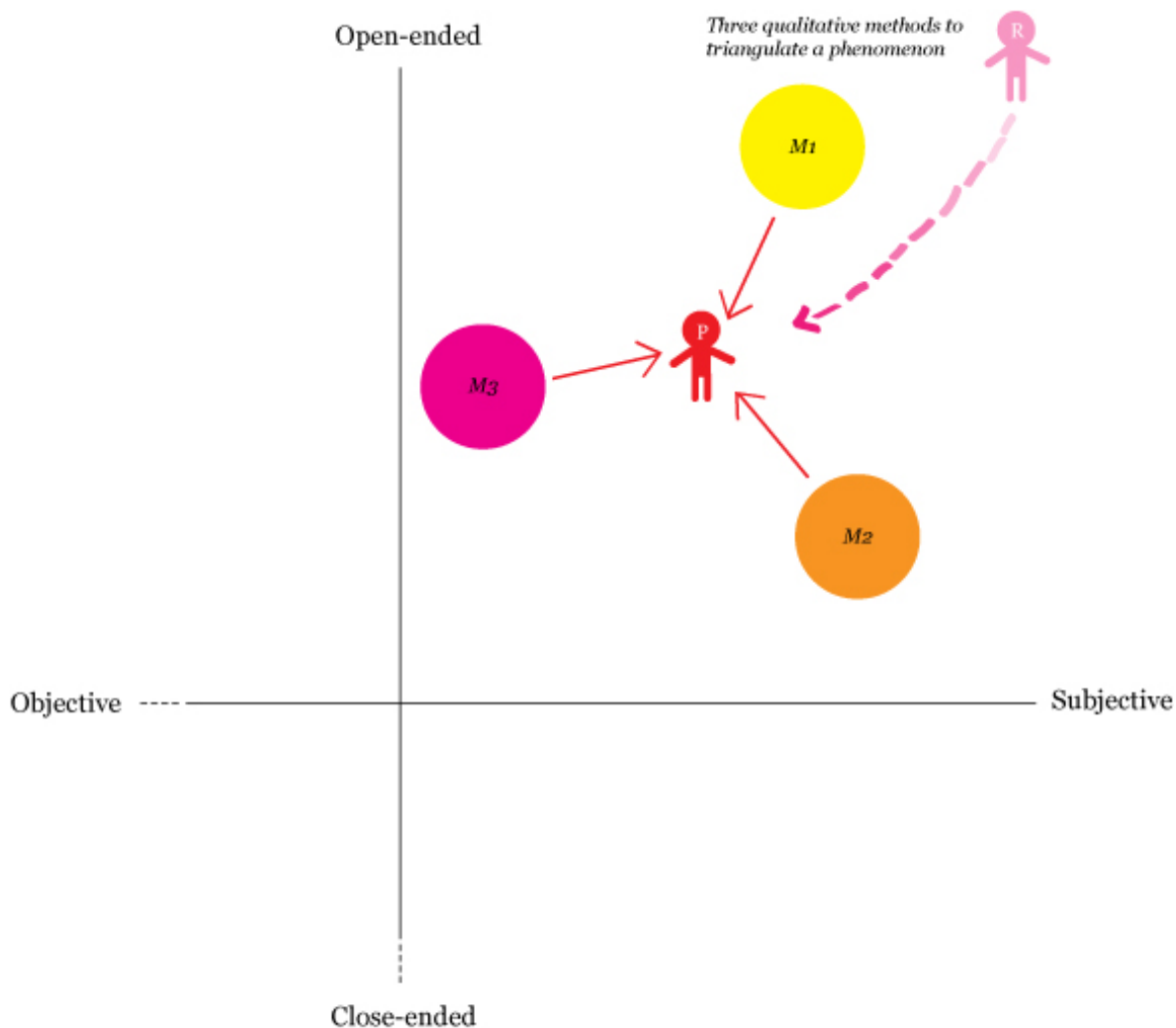


Figure 3.2 The parameters of the map illustrate the position of the research methods proposed. This research focuses on qualitative methodology. The research methods selected for triangulating the research problem are therefore positioned in the top right area of research methodology describing the approach towards research of an open-ended and subjective nature.

Triangulation is not a tool or strategy to validate research, but it can be seen as an alternative effort to validation. Richardson goes beyond the technique of triangulation and uses the metaphor of *crystallisation* (1994, p.522 cited in Janesick, in Denzin and Lincoln eds., 2000). The crystal “combines symmetry and substances, transmutations, multidimensionalities, and angles of approach. Crystals grow, change, and alter, but not are amorphous...Crystallisation provides us with a deepened, complex, thoroughly partial, understanding of the topic. Paradoxically, we know more and doubt what we know” (ibid). Instead of utilising this technique for the purpose of validation, triangulation on the

qualitative level, can also be used to provide colours, patterns, arrays and directions of the researched phenomenon.

In relation to the research problem, the triangulation technique is employed to crystallise the experiences of the home for older adults in the UK. In particular, the triangulation strategy focuses on the use of various methods, with the aim to provide rich and colourful directions of the research phenomenon. It is convinced that this strategy will not only help the researcher to understand the researched, but also benefit designer in their creative process. The methods are therefore selected for the purpose of informing the designer of important information about the life of the older adults and their existing homes.

3.3.2 Research methods

3.3.2.1 Criteria of methods

In relation to the field of human computer interaction, as discussed in the literature review chapter, the research methods selected have also to reflect and support the use of qualitative methods in order to open up the ‘possibility of play’ (Anderson, 1994) for the purpose of new technology development. More importantly, as identified earlier in this chapter, qualitative methodology describes criteria of inductive and exploratory process. The research methods are therefore required to be of exploratory nature in order to develop ideas and understanding of the subject. Six key criteria are identified to inform the formulation of methods for this research

- 1) The aim of the research is not to focus on producing knowledge of how people behave and how they make sense of their everyday routine. More, it focuses on producing *meaningful experiences* of their homes. To explore meanings beyond productivity and efficiency and focus on the *play of possibility*, methods other than observation should be incorporated.
- 2) To *triangulate meaningful experiences*, *multiple qualitative methods* should be employed. These methods should therefore include an *open-ended* approach and commit to produce a *natural* account of the field.
- 3) In order to understand meanings, methods should allow exploration of individuals’ life histories, stories, experiences and attitudes.

- 4) The selection of methods and process should acknowledge clearly the role of the researcher and the researched. It should include a *collaborative* approach, allowing the researcher to *participate* and *empower* the researched to express their feelings.
- 5) The selection of methods should allow *time and space for reflection*, for both the researcher and participants.
- 6) Methods should generate information that can be derived from the natural setting of the home. In the case of this research, *textual, visual and other sensorial qualities* of the home should be incorporated. In relation to criteria for developing new product ideas, this information can also be useful for the designer to contextualise the phenomenon and create their concepts.

3.3.2.2 Selection of research methods

The technique of triangulation of methodology generally implies the use of three different research methods. The strategy of this research is therefore founded on the design of data collection using three different methods.

Method one: Adopting of the cultural probe method

The first method was selected to respond firstly to the use of, and furthermore the debate in, the qualitative tool ‘cultural probe’ (Gaver, Dunne and Pacenti, 1999) particularly in the field of Human Computer Interaction design, as discussed in the literature review chapter. More importantly, the adoption of the cultural probe is designed to respond to the criteria for research methods. The characteristics of the ‘probe’ approach are:

- It recognises the value in the *interpretative* nature of qualitative research and its associated process.
- Researcher has the opportunity to *participate* through (i) the design of each probe (ii) interaction and communication with the participants during the process
- The way probe study is conducted allows *time and space for reflection*, especially after the probe is deployed in the field. During this period, the researcher plays a less intrusive role by positioning themselves at a

distance. The connection between the researcher and the participants is maintained by design and questions posed by the researcher.

- Participants have an opportunity to *express their own opinions* without the supervision of the researcher.
- Researcher and participants, in a sense, *collaborate* over a period of time to generate insights

The cultural probe is strategically positioned at the start of this research process to begin a conversation about the subject of ‘home’ that takes place in the natural and private setting of the home environment. The aim is to create a collaborative process through the exchange of experiences and inspirations between the participants and researcher. The ‘probe’ approach in this research therefore is used as a starting point to encourage reflection on the subject of ‘home’ and experience in the past and today. The returned materials also provide a potential framework of discussion for further development on the research subject.

Comparison with other similar method in social science

The technique the cultural probe employs in this research is understood to be a combination of qualitative social research techniques. The original probe uses techniques of, for instance, open-ended questions, self-documentation with photo ethnography and diary. These are employed in conjunction with other design techniques using familiar formats of consumer products, such as postcards and maps. More importantly, the researcher no longer hides behind the formal and objective ‘suit’ of professional investigator and actively engages the participants with their interpretation of the subject through the detailed designs of the probe.

The probe’s approach has been adopted for other research and design purposes. However, Gaver et al. (2004) would not necessarily agree with some of adopted approaches because some adoption seem to be unsatisfied with the playful and qualitative approach to data collection and interpretation, and attempt to apply ‘probology’ in a scientific and systematic manner. Nonetheless, this method has inspired and leads many creative and challenging directions in the area of user research in HCI; a new movement away from traditional observation, towards participatory and collaborative attitudes of a post-structuralist qualitative

researcher. Moreover, it is the philosophical belief to capture the ‘quality’ and depth of human life that push this type of new thinking forwards.

The ‘probe’ method has been adopted and debated for its uses and process of analysis. Although Gaver, et al (2004) has strong doubts in whether the probe returned should be ‘analysed’ at all, it is to say that, in some ways, many researchers who ‘analysed’ the probe returns merely attempted to make sense and use of the collected data.

It is therefore important to clarify the purpose of the probe and the strategy by which the collected data is ‘analysed’ or interpreted. The role of data analysis, and how it is carried out in this research, plays a significant role in supporting, as well as validating, the qualitative findings. The detailed design and deployment of the probe is discussed in the next chapter. In the following section, the design of two other research methods, and how these are integrated with the ‘probe’, is presented.

Method two: Interview

The second research method employs one of the four basic methods for qualitative data collection – interview. It is often face to face, though some may take place over the phone. The qualitative interview is a significant part of the research design as it is “particularly useful as a research method for accessing individuals’ attitudes and values - things that cannot necessarily be observed or accommodated in a formal questionnaire” (Byrne, in Seale ed., 2004, p.182). The employment of the interview technique is aimed at developing issues and topics mentioned by the participants in the probe return.

There are three types of interviews; structured, semi-structured and open-ended. Structured interviews are used mainly in surveys. Interviewees received the same questions in the same order. All or nearly all of the questions are closed-ended and interviewees are asked to select their responses from a limited set of answers designed by the researcher. This result is consequently useful for quantitative analysis. The main disadvantage of structured interview is that the researcher has little scope of the interviewees’ feelings, experiences and life histories towards the

subject (Burns, 2000). More importantly, this impersonal and objective approach often distances the researcher from the researched, which post-structuralist qualitative research intended to avoid.

In contrast to structured interviews, unstructured or unstandardised interviews have no standard set of questions or schedule. In the unstructured interview, the interviewers adapt, develop and generate questions according to the given responses from the interviewees. The interviewer operates under the main concern of the research subject, leaving the interviewee to express openly their opinions (Berg, 1995) on the subject.

Semi-structured interview

In comparison to structured and unstructured interviews, the semi-structured interview lies between the two extremes. It is widely used in qualitative research because it provides flexibility, as well as focus, to the research question. Generally, the interviewer uses predetermined, as well as open questions, in a consistent manner, but is expected to probe far beyond the standardised questions. In other words, the interviewer has more freedom in the sequence of the questions and wording, and can also better control the time given (Robson, 2002).

In this research, the format of the semi-structured interview is informed by issues identified previously in the 'home probe'. The home probe is expected to produce a mixture of textual and visual responses that is limited to the questions and formats given in the design of the probe package. The use of the interview technique would therefore be helpful in probing beyond the answers given by the participants, for instance, events that happened in the past that cannot be described in detail in the home probe. The face to face approach also allows the researcher to 'feel' the environment in which the participants are situated. In relation to the research subject of the home, the researcher may be able to benefit from participating in such an environment and getting access to those phenomenon described in the probe, as well as those that are not discussed in the answers. For instance, the interviewer has a chance to discuss the photographs taken by the

participants in the situated environment and probe into the reason why it was taken.

Method three: Participant observation / Video ethnography

The third research method, video ethnography, is employed to crystallise the researched phenomenon. In order to develop the issues discussed in the home probe and semi-structured interview, the technique of participatory observation is employed, in particular with the assistance of a digital recording device.

The term 'ethnography' is defined by Hammersley and Atkinson (1995) as:

'[Ethnography is] a particular method or set of methods which in its most characteristic form...involves the ethnographer participating overtly or covertly in people's daily lives for an extended period of time, watching what happens, listening to what is said, asking questions – in fact, collecting whatever data are available to throw light on the issues that are the focus of research.' (Hammersley and Atkinson, 1995, p.1)

The concept of ethnography has been used in different ways from the traditional approach of the anthropologist such as Malinowski (1922) to more recent adoption by the sociologist (Berg, 1995). In recent decades, Van Maanen (1982, cited in Berg, 1995) suggests that doing ethnography involves extensive fields of various types such as filming, recording, interviewing and participant observation. Through various methods of collecting data from the field, the responsibility of an ethnographer is to gather first-hand and descriptive information of the researched. This is because researchers consider this approach particularly useful in providing a description of what actually happens (Burns, 2000).

From this perspective, the use of the two research methods employed in the first and second stage of research design can both be characterised under the roof of ethnographic work. The aim of carrying out ethnography research is not only to collect data, but also to interpret, analyse and represent what happened in the field. In other words, at this stage of the research, various data have been collected and analysed. The analysed data, for instance, the return of the probe materials,

have been fed into the overall design of the research, and informed the design and process of the semi-structured interviews. In relation to the third method, the use of video ethnography is to add a third dimension to data collection and help to inform analysis and interpretation of data collected in the previous two stages.

In this research, the third method specifically describes the strategy to observe the natural setting of the researched environment and for the researcher to participate in this environment. Junker (1960, cited in Walsh, in Seale, ed., 2004) classifies participant observation into four categories; complete participant, complete observer, participant as observer and observer as participant. Complete participants and complete observers are the two extremes of participant observation. When a researcher takes a covert approach to ethnographic research, the researcher generally immerses him or herself as participants in the field of the studied. For the overt approach, the researcher simply observes and avoids social interaction with the observed. For the third and fourth type of participant observation, the participant, as the observer, suggests that the field relationship between the observed and the observer is made clear for the purpose of establishing trust and rapport. Finally, the role the observer takes as the participant is similar to the participant as the observer, however, it emphasizes the observation more than the role of participation.

In this research, the use of a 'video tour' is employed. The purpose of this research position is, firstly, to follow the strategy of the cultural probe, which is to engage the participant in a collaborative process of expression and interpretation, and, secondly, to explore issues and meanings identified in the semi-structured interview. It is therefore suitable for the researcher to take up the role as 'participant as observer' or similarly of 'observer as participant'; in order to, firstly, utilise the role as the participant to gain trust and rapport with the researched and establish an open dialogue about the subject; and, secondly, to observe the natural setting of the interactions and the environment when suitable.

In relation to the home environment, participating completely in the natural setting of the environment can be challenging for a researcher when it comes to the political standpoint of the research process. The participants are the

gatekeepers to the environment that researchers intend to investigate. It is therefore very important to identify an appropriate strategy to gain acceptance from the gatekeepers. On the other hand, home is a very private environment. The study of this environment therefore requires strategy that could encourage participants in a conversation of private matters. Approaching research solely as a complete observer is therefore unsuitable if deeper subjects, such as feeling, meanings and attitudes, are to be explored.

This third method will be introduced as a 'tour' in the participant's home. The researcher will take the role of an observer by shadowing the observed in their natural environment and documenting the interactions in that environment with a video camera. The researcher will also ask questions during the tour. The questions are unstructured and the researcher only asks questions when there are unexpected occurrences or additional information that he or she is interested to know. This also helps to capture detailed information in the form of non-verbal language, and the visual and sensorial qualities of the space.

The use of the video camera therefore incorporates and enhances what has been identified in the home probe and semi-structured interview, and enhances the verbal language with non-verbal expressions and sensorial information projected in the environment. The participation of the researcher also plays an important role in observing and experiencing the environment from the outsider's point of view.

Ethnography has a constructional and reflexive nature. Regardless of the role researcher plays, Hammersley and Atkinson (1995) argue that, in a sense, all social researchers are participant observers, the aim of this type of approach is to produce knowledge about the field.

3.3.2.3 Formulation of the research methods

Walsh (in Seale ed., 2004, p.230) suggests that, "the research process is one of a constant interaction between problem formulation, data collection and data analysis." In a sense, there is no clear distinction of stages between theory and hypothesis generation, data gathering and hypothesis testing. In the case of this

research, the process of developing research design and procedure is also an interactive process. It involves various ethnographic techniques with a central aim of crystallising the life of older adults in older homes.

The integration process

In this research, each method works independently at producing results valued for its unique purposes. They also work conjointly, aiming to develop a rich description of the field. The probe is designed to capture the holistic view of the field and engage the participants at the beginning of the research with artist-designer techniques. The semi-structured interview is designed to investigate the in-depth meanings of those issues identified. The technique of video tour is employed to develop non-verbal, visual and sensorial information about the environment and, more importantly, to develop issues identified in the home probe and semi-structured interview with digital recording equipment. This formulation is a non-linear process. It suggests that each of the research methods inform and influence the conduct of methods as well the research process as a whole.

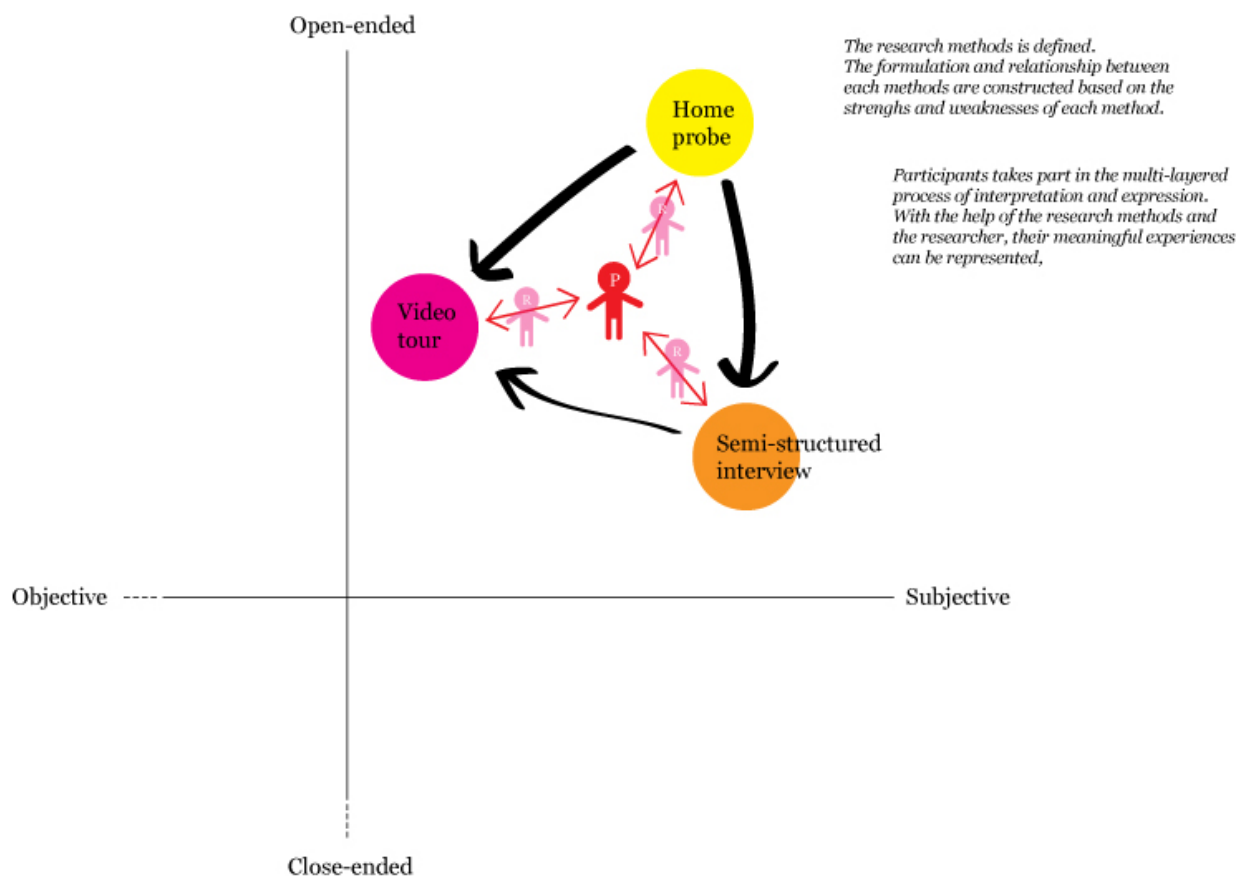


Figure 3.3 This figure illustrates three research methods selected for investigating meanings in older homes. The participant (P) is located at the centre of the research process. The researcher uses the cultural probe, semi-structured interview and video tour to understand and interpret the phenomenon expressed by the participant.

Cultural probe

The approach of the cultural probe has influenced the development of the research strategy. From the perspective of Gaver et al. (2004), the purpose of probe is to embrace the value of personal expression and subjective interpretation. It involves a multi-layered process of interaction with the participant volunteer (Figure 3.4). The quality of this research lies in the uncertain and uncontrolled nature of the research environment which Gaver et al. (ibid) intended to create. They emphasize that this process, and the result which probe produces, is not meant to be controlled with the aim of producing an impersonal and objective account of the field.

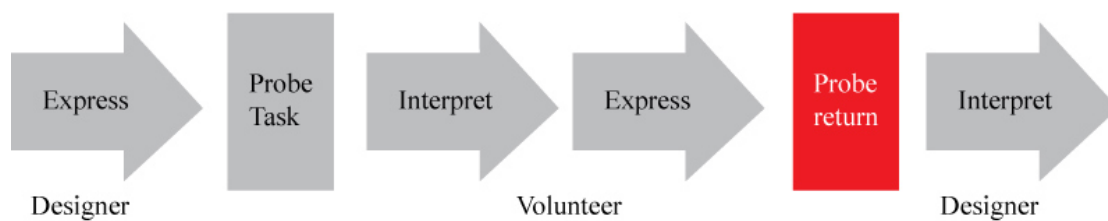


Figure 3.4 Probe results are the result of a multi-layered process of expression and interpretation (Gaver et al., 2004)

The adoption of the cultural probe in this research also identified the values of insight suggested by Gaver et al (ibid). However, many researchers have argued about the use of the probe, the process and the treatment of the results. Consequently, although the probe approach has attracted considerable interest by academic and industrial research, and design agencies, it is to say that the argument remains persistent and diverse.

In relation to this research, the use of the second and third research methods, semi-structured interview and video ethnography, is to develop further the insight that this research intended to convey. This is a strategy to enhance the quality of qualitative data collection by using a combination of other ethnographic techniques. The integration of the research method is to argue that:

1) The combination of various ethnographic methods is to address the specific research problem - to identify 'meanings' in those homes. It is therefore difficult to generate results if the researcher does not have an opportunity to engage the participants and participate in the field in a collaborative process such as the video tour.

2) The use of the triangulation technique does not suggest that the design of the research aims to produce only a validated or objective account of the field. As discussed earlier, validity is less important from the perspective of qualitative research. A qualitative approach is therefore more valued for the rich and deep information generated from the field. The combination of three qualitative methods is therefore helpful to crystallise the aspects of phenomenon in the field.

3) Rather than looking at the research design as a linear process, with the integration of three research methods, this research also suggests that the use of semi-structured interviews and video tours is an extension of the probe, in other words, to add layers in the probe's process of interpretation and expression.

This research therefore argues that the combination of the home probe, semi-structured interview and video tour strengthens the quality of qualitative data, especially when the research aim is to identify 'meanings', life stories and attitudes towards the subject of the home.

It is not to say that the research is not satisfied with the ambiguous and subjective account of inspirations that the probe generated, rather, this research also intends to celebrate the use of the probe and the use of qualitative information for the purpose of design; design to understand the empathetic view, meaningful experiences and the socio-cultural standpoint of older adults. The differences between the approaches of the cultural probe to this research are that this research does not expect to use design prototypes to reflect on what have been learned from the field. Instead, the aim of this research is to produce an understanding of older adults and to facilitate an important opportunity for designers to reflect on their understanding of users, to empathise, and respect users' view points.

Moreover, the use of additional 'probes', such as the semi-structured interviews, is designed to satisfy the aim of this research; to identify meanings. Therefore, the introduction and the integration of two other research methods are designed to add dimension to the research process and can be seen, from the perspective of this research, as probes to record rich audio-visual information about the environment of inspiration.

Co-creation

As shown in the figure (Figure 3.5), the adopted 'probe' process is extended further by adding two more layers of interpretation and expression. Firstly, after the probe is returned, the researcher has time to reflect on the material collected. In the following phase, the participants are invited back in the research process to

co-develop issues identified in the probe. The researcher is now playing a more active role in participating in the environment researched while the participants are also given an opportunity to elaborate on the subject. In the final phase of data collection, the researcher then interprets the data generated from three qualitative methods.

One may argue that the involvement of participants in the semi-structured interview or video tour may contradict the use of the cultural probe, at the first place, as the interpretative space and the nature of the interpreted return by the participants might be scrutinised by further steps of 'elaboration' or 'analysis'. What can be argued in this research, however, is that the extended phase of investigation with semi-structured interview and video tour is designed to explore further ideas and insights by the participation of the researcher in the natural setting of the homes. From a 'trustworthy' perspective (Lincoln and Guba, 1985) of the qualitative information, the aim of involving participants with the second and third research methods is to produce a faithful account, and give the participants opportunities to express and elaborate on what have been addressed. From the perspective of the researcher, this approach has no intention to interfere with the field or little attempt to establish objectivity. However this is often a challenge in the nature of qualitative methodology.

The volunteers (participants) are invited to develop meaningful stories in the process of the semi-structured interview and video ethnography. The researcher is also a participant in this process. At the end of this proposed multi-layer process, the researcher takes the role of the ethnographer and composes the data gathered from the field for the purpose of producing narratives about the participants.

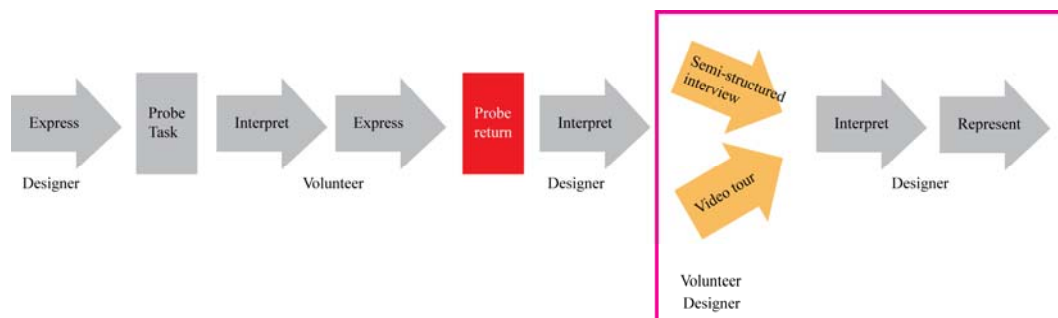


Figure 3.5 A multi-layered process of ‘probe’ expression and interpretation of this research. It includes an additional layer (highlighted in the square) of interpretation at the end of the process Gaver et al. (2004) proposed. The participants are invited to address their responses and develop their stories with the researcher in this new proposed research process.

In addition, the design of this research has no intention to claim that the research process completes, or ‘takes full advantages of the probe’s potential’. On the contrary, this research is considered as an attempt to embrace the philosophy of the probe and intends to utilise the interpretative inspirations for the purpose of this research project.

3.3.3 Research sample

3.3.3.1 Sampling strategy

The qualitative approach accepts the post-structural and postmodern sensibilities. This new genre of poststructuralist qualitative researchers considers human ‘life not as something composed of identities, objects and subjects, but of difference, complex relations, and instability’ (Filmer et al., in Seale ed., 2004, p.42). The aim is to tell a different story to the traditional positivist view.

Adopting the poststructuralist point of view, the sampling strategy is therefore designed with the aim of reflecting diverse and different experiences of older adults living in older homes. The technique of ‘non-probability sampling’ is employed to investigate the private home lives of participants aged 50 and above.

In this section, the selection of the sample is first defined. Secondly, sampling techniques used in social research are discussed. Finally, the employment of the

non-probability sampling technique and the recruitment strategy for this research are illustrated.

3.3.3.2 The diversity of the ageing population

Definition of older adults – aged 50 and over

Office for National Statistics (2004) describes older people as people aged 50 and over. The term ‘older people (adults)’ is also defined in this research also as adult who is aged 50 and over.

Coleman (1993, cited in Clarkson, et al., eds., 2003, p.121) emphasize the rapid growth of the market of consumers aged 50 and over. “By 2020 close to half of the adult population of the UK will be over 50 years old”. Coleman (2006), in a conversation with the Design Council about inclusive design, also stresses that in ten years time by the year of 2021, not only half of the population will be aged over 50, this older population will become increasingly, part of the mainstream (Design Council, 2008). Designing for the older population is an important part of a strategy to ensure that mainstream products, services and environments are accessible to the largest number of people’ (Design Council, 2008).

Baby boomers

An important aspect of the social change in the ageing society is the ‘baby-boomers’ generation. Their potential for contributing to the economy and society has been recognised (European Commission, 2008). The baby-boomers generation describes a particular generation born between the years of 1946 to the early 1960s and thus 50 years of age or over. “It is commonly applied to the surge in births that occurred in much of Europe, Australia and North America following the end of World War II” (Dalley, Falkingham, Hancock, Lewism, Means, and Phillipson, 1997, p.206) Reaching the retirement age now, the baby boomers “will find themselves with more time to spend on their interest” (Keates and Clarkson, 2004).

Diversity in older age

The trend of ageing population, as discussed earlier (Chapter 1) illustrates a need to recognise and address the increasing diversity of life experiences of older

adults. This diversity arises from, as Laslett (1989, cited in Clarkson et al., eds., 2003, p.121) describes, the divergence of experiences, interests, activities and capabilities as people age. “In the context of ageing populations, such diversity will increase, in particular as people explore the new possibilities opened up by 25 or more years of life-expectancy.”

The longer life expectancy also allows a longer working life or more leisure time after retirement. Not only will the population of the over 50s are becoming more wealthier (with 60% of all savings in the UK are held by the over-50s), but they will also be expecting good products and services that helps them to prolong active, independent and healthy lifestyles (Myerson, 2001, cited in Warburton, 2003, in *ibid.*, 2003).

The baby boomers not only will continue to use information and communication technology such as information and communication technology (Newell in *op. cit.*, 2003), but also present a potential market for new digital and information technology demanding new focus on wellness, simplicity, personalised service and connected convenience-and that will benefit everyone (Coughlin, 2007).

To summarise, the ageing population is “the only consumer sector with real growth potential” (Coleman in Clarkson et al., eds., 2003, p.121). This demographic profile is created to capture, firstly, the biggest growing consumer market in the UK over the next decades. Secondly, this demographic group not only shows interest in products and services such as future-proof or lifetime homes, but also requires products and services for healthier and sustainable ways of life. Thirdly, this profile showed the strategic direction of this research and the intentional emphasis on the diversity of lifestyles in older adults.

Although definition of older adults varies, (e.g. aged 60 and over by United Nations, 2007), the term of older adults in this UK based research remains focus on the aged 50 and over. The purpose of the sample is to include both older adults who are in employment and retirement. The scope of the research sample is therefore designed to include diversity of lifestyles in older age. In addition, the sample also places more emphasis on the baby boomer generation.

3.3.3.3 Sampling technique

The purpose of sampling is to take a random selection or sample of the population and, from that, make a generalisation about the whole population. The design of the sample depends on the goal of the research (Bloch, in Seale ed. 2004).

There are two broad types of sampling method: probability and non-probability sampling. A sample that reflects the whole population is called a representative sample. This is generally related to the probability sampling technique as each person in the population is more likely to have an equal chance to be selected. The population is selected using, for instance, a simple random sampling technique or cluster sampling technique.

However, it is not always possible to carry out random sampling that represents the whole population and, in some cases, it is not always desirable to select a representative sample. In this research, probability sampling is considered unsuitable for the aim of this research; to investigate insights values and experiences of older adults in their older homes. Therefore, a technique that will help to sample a 'diversity' of experiences was considered more appropriate.

3.3.3.4 Non-probability sampling technique

A non-probability sampling technique is often associated with qualitative work. The use of this technique is designed to sample groups that are hidden from the public domain or when a complete and accurate sample cannot be achieved. The main types of non-probability sampling techniques in survey research are quota sampling and the snowball or network technique.

The use of qualitative methods also, more importantly, emphasizes the quality of the individual case. The nature of this approach requires considerable attention and time to be spent with each individual case in order to find out about in-depth information about the researched person. In the case of this research, the use of the snowball or network technique was employed to investigate in-depth experiences of older adults living in older homes. This non-probability approach helped to capture original and unique ideas and concepts that are not identified by

a representative sample. To represent the whole population was therefore less important in this case.

3.3.3.5 Sampling strategy of the research

The sample was influenced by the aim of this research. As discussed earlier in the section, the research intended to investigate the sample of the ageing population. The design of the sample was therefore created to frame a broad and yet diverse set of cases to contribute to the generation of ideas and concept for the purpose of new product development.

This research employed the following sampling techniques:

1. Snowball or network technique
2. With multiple starting points to access more than one network
3. Advertisement in public places (For instance, recruitment poster (Figure 3.6))



Call for Participants

We are interested in designing for the home. We are also interested in finding individuals who love to share their everyday ideas and like a bit of a challenge.

What is this project?
A design research project 'Sherlock Home' that investigates the everyday home.

Time: March-May 2009

How to help us:
We will provide you with a collection of probing questions organised in the form of postcards, easy photographing tasks and a diary which asks you to write down your experiences of your home. You can help us by answering the questions and sharing with us your opinions about the 'home'.

Example of question:
'What makes you feel at home?' or 'Take a picture of something beautiful'

How long will it take
You will be given the Home Probe to do at home. You have a period of one week to complete them. The tasks will only take about a little less than 2 hours of your time. It will really help us in our project if you could answer the questions.

What happens next
We plan to organise a workshop inviting people who has kindly participated in this process. This will happen at the end of Home Probe investigation where directions for future design will be drawn. A light lunch will also be provided.

Call Sonia on 07919180635
Email her at hsueh-pei.wang@brunel.ac.uk

Figure 3.6 Flyer for recruiting participants outside of the immediate network (Appendix I)

The design of the sample aimed:

1. To recruit participants of age 50 and over
2. To select various working and retirement lifestyles
3. To select different household structures, if accessible
4. To select various household ownerships, if accessible

5. To give consideration to a gender balance sample
6. To select participants living in older housing stock in the UK.

What is missing in the tradition survey research or ethnographic study is the sense of private lives of households (Miller, 2001). The sampling approach of the research influenced significantly the knowledge this research intended to contribute; private life and personal experiences of the home environment. The sampling strategy gave a frame to and an indication of the direction which this research intended to take; to identify insight. In order to do so, the strategy was designed to investigate lives of older adults and aimed to identify insight into each unique and individual case. Therefore, this research did not aim to be comprehensive in its own right, but rather to complement the in-depth understanding of many diverse ways of living.

3.3.4 Data analysis and evaluation

Carrying out ethnography research is not only to collect data, but also to interpret, analyse and represent what has happened in the field. It is an on-going analytical and evaluative process from the beginning to the end.

3.3.4.1 Qualitative data analysis

Qualitative data can be derived from a variety of forms. It can be produced from documents, audio recordings, visual images or field notes. The initial task of data analysis is therefore to make sense of various data collected from the field. Furthermore, qualitative data is often unstructured. In comparison to structured research, such as the quantitative survey, which has a set structure determined prior the research taking place, to analyse qualitative data requires a different strategy of analysis.

The process of qualitative analysis may begin with describing social events and progressing towards developing and testing explanations or theories (Hammersley and Atkinson, 1995). Qualitative analysis begins with the development of a set of analytical categories using the technique 'coding'. Coding involves grouping similar ideas or concepts together, by doing so, the researcher can begin to select what is theoretically relevant, important and interesting to the research problem.

Creswell (2009) suggests a basic process of data analysis. It involves collecting data and developing analysis from the information supplied by the participants.

The process suggested by Creswell is:

1. Organise and prepare the data for analysis
2. Read through all the data
3. Begin detailed analysis with a coding process
4. Use the coding process to generate a description as well as categories or themes for analysis
5. Advance how the description and themes will be represented in the qualitative narrative
6. Make an interpretation or meaning of the data

The basic analysis procedure that Creswell suggests can also vary depending on the related theory employed and the style of the individual researcher. Dey (1993, cited in Creswell, 1998) suggested that qualitative research ‘‘learn by doing’’ and adapt their research approach in an intuitive, soft and flexible manner. This means that the strategy of analysing qualitative data is adaptable during the course of the research, allowing the data to lead the development of emerging and unexpected theory. Seale (2004) suggests that this systematic approach of organising, coding and analysis methods may help to add validity to qualitative data.

3.3.4.2 Computer-assisted analysis of qualitative data

Further attempts to help the qualitative researcher to understand their data is the development in computer-assisted analysis software. These types of software often provide assistance in organising and managing the complex and voluminous data, and, in turn, release time for the researcher to concentrate on analytical work. Today, it is common for social researchers to involve computer software such as Ethnography or NVivo. The employment of such software has been considered in this research, and the further strategy of utilising computer-assisted analysis in this research project is discussed in the following chapter.

Through this analytical process, important and interesting theories or insight can be generated. However, it is also important to devise ways of developing and testing these ideas.

3.3.4.3 Data analysis and evaluation of this research

The aim of the data analysis in the process of this research is to produce a rich description of stories that are informative, inspirational and, most importantly, trustworthy (Lincoln and Guba, 1985), from the perspective of qualitative research and for designers.

Data analysis in stage one

- To organise and manage data
- To read through the data
- To Carry out coding
- To create categories or themes for analysis
- To advance how these themes will be used to formulate the narratives
- To carry out peer debriefing (this concept is explained later in the section ‘trustworthiness of this research’)

This research also adopts a standard analysis process of qualitative research. As Creswell suggested, the complex sources of data generated from home probes, semi-structured interviews and video ethnography are firstly organised in preparation for data analysis. The analysis starts at the beginning of the data collection with the support of materials generated from the field observations. In order to increase the efficiency and manageability of the large volume of the data, computer-assisted software will also be introduced. In the next chapter, data organisation, management, analysis strategy will be discussed in detail. Peer debriefing is also introduced at the end of the preliminary analysis in order to establish credibility, dependability and conformance with the research process.

3.3.4.4 Creative workshop

The introduction of a workshop is designed to facilitate opportunities to establish the ‘trustworthiness’ (Guba, 1981a, cited in Lincoln and Guba, 1985) of the research process and, more importantly, the usefulness of the research outcomes. The technique of involving other peers in the data analysis and representation process is to allow the findings to be seen in other perspectives outside of the researcher’s and, in other words, to add credibility to the research findings.

The technique of a creative workshop is to facilitate opportunities for, firstly, evaluating the results of the analysis, in terms of the process and representation of the data; secondly, it is designed to utilise the data and generate ideas from the data presented in the brainstorming session (de Bono, 1982). The concept of the brainstorming session is defined by Alex Osborne. It has since become a much used technique to facilitate creative discussion and design thinking in various professional fields. It is also important to note that the purpose of brainstorming is to generate new ideas, not to evaluate the old ones (ibid).

A small group of design practitioners from various disciplines, who have knowledge of or are aware of the issues in the field of the home environment, will be invited to participate in this workshop. They are invited to join a group that assembles a new product development team to generate ideas based on the data provided in the workshop. This also facilitates an opportunity for the researcher to observe the use of the ethnographic information in a real setting. The observation of these sessions, from the perspective of the researcher, is designed to evaluate whether the data is usable, useful and can be used to inform the process of design.

Many techniques can be used in the session of a creative brainstorming workshop. Here, in this research, the data will be introduced in the workshop in three formats, namely, stories, themes and categories of the analysis, and audio-visual recording captured in the field. As the main representation is in the format of a narrative, it is considered most appropriate to use a storytelling technique to present the stories identified by the research. The process of the creative workshop in the second stage of the data analysis and evaluation is presented below.

Data analysis and evaluation in stage two

- Presentation of preliminary analysis and representation technique in an informal workshop. This pilot aims to test themes, categories and ideas.
- Peer debriefing will be introduced after the pilot workshop. The feedback from the workshop is debriefed with two academic researchers and advanced analysis is carried out in response to the feedback.

- A formal workshop is conducted. In this session, a group of design and healthcare practitioners are introduced to the research background, stories generated from the field, visual storyboards with quotations from the analysis, ideas and categories of the analysis, and a video interface to support the stories.
- After the workshop, an interview-based questionnaire will be introduced to the workshop participants to give feedback on the outcomes of the workshop.

The process of the workshop is also a strategy to involve peers in the research process. The researcher is the facilitator of the workshop and does not intend to participate in the discussion. The participants of the workshop take part in brainstorming sessions to use analysed data in a creative process of producing new ideas and concepts for new product development. More significantly, this process actively involves external peers to evaluate the analytical approach of the data, the representation of the data and the ‘trustworthiness’ of the findings. After the workshop is completed, the workshop participants will be contacted by the researcher on a separate occasion. Time is given to the participants to reflect on the experience of the creative workshop.

This workshop will be used to inform the development of a new design tool which will be discussed in detail in chapter seven.

3.3.5 Data interpretation and representation

Analysis of qualitative data is an essential process that leads towards an understanding of the meanings within the researched field. It is, however, important to know that this analytical process does not always lead towards theory generation. Development of descriptive information or explanations of a particular phenomenon about the life stories of an individual, group or organisation can also be very valuable and “provide us with knowledge of cultures hitherto unknown, and thereby shake our assumptions about the parameters of human life or challenge our stereotypes.” (Hammersley and Atkinson, 1995, p. 207)

The aim of this research is to provide an in-depth account of older users in the natural setting of older housing. To reflect on the purpose of the first research method, the cultural probe, it is suggested that the aim of this research is also to open up new thinking in the process of design research, by emphasizing the importance of both research designers and their participant users in the process. It is, therefore, also important to recognise that this analytical process does not end when the data collection and analysis are completed. Rather, it is a continuous process that involves the designer of the research and the user of the research to develop further interpretation about the subject. Therefore, the representation of findings not only plays an important role in describing what really happened in the field, but also plays a critical role in informing the users of these findings; in the case of this research, the designers who wish to understand older users in the setting of older homes.

3.3.5.1 Development of a design tool

The representation of ethnographic data is also used to inform the development of a design tool. As identified in the literature review, there is a lack of product strategy for the development of smart homes (Mozar, 2005).

The investigation of the home, as this research identified, has a great potential to help the designers to understand some of the important meanings in the home. Nonetheless, little progress has been made towards translating real world concepts into useable and useful smart homes (Davidoff, 2006). Furthermore, to develop new products such real world information is required. It is suggested in this research that a design tool can help to translate qualitative information and bridge the gap between the real world stories and the process of creating new ideas for design.

Radical innovation requires qualitative information to inform the process of development as suggested by Fulton-Suri (2009). In relation to the use of ethnographic information generated from this research, it is therefore useful to maintain the use of descriptive qualitative information for the purpose of innovation. While writing from the perspective of the ethnographer, this descriptive information can also have the potential to help the reader (designer or

developer) to understand and challenge the perception of the part of the world this research intends to convey, through real life stories told by the participants of this study. As a result, the first criterion for creating a design tool is based on this perspective.

The second criterion is formulated based on the ideas and themes derived from the field research. These ideas are seen as an important link to the original data generated from the field. These data include quotations from the audio transcripts, photographs and replies to the probe. These links to raw data may also serve as a way to bridge the real life stories to the process of new product development, for example, for the idea generation stage.

As Janesick (in Denzin and Lincoln, eds., 2000) suggested, the process of research is an on going analysis of data. Furthermore, in the naturalistic inquiry, planning and implementation often influences the process of the inquiry. Hence, the development of the tool relies also largely on the development of the data collection, analysis and representation at the later stage of this research. It is therefore difficult at this stage of the research to finalise the structure of the tool, although a foundation of such a tool has been established according to the nature of qualitative and ethnographic research, as well as for the use of design developers. In the next chapter, the design of each research method is discussed in detail. The development of a sensitising tool is formulated after the end of the data collection, analysis and evaluation at the end of this thesis.

3.3.6 Validity and reliability

The subjective nature of the interpretivist's approach is often questioned for reliability and validity, particularly from a naturalist's point of view. However, the issue of validity and reliability in qualitative research is different in comparison to quantitative research, as argued by Janesick (2000 in Denzin and Lincoln, 2000).

3.3.6.1 Internal validity, external validity and reliability

From the traditional scientific approach, the validity of a research project can be examined from internal as well as external perspectives. Internal validity describes, particularly, the testing of a casual hypothesis of a scientific inquiry;

causality is the notion that, “an independent variable is expected to produce a change in the dependent variable in the direction and of the magnitude specified by the theory” (Nachmias and Nachmias, 1996, p.103). External validity is described as, “the extent to which findings can be generalised beyond the research project” (Dane, 1990, p.149) and to larger populations. This is validated by the representative sample of the research and the reactive arrangement of the research process. This means the experimental setting of the researched situation does not reflect the situation the research intends to generalise. The procedure which the researcher takes to react to the situation would become a significant influence to the validity of the research.

In terms of reliability, it is concerned with the consistency, dependability, stability or predictability of the research (Kerlinger, 1973, cited in Lincoln and Guba, 1985). The objective is to test the reliability of the research process on different occasions to determine whether same results can be produced. “The goal of reliability is to minimize the errors and biases in a study” (Yin, 2003, p.37) and “precondition for validity” (Lincoln and Guba, 1985, p. 292).

However, this scientific notion of comparison, manipulation and control in the name of internal and external validity is often questioned by the qualitative researchers as not only is the methodological approach qualitative research fundamentally different from the scientific approach of a quantitative research, but also the aim and proposed claim of such research approaches are fundamentally different from quantitative ones. This is why some qualitative researchers rarely consider the issue of validity, reliability and generalisability (Seale, 2004, p.76). Rather, it is the credibility (Janesick, in Denzin and Lincoln eds., 2000), quality and the authenticity of the research that should be addressed.

3.3.6.2 Trustworthiness and authenticity

Traditional positivists’ employment of internal and external validity can be replaced with terms such as ‘trustworthiness’ and ‘authenticity’ in the view of the constructivists according to Lincoln and Guba (1985). Qualitative research does not aim to generate a representative sample and understanding of a larger population. As Greene and Caracelli (1997) illustrated,

“In fact, the value of qualitative research lies in the particular description and themes developed in context of a specific site. Particularity rather than generalizability (Greene & Caracelli, 1997, cited in Creswell, 2009, p.193) is the hallmark of qualitative research.”

Originality and discovery is more important in qualitative research. In other words, it is not the goal for qualitative researcher to claim holistic understanding of a subject. Rather, the real value and contribution of such approach can be discovered in the thoroughly partial understanding of a complex subject. More, as Janesick (ibid) argues, that the use of language derived from a quantitative tradition, such as generalizability, reliability and validity, is not all appropriate to examine the aim of an interpretivist’s inquiry in the first place.

“Trustworthiness” as described by Lincoln and Guba (1985) questions the “true value”, “applicability”, “consistency” and “neutrality” of research. It can be assessed by “credibility”; by exposing oneself to disinterest peers to explore aspects that are outside of the inquirer’s knowledge. “Transferability” assesses whether the identified context can be transferred to a similar context. For this criterion, the inquirer is expected to produce sufficient information about the researched so anyone can have a base to pass judgement on the information gathered by the inquirer. Another technique to assess the trustworthiness of a research is “dependability” and “confirmability”. The former evaluates the appropriateness of research steps and methodological development, which may involve an external auditor. The latter can be established using an audit trail or triangulation.

For instance, field research methods, such as ethnography or a qualitative interview, require the researcher to spend a considerable amount of the time in the field. It uses rich, dense description to convey the findings. Therefore, the research is more likely to be assessed as to whether this field research produces ‘credible’ results and if the research development is ‘dependable’ or if the findings are ‘transferable’.

3.3.6.3 Trustworthiness of this research

The issues of validity and reliability have been introduced in a different light in qualitative traditions in the previous discussion. Accordingly, the contribution of the particularity of a research produced can be assessed according to ‘credibility’, ‘transferability’, ‘dependability’ and ‘confirmability’ according to Guba (1981a, cited in Lincoln and Guba, 1989). Instead of internal validity, external validity, reliability and objectivity, the criteria for a qualitative research in this research focuses on the ‘trustworthiness’ of the knowledge produced.

Several tactics are employed at each research phase. These tactics were employed to ensure the quality of this research and the design is examined thoroughly. The trustworthiness of this research can be evaluated according to the tactics that have been implemented in the research design and process. Here, the ‘trustworthy’ strategy is established in three areas. They are research design, data collection and analysis, and data representation.

Research design

In the phase of research design, three tactics are selected. Firstly, the technique of methodological triangulation (Denzin, 1979, cited in Denzin and Lincoln, 2009) is employed. This tactic utilises three research methods, namely culture probe, semi-structured interview and video tour, in order to triangulate rich descriptions of the field. Secondly, the research process takes place over the period of two months. This tactic is to allow time to engage the participants and reflect on research design, data collection and analysis.

Data collection and analysis

In the phase of data collection and analysis, the purpose is to address the issue of ‘trustworthiness’ to ensure that not only have the collection and analysis of data been carried out rigorously, but also to demonstrate that the process of the research design has been reflected thoroughly at each stage.

Lincoln and Guba (1985) and Yin (2003) both suggest that, by carefully documenting the research process, one can demonstrate the rigour of the research by also carefully documenting the process of observation; such documentation can

be generated in the format of field journals, and day-to-day or personal logs. In this research, the first step is therefore to document the research process from the beginning of the research design, planning, communication with the participants, analysis approaches and representation of data and so forth. It is carefully recorded for instance, in a research journal, field memos, recording of field visits, transcripts of field visits, as well as in the documentation of visual imagery, such as photographs and drawings produced by the participants.

The second tactic to address credibility in this research phase is to involve a rigorous process to evaluate each of the research steps and analytical approaches. Six evaluative phases are introduced. The main tactics describe the de-briefing (Lincoln and Guba, 1985, p. 283). Peer debriefing is a one of the techniques to establish the credibility of research as Lincoln and Guba (1985) describes,

“It is a process of exposing oneself to a disinterested peer in a manner paralleling an analytic session and for the purpose of exploring aspects of the inquiry that might otherwise remain only implicit within the inquirer’s mind” (Lincoln and Guba, 1985, p.308)

The peers are invited to probe into the design, process and detail of interpretation and, in a sense, reinforce the importance of ‘honesty’ during the research process. This research invites peers of the professional academic community held at periodic intervals. The process of establishing ‘trustworthiness’, including the use of peer debriefing techniques, is illustrated below:

- (i) Firstly, the initial study with the ‘cultural probe’ method will be carried out in the pilot study with potential participants. Upon the return of the materials, the participants will be interviewed not only for the purpose of data collection, but also for feedback on the procedure and design which researcher has proposed. The evaluation takes place in this first phase of the data analysis process.
- (ii) Secondly, once data is collected, the initial analysis of data is debriefed to two external peers in the design research community of Brunel University. This peer debriefing (Guba, 1981a, cited in Lincoln and Guba, 1985) tactic aims to minimise the research investigator’s bias.

- (iii) Thirdly, the outcome of the data analysis is then formulated and presented in a pilot workshop; an informal workshop to assess the representation of data before the formal workshop. This is aimed at evaluating whether the representation of the data shows a degree of authenticity of the field research and seeks feedback from a small group of design postgraduate researchers.
- (iv) Feedback from the pilot workshop will be employed accordingly. The data then is debriefed to the peers before presenting in the formal workshop
- (v) Two groups of design and healthcare professions are invited to the workshop to evaluate the research findings. At this stage, the outcomes of the analysis and representation of data is evaluated.
- (vi) At the end of this evaluation process, the participants of the workshop will be interviewed to give feedback on the data presented in the workshop.

To summarise, the process of data analysis is examined in six stages. At each stage, peers in the area of academia and design professions have been involved to ensure that the process of the results of this research is credible, dependable and confirmable for the purpose of developing new ideas for new product development.

Data representation

To address authenticity and trustworthiness in the phase of data representation, it is important to ensure that the rich and thick description of each of the stories generated can convey the essence of the research findings (Creswell, 2009). At this stage in particular, it is the quality of the data representations that are assessed here. The participants of the workshop will be offered a variety of presentation of the findings through storyboards and visual materials, produced by the 'probe' participants. Other materials generated from the field research are also supplied by an installation of a multimedia interface. The researcher uses a storytelling technique to present the data in the setting of the creative workshop. The aim is to create clear links between the use and representation of each raw data and, more importantly, to demonstrate how they are formulated. For instance, audio transcripts of semi-structured interviews and video ethnography are also

employed in the representation of data. By quoting segments of transcript that are most useful in describing the field issue discussed, the strategy here is to let the voice of the participants be heard and 'feel' of the environment be seen.

The aim is to identify these experiences and contribute to the understanding to inform designers of new products. The priority of this research therefore focuses on crystallising the life experiences of these participants using tactics employed in the field of qualitative research.

3.3.7 Research ethics

Research often involves collecting data from people (Creswell, 2009). It is therefore natural to raise several issues in regard to ethics. Research ethic guidelines (Brunel University, London) were considered in this study.

The bullet points below illustrate the conditions with which the guidelines and procedures of ethical conduct of this research is concerned:

- This study intends to recruit volunteers of older adults aged 50 and over, both male and female.
- The participants were recruited through networks of the members of the staff as well as through students
- The study will take place in their home environment.
- The participants were contacted four times over the period of a month. This comprises: (i) briefing of the study (ii) during the study (iii) and when the data is collected (iii) on the date of the semi-structured interview and video tour.

Before the participants engage in the study, they will be given an *informed consent form*; this provides the potential research participants with all the information necessary to make a decision concerning their participation (Dane, 1990). This form informed the participant about the identity of the researcher, the sponsoring institution, the purpose of the research and the type of participation involved. The participants were also guaranteed confidentiality and assured that, if they wish to withdraw, they have the right to do so. The participants were also supplied with the contact of the researcher should any questions arise.

The participants were met and briefed by the researcher in person. The informed consent form was issued on location.

The first research method, cultural probe, involves the task of completing questions in writing and drawing as well as taking photographs. The second and third methods take place in the home of the participants. The researcher asks for the permission of the participants before the study takes place. They were also informed that any audio or video data documented during the semi-structured interview or video tour would only be used for the research purpose of the study only. If, under any circumstances, a need of demonstrating the data to a third party should arise, the researcher would consult the participants for permission.

3.4 Chapter summary

The cultural probe inspired the approach of qualitative research to address the particular question this research has identified. This chapter explains the emphasis on the quality and values of qualitative data and its potential role in the research and development process of new product development.

To identify meanings in the social world of older adults in older housing, semi-structured interviews and video tours are employed to develop insights opened up by the ‘probe’, in the dialogue between the researcher and the participants on the subject of the home. The multi-layered process of interpretation and expression is supported by these two research methods by adding the important dimension to the task of interpreting the meanings. The participants and the researcher have an opportunity to interact with each other in the natural setting of the home. This encounter also significantly facilitates a co-creating process of interpretation and expression.

The design of three research methods helps to triangulate and, more importantly, crystallise the phenomenon of the investigation. To demonstrate the ‘trustworthiness’ of this research, this chapter also discusses how each research stage addresses the issues of credibility, transferability, dependability and

confirmability in such qualitative research. In the last section, the ethical issues involved in this research are also addressed.

The main discussion in this chapter explains the philosophical, theoretical, and strategic approach of this research. It illustrates the processes and stages which this research takes in order to address the research question. Each research method is selected according to its strength and benefits in addressing the problem of the investigation. Each method also has a weakness that requires support from other methods. The research design addresses specifically a strategic approach to apply social research methods for identifying ‘meaning’ for the purpose of new product development. The ambition of this research is to demonstrate that a method, such as the cultural probe, can benefit from a crystallising process using methods such as the semi-structured interview to enhance the quality and ‘uncertainty’ Gaver et al (2004) stressed in a new technology development process.

However, it is also the emphasis of this research to stress that the qualitative methodology does not intend to claim a holistic understanding of a social phenomenon. Rather, it is proposed that such crystallised insight (particularity of an aspect of a social world) can help to challenge the existing perception and knowledge about the world.

The multi-layered and multidisciplinary approach to identifying insight is an alternative to truly open up possibilities for design, and, more importantly, leverage the position of both the design researcher and the participants of the research. In the next chapter, the details of the design of each research method are discussed. This is followed by the discussion of the data analysis and evaluation. The development of the findings then leads to the development of a new design tool for new product development.

CHAPTER 4

METHOD DESIGN AND DATA COLLECTION

4.1 Introduction

Three research methods have been identified in the previous chapter to investigate the existing home environment of older adults. The formulation and the structure of the research design illustrate the framework of the research and the purpose of selecting each method. In this chapter, the details of the designs, process and strategy of deployment are discussed. This chapter addresses the objective four and five of this research, ‘To develop a user-oriented and –participatory research method and process’ and ‘To investigate, using the developed tool and process, the lives and homes of older adults in the UK’.

In the first section of this chapter, a pilot study on the design of the home probe is presented. This was carried out to inform the design of the formal ‘home probe’. A detail account of design of the ‘home probe’ is presented in this first phase of the data collection. The second phase of the research, the design of semi-structured interview and process are discussed. Finally, the third phase of this research, the design of the video ethnographic technique in the form of a tour is illustrated.

4.2 Home Probe

The pilot study is designed to test the design and the questions pose in the home probe. Before the formal home probe is deployed to the participants, the pilot sessions help to identify directions and the ‘tone’ of the probe. Several research questions have been posed in response to the main concerns of this research, the concept of the home and the existing way of living. As discussed in previous chapter, the cultural probe method is adopted for the following considerations:

- It is suitable for use in a private setting (i.e. home)
- It is suitable for use for investigating private and intimate subjects
- It can provide a starting point for an on-going dialogue

- It can facilitate a conversation about the concepts of the home and allow engagement of further in-depth research methods, such as the home interview and video ethnography with the participants.
- It encourages the exchange of opinions via visual and textual means

4.2.1 Pilot study

The purposes of the pilot study were to 1) Refine the scope of the research context, 2) Refine the design and content of the probe, and 3) to examine the sampling strategy of this research.

Previous research in the field of Human Computer Interaction has addressed the topic of home relating to family life, in the care setting and technology in the home. In this research, the topic of research is informed by the main concern of this research, namely the existing and older housing. More uniquely, this topic places an important emphasis on the lives of older adults in these environments. In detail, the topic intend to address the concept of the home, material objects in relation to the home environment and sensory experiences, from both physical and metaphorical perspectives.

The pilot probe is designed following a similar format of the original cultural probe. There are postcards, photographing tasks and a diary. In addition to the original design, a task booklet and a treasure map are included. These five items were assembled in a folder (Figure 4.1) with a supply of pens, a magnifying glass and a digital camera to assist with the tasks.



Figure 4.1 Picture of the pilot home probe

The design of the home probe also aims to be as open as possible as the cultural probe. It involves various ‘probing’ techniques to probe into issues of ‘home’, objects around their home and their experiences in the environment. The pilot probe is also designed to test the format, the length of the study and the communication methods between the researcher and the participants.

4.2.1.1 The design

Format

The format of the probes plays an essential role in introducing the research topic to the consumers. The use of formats, such as postcard and diary, that are familiar to everyday life, is a strategy to reduce the formality of a traditional survey questionnaire and encourage responses from the participants. In comparison to the traditional scientific approach, where the participants are the passive subjects of study, the home probe intend to encourage the participants to express themselves, with different probes, in a familiar yet unfamiliar way.

The participants can also express their opinions with written words and drawings, as well as photographs. These materials can help to add richness and depth to the qualitative data. The components of each home probe are illustrated below.

Postcards

The postcards are a starting point of the conversation on the topic of the 'home'. The questions are not organised in a chronological order. They jointly address the main issues mentioned above. For example, 'what object(s) in your home makes you feel 'at home'? ' addresses the feeling of home and their relationship to objects. The question, 'You are a wizard, imagine you have a magic wand. Now is your chance to give your favourite object (s) a magical property. Tell us what it would do.' encourages the participants to be imaginative. Another question, 'Your future portrait...' investigates their aspirations. There are eight postcards in total. The questions are shown below (Figure 4.2)



Figure 4.2 Part of the pilot home probe – Eight postcards

Questions:

- What object(s) in your home makes you feel ‘at home?’
- Tell us a story about your most comforting thing, for example, how you acquire it, how do you feel to own it?
- Tell us story about you (the one which is most important to you)

- Your future portrait. Describe how you'd like to see yourself in the near future. Draw a picture of the image (Use both sides if you like). If don't like to draw, please describe using a minimum of three words
- You are a wizard, imagine you have a magic wand. Now is your chance to give your favourite object (s) a magical property. Tell us what would it do
- When you travel locally or far away, who do you like to travel with? And what do you always take with you?
- The best sounds I heard today
- What can you do to help saving the planet? Will it work?

The postcards are one of the original formats that Gaver, Dunne and Pacenti (1999) used to communicate their research questions to their distant participants. Although there are no such geographical barriers between the research author and the participants of this research, the design of the postcards pose as an reminder to the participants, asking them to re-examine their surroundings, while simply portray as familiar objects of everyday life. The postcards have been prepaid for the participants to return during the period of the study.

Picture Book

The Picture Book asks participants to take pictures in their home. The main purpose of this task is to obtain visual responses from the participants other than written descriptions. This gives a richer picture of their surrounding objects and environment. The questions are listed below (Figure 4.3).

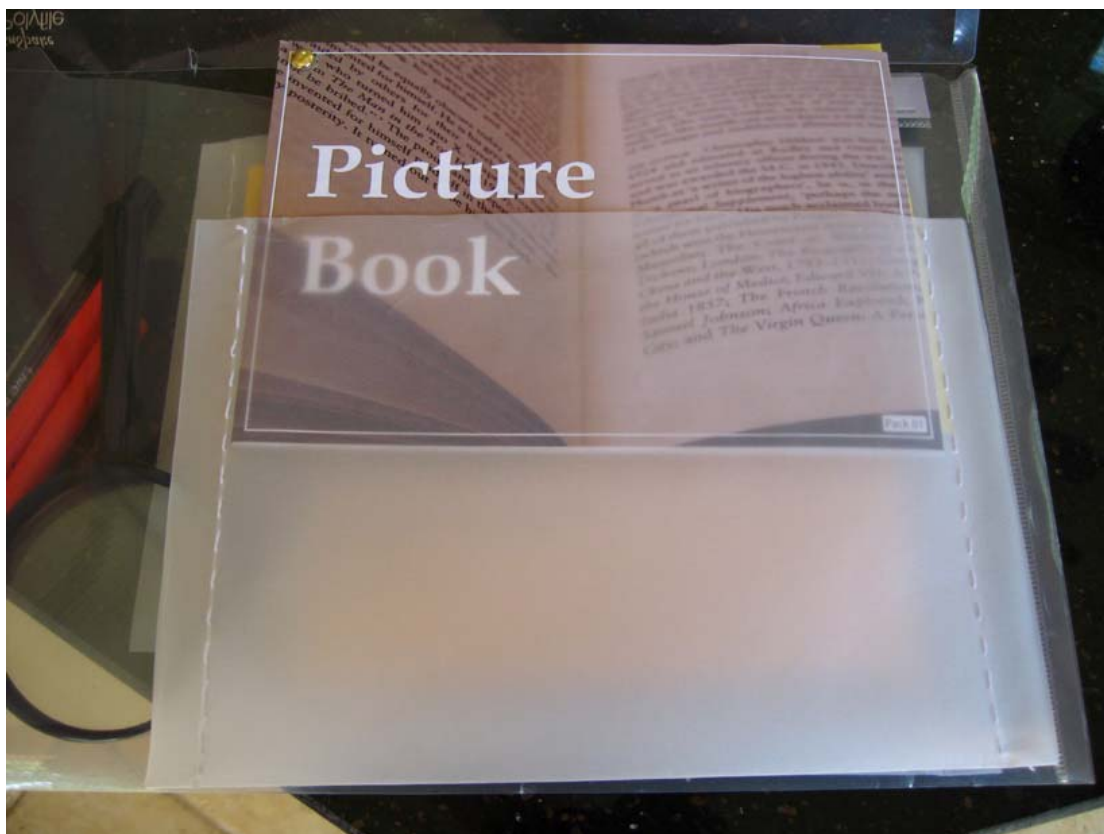


Figure 4.3 Part of the pilot home probe – the Picture Book

Questions:

- A portrait of your home: Tell us about your home, why you love or hate it. Describe your relationship with your home as if it was a person and take pictures of him/her
- Absence makes the heart grow fonder: Look around your homes, take pictures of things that you cannot live without
- Things of you: Look around your home, take pictures of things that represent you
- A little bit of help: Show us things that have been brought into your home in recent years that make you feel good about yourself
- Cut / Paste: Use this as your scrapbook, paste anything you like or you don't like here: Be happy / be grumpy

Originally, a digital camera was issued with the probe pack. Some participants prefer to use disposable camera because they were not very confident with using unfamiliar equipment. A disposable camera with a flash function is offered as an alternative. The photographs were collected by the author at the end of the study.

The participants were not asked to process the photographs. In addition, the processing time for the disposable cameras requires an interval visit between the collection of the probe and interview.

The use of visual materials in ethnography research is common nowadays. The purpose of the 'Picture Book' is to capture glimpses of the participants' life.

The Book of House Work

'The Book of House Works' (Figure 4.4) investigates the domestic environment and activities within, for example, the everyday routine (e.g. House post-it) and the embodied experiences within the environment (magnify, smell, and blindfold). The purpose of these tasks is to ask the participants to reflect on their home experiences that have become mundane.

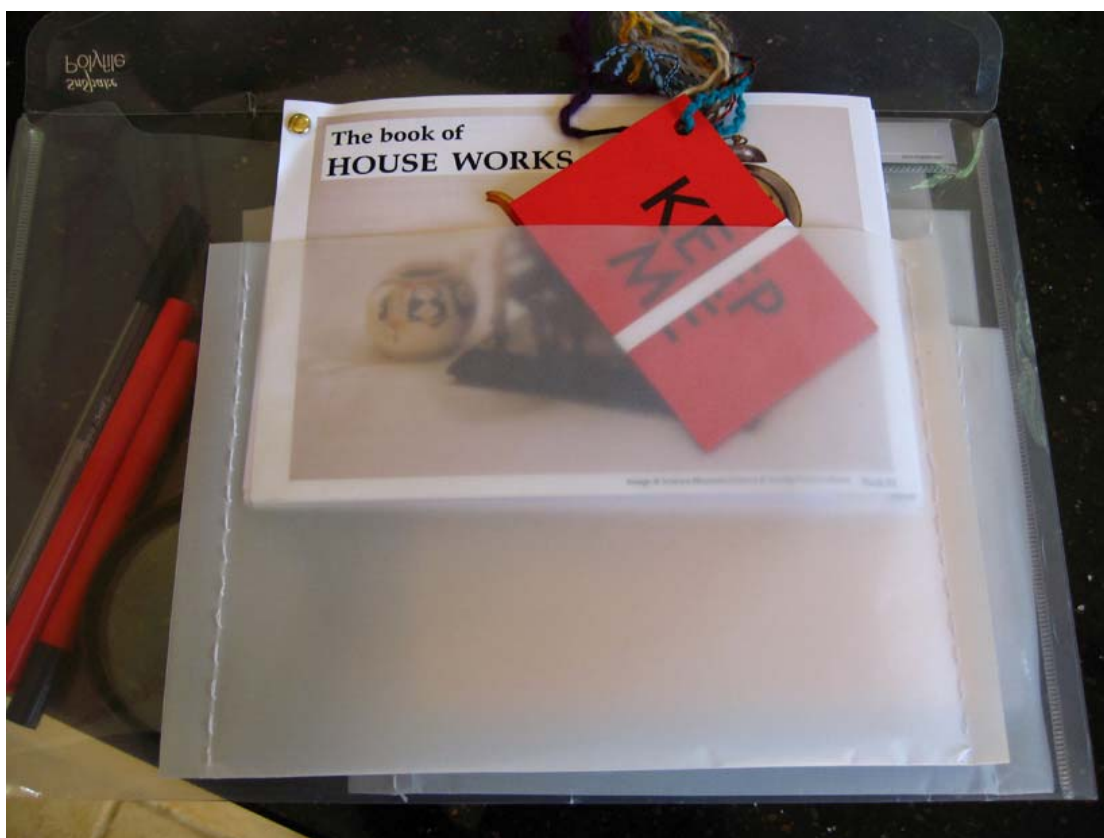


Figure 4.4 Part of the pilot home probe – The Book of House Work

A treasure map is also included in the book. It asks the participants to draw layouts of their daily routine in the household. The map encourages the participants to re-examine their routine within the spaces of their home.

Questions:

- House post-it: We go about our everyday activities without much thinking. We do occasionally remind ourselves of things to do. Use the yellow post-it to write down your things to do and post them back on this sheet
- 60 minutes make over: If you have a chance to have a 60 minutes make over, what would you keep? Use the little red cards provided and take a picture of what you decided to keep.

(The concept of the 60 minutes make over was inspired by a British daytime television programme. In this programme, one household is redecorated in 60 minutes by a group of professional decorators. Before the redecoration starts, the participant of the programme is asked to leave red cards 'Keep me' to keep things that are important to them. For example, some participants choose to keep nothing but sentimental objects such as picture frames. Some choose to renovate the whole household. The marked objects are kept and re-displayed in the freshly decorated home. For the home probes, participants were asked to use red cards 'Keep me' provided and take photographs of these marked items.)

- Magnify: Look through the magnifying glass. There are images, textures, colours and words that you love in your home. Use the magnifying glass to get a good look at them and take pictures through the glass.
- Smell: 1. Write down your favourite smells in your home on a little piece of paper. 2. Put them in the jar provided
- Blindfold: Taking care to be safe, close your eyes and listen, smell and touch your surroundings. Then write down what you 'feel'. Be careful!
- Treasure map: 1. Draw a map of your home, roughly where your rooms are 2. Mark out with the red marker, where your journeys take place. 3. Write down what your activities are and tell us your reasons

Participants can write down their responses into the pages of this book. Props were provided to assist in the tasks. Unlike the Picture Book, participants reply mainly in writing apart from the task '60 minutes make over' task which requires the participants to take photographs. 'The Book of House Work' emphasizes the familiar experiences and activities surrounding a domestic household. It also doubles as a log book of the experience activities. The request for the participants to document their experiences of actions actively in the book poses a challenging concept to them.

Treat yourself diary

The treat yourself diary (Figure 4.5) is designed to investigate the idea of comfort and relaxation in the home environment, as pointed in previous research (Haines, et al., 2007). The diary re-examines issues identified relating to activities of comfort and relaxation. The questions are, 'what have you decided to do? Reasons? How do you do it? How do you do it? And where?' Participants are also asked to rate the scale of their 'treats' with red stickers.

In total, twelve pages were supplied for the study period of four weeks. The participants were encouraged to reply in writing.



Figure 4.5 Part of the pilot home probe - Treat yourself diary

4.2.1.2 The process

Recruitment of participants

A snowball technique is used to recruit participants for the pilot Home Probes. This technique is discussed in the previous chapter (section 3.3.3.3 & 3.3.3.4) Family friends and work colleagues over the age of 50 were invited to participate in the pilot study of the home probe. One other important purpose of piloting the probe is asking the participants to evaluate the design of the home probes.

The study was carried out mainly in the South East area of the United Kingdom. Four of the probes were introduced in person by the research author. Only two packs were delivered by a third person.

Time frame

The pilot study took place over a period of four weeks. An instruction was provided to give guidance on the tasks. The participants were asked to return two postcards over the four- week period. Other tasks such as the 'Picture Book' and

'The Book of Housework' were designed for the entire period of the study. At the end of the fourth week, the packs were collected by the researcher in person.

Instruction

There was an instruction for each probe. It detailed the components and props for each task and describes how to complete it. The design of the probes were not explained in detail. This tactic was aimed at leaving spaces for participants to explore the home with their own interpretation.

Deployment

The pilot study of the home probes began in September 2008. Most of the probes were given to the participants by the author in person. The participants were briefed on the content of the pack, as well as the purpose of this pilot study in general.

4.2.1.3 Findings and evaluation of the pilot study

During the study, the participants were encouraged to complete all tasks. At the end of the study, they were visited and interviewed by the author in their homes. A feedback session on the design and the content of the probes was carried out at the end of the interview. This was aimed to evaluate the overall execution of the probes, as well as the appropriateness of the questions.

This semi-structured feedback session was organised by, firstly, questions in regards to the location and the time of when the participants contribute to the probe tasks, following by the overall time scale, quality of the probe and the design of the tasks involved. The feedback session concluded with questions regarding the wording, phrasing and imagery (See Appendix F for the questionnaire).

The finding from the pilot is used to evaluate the openness, the provocative and engagingness of the probes. In the interview session, the participants were asked about the answers they have given in response to the probe questions. These were all documented with a voice recorder.

The summary feedback of the pilot study is discussed below, namely the time scale, the design of the probe, wording and phrasing of questions and the use of visual imagery as well as the outcome of the probe on its return in this pilot phase.

Time scale

Most of the participants kept the probe pack in a busy location of their household, although many expressed that the probe was not one of their priority 'chores' among other everyday activities. For example, Len kept his pack on the dinner table with his other letters and files that to be addressed.

Compared with the traditional self-completion questionnaire, the probe tasks asked the participants to engage the research process by describing their environment through each probe task and documenting it according to the design of the tasks. In this phase, the role of the researcher / probe designer is to encourage the participant to take part in the probe task. It is important also to leave the participants space and time to carry out tasks and reflect on the questions, as observed in the pilot study. This seems to open up more space also for discussion in the semi-structured interview session later on.

The length of time required to complete the probe tasks raised questions among the participants. This challenges the purpose of the probes as well as the design of methods for this research in general. As a result, several suggestions are made.

- For some participants, they reflect that this type of survey could be almost time-irrelevant for them. Some participants express that in the probe interprets their everyday activity and environment because it is alien to their routine. As a result, some of the tasks were not completed during the period of the study. The participants however felt happy to give their answers in the interview session because it can be done in a relatively short space of time.
- An interval phone call was made during the probe study. The purpose of the contact was to motivate the participants. Although the participants were generally inspired by the method and were interested in participating in the first place, the tasks of completing the probes become a little

burdensome towards the end of the weeks. This confirms the requirement for research strategy to include other methods such as the semi-structured interview.

The design of probe

In relation to the design of the probe, several issues were identified. The data generated from the pilot probe was ambiguous and required effort in interpreting 'meanings'. Participants generally found it difficult to complete tasks that are more complicated. They felt many probe components were interesting, however, it was challenging for them to keep track of various components. In general, there was a need to:

- keep the format simple
- consider a more consistent format. More organised formats may help the participants to interpret the tasks
- avoid complex instructions
- avoid similar and overlapping questions.
- employ only necessary props to assist with the tasks. For example, a magnifying glass is not very easy to use with camera, especially when taking close up pictures. This task could be simplified by replacing it with the macro function of the digital camera

Wording and phrasing of questions

The pilot study also aimed to address the design of the questions and how they are posed. The result of the pilot home probe suggests that:

- Open and ambiguous questions often lead to more interesting feedback and discussion. It is important to give space for interpretation and leave the role of interpretation to the participants. The designers have openly presented their view on the subject of the home with the design of the home probe, thus it is the user participants' opportunity to interpret the questions and answers however they consider appropriate.
- Interestingly, two of the participants, Hilary and David, made a remark on the word 'probe'. They found the word 'probing' into their private space of home a little intrusive.

- The result of the pilot probe also suggested that a further interview session may be helpful for eliciting further responses.

The use of imagery

There is a positive response to the imagery presented on the pilot postcards and other elements of the probes. The research author briefed the participants about the concept of this research and avoided giving suggestive instructions on how to interpret the imagery. This approach to open interpretation gives the participants freedom to interpret the image content. It also facilitates an opportunity to discuss with the participants in the interview session regarding the imagery chosen. The result led to interesting conversations between the design researcher and the participants regarding the 'home'.

Imagery with retro or little historical references and images of common everyday objects for example were used. The selection of imagery is based on the author's interpretation of the subject questions. The selection and design of the images intend to reflect the design influences of the original cultural probe.

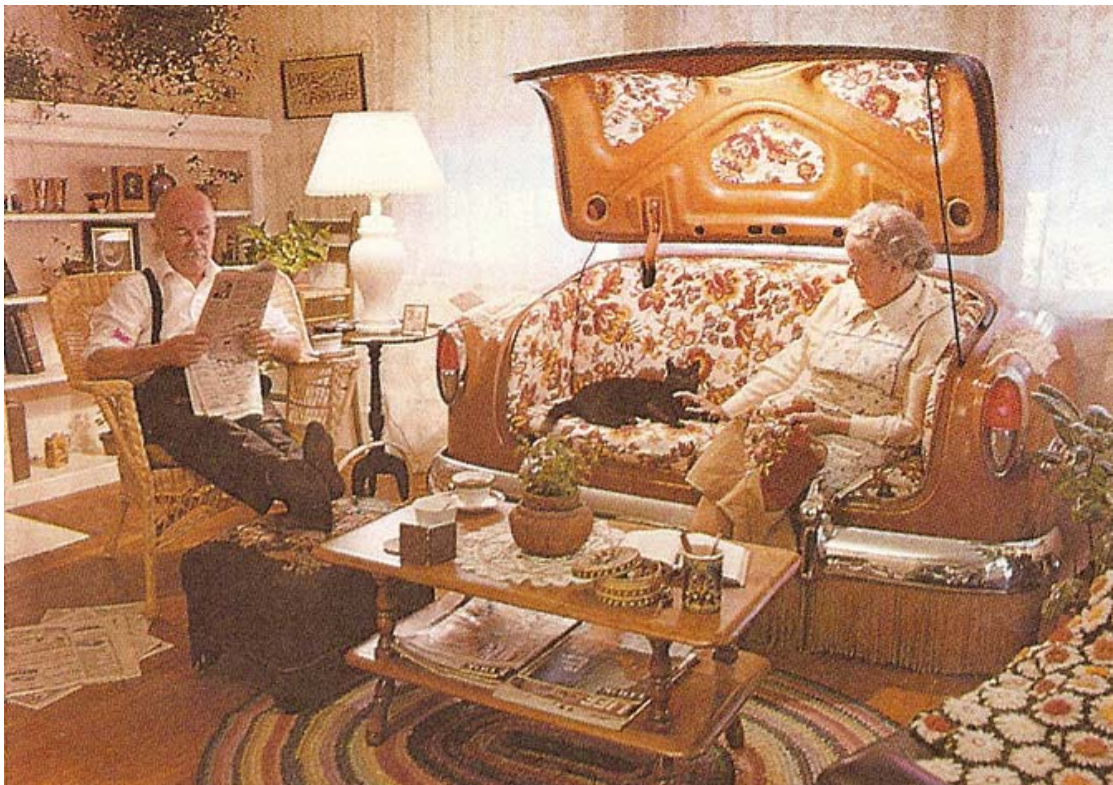


Figure 4.6 An image used on one of the postcards. The copyright of the image belongs to Philip Garner, produced for the 'Better Living Catalogue.

With the best intention, the imagery served as a medium to encourage the exchange of opinions on subjects that are hard to grasp by written descriptions during the pilot study.

Evaluation of the sampling strategy

The sampling strategy targets a wide background of people over the age of 50. The pilot study set out to also examine this strategy. Non-probability sampling strategy is employed in the pilot study. The participants were recruited through family and friends networks. As a result, different backgrounds of older adults participated in the study. The background of the pilot participants are described below.

Flora and Simon have built their dream home and moved into that home about four years ago. They are semi-retired.

Brigitte has two homes, a family home where her husband and children live, and a place she stays while she works away.

Hilary and Malcolm have owned her home with her husband for more than 25 years.

Len owns a family home for a little longer than 2 years.

David lives with his partner. He rents his house through private landlord.

In brief, the pilot study helped to examine the selection of the sample as well as the strategy of recruiting participants. It was clear the method of the non-probability sampling technique, such as the use of networks, is useful in exploring the potential participants of the local network. However, it is noted that the sampling strategy should also include multiple starting points (Bloch in Seale, ed. 2004) that will enable a broader and more diverse case of participants outside of the local network. Hence, other sampling techniques, such as advertisement in public places should also be considered.

The results generated from the pilot study also appeal to sample audiences from different working lifestyles and consider other members of the participants' families in the field study.

4.2.1.4 Summary of pilot study

The purpose of the pilot study with the ‘home probe’ was to 1) refine the research scope, 2) test the research questions, 3) refine the design of the probes and 5) test the sampling strategy.

The pilot study has served the purpose of re-examining issues raised in regards to the use of the home probe. The information generated from the pilot study gave a fundamental understanding of the notion of the home from the perspective of the participants. This also helped to refine the scope of this research.

The design of the probe was evaluated on the basis of format, questions and imagery employed, and the strategy taken. The main concerns of this method was to examine whether the use of the probe tasks provide a sufficient account to reflect the lives of older adults in their homes. The evaluation of the probe highlights the importance of the simplicity of format, the importance of the use of ambiguous questions and imagery, and the need to further discuss detailed accounts of information generated from the probe study.

The design of the original cultural probe intentionally took on an artist-designer approach to the subject of studying human lives. It is, however, challenging for the research designer to introduce the probe to the participants in ways different from the familiar market questionnaire approach. Despite this difficulty, the introduction of such method generally attracts good intentions and beneficially encourages participation.

The cultural probe inspired method ‘home probe’ was posed in this research as a channel for the communication and an opportunity to learn from the home environments visited. Home probe also interested the participants as a research tool. It acts as an importance process for the researcher to acknowledge the importance of the experiences of the researched world and empower participants in a collaborative way.

4.2.2 Home probes

The design of the home probe is informed by the pilot study. The aim of the home probe is:

- 1) To identify important issues about the home
- 2) To investigate changes in the home
- 3) To identify the sensory attributes relating to the meaning of the home

4.2.2.1 The design

The home probe continues with the research themes refined in the pilot study. It aims to identify ways to understand the experience of the home through the material surroundings of the environment. This method of studying modern life through material objects is not new. Csikszentmihalyi and Rochberg-Halton (1981) demonstrates that the meanings of the things in the domestic environment can be studied through the domestic objects possessed. Their study suggested that these material objects could indicate, in some ways, the traces of 'flow' of everyday life and reflect, through their existence, the meanings of the home and the people who inhabit that environment.

The home probe begins with a set of nine postcards, following by a photographing task and a sensory diary.

The postcards

There are nine postcards in the 'home probe'. The main themes of the questions are the 'home', 'changes in the home' and 'sensory experiences' in the environment. The design of the postcards employs the same philosophy as the pilot study. The postcards were designed with the aim to give everyday familiarity to the research approach. The intention of the research is also expressed through the use of imagery. Although it is not in the nature of the postcard to pose probing questions, the cards are designed to engage the participants in a conversation with the researcher, as if expressing their opinions and experiences to their friends and family.

The questions are listed below.

- 'What is your most comforting thing at home?'

Recent research (Haines et al, 2007) examined the issues surrounding the notion of the home. The idea of comfort remains one of the most important issues associated with the home. This theme also appears in the pilot study of this research.

The majority of participants in the pilot study emphasized the importance of comfort of their home including both physical and metaphorical attributes. While this question ‘What is your most comforting thing at home?’ may directly address the issue of physical comfort, it was also the intention of this research to investigate other elements of comfort, such as in terms of the sensory experiences or the metaphorical meaning of comfort. Here in the ‘home probe’ postcards, the idea of comfort remains the main part of the issues this research intends to discuss.

- ‘What makes you feel at home?’
Designers naturally aim to provide solutions for the tangible aspects of a product, and it was interesting to learn that the enthusiasm is not necessary shared by people who use the products, as Brigitte and David pointed out in the pilot study. The feeling of being at home, to them, is associated with the overall meaning of the home and it is not always associated with physical objects. This issue remains interesting to the research question and it is therefore employed in formal home probe.
- ‘An incident happened in the home’
Previous research such as Lee et al. (2006) and the pilot study of home probe showed that many demands in the home are often caused by unexpected and unpredictable circumstances. Some of these situations could result in re-organisation of a family routine to the reconstruction of social life. For example, if one of the family members has fallen ill. Other members have to re-organise their schedule in order to offer care for them. The experience illustrated an uncertain and more stressful part of family / home life.
- ‘How do you see yourself in the future? Describe your future self in a minimum of three words and, if you can draw a picture.’
This question addresses consideration for changes of houses in one’s life and the influences of these changes in regards to their home.

- ‘You are a wizard. Imagine you have a magic wand. Now is your chance to give your favourite object(s) a magical property. What would it do?’
This question aims to encourage imagination.
- ‘What object most represents your home?’
- ‘If you could give your whole home magical properties, what would it be? Please describe the transformed place. If you wish, draw a picture too.’
- ‘Describe a memory from you home long ago, as if you are looking at an old photograph of the place.’

As Myerhoff (1978, cited in Hecht, in Miller ed., 2001, p.129) describes, *homo sapiens* are also *homo narrans*, the storyteller. “The process of recollecting and recounting our past, and in particular our childhood years, is consequently seen as an important agency in linking past, present and future, enabling us to order and reflect upon our experiences...” If “the house is not experienced from day to day only” according to Bachelard (1994, p.20), the telling of our stories from the past, the childhood, could, in turn, open up a window of opportunity to understand the needs of the present and tomorrow. Although this question does not specifically address memories from the childhood, it intends to ask the participants to reflect on their experiences of the past in relation to their values and needs of tomorrow.

- ‘Choose a corner in your home and describe it in detail’

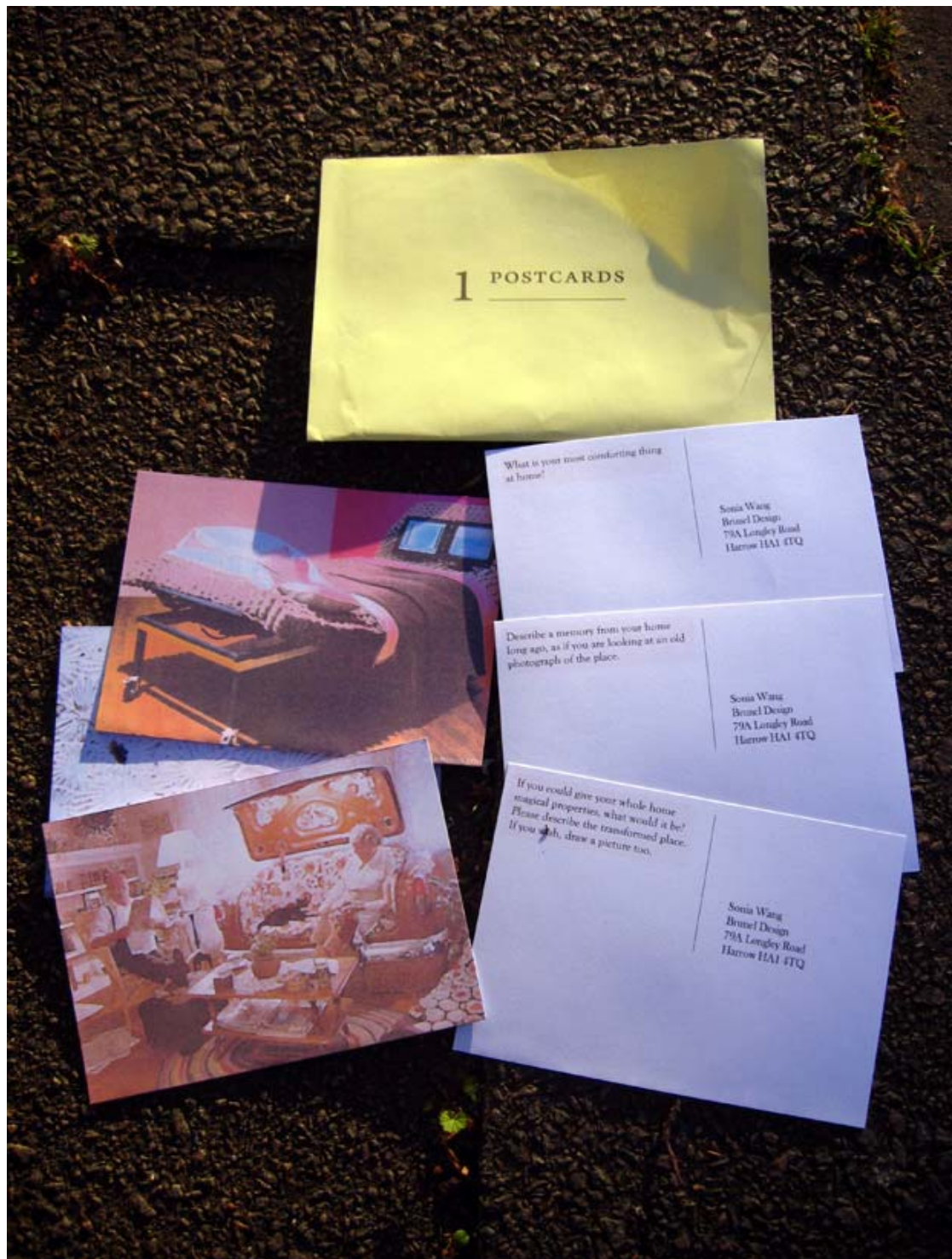


Figure 4.7 Home Probe- postcards

Take pictures / photographing tasks

The use of photographs gives opportunities for the researcher to address insight that is otherwise a hidden textual description. The instructions for taking the photographs are presented in photograph format.

In addition, the purpose of the photograph format is to engage the participants in the frame of mind to produce visual responses. A disposable camera is supplied with this task. The questions are:

- Take a picture of one thing that makes you feel at home.
This question relates to the questions posed previously in the postcard. It asks the participants to produce a visual account of the answer given.
- Take a picture of object that most represents your home
Similarly, this instruction also asks the participants to produce a photograph that illustrates questions addressed in the postcard.
- Take a picture of any one corner of your home
This instruction also links to the question addressed in the postcard.
- Something complex
- Something simple
- Something surprising
- Something beautiful
The four questions above address the issues highlighted in the previous literature review, as well as issues derived from the pilot study of this research. The participants are instructed to take photographs of what they consider suitable for the questions, the complexity, simplicity, surprising and beauty elements relating to their home.
- Take a picture of the object that you are going to give a magical property to
- Take a picture of your home
This question aims to capture elements that participants consider to be their home.
- Take any pictures you like



Figure 4.8 Home probe – Take pictures

Sensory diary

Senses create the majority of experiences in the homes as it is closely linked to emotion and memories (Conway 1990; Rubin, 1995, cited in Hecht, in Miller ed., 2001). It also provides a means for the reader of the ethnographic work to relate their experiences to the subject. This diary aims to encourage reflections on everyday senses.

In the previous pilot study, the feedback suggested that the questions relating to the five senses were interesting to the participants. The participants generally express a positive degree of appreciation towards their existing sensory experiences of their home.

The participants were also asked to record the date, time and place of when and where they record their sensory experiences. The sensory diary consists of five questions:

- Choose your favourite spot at home and close your eyes as if you are blindfolded, what can you feel?

- What is the best sound you heard today in your home?
- What is the smell (s) in your home now?
- Describe one place in your home that you would not want to change, and tell us why.
- Describe a place in your home that you would like to change, and tell us why.



Figure 4.9 Home probe – the sensory diary

4.2.2.2 The process

Recruitment of participants

A *snowball* (Bloch in Seale ed. 2004, p.176) technique is used to recruit participants for the main home probe study. Friends of families and friends of work associates were invited to participate. A small poster and flyers were distributed locally to reach people outside of the immediate network. The selection of techniques is discussed in the research methodology chapter (Chapter 3).

Time scale

The home probe is designed for a period of two weeks. During this period, the researchers remain in contact with the participants from a distance. This is to motivate and encourage participation. Each participant was given a brief on the probe tasks by the author in person. In the mid-week, an interval message or phone call is also sent out to follow up on the progress of the probe. At the end of this period, the probe materials were collected by the author. The photograph films were then sent for development. The second visit for home interview is arranged.

Instruction

Instructions were given to each element of the home probe in the pilot study. Most of the participants found the instructions useful. However, feedback on the pilot design suggested that the variation of formats and detailed instructions can overcomplicate the tasks at hand. Hence, the design of the final home probe was supplied with only minimum instruction as all the elements were self-explanatory and are in familiar everyday formats. Any probe component that required further explanation was introduced in the briefing session when the author met the participants in person.

Deployment

The home probes were given to the participants by the author in person. The participants were briefed on the content of the pack as well as the purpose of the study.

On the return of Home Probe, the responses from the participants are documented, organised and interpreted before the interview took place. This gives the author a chance to go through the data in this preliminary phase of data collection. More importantly, this process also helps the researcher to modify approaches and methods for further research and prepare for analysis of the data.

4.2.3 Summary of the design of the home probe

This section discussed the design of the home probe. A pilot study was conducted to 1) Refine the scope of research context, 2) Refine the design and content of the probe, and 3) to examine the sampling strategy of this research. As a result, the feedback from the pilot workshop was used to inform the design of the formal home probe.

The home probe consists of three components; they are 1) nine postcards, 2) the photographing tasks, and 3) sensory diary. The questions were designed to investigate the concept of the home, and changes and sensory experiences in the home environment. The design of the questions was aimed to provoke imaginative responses. The design of each probe was aimed to engage the participants in familiar, yet unusual way, in comparison to traditional user research or marketing questionnaires.

In the next section, the design of the semi-structured interview is discussed. This is the second research method employed in the data collection process.

4.3 Qualitative interview

As discussed in the previous chapter, three qualitative methods, the home probe, qualitative interview and video ethnography were selected to triangulate issues identified in the literature review, as well as from the pilot study (Figure 4.10).

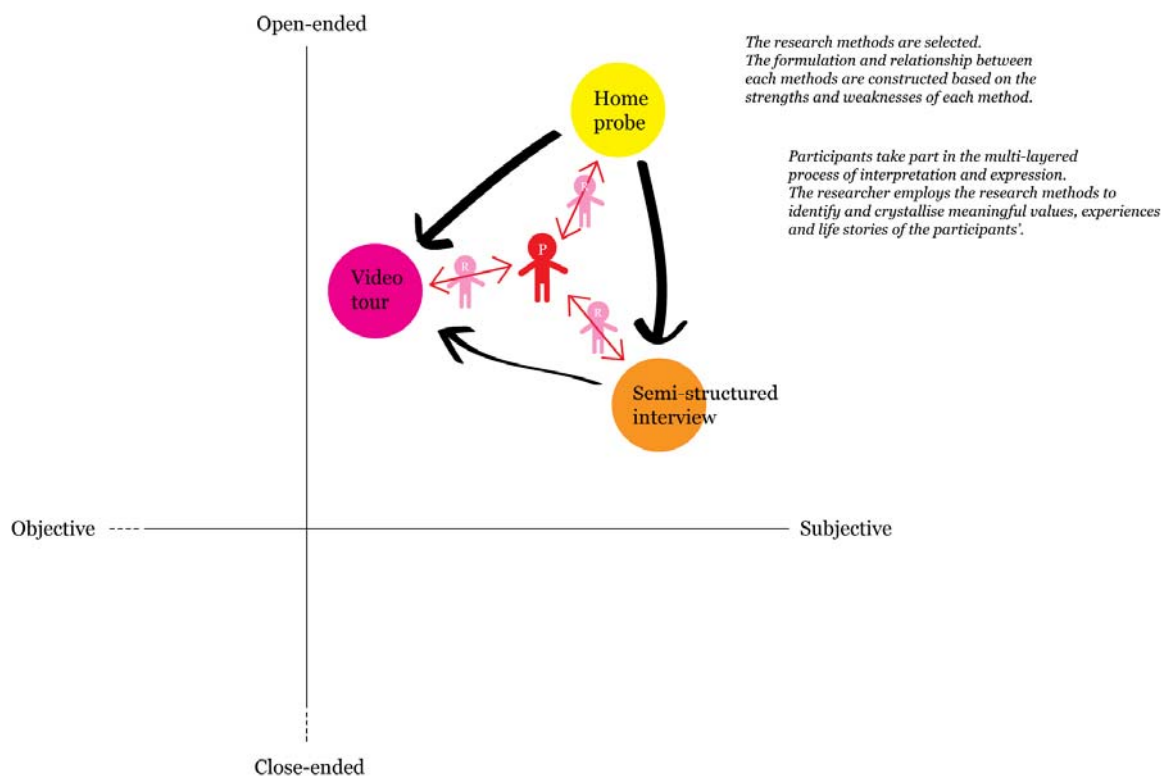


Figure 4.10 Triangulation of research methods. The home probe is the first phase of the data collection following by the semi-structure interview. The detail formulation of the three methods was explained in chapter 3 (section 3.3.2.2 and 3.3.2.3)

The qualitative interview here explores further the issues generated from the home probes. It is seen as an extension of probe that captures the voices of the participants. Before the interview session took place, the author collected the answers of the home probes from the participants and developed the photographic film. An arrangement was made with the participants for a future interview date at their home.

4.3.1 The design of the qualitative interview

The use of home probe gives the participants freedom to express their ideas, opinions and values through written words, drawings and photographs. While the role of the home probe leaves spaces for open interpretations and imagination, the interview is intended to develop in-depth information about the participant's responses to the probe.

The interview is semi-structured around the themes identified in the pilot and formal studies of the home probe. The objectives of the interview are:

- To allow an opportunity to discuss and explore further the written and photographic responses generated from the home probe
- To capture detailed descriptions and expressions about the participant's home environment with the aid of an audio recorder
- To address and refer to issues emerged from a different period of time to the appointed one. For example, when asked to give a description of an old photograph from the past, the interviewer can further inquire about similar attributes that still remain today in the participants' surroundings.
- To probe for tangible, as well as metaphorical, meanings of the given responses
- To emphasize sensory experiences in terms of vision, colours, textures, sound, smells and taste

In addition, it is important to note that the purpose of the interview is not to gain conformance of what are already known; instead, the interview technique is employed to probe into further directions that can be addressed while the researcher is in situ (i.e., in the environment described by the interviewee).

4.3.2 The time and location

The interviews are to be conducted in the participants' homes. The author arranges a time for interview with the participants after receiving the home probe. The interview takes around one hour. In addition, there are possibilities that the interviews may take place over a telephone call if the circumstances forbid a home visit. For instance, the participant does not feel comfortable or has little time for a home visit. However, before the research take place, the participants who agree to participate in the study are notified of the tasks involved, including interview and video tour. Therefore, the main strategy of conducting semi-structured interview remains focused on the face-to-face format.

4.3.3 Documentation

The interview conversations were documented in an MP3 format with a professional field recorder and were transcribed for later use in the analysis. Field

notes were also taken before, during and after the field visit in the format of memos and documented in the research journal.

4.3.4 The process

Before the interview takes place, the returned home probe was shown to the participants to remind them of their answers. The interview then begins by posing questions openly about the issues participants chose to reply to in the home probe. The return of the home probe gives a framework of structure that informs the questions. However, the interview is not constrained by the answers of the probe. The general approach taken by the author was to encourage conversations about their needs, lifestyles and aspirations relating to their 'home'. This is also a chance to probe into events of the past as well as issues relating to the possible future.

In short, the interview session is flexible and the participants can choose freely what they would like to discuss.

4.3.5 Summary of the semi-structured interview

The purpose of the interview is to investigate issues identified relating to the main themes of the research, namely, the concept of the home, changes and sensory experiences. This process documents interview conversations between the participants and the researcher with the aid of an audio recorder. This is also an opportunity for face-to-face interaction and observation beyond what is already identified in the previous research stage.

4.4 Video ethnography

4.4.1 The design of video tour

The video ethnography session is designed to capture audio and visual languages in the home environment. It is introduced to the participants as a tour of their home.

The work conducted by Pink (2004) is one of the examples of using video camera to capture the spoken and unspoken sensory attributes in the home environment.

In this research, the role of video ethnography is incorporated as an extension of the sensory diary that explores the sensorial signals through the lens of the digital camera as well as from the participatory experiences of the researcher.

One of the main characters that distinguish ethnographic work from laboratory observation is the role the observer plays in the research. In this process, the observer is 'the primary research instrument' (Walsh in Seale ed., 2004, p.228) who 'accesses the field, establishes field relations, conducts and structures observation and interviews, writes field notes, uses audio and visual recordings, reads documents, records and transcribes and write up the research.' From this perspective, the researcher joins his or her informants to explore the subject of the research and take on a more participatory role in the environment researched.

In this research, the participants are asked to show the researcher around in their home. This follows a flexible structure based on the questions raised in the sensory diary of the home probe, as well as in the semi-structured interview. The participants are firstly asked to give a tour around their household including the outdoor space of their house. The tour then addresses the subjects replied to in the sensory diary.

In the pilot study of home probe, the participants were asked to reflect on the sensory experiences in terms of their senses of touch, smell, sound, taste and vision. The pilot participants found the experiences of reflecting to their sensory experience interesting. The purpose of the video tour is also to capture experiences participants described. This includes sound and visual information describing not only the visual and audio environment of their home, but also how participants interact with the environment through the non-verbal body language shown during the video tour.

As part of the tour, the participants were also asked to show where the experiences they described take place and asked to lead the researcher to the location. This is followed by a loosely structured question of issues relating to the subjects. For example, when discussing the blindfolding task, the participants were further asked about the reason *where*, *what* and *why* they choose to express

their particular experiences and the role these experiences play in their home. Other elements are also investigated such as the time of the day, their companions at the time or the details of objects relating to these experiences.

Although the use of a video camera is limited in a way that only captures the immediate interactions of the present time during the walkthrough, the observer has the opportunities to ask about issues regarding the changes of the experiences with time, and probe into the changes of the material objects surrounding the experiences. The participants, more importantly, have the freedom to discuss what they find relevant and appropriate. Questions are posed only if the author considers them suitable at the time. The author takes on a more passive role according to the situation of the field.

4.4.2 The time and location

The video tour takes place in the participants' home. This gives a naturalistic and realistic account of the environment. The tour generally lasts around 20 minutes.

4.4.3 Documentation

The ethnographic tour is documented with a video camera. The footage is then edited for later use in the evaluative design workshop. The video footage is also transcribed for the purpose of analysis.

4.4.4 The process

The video tour also takes place on the day of the qualitative interview. The use of the video camera is then employed at the end of the interview session. From here, the author asks the participants to show her around their home and further discuss the issues mentioned in the sensory diary. The tour is captured on the camera. At the beginning of the process, the author shows the participants how the imagery is captured on the camera. This is to explain that they are free to ask the author to switch off the camera if they find any topic private or uncomfortable to discuss on camera.

4.4.5 Summary of the video tour

The use of video ethnography further supports the findings of the home probe and the qualitative interview. It helps to capture detail meanings and interactions in the home that are otherwise difficult to interpret with written and static visual descriptions only.

In a way, the ethnographer is a storyteller (Walsh in Seale ed., 2004) who creates narratives of the environment with available resources from the observed environment. These resources are the conversations between the participant informants and the ethnographer, as well as the participants' reflections during the tour.

It is clear that the responsibility of the ethnographer is to capture every possible resource from the field and actively document them. While remaining as a collector / observer, the role of the ethnographer is also to participate in the process of capturing the experiences with the researched and representing it in the ethnographic writing. The design of the video tour therefore aims to identify not only the experiences of the participants in their naturalistic environment, but also to identify possibilities of uncovering new information with the aid of the video camera.

4.5 Chapter summary

Detailed design of the three research methods is explained in this chapter. The previous research methodology chapter illustrates the design of the research. In this chapter, the design of each method, namely, the home probe, semi-structured interview and video tour is illustrated.

The 'home probe' research method was designed in two stages. It was tested in the pilot stage first to refine the scope of the research, the design and tasks of the probes, and to examine the sampling strategy of this research. The home probe consists of nine postcards, a photographing task and a sensory diary. It is designed

for a period of two weeks. The participants were asked to complete the probe in their home without the supervision of the probe designer.

The second phase of the research is the semi-structured interview. The interview is designed to address replies of the home probe and, more importantly, to explore life stories, attitudes, and aspirations of the participants. It is semi-structured around the topics opened up by the probe. The author conducted the interviews in situ in the researched environment with the aid of an audio recorder.

The third research method is the video tour. This technique is employed to capture audio, visual, as well as non-verbal languages, in the home environments researched. The video tour was conducted in the field. The participants took on an active role in introducing and discussing the environment described in the home probe and the semi-structured interview. The ethnographer (the author) maintained her participation in the environment and posed questions when appropriate. The ethnographer also had the opportunity to experience the environment.

The home probe plays an important role to open up conversations about the topic of home life for older adults and aims to engage participants in a design process. The interview and video tour are seen as extension of the home probe. The integration of these two methods aims to add depth to the qualitative data by providing audio and visual information, and, most importantly, participants' interactions in the field.

In the next chapter, the analysis of the data is discussed. This includes the strategy of data analysis, and the process of preparing and analysing data gathered by the home probe, semi-structured interview and video tour. Evaluation of the analysis is discussed at the end of the next chapter.

CHAPTER 5

DATA ANALYSIS AND EVALUATION

5.1 Introduction

In the previous chapter, the detailed design of research methods and data collection is illustrated. This chapter describes the analysis and the subsequent evaluation of the collected data. It addresses the objective six of this research, ‘To analyse and evaluate the outcome of the investigation’. At this stage, the raw data gathered from the field were returned. These included home probes, audio recordings of the semi-structured interviews and video footage from the field tour.

This chapter begins with the description of the raw data gathered. A research strategy is developed for analysis of the raw data. The qualitative data is firstly analysed with the assistance of the computer analysis software NVivo 8. This is followed by a creative workshop designed to evaluate, as well as develop, the data generated from the field research.

5.2 Raw data

The data are collected using home probes, field interviews and video tours. Data collected from each research method is prepared accordingly. This section briefly discusses the preparation of the data.

5.2.1 Home probe

Home probe includes postcards, a photograph taking task and sensory diary. The pack was given to the participants in person by the author. The participants were briefed to carry out the task without the supervision of the author and were asked to return the pack once they had completed it. The replies are in the format of:

- Written answers from nine postcards
- Drawings from the postcards
- Photographs taken by the participants
- Written answers from the sensory diary

In total, 16 packs of home probes were returned; these included 144 postcards, 277 photographs, 22 diary entries and nine drawings produced by the participants. Examples from the postcards (Figure 5.1) and the photographs (Figure 5.2) are presented below.

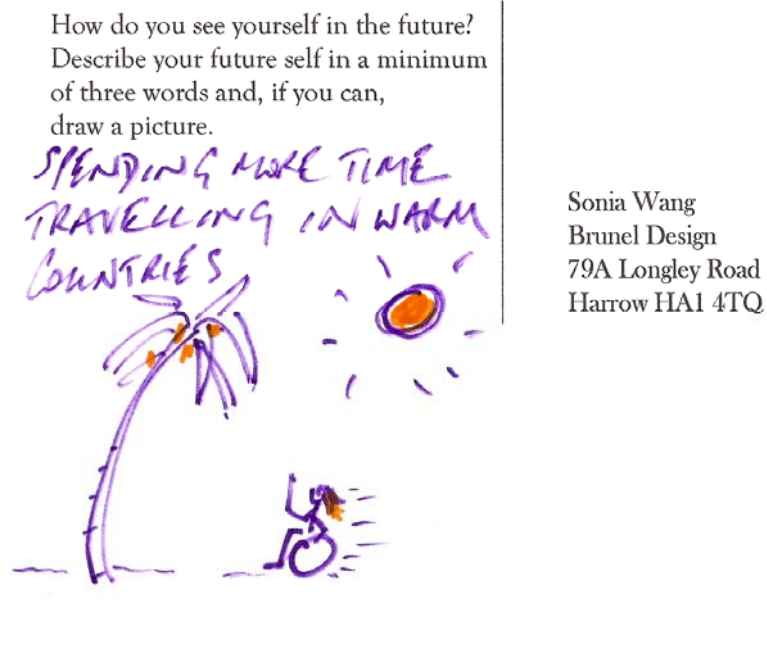


Figure 5.1 An example from the one of the returned postcards



The Garden Room

Figure 5.2 A photograph taken by one of the participants of the home probe

5.2.2 Semi-structured interview

Semi-structured interviews were employed to investigate further issues raised by the answers of the home probe. Open-ended questions were included to probe into participants' background, life stories, families and history of their home. The data were gathered in the format of

- Background information in Word documents
- Conversation in audio files (mp3)
- Transcripts of the conversation in word document

In total, 18 people were interviewed. Twenty-two hours of conversations were recorded. The audio recording of each interview was transcribed following a guideline consisting of simplified transcription symbols (See table 5.1)

Table 5.1 Simplified transcription symbols

Symbol	Example	Explanation
(0.5)	That (0.5) is odd?	Length of silence measured in tenths of a second
(.)	Right (.) okay	Micro-pause, less than two tenths of a second
:::	I:::I don't know	Colons indicate sound-stretching of the immediately prior sound.
=	You know=that's fine	Equal signs indicates that there is no audible gap between the words
[T: [Well, that's R: [I mean really	Left brackets indicates the point at which one speaker overlaps another's talk
?	Oh really?	Question mark indicates rising intonation
.	Yeah.	Full stop indicates falling intonation
()	What a () thing	Empty brackets indicate inability to hear what was said
(word)	What are you (doing)	Word in brackets indicates the best possible hearing.
(())	I don't know ((shrugs))	Words in double brackets contain author's descriptions.

(Source: Rapley, in Seale, 2004, p.387)

The quotations used to present conversations generated from the audio transcript are therefore verbatim following the guidelines provided in the table above.

5.2.3 Video ethnography

A video camera was introduced to capture the environment of the participants' home. Open-ended questions were asked during the tour. The data were gathered in the format of a movie file. Approximately, two hundred and twenty minutes of video footage were captured. The figure below is an example of the video footage. The video has been analysed and, as a result, clips of footage have been selected.

Brenda



< back to main menu

Figure 5.3 An example of the video clips

5.2.4 Field notes and correspondences

Field notes and communication between participant informants can also be used as part of the qualitative data sources. A research journal was kept during the field study. It helped to coordinate the field notes and correspondence generated. In this research, the types of field notes generated from the field are:

- Correspondences in the recruitment process, including emails, telephone calls and face-to-face contacts.
- Memos taken during and after the interview and video tours

To summarise, there are four main formats of data sources; textual, photographic, audio and video data. The next stage of the research is to organise the data into manageable resources for analysis.

5.3 Research Analysis

5.3.1 Analysis strategy

“Radical innovation requires both evidence and intuition: evidence to become informed, and intuition to inspire us in imagining and creating new and better possibility” -Fulton Suri, (2009, p.53)

The analysis strategy is vital in the innovation process as it also influences the outcome of the research findings. Research for innovation should be informative as well as inspirational (Fulton-Suri, 2009). In relation to qualitative research in the area of social science, qualitative analysis also relies largely on insights, intuition and impression (Dey, 1995, p.78, cited in Creswill, 1998, p.142).

Two criteria inform the basis of analysis of this research; these are ‘cultural probe and preservation of originality’ and ‘The role of inspirations in the front end of innovation.’

Criteria one: Cultural probe and preservation of originality

To begin with, the use of the home probe aimed to encourage production of knowledge beyond productivity, efficiency and generality. Analysis of materials generated from the probe therefore requires appropriate methods to represent and reflect values that ‘probes’ intend to convey.

In other words, methods that favour representation of generalised data may contradict the purpose of the ‘home probe’. It is therefore important to employ analysis methods that preserve the originality of data by facilitating links between the analysed outcomes and the raw data.

Criteria two: The role of inspirations

It is clear at the beginning of the analysis that production of knowledge of this research would focus on presenting insightful information from the field. Consequently, this suggests the needs to produce qualitative research that could inform and inspire the process of design. The analysis process should therefore

help to identify important ideas and concepts, and, moreover, ensure that the outcome of the analysis would be useful for the development of the front end of the innovation.

5.3.1.1 Aim and objectives of the data analysis

The aim of the data analysis, in the process of this research, is to produce a rich description of stories that are informative, inspirational and, most importantly, trustworthy (Lincoln and Guba, 1985), from the perspective of qualitative research, and, for designers, as illustrated in the previous chapter. The appropriate research methodology and methods are selected. In this section, the design of the analysis is described. The aim and objectives of the data analysis in this research are described below:

❖ Aim of the data analysis

Translate insightful information gathered from the field into usable and useful directions for new product development

❖ Objectives of the data analysis

1. To organise the raw data into a manageable resource
2. To ask questions about the phenomenon observed and gathered.
3. To identify important and interesting themes emerged from the data
4. To verify important and interesting themes identified

5.3.1.2 Analysis stages

Stage one: Analysis with NVivo 8

The analysis strategy indicates two important criteria for selection of methods. The first step of the analysis should therefore help to organise the mass amount of information and transform them into readable data. This suggests, firstly, that the selection of method at this stage should emphasize on the management and organisation of data such as various formats of raw materials including visual, audio and video footage. The organisation of raw information is vital for identifying emergent themes. By classifying relevant data into same groups and eliminating the irrelevant information, ideas and concepts can emerge (Bazeley,

2007). The initial organisation of data therefore helps to ‘kick-start’ the analysis of qualitative information.

More significantly, the use of the analysis software can help to bring the issue of rigour and validity to the centre of the analysis process. It firstly helps to bring together the raw data (response from the home probe), researcher’s interpretation of the raw data (data analysis) and observations of the field (video footage generated from the home visits). Secondly, the use of such analysis strategy provides transparency to the analytical process.

In this research, computer-assisted analysis of qualitative data (NVivo 8) is selected particularly for its capacity of managing and integrating the multimedia data. One specific advantage of NVivo is the ‘external’ or ‘hyperlink’ functions that can reference to the original source. This, in turn, helps to preserve the originality of the data generated from the probes.

Stage two: Creative workshop

The purpose of a creative workshop at the analysis stage of the research is to support the interpretation of qualitative data. In the first stage of the analysis, the raw data was analysed with the aid of NVivo 8. In the second phase, the workshop was employed to assist the evaluation of the preliminary analysis and, more importantly, to carry out such processes in a multidisciplinary team situation. The workshop was designed to examine whether the issues highlighted in the first stage of analysis with NVivo could be understood and shared among the team members. Secondly, the involvement of the workshop also intended to examine the ‘trustworthiness’ (Lincolne and Guba, 1985) of the data. This focuses specifically on whether the analysis outcomes are informative and insightful, and, more importantly, are intrinsic to the design process of a new product and services for older adults and their existing homes.

In addition, the workshop facilitates an important opportunity to examine the representation and presentation of the qualitative information. This process is designed to assist verification of how appropriate and effective the data are communicated. The workshop therefore displays an installation of data that is

represented by the researcher, as well as raw information such as the video footage generated from the field.

To summarise, the criteria selected were aimed to establish the principle for the analysis of qualitative data. Analysis in stage one addresses the consideration for originality of raw materials and the task of organising and identifying emerging and important ideas. In stage two, the analysed data are evaluated in a team situation focusing on the usefulness and the quality of outcomes. In the next section, discussion of the first stage of the analysis is illustrated.

5.3.2 Qualitative data analysis with NVivo 8

5.3.2.1 What is computer-aided analysis of qualitative data?

Computer-assisted analysis of qualitative data (CAQDAS) offers significant benefits to the social researcher. (Silverman, 2005) Computer software helps to reduce the mundane chore of data management and organisation, and improve speed, reliability and, more importantly, collaboration of a team.

Speed of handling large volume of data

The most obvious advantage of using computer-assisted software is the management of data, in particular, for large volumes of data. With the assistance of computers, researchers save time and effort carrying out clerical work like photocopying, colour coding, sorting and cutting up, and pasting that were previously carried out in the traditional analysis process. This, in turn, releases more time for the researcher to think about the meaning of the data and results from their new analytical ideas. Sometimes the amount of material collected during the research is mountainous, and the use of a computer simply helps to piece together relevant segments of data by excluding the irrelevant material. (Seale, 2004, p.313)

Improvement of rigour

The use of computers in the analysis process improves, in a sense, the reliability of qualitative data (Silverman, *op. cit.*). The computing process helps to demonstrate that the whole corpus of data has been thoroughly examined and

conceptualised by the researchers. Both supporting and deviant instances of the data are made available through straight forward links between the concept proposed and the raw materials.

In particular, a computer can help to produce counts of the number of times particular things occur. This reassures that the researcher has not just selected the anecdotes to support his or her bias; an important aspect of qualitative research as far as validity and rigour are concerned.

In addition, users of the software also suggest that “using a computer simply ensures that the user is working more methodologically, more thoroughly, more attentively. In these senses, then, it can be claimed that the use of computer for qualitative analysis can contribute to a more rigorous analysis.” (Bazaley, 2007, p.3).

Facilitation of team research

The computer-assisted software also, more importantly, facilitates the sharing of data and information especially in the team situation. Researchers in a team can access and share the data they retrieved from the field. This helps to create a more objective approach to the construction of emergent theories.

Qualitative analysis is still less formulaic than statistical analysis. Personal computers make the instant retrieving of raw material possible, and allow iterative feedback on the emergent questions which alternatively contribute to theory building. For the purpose of this research in particular, the use of computing software could potentially assist, not only the organising and management of data, but also improve the management of ideas and emerging questions.

5.3.2.2 Mainstream packages of CAQDAS

There are three mainstream software packages available to assist the analysis of the qualitative data. These are *ETHNOGRAPH*, *NVivo* (formally known as *NUD*IST*) and *ATLAS*, as suggested by Bazaley (2007).

ETHNOGRAPH is one of the first CAQDAS programmes developed in the 1980s. It is also the most commonly used software by qualitative researchers because of its straight forward function of code-and-retrieve.

Originated from *Nud*IST*, *Nvivo* is another mainstream software employed by the qualitative researcher. *NVivo* is a flexible tool for instant retrieval and referencing of raw text, pictures and audio and video files. More importantly, NVivo can facilitate team research with the use of a visual display, such as the function 'Model' and exporting of documents to be shared among team members. In comparison to ETHNOGRAPH, This software offers more features, but is more complicated for first time users.

ATLAS offers more extensive functions for theory developing. This attracts many researchers because of its capacity to support advanced analytical processes. However, the interface of ATLAS is initially more complex than other software, i.e., it is more difficult to use than ETHNOGRAPHY and NVivo.

The use of NVivo 8 in this research

Each mainstream software package has its particular advantages, as well as limitations, for qualitative analysis. The selection of NVivo is based on three main benefits in comparison to ETHNOGRAPH and ATLAS. NVivo has the capacity to organise and manage multiple formats of data. The use of such computer-assisted software satisfies the first objective of the data analysis; to organise the raw data into a manageable resource. Secondly, the function of instant retrieve-and-code can help to code ideas and retract ideas instantaneously, in particular, with the multiple formats of data generated from the three collection methods. Although the interface of NVivo may be more complicated to operate, in comparison to ETHNOGRAPH, the function of instant coding and retrieving data, such as audio or video files of a fragment from the original raw data, seems to be more beneficial for this research. Thirdly, the function of 'model' can help to display, visually, the relationship and evolution of ideas. This may help to represent, not only the development process of the analysis of the data, but also the representation of the data at the end of the analysis.

5.3.2.3 Preparation of data in Nvivo 8

A project is created for this research in NVivo 8. The first task was to import all the data gathered from the field study into the software. A case was created under the project for each participant. Age, gender, and background information were assigned to each case member.

Home probe

For responses from the home probe, documents were created to facilitate written replies from the participants. These pieces of responses were individually typed into the documents. Some drawings by the participants were scanned into digital files and linked as external sources. The photographs produced by the participants were developed, scanned and imported straight to each case folder.

Semi-structured interview

The audio files of the semi-structured interviews were imported to each case. The conversations were transcribed by the author and stored in NVivo. The transcripts were also exported to Word documents.

Video ethnography

The video footages from the walkthrough were also imported into NVivo. The materials were transcribed and made ready for analysis.

Field notes and correspondence

Field notes and communication between participant informants were imported directly from a Word processor. Some were also typed into memos or documents.

A research journal was created to take notes on the development process of the research and was also used as an 'idea wallet' for memos and emerging ideas.

5.3.2.4 Analysis with NVivo

As outline previously, the goal of the analysis is to transfer qualitative materials gathered from the field into insights for new product development. Therefore, the first stage of the analysis begins with the coding.

5.3.2.4.1 Coding

Coding is a process with an aim of building knowledge about the data by selecting and eliminating irrelevant materials. The process of coding helps to form patterns of theory that the researcher intends to formulate. More importantly, coding could also determine the quality and excellence of the research (Strauss and Corbin, 1990).

Coding scheme – qualitative thematic analysis

The coding scheme follows the first criteria (cultural probe and preservation of originality) of the analysis and employs qualitative thematic analysis as an approach for the analysis of the data with NVivo 8. Qualitative thematic analysis is a term coined by Seale (2004) to describe a common approach to qualitative analysis. This approach is not guided by specialist methodologies, such as grounded theory or semiotic analysis.

Thematic analysis, although not guided by pre-determined theory, works well for the researcher who seeks to develop their understanding of data at the beginning of the analysis stage (ibid).

Coding process

The coding begins with selecting ideas and concepts that are relevant and interesting to the research questions. This is a basic analytical procedure of asking questions about the data and making comparison for similarities and differences (Strauss and Corbin, op. cit.).

These ideas, incidents, events or instances of phenomena are coded as nodes. The passage below gives an example of creating a new node. This passage is selected from one of the replies from the home probe. It is highlighted in yellow.

- **Describe one place in your home that you would not want to change, and tell us why.**

A: My bedroom as it is a sanctuary from the world and I have it just how I like it.

In this instance, the reply and the question were created as new node called ‘Just the way I like it.’

In another situation where nodes are created previously, the passage is highlighted to add to an existing node. The example below shows a conversation between the interviewer (H) and the interviewee (C).

*H: Do you think your way of living has a lot to do with your profession?
C: Yeah, absolutely. H: Do you enjoy it? C: I do enjoy it actually, yeah. I've always like living in different cultures and different languages. Because it just makes you feel on the edge of things, it gives you perspectives, a finer perspective. I don't feel insecure. My home is where I am. I don't have a sense of one place being home. H: so I guess by travelling that much and have the experience behind you, you will have to adapt to different environment? C: Yes, it's the question of adapting and that's interesting. Cos it's almost like taking on another identity, particularly with the language.*

The coding of this passage is added to the node ‘Home is more than a house’. In addition, multiple nodes can be created at the same passage. In other words, passages that have more than one idea created can create multiple nodes.

Coding can be applied to visual imagery as well. Upon opening of the image, the section of image can be selected and created to add to existing nodes or to create a new one. The figure shows a selection of the image highlighted in yellow. The selection was then coded as ‘A room with a view’.



Figure 5.4 A photograph created by participant of home probe

For video content, coding took place in the transcripts as well as the actual time span of the file.

The nodes are created as free nodes, a term used in NVivo; the nodes without clearer indication for grouping were firstly placed under this category. For the nodes that have clear indication and potential to be group together, they are coded as tree nodes. Tree nodes are used as a term to describe nodes that have a hierarchical property associated with them.

All source documents were coded at the end of the coding process. The coding process is flexible and can be modified according to the development of the analysis and, more importantly, the emergent theory.

5.3.2.4.2 Clarifying and grouping

The next step of the analysis is to clarify the property of each node. Through an iterative process of clarification and comparison, codes with similar concepts are grouped together and, moreover, compared for their importance and differences.

Some codes are merged into one. Others are clarified and renamed with a clear title. New nodes are also created to represent new concepts. The relations between

the nodes are also clarified and compared during this process. Important themes are refined at this stage.

5.3.2.5 Results of qualitative analysis with NVivo

5.3.2.5.1 Taxonomy of nodes and theme identification

The taxonomy of nodes describes a good classification system for bringing a mass of concepts together (Bazeley, 2007). 'Tree node' in NVivo provides this function to help the researcher to contextualise his or her findings in a fuller picture. At the end of the coding analysis, 131 nodes emerged from the raw data.

These 131 nodes are grouped into 15 themes: 'Aging', 'Being human', 'Cave', 'Fundamental needs', 'Imagination', 'Life', 'Self', 'Sense', 'Continuous homemaking', 'Everyday', 'Resources', 'Rules of tribes', and 'Family life'. The 15 themes are further classified into four main categories: 'Aging', 'humans', 'older homes', and 'rules of tribe'.

Examples of nodes and the hierarchy system are shown below. (Figure 5.5, 5.6 & 5.7 Example of the taxonomy of nodes).

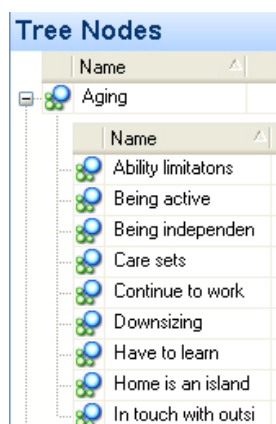


Figure 5.5

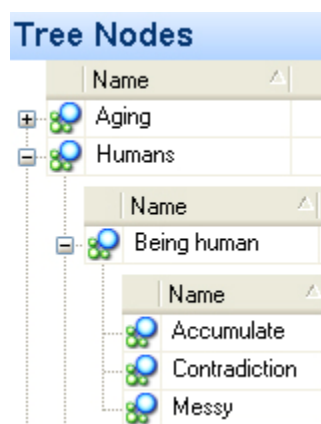


Figure 5.6

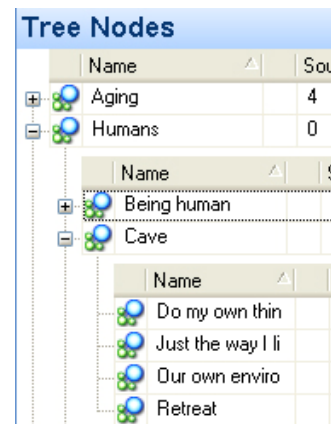


Figure 5.7

This preliminary analysis of nodes is examined in a process of peer debriefing. Two academic peers were debriefed about the process of the analysis and the results of the taxonomy of nodes. The individual nodes, categories and themes of the nodes are therefore prepared and validated at this stage for the next phase of data analysis. The full taxonomy of the nodes is included in Appendix J.

5.3.2.5.2 Taxonomy of nodes for creative workshop

For the next stage of development, 131 nodes were made available to the workshop instead of the 15 themes. This approach is devised by two initial concerns:

- 1) It is difficult to present ideas or themes when it is viewed out of the context of the original data. The facilitation of all 131 nodes in a way provides participants with a tool to explore the data and make the connection between the analysed results and the original data.
- 2) The use of taxonomy essentially reflected an important benefit; to be able to see the data in its full structure of relations and correlations. Detail nodes should also be made available to the workshop participants as another way to view the field study in a fuller picture. The display of 131 nodes in addition facilitates an alternative opportunity to work with data as each node represents an idea generated from the field. Instead of trawling through a chunk of original text or imagery, the result of the analysis produced in 'nodes' allows the participants to navigate through ideas and, furthermore, develop visions accordingly.

In the next section, the second stage of analysis occurs in the form of a creative workshop. The result, analysed with the assistance of NVivo, is carried forward to the next stage of the data development.

5.3.3 Creative workshop

The creative workshop serves as the second evaluative platform for the analysis of the qualitative data. As discussed in chapter four, this process was also designed to assist the development of a design tool. The design of a workshop and pilot of the workshop is discussed in this section. This is followed by the execution and results of this process.

The raw data was analysed with NVivo 8 in the first stage of the data analysis. The result of the data analysis, the taxonomy of nodes is employed in the workshop for further evaluation.

5.3.3.1 Aim and objectives of the creative workshop

The aim of the workshop is to identify meaningful insight that can help designers of smart homes to improve understanding of home life of older adults in the UK. When recruiting participants for the workshop, the aim of the workshop is introduced as well as the objectives, as illustrated below.

Objectives for the participants

1. To reflect on the meaningful experiences generated from the field study of older adults and their older homes
2. To evaluate the important insights generated from the field
3. To identify core opportunities and advantages for new smart home products

Objective of the workshop

The workshop more importantly serves as an evaluative platform for the analysis and representation of the preliminary data. From the perspective of the research design, several objectives were identified. The purpose of the workshop is to:

1. To examine if the issues and values identified in the field research can be shared and understood in and amongst the team
2. To evaluate if the outcomes of the analysis are inspirational, insightful and informative
3. To utilise the stories and taxonomy of nodes in a product development team
4. To evaluate if the tool proposed in the workshop adds value to the design process of new products and services for older adults and their existing homes

5.3.3.2 The pilot workshop

5.3.3.2.1 The design of pilot workshop

A pilot workshop was conducted to test the design of a workshop and formulate a method of presenting the raw stories. More importantly, the pilot study is designed to examine what, how and whether the representation of the data is

useable and useful in the creative process of a workshop. The objectives of the workshop are:

1. To test the communication method of the raw data
2. To gain feedback on the process of the workshop
3. To clarify the role of the qualitative data and how it can be utilised for the use of new product development

5.3.3.2.2 The process of the pilot workshop

The workshop is titled, 'Stories People Tell about Themselves and Their Homes'. Two people participated in the pilot workshop. One participant is an academic lecturer in design management. The other has background in Computing Aid design and is currently a doctoral candidate in an engineering subject. The session began with a presentation of the research. A 'what is home' exercise is conducted as a way to bring out the emphasis of the research.

The raw data were presented in two ways. The first method was to present the data as taxonomy of nodes and display it in the software NVivo 8. The other method was to present the data as stories using photographs generated by the participants of the study. These photographic image boards were displayed during the session. After the research presentation, the participants were asked to, firstly, interpret the data presented and, secondly, to provide feedback on how the information was communicated.

The agenda was introduced at the beginning of the workshop in the research presentation. The structure consists of a research presentation, storytelling session and discussion. At the end of the workshop, the participants were asked to provide feedback on how the workshop was structured and whether it helped them to understand the subject of home life for older adults. At the end of the sessions, participants provided oral feedback on the overall design of the workshop.

The participants were asked to evaluate whether the process of the workshop provided them with insightful information that reflects issues and values in the home of older adults. More specifically, feedback also relates to questions that address the process of new product development and idea generation.

5.3.3.2.3 Feedback of the pilot workshop

Storytelling

One of the main tasks of the workshop is to present the stories gathered from the field study. It was particularly important to illustrate that the use of a storytelling technique is not only vital for representing the phenomenon of the field study, but also valuable for generating further discussion for the purpose of design.

Taxonomy of nodes

The taxonomy of nodes presents as an overall view of the data and, more importantly, the pattern of the concepts. The concepts were grouped as themes which illustrate important and interesting insight generated from the result of the home probe, semi-structured interview and video ethnography.

Participants were asked to review the preliminary overview of the taxonomy of nodes, and were given an opportunity to provide oral feedback on the nodes and patterns of concepts presented in the pilot workshop.

Although the nodes were not employed in the discussion by the participants in the pilot workshop, it was useful as a way to demonstrate where the ideas were generated from originally.

Ideas productions beyond problem solving

The complexity and richness of the qualitative data is vital for creative purposes, as learned in the pilot workshop. The presentation of information as stories made little emphasis on problems observed from the field study. This was intended to encourage lateral thinking (de Bono, 1992) at the ideation stage before the production of a 'need statement' (Ulrich and Eppinger, 2001) in the concept generation phase of the new product development process.

To elaborate, firstly, the generation of ideas can benefit from a human centre approach. If the qualitative data was interpreted from a 'problem solving' perspective, it is more likely that the development of ideas are limited to provide solutions. 'Problem solving' means to see the way of living in the homes as problems that need to be solved. For example, if the 'accumulating behaviour' of

human nature was interpreted as a barrier for system developers. Unsurprisingly, the solution for this problem may suggest a systematic way to ‘reduce’ the chaos of the environment. What was natural and enjoyable behaviour of accumulating becomes a ‘problem’ that somehow needs to be resolved; an opposite direction of human-centre approach.

Secondly, the development of analysis and evaluation also influences the development of ideas. The ‘problem solving’ approach contradicts the purpose of employing a cultural probe in the first place. The probe fundamentally emphasizes creating dialogue for opportunity development. The aim of the probe is not to investigate ‘problems’ in the home. Therefore, the analysis of information should not aim to find solutions.

Thirdly, the problem-solving approach often describes a doctor-patient’s relationships, as argued in the use of the cultural probe (Gaver, Dunne and Pacenti, 1999). The merit of the probe lies in the qualitative result co-created by the users and the research investigator; it is a result of understanding phenomenon of the real world. Instead of seeing the real world as a problem, the focus is to represent the world as close to nature as possible.

To conclude, the feedback from the pilot workshop indicates that there is a need to address the role of the probe in the workshop and promote production of visions instead of problem solving.

Conclusion of the pilot workshop

The use of narratives (storytelling), contextual mapping of qualitative data (Taxonomy of nodes) and lateral thinking (idea generation beyond problem solving) established a clearer structure that helps the participants to understand and identify insights.

The feedback from the pilot workshop suggested that the participants were inspired by the stories. They had an opportunity to understand the complexity and diversity of the home environment and were provoked to reflect on their attitude towards the older homes. Moreover, the participants also reflected on the

possibilities for the qualitative information and how it can contribute in the new product development process.

5.3.3.3 The creative workshop

5.3.3.3.1 Workshop agenda

Based on the results of the pilot workshop, the formal workshop was conducted with structure that supports storytelling, reflection, and idea generation. The detailed design of the workshop is illustrated below.

Agenda 1: Bringing together practitioners of various backgrounds

The workshop aims to assemble a group of practitioners representing various roles in a new product development team. This models the multi-disciplinary approach (Norman, 2004) to new design and is particularly useful in the creative process of new product development. The first stage of the workshop is to bring the multidisciplinary team together. This allows the team to understand the insight generated from the field and develop their interests based on a common ground.

Agenda 2: To understand and evaluate raw data

The second agenda is to involve participants to understand and reflect on their own meaningful experiences in relation to those observed in the field of older adults and their older homes. Through actively and purposefully reflecting on the subject in a team discussion, the aim of this agenda was to allow participants to gain empathy towards the values and meanings identified in the field.

Agenda two also involves the evaluation of the taxonomy of nodes identified in the early stage of analysis. The insight identified with the aid of NVivo 8 would be presented as individual keywords in the workshop. The participants were asked to select keywords, and, more importantly, use these keywords to illustrate their understanding of the stories.

The selected were grouped together as ‘themes’ and were used in the next phase of the workshop.

Agenda 3: Translate the raw data for the front end of innovation

The task of agenda three was to use the themes to develop directions that would assist the design of new technological products. The purpose of the creative workshop, as discussed earlier in the research methodology chapter, is to evaluate and facilitate an innovation process that can help designers to foresee opportunities for development. In other words, this process offers a way for the developer to gain empathy towards phenomena and sensitise their design approach for and with the users of new technology in the existing home.

‘Core vision’ was employed as a contextual guideline for the development of vision. Firstly, the name of the vision is selected; this is followed by a narrative inspired from the field study that describes the vision; thirdly, this vision is used to generate ideas for new designs. Further explanation is discussed below.

1. **Core vision (s):** Core vision emphasises the importance of vision over products. At this stage of development, innovation needs to be supported with channels that open up windows of ideas. This process explores the opportunity of ideas prior to the selection and prioritising of product concepts.
2. **The story describing the vision:** The use of storytelling techniques is employed here again to reinforce the importance of qualitative data. This is also a way to reconnect the original sources where the visions were derived from. The task set out to ask the workshop participants to actively involve information they have understood, reflected on and interpreted, and to create visions. At this stage, the participants also have the flexibility to employ multiple inspirations from difference source cases. The task to create a story of vision was not limited to a single case from the field.
3. **To visualise platform of products for the years to come**

Based on the vision chosen, the participants were asked to visualise a platform of ideas for new products. Scenarios are used in this exercise to illustrate the sensitivity of the vision for new product directions.

The storyteller and moderator

In the first agenda, the author acted as a storyteller and a moderator in the workshop. The role of the storyteller was to provide a close-to-first hand experience of the older homes to the participants of the workshop. The participants have the opportunity to inquire about the sampling of the cases, detail information of each case and the relationships between the cases, etc.

The author also acts as a moderator who helps to verify links between the taxonomy of nodes to the original source stories and guide the development of visions.

5.3.3.3.2 The process

The recruitment

A multi-disciplinary background of practitioners in the field of product design, design research / management, human factors, engineering and social work were invited to participate in this workshop. The invitations (Figure 5.8) were sent out a month prior to the workshop. The participants were selected based on their background experiences as well their interest in the workshop.



Stories people tell about themselves and their homes

This photograph was taking by one of the participants of this study.

You are invited to a design workshop

We would like to invite you to participate in a design workshop on July 09. This workshop offers a rare view of stories people tell about themselves and their homes. This is an opportunity to join a debate to discuss important issues when designing new technologies for the older adults and their existing home environments.

Practitioners of various backgrounds including design, human factors, engineering, social and computer science, psychology, and social work are encouraged to participate. This should be an exciting chance to reflect on challenges developers face today. At the end of the workshop, we wish to propose future direction for design of smart homes.

Share an object

Please bring a special object or a photograph of the object with you that you think best represents your way of living now and the possible future.

Contact

Sonia Wang
email: hsueh-pei.wang@brunel.ac.uk
Tel: 07919180635

Date
Location
Time

July 9th (Thursday)

DEC, Tower A,
School of Engineering
and Design, Brunel
University, Uxbridge
UB8 3PH

Outline of the workshop

10:00-10:15
Workshop registration
10:15-11:00
Introduction of the workshop
11:00-12:30
Storytelling session /
Discussion
12:30-13:10
Lunch
13:10-14:40
Discussion / Brainstorm
14:40-
Concluding summary

* Lunch and refreshments will be provided.

Figure 5.8 The invitation for the creative workshop

Research presentation

At the beginning of the workshop, backgrounds of the research projects were presented. The workshop is warmed up by a small brainstorming exercise of ‘What is home?’ (Figure 5.9); this exercise asks the participants to give ideas that relate to what they consider as ‘home’ or relating to the ‘concept of home’. The aim of this exercise was to ask the participants to reflect on what ‘home’ really

means to them and rethink the idea of a 'smart and technological home'. This also helps in transitioning to the next stage of the storytelling session.

The participants also had a chance to introduce themselves to one another.



Figure 5.9 The outcome of the 'What is home' exercise

Participation in the workshop

Ten people participated in the workshop. They were divided into two teams at the beginning of the workshop for the next stage of the group discussion. The workshop is documented with an audio recorder to capture discussions in groups, as well as with a video recorder to document interactions within the group.

Table 5.2 The table shows the background and experience of each participant. Abbreviation is used in this table to list each workshop participant

Name(s) of Participant (abbreviation)	Team one	Background	Experience
A	Design management academic	Industrial design and design management	5-9 years
J	A designer studying MA Design Strategy and Innovation	Industrial design, design management, strategy and innovation	3-4 years
JY	A PhD student in design management	Interior design, design theory and design management	5-9 years
Y	An PhD student in engineering	Mechanical Engineering and Computer Aided Design	5-9 years
B	A medical doctor and a PhD student in Public health	Medical doctor, healthcare, public health and policy maker	5-9 years

Name(s) of Participant (abbreviation)	Team two	Background	Experience
H	Leading academic in the area of inclusive design	Inclusive Design and Product design	5-9 years
S	A product designers with over 25 years of experiences in consumer and medical products	Product design in industry and academia	More than 25 years
F	A PhD student in Inclusive and human centred design	Design research and Inclusive design	5-9 years
LA	A PhD student in inclusive design	Product design	3-4 years
L	A social worker in the sector for older adults	Occupation therapy with volunteering experiences with older adults	5-9 years

Installation of the workshop

The installation format presents written texts, interview conversation, field photographs and video clips in a hypermedia format, instead of presenting the qualitative data in the format of a written report; the installation aimed to preserve the richness of the data with the assistance of multimedia interfaces.

As suggested in the pilot workshop, information about each home probe participants are more insightful if displayed as narratives. Through the integration of photographic imagery and video interface, the stories were enhanced with detailed information of not only the visual description of the field, but also the sensorial descriptions of the older home environment; for instance, the sound and the non-verbal body language of the participants of the study.

In addition, the storyboard is a simple platform to present background information and the main theme of each story, as well as the original responses from home probes.

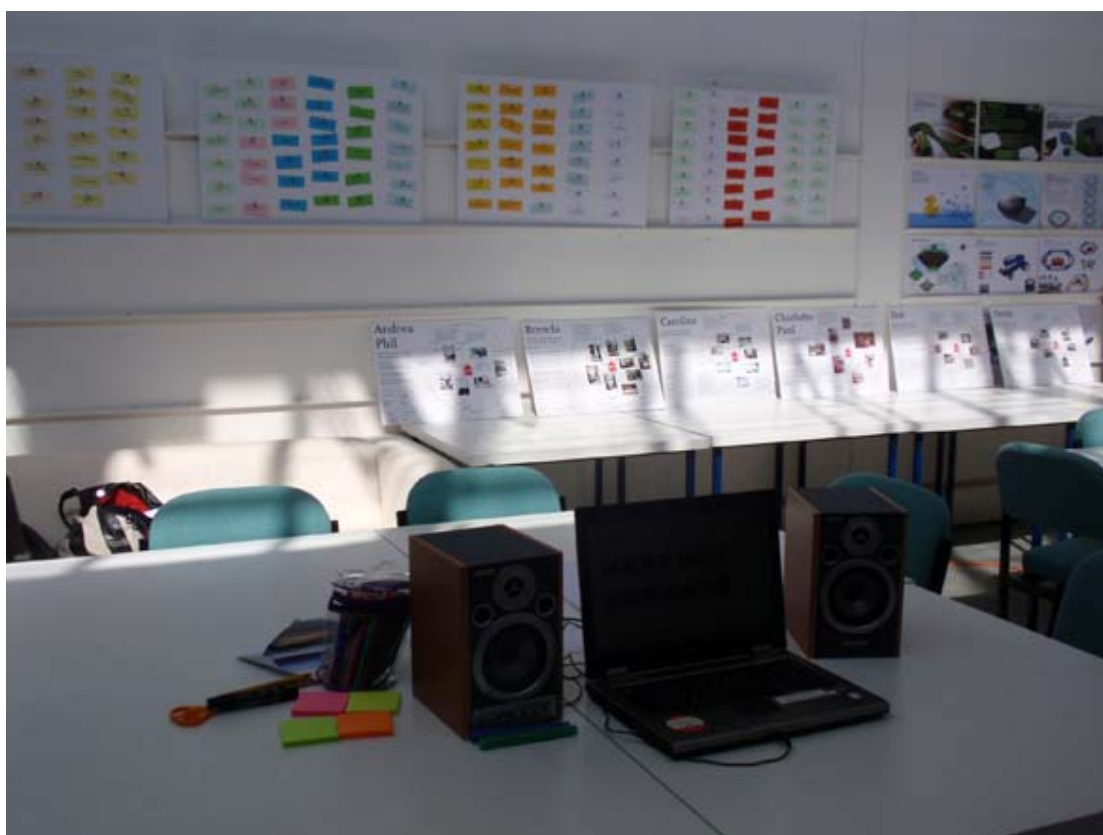


Figure 5.10 Part of the installation of the creative workshop

The process of the workshop

Agenda one: Understanding the meanings

Storytelling

The stories were presented on the A1 size boards and displayed around the workshop space. The author took the workshop participants around the installation and told stories about each participant and their homes.

The information on the storyboard displayed are:

- Name
- Age of the house
- Home occupancy
- Key characters of the participants and their homes
- Photographs, transcripts and home probe answers that are directly relevant to the key characters
- The nodes that are generated from the above sources

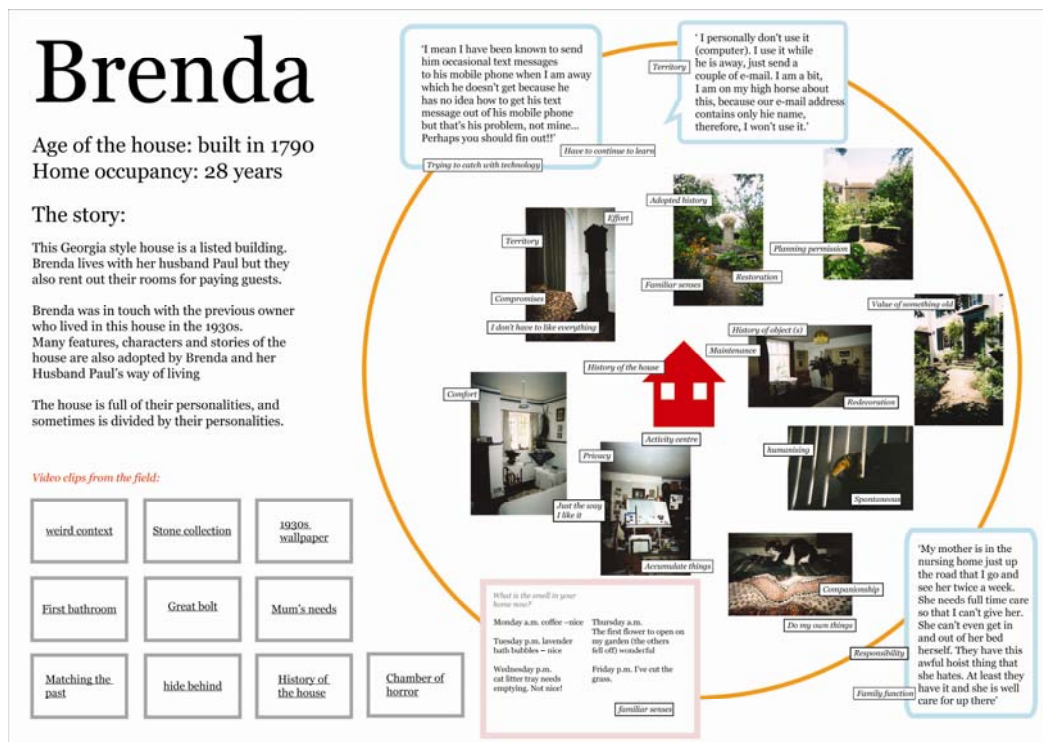


Figure 5.11 This figure shows an example of the storyboard. The rest of the storyboards are supplied in Appendix N.

Nodes

The 131 tree nodes were also displayed as part of the installation. These nodes were deliberately presented as individual keywords derived from the stories. A slight distinction between the nodes was made by the grouping of them with colours. The groups also represent the result of the first qualitative analysis.

Duplicates of nodes were also made available to the workshop participants. The participants could use these keywords to build up further themes and visions.

Additionally, the coding process and clustering of nodes were not introduced to the participants. The evaluation of nodes in the workshop aimed to avoid influence from the preliminary analysis. Post-it notes were available for the participants to add information they wished to include.

Video interface

The video clips from the field walkthrough were made available to the workshop participants. The clips were presented as web pages in html (Hypertext Mark-up Language) format designed with Adobe Flash software, a multi-media platform.

Each team had the interface available on their desk together with audio speakers. During the discussion, the team could navigate through the videos by stories and find relevant clips they wished to investigate.

The link of the video clips was also displayed on each story board to indicate the topic of these clips and relevance to the stories.

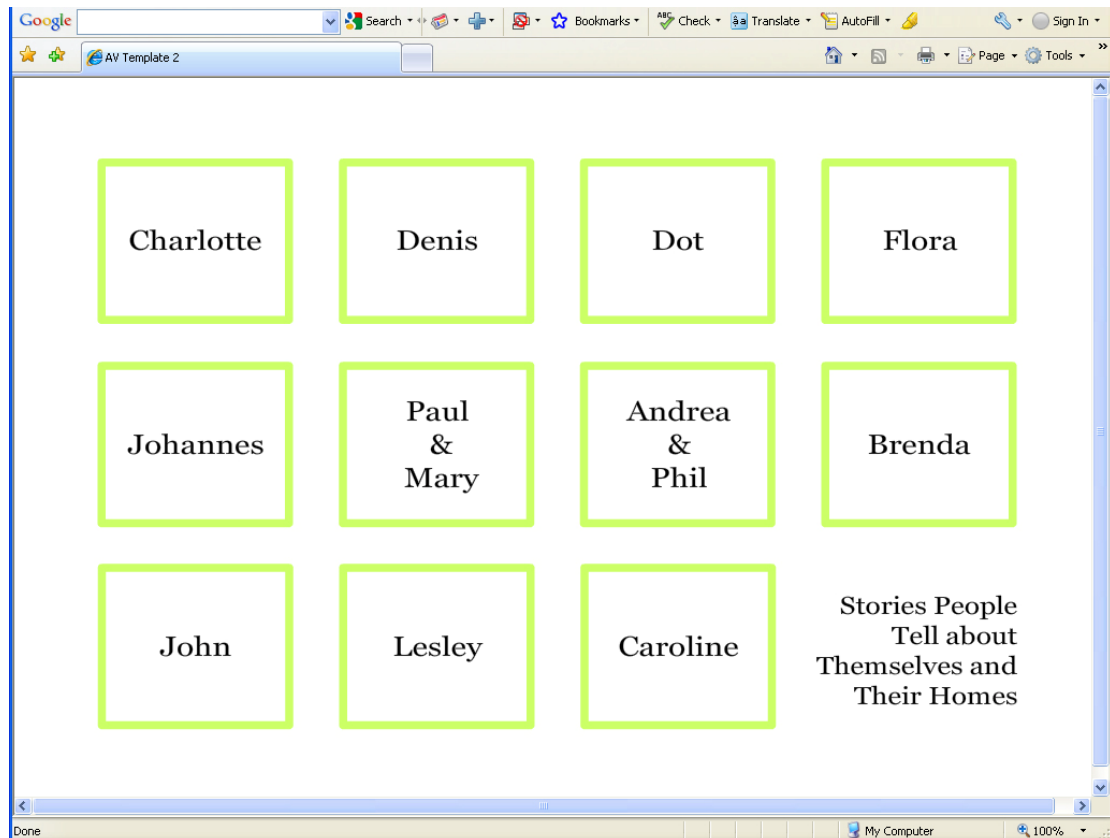


Figure 5.12 The video interface for the workshop



Figure 5.13 The installation of the interface



Figure 5.14 The video interface

Evaluating the meanings

After the storytelling session, the teams were asked to develop themes based on what they considered significant or interesting from listening to the stories. They were then asked to work as a team to evaluate, map out and establish insight relations and correlations between the themes.

They also had the freedom to add or delete nodes that have not been highlighted but might be useful for them to complete their visions for the next stage.

Agenda Two:

Core vision exercise

The term “vision” is used in this research to link raw data from the field to the ideation stage of the product development process.

In the first part of the workshop, the personas were presented as stories of real life cases using the storytelling technique. The presentation was not intended to illustrate diagnoses of each case or emphasize potential problems. The purpose of this exercise was to encourage participants to create openly and divergently instead of narrowing their visions to solve specific problems.

The participants used the themes they identified earlier to create their visions. They were also encouraged to use storytelling technique to illustrate their themes and use the story as a platform to link to the visions for new product platforms.

The teams also have access to the original photographs taken and video clips from the field. Other materials, such as visual imagery from printed materials like brochures and magazines, were also made available to them to assist them in transferring their understanding into visions.

5.3.3.3 Result

Each team contained four to five members and produced first, according to the agenda, identification of the important and interesting nodes from the stories. Following the morning session, each team used what they identified in the morning to produce their visions. At the end of the workshop, each team

presented their results, explaining how they formulated their selections from the stories and how they carry their selection forward to their visions.

Participant profile

Team one consisted of 1) design management academic with background in industrial design 2) A designer studying postgraduate degree in design strategy and innovation 3) A PhD student conducting design research with social science methods 3) A PhD student in engineering 4) An medical doctor who is practicing medicine while doing a doctoral research in the area of Public Health.

Team two consisted of 1) Leading academic in the area of inclusive design 2) A product designers with over 25 years of experiences in consumer and medical products 3) Two PhD students researching on the subject of inclusive design 4) A active volunteer in the sector of social work for older adults.



Figure 5.15 The creative workshop in progress

What has been identified?

A number of around 20-30 nodes were selected in the team discussion from the 131 taxonomy of nodes identified in the first stage of data analysis. The selection results are discussed below.

[Team one]



Figure 5.16 The picture of team one in discussion

Selection and development

Team one emphasised on two areas identified from the storytelling session; ‘Home is more than a house’ and ‘aging’.

The two themes were mapped out on separate sheets. Theme one ‘Home is more than a house’ consisted of 23 nodes (Figure 5.17). Theme two ‘Aging’ consisted of 24 nodes (Figure 5.18).

Team one made a joint decision on the selection of their main themes. Each member then selected relevant and important nodes, and placed them according to the relevance and correlation to the main themes and the surrounding nodes.

The most relevant and important nodes were placed around the main theme. After careful review of their selection, the team selected a couple of key nodes from their connected map for their next stage of development. The main selection derived from the theme ‘Home is more than a house’ was the node ‘territory’, and, from the theme ‘Aging’, was the node ‘limitation’

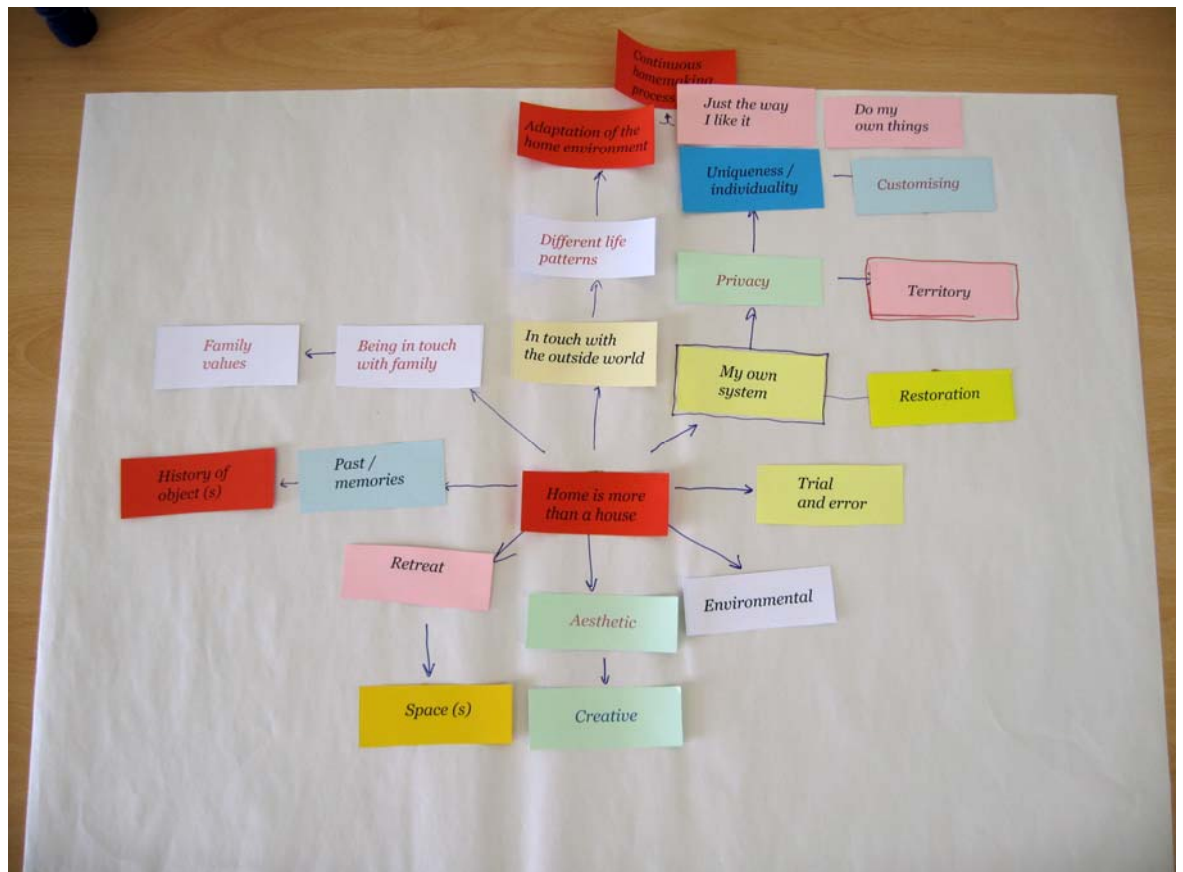


Figure 5.17 Theme ‘Home is more than a house’

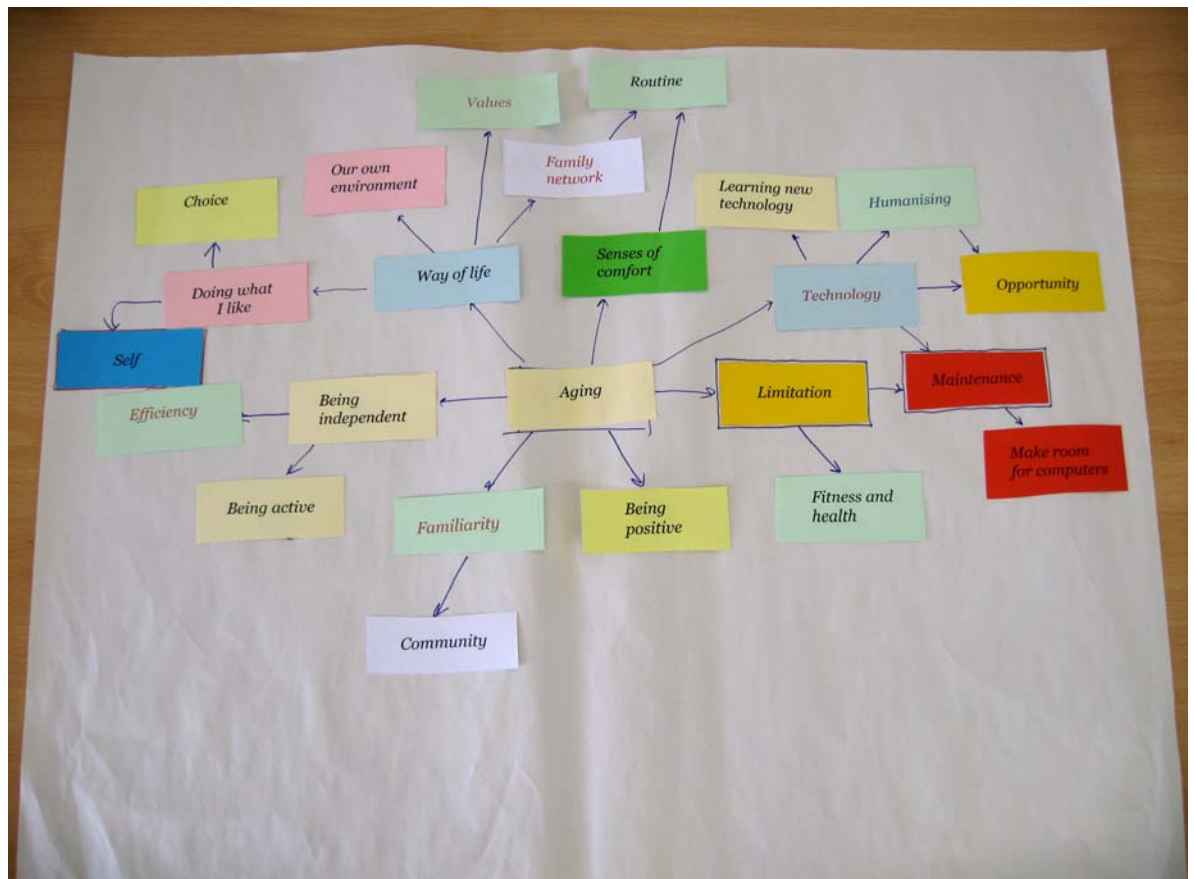


Figure 5.18 Theme 'Aging'

Team one identified the home as an important 'territory' (Figure 5.17). Technology is an enabler to remove limitation and enable one's lifestyle. The theme of 'Territory' also relates to the fundamental / definition of home, emotional attachment, making yourself at home, 'basic / fundamental definition of home' and personalisation / customisation. This theme was then focused on 'bringing 'home' with them anywhere they go.' Technology was mentioned at this stage to visual how this concept can be taken forwards.

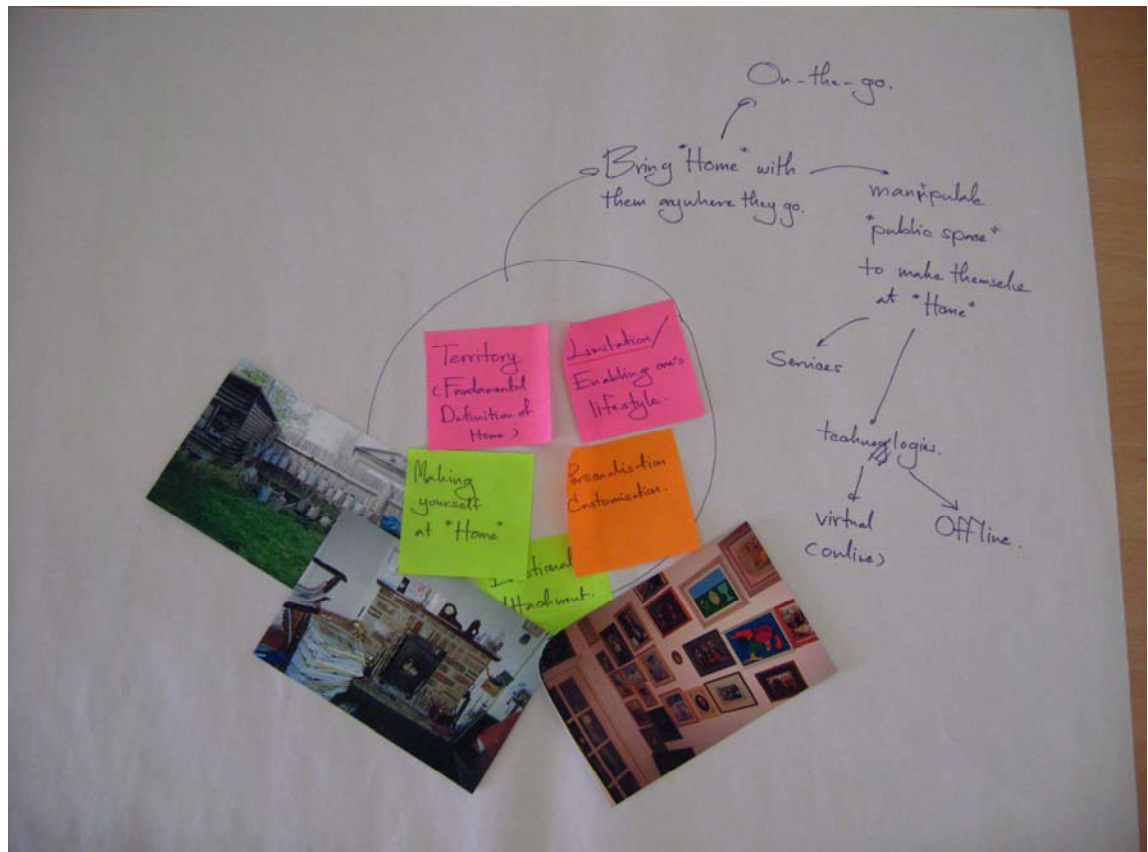


Figure 5.19 Brainstorming based on the theme 'Home is more than a house' by Team one

Core vision: Bring 'home' with them everywhere they go

Product visions:

The role of technology in this vision 'needs to enable us to do / live the way we like.' This includes raising the awareness of the needs for technology, as well as the practical benefits technology can bring, for example, remove limitations and enabling independence (see Figure 5.19).

- Virtual packages – using a virtual environment to connect the feeling of being at home when in a public space such as a hospital or hotel
- Service pack - to bring a piece of home to wherever you are. The vision illustrates personalised and customised service that provides visuals of the environment derived from the users' own home.
- Offline packages - brings senses of home in a piecemeal fashion. The vision for technology is the ability to capture sensorial qualities in the home and delivers it to you when you are away.

[Team two]

Figure 5.20 Picture of team two in discussion

Selection and development

Team two selected three main themes; ‘Home is where the heart is’, ‘Home is more than a house’ and ‘Love’ (Figure 5.21). Thirty-seven nodes were selected. Team two first selected the nodes individually and later made joint decisions on the relations and correlation of the nodes. Each member then voted on the nodes selected as a whole and prioritised the nodes with the highest votes.



Figure 5.21 Themes 'Love' identified by Team two

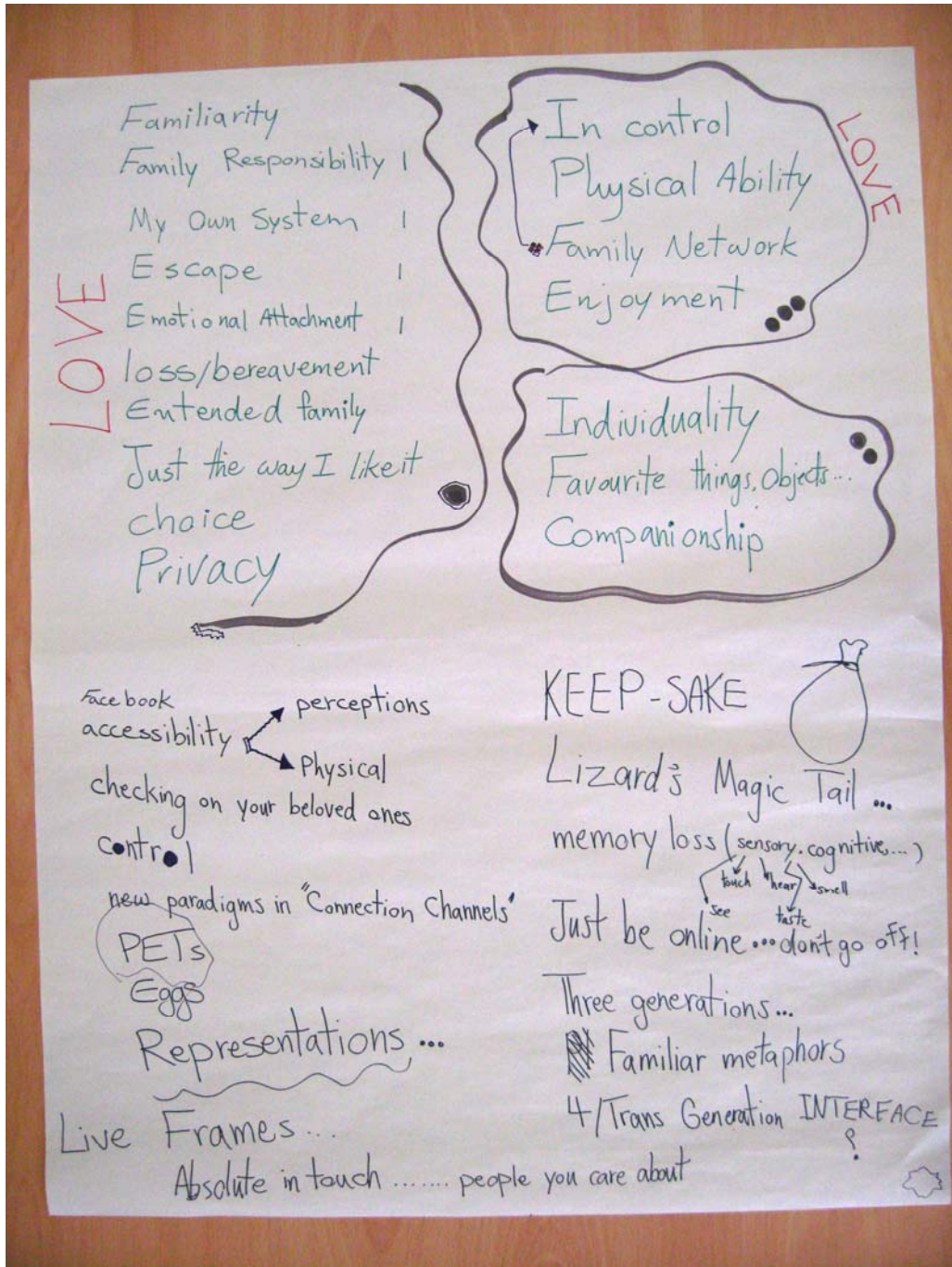


Figure 5.22 Brainstorming based on the theme identified by team two

The selected nodes were categorised into three groups, as seen in the image. The group (theme) with most votes (three black dots) was selected for use in the next stage.

Table 5.3 Categories of themes identified by team two

Theme one	Familiarity, family responsibility, my own system, escape, emotional attachment, loss/bereavement, extended family, just the way I like it, choice and privacy.
Theme two	In control, physical ability, family network, and enjoyment
Theme three	Individuality, favourite things, objects, companionship

Based on their selection, team two took the ideas identified in theme two to create their vision. These included ‘New paradigms’, ‘Connection channels’, ‘Pets’, ‘Live frames’, ‘Keep safe’, ‘Lizard’s magic tail’, ‘Just being online...don’t go off’ and ‘Family metaphor of four / trans generation’. The example below illustrates the vision team two presented at the end of the workshop.

Core vision: Lizard’s tail

Product visions:

This vision emphasizes the importance of ‘love’ and communication between different generations. Team two uses the metaphor of lizard’s tail to illustrate the idea of adapting the interface (lizard’s tail) to the needs of different generations. Metaphorically, the broken tail is the interfaces that are flexible for adaption. The body of the lizard symbolised the shared value of ‘Love’ and the facilitator of communication.



Figure 5.23 An idea developed by team two based on theme identified previously

- Four / trans generation of a product that can connect the family through means that each family member finds accessible. For instance, for the grandparents' generation now, technology can be utilise in familiar things and objects such as a telephone. For instance, text messages sent by the grandchildren to the grandparents can be transferred to more appropriate form of information such as voice mail for the telephone. The grandparents can access text messages through a medium they are familiar with. Each interface is like a tail of the lizard, it connects to the main body of the lizard while providing four different generations of their own identity.

The workshop concluded with a presentation from each team. The teams presented the results of their discussion and brainstorming session. This includes their choice of themes, how they develop further concepts and why these concepts were chosen to create their vision. Further evaluation of the workshop is discussed in the next section of this chapter.

5.3.3.3.4 Observation

A need for clearer briefing

For both teams, it was challenging to translate insight generated from the field to vision for innovation. Although it was clear that the participants were inspired and sensitised by the stories, further briefing was required in order to proceed to the next stage of the core vision exercise. The briefing requires clearer emphasis on their role as researchers and on the use of the storytelling technique; and the role of inspiration at the front end of innovation.

Approach to vision development

The main difference between the two teams is their approach to the use of qualitative data. Team one selected a key node 'territory' to develop their vision. Their vision was visualised by technology such as Virtual Environment, which they selected. Team two selected the key node 'love' to develop their vision. Their vision was visualised with the story of four / trans generations.

Team two's development was led by a scenario that reconnects the origin of their theme with their story. Their story extended to four directions entailing various approaches to development of the interfaces, what they called lizard's tails. The use of technology was employed as an example to visualise the possibilities.

Team one approached the development of their vision by involving a potential for technology in their discussion. In comparison to team two, the involvement of technology was addressed much earlier on when developing visions. In a sense, team two's development of ideas was 'pushed' by the capacity of the technology. The use of visions were mainly employed to describe how the technology 'Virtual Environment' could allow the users to 'Bring "home" with them everywhere they go'. Although their ideas were generated from an insight such as 'territory', their visions were limited to what they think the technology can do.

To conclude, the approach of team two opens up the opportunity to foresee possible plans to develop further ideas and resources for new product development. Their vision was not limited to the existing knowledge of technology. The vision of team one, however, was led by a technology-push

approach, and further opportunity for development was constrained by the technology discussed.

Qualitative data could be insightful whilst difficult to interpret and apply. The usefulness of qualitative data depends more importantly on the implementation of data at the appropriate stage of the product development, as observed from the workshop.

Human centre at the front end of innovation

In brief, technological or business resources are central in the new product developing process, however, if introduced too early at the front end of the new product development process, it could limit opportunities for exploring visions outside of the technology possibilities, as observed in the workshop.

The raw and interpretive nature of qualitative data reinforces the connection between the human centred thinking, and helps to broaden and deepen design directions at the early stage of the design process.

Designer's approach for vision development

Interestingly, it was easier for the designers to visualise their vision with concept scenarios. Their scenarios describe tangible examples of products that encompassed the ideas and concepts generated from the insight. In a way, the scenario was the storytelling tool designers used to create their visions.

5.3.3.3.5 Summary of the creative workshop

The aim of the workshop is to identify meaningful insight that informs design of smart applications for the home. A pilot workshop was conducted to assist the formulation of the workshop. The feedback from the pilot study suggested three strategies for the design of the workshop; the storytelling technique, taxonomy of nodes and ideas production beyond problem solving. These were used to inform the design and the process of the formal workshop.

The workshop involves two teams of multidisciplinary backgrounds of practitioners. Their tasks were to firstly understand the stories and to reflect on the stories in a discussion. Secondly, the teams were asked to identify important and interesting themes. Finally, they were asked to translate the themes to visions for the front end of innovation. Two important themes were identified by the teams. These are 'Territory' and 'Love'. At the end of the workshop, each team presented their vision and gave feedback to each other on the vision selected.

The observation of the workshop provided insight on participants' approach to processing of qualitative information generated from this research. The evaluation of the result of the workshop is discussed in more detail in the next section.

5.4 Evaluation of qualitative analysis and the creative workshop

This section describes the evaluation of the research analysis. The first section discusses the evaluation of the qualitative analysis with NVivo. The second section discusses the evaluation of the creative workshop.

This section, in particular, introduces an interview-based questionnaire to evaluate the qualitative information introduced in the workshop, as well as the procedure of the workshop. By introducing this evaluative questionnaire, this research intends to validate the contribution of the qualitative data as well as the process involved in presenting the data.

5.4.1 Evaluation of qualitative analysis with NVivo 8

The evaluation of the qualitative analysis aims to establish the 'trustworthiness' of this research. The contribution and limitation of the research investigation is discussed in this section.

Evaluation of stage one: Analysis with NVivo 8

The purpose of employing NVivo 8 was to assist in organisation and management of raw data, and, more importantly, to ask questions about the data gathered and identify important and interesting themes. The objectives were:

- To organise the raw data into a manageable resource
- To ask questions about the phenomenon observed and gathered.
- To identify important and interesting themes emerged from the data

At the end of the analysis, the taxonomy of nodes was devised and created a total of 131 nodes classified into 15 themes.

5.4.1.1 Peer debriefing

The evaluation of the qualitative data is conducted in four stages. The taxonomy of nodes was firstly evaluated by two academics, comprising a design manager and researcher, prior to the pilot study of the creative workshop, in a debriefing session. The purpose of peer debriefing is to establish the credibility of this research (Lincoln and Guba, 1985).

The reviewers were debriefed about the research methodology, methods of data collection and the strategy behind the analysis of the raw data. They were then asked to evaluate the classification of the nodes and the meanings of individual nodes as well. This process was intended to provide a more objective perspective on the selection and structuring of the taxonomy as well as the results of this analysis.

5.4.1.2 Evaluation in the stage of the pilot workshop

After the initial stage of evaluating the preliminary analysis, the taxonomy of nodes was introduced in the pilot workshop for a second evaluation. The preliminary result of the taxonomy was presented in the software NVivo 8. The participants were asked to evaluate the themes of the nodes in relation to the mock-up story boards provided. The second peer debriefing was introduced. The peers were debriefed about the pilot workshop, and, in particular, the response relating to the qualitative analysis.

5.4.1.3 Evaluation in the stage of the creative workshop

The creative workshop is the third step in the evaluation of the preliminary results from the qualitative analysis. This is also the most important step for establishing the clarity and usefulness of the taxonomy content. The taxonomy of nodes was

introduced in the first session of this workshop after the storytelling session. At this stage, the structure of the taxonomy was more defined with different colour codes. For instance, the theme 'Aging' was colour coded in orange. Each theme had an individual colour scheme. The participants were asked to go through the nodes and identify important and interesting themes using these nodes.

Each team spent time to discuss their selection of nodes and use brainstorming techniques to generate ideas based on the information provided. The nodes were utilised and examined in the team discussion exercise to create maps of visions, to select concepts and to generate scenarios describing the visions they have created.

5.4.1.4 Clustering analysis after the workshop

In the last stage of evaluation, the taxonomy of nodes was analysed once more with a clustering technique (Aldenderfer and Blashfield, 1984, cited in Bazeley, 2007) after the creative workshop.

Clustering is a method of 'classifying objects into meaningful sets...is as important procedure in all of the social science' (Niemi, in Aldenderfer and Blashfield, 1984, cited in *ibid*). In this research, clustering of groups of concepts helps to re-examine the results of the preliminary analysis and the group evaluation generated from the creative workshop. In addition, clustering also helps to clarify the name of codes, and their correlation with other nodes and themes.

5.4.1.5 Conclusion of evaluation of stage one: Analysis with NVivo 8

Preliminary analysis with NVivo 8 presented 131 nodes. These were clustered into 15 themes and grouped under four main categories.

The evaluation was conducted based on the feedback given in the peer debriefing, pilot study and the creative workshop. As a result, nodes were clustered into a total of 137 nodes categorised into more refined themes of 10. This result forms the basis of the design tool, the 'taxonomy of nodes' which will be discussed in the next chapter.

5.4.2 Evaluation of the creative workshop

The creative workshop was designed to examine the results of the qualitative analysis and, more importantly, the use of the qualitative data in the design process. It aims to verify the quality and ‘trustworthiness’ of this ethnographic research in a team environment.

The creative workshop was conducted with two teams of design, engineering and health professions. The purpose of evaluating the workshop is to examine the use of data represented as well as the process of the workshop. The objectives of the workshop were:

1. To examine if the issues and values identified in the field research can be shared and understood in and amongst the team
2. To evaluate if the outcomes of the analysis are inspirational, insightful and informative
3. To utilise the stories and taxonomy of nodes in a product development team
4. To evaluate if the tool proposed in the workshop adds value to the design process of new products and services for older adults and their existing homes

The evaluation of the workshop therefore focuses on the issues described below.

1. In response to the first objective of the workshop, the evaluation is designed to gain feedback on the procedure and usefulness of the workshop
2. In response to the second and third objectives of the workshop, the evaluation is designed to gain feedback on the content presented in the workshop
3. In response to the fourth objective of the workshop, the evaluation is designed to evaluate the effectiveness of the qualitative data and to assess the components (Stories and Taxonomy of nodes) of a potential design research tool.

5.4.2.1 Interview-based questionnaire for evaluation

A questionnaire was designed and employed to evaluate the workshop. This aims to gain feedback from the participants of the workshop and, more importantly, to evaluate the qualitative information gathered from the field study.

The questionnaire was designed with a combination of open-end and ranking questions. The first part of the questionnaire was designed to evaluate not only the process of the workshop, but also to discuss the procedure of how each team member shares the qualitative information and carries out the tasks given. (See Appendix O for questions 5 to 7. Questions 1 to 4 were designed to explore detailed background information about the participants relating to their professional work)

The second part the questionnaire was designed to gain feedback on how the participants perceived the content generated in the workshop, and if the issues discussed in the workshop have been reflected during the period between the workshop and the questionnaire. The content includes the stories presented in the workshop, participants' discussions in the team situation and the core visions created. The questions were specifically addressing content in relation to the topic of the home, the older adult and their older homes, and design for the home.

The third part of the questionnaire was designed to evaluate the effectiveness of the qualitative content of the workshop. The workshop participants were asked to rank the influences of content in terms of its usefulness in generating ideas.

The fourth part of the questionnaire addressed issues relating to the smart home. This part aimed to investigate the effectiveness of the data in terms of how or if the qualitative information has changed the participants' perception towards the smart home. In particular, with the experience of participation and a period for reflection, would participants recognise values in this research and who would be considered the individuals who would benefit from this process?

5.4.2.2 Results of the workshop evaluation

Nine out of ten workshop participants completed the interview-based questionnaire. The feedback discussed here are the results of the interview-based questionnaire carried out with the nine participants.

1) Multimedia installation

The qualitative data was presented as narratives in the formal workshop as *‘Generally, designers are interested in raw data’* (participant H). It was easier for the team to feel inspired by ‘real life’ stories. For the participants, the combination of the storyboards, video interfaces and boards for the taxonomy of nodes (keywords) help to contextualise the stories. The design of the storyboards was successful in communicating the insight. The participants also found the combination use of presentation methods effective in helping each team to go back to the stories through details presented, in particular, by the use of keywords and video interface.

‘Good stories should remind the listener of the details’ – participant H, a leading academic in the area of inclusive design

The participants were encouraged by the stories and the way information was presented. They felt that they can identify with the stories and understand the phenomenon illustrated. They also felt that the information was very relevant and useful (participant F).

‘You feel you can trust it’ – participant F, a PhD researcher in inclusive and human centred design

2) The process of the workshop

After the storytelling session, the team began their discussion. They found the stories to be ‘powerful’ (participant A) and inspirational. The stories were used as a starting point for development. They were also used as a reminder during the process of team discussion.

The participants also related their own experiences to the stories. Some related the experiences of their family members, whilst others related their own experience as individuals to the older adults in the stories.

‘Stories make you relate to your own thoughts’ – participant J, product designer

‘When we listen to the stories, it reminded us of our own life and how we live,...I realise we are, after all, not that different from them(older adults)’ – participant A, design management lecturer

Interaction in the team

As observed, participants worked individually and conjointly to select the keywords that they considered important and interesting. The use of keywords, or, in other words, the taxonomy of nodes, improves the interaction between the team members by giving each participant the opportunity and freedom to explore their ideas in relation to the subject presented (participant S).

Although the keywords are not as powerful as the story itself, the participants had a ‘feeling’ (A) of where they come from. This, in turn, helps the team to come up with their ideas.

A shared language

By bringing together a multi-disciplinary background of people in an ideation process, such as brainstorming, the team had an opportunity to understand each other’s thought processes and develop their vision based on the shared understanding of the stories.

‘This helps me to understand the design process better and the other team members’ thought processes and contribute towards it.’ – participant L, a social worker

‘Having the opportunity to know how a designer thinks, as a person with engineering background, I felt I can help designers to optimise their vision.’ – participant Y, PhD student in engineering

In participant L’s case, this session helped her to understand the designer’s approach to the development of ideas and contribute her professional experience from the social sector to the development process of core visions. The stories help to facilitate a common language that a multi-disciplinary team can utilise in developing their ideas and vision, as suggested.

3) Has the tool provided in the workshop influenced their creative thinking?

This questionnaire also addresses three aspects of the ethnographic findings that this research represented. They are (1) Understanding the nature of the home, (2) Understanding older adults and their older homes, and (3) Design for the home.

1. Understanding the nature of the home

There were two fundamental purposes of the workshop; firstly, to understand meaning and values in those homes, and, secondly, to encourage development of new products informed by those meanings and values. As participant H expressed: The stories help participants to contextualise important attributes in the homes. It was most interesting to participant H that this process is different from the traditional ‘this is the problem’ approach to product development. She found the stories to be informative and inspirational, not only for identifying potential problems in the homes, but more importantly for reflection on the practice of understanding users.

‘The answers is in the story itself, they are also the trigger’- participant H

For participant A, the process helped her to better understand the nature of the home, in particular, when compared with traditional market survey types of reports. The stories in the workshop confirm her understanding towards the concept of the home and changed her perception towards the meaning of the home.

'House is no longer a house, this process changes some part of my perception' - participant A

The question posed was 'How much have these stories made you more aware of the nature of the home.' The rankings were as follows:

- 1 - It didn't make a difference
- 2 - It made very little difference
- 3 – Made me more aware of the issues
- 4 – Made me very aware of the issues
- 5 – Changed my perception

Five out of nine participants gave a feedback ranking of 4 and higher. The rest gave a ranking of between 3 and 4. Overall, the participants have given very positive feedback towards the insight describing the stories.

Table 5.4 The ranking given by the workshop participants for the question, 'How much have these stories made you more aware of the nature of the home'

	Participants								
	<i>A</i>	<i>J</i>	<i>JY</i>	<i>Y</i>	<i>B</i>	<i>H</i>	<i>S</i>	<i>F</i>	<i>L</i>
Q. How much have these stories made you more aware of the nature of the home	4	3.5	3	4	4.5	4	4	3.5	3

2. Understanding older adults and their older homes

In terms of understanding older people and their way of life, the participants felt that the stories demonstrated a positive, yet empathetic, view on older people and their older homes. This research confirms 'older people's attitude towards ageing' (A), and, in particular, their aspirations to positive and enjoyable lifestyles (F).

Furthermore, the participants have not only identified their experience of living with these older adults, but also gained respect towards the values and meanings emphasized in the stories (F). In a sense, the participants were introduced to meaningful experiences similar to their own. By increasing respect for older

people's way of living, developers of smart homes can improve their understanding of older people and avoid the traditional problem solving and diagnose approach to user research.

'We are after all similar in some way'- participant A

'How they look does not always equal what they are feeling'

– participant B, A medical doctor and a PhD student in Public Health

More importantly, this process helps the participants to realise the concept of home and the constitution of such environment consists of emotional values beyond the structure of a house. The definition of space and concept of the home embodies both psychological and physical objects.

'You also get to understand that the well-being and psychological part of a personal space are also important...design should be subtle, with a strong mental view, not only what you provide in it' – participant B

The second question asked, 'How much do the stories make you reflect on your perceptions towards the older adults and their older homes?' The rankings were as follows:

- 1 - It didn't make a difference
- 2 - It made very little difference
- 3 – Made me more aware of the issues
- 4 – Made me very aware of the issues
- 5 – Changed my perception

Five out of ten participants gave ranking of between 4 and 5. Generally, positive comments were given to support participants' feedback from the content presented in the workshop.

Table 5.5 The ranking given by the workshop participants for the question, ‘How much do the stories make you reflect on your perceptions towards the older adults and their older homes?’

	Participants								
	<i>A</i>	<i>J</i>	<i>JY</i>	<i>Y</i>	<i>B</i>	<i>H</i>	<i>S</i>	<i>F</i>	<i>L</i>
Q. How much do the stories make you reflect on your perceptions towards the older adults and their older homes	4.5	3	3	4	4.5	3	3.5	5	4

3. Design for the home

This process provided a sensitising process by which perceptions towards the concept of the home and design for older homes are challenged. As a result, it helped the workshop participants to bridge common things people value (A) and, in other words, the stories helped to establish a shared value between end-users and the developers. As participant A expressed, ‘*This is more about understanding, not only designing*’. The feedback suggested that the participants have recognised the value of the stories and also used this experience in the workshop to reflect on their own approach for design for the home. For instance, design for the home also includes design of services and policy. This result of the workshop confirms the importance of qualitative information and has inspired participant B to reflect on his own practice in policy making.

‘You can’t think strategy without people in mind’ –participant B

‘Putting a human face on policy, not just the numbers’ – participant B

The next question asked ‘To what extent has the workshop had changed your perception of design for the home’. The rankings were as follows:

- 1 - It didn’t make a difference
- 2 - It made very little difference
- 3 – Made me more aware of the issues
- 4 – Made me very aware of the issues
- 5 – Changed my perception

Three participants gave their feedback ranking at between 4 and 5. The results indicated that the participants felt the workshop has, to some extent, made them very aware of the issues of design for the home and changed some of their perceptions towards this subject.

Table 5.6 The ranking given by the workshop participants for the question ‘To what extent has the workshop had changed your perception of design for the home’

	Participants								
	<i>A</i>	<i>J</i>	<i>JY</i>	<i>Y</i>	<i>B</i>	<i>H</i>	<i>S</i>	<i>F</i>	<i>L</i>
Q. To what extent the workshop has changed your perception of design for the home, what has been changed	4	4	M	M	4.5	3.4	3	3	M

The symbol M in the above table denotes that the data are missing. The participant did not give a score in response to the question.

4. **Breadth of ideas**

‘Keywords and the combination of other content helps to trigger freedom to make a connection with the phenomenon gathered from the study rather than the “this is the problem” approach’ – participant H

The workshop participants were introduced the field study as stories for inspiration rather than for problem solving. Participants have found the stories to be most useful for creating ideas and the keywords help to facilitate generation of their ideas.

The participants were very interested in the approach of this research and were inspired by the stories and the way they were collected and presented. They were also interested in the inspiration and possible outcome that this process could generate. From their point of view, the research methods of the home probe were particularly interesting from their designer’s perspective.

The question posed was ‘Did the workshop influence your breadth of ideas?’ The rankings are as follows:

- 1 - It didn’t make a difference
- 2 - It made very little difference
- 3 – I was inspired
- 4 – I was very inspired and I want to know more
- 5 – I was very inspired and I have since used it in my own practice

The seven participants who responded all provided a ranking of 3 and above. The symbol M denotes that the data are missing.

Table 5.7 The ranking given by the workshop participants for the question Did the workshop influence your breadth of ideas?’

	Participants								
	<i>A</i>	<i>J</i>	<i>JY</i>	<i>Y</i>	<i>B</i>	<i>H</i>	<i>S</i>	<i>F</i>	<i>L</i>
Q. Did the workshop influence your breadth of ideas	5	4	M	4	3	4	3	4	M

For participants from a non-design background, it was more difficult to address the question of whether the stories, or other tools provided in the workshop, have helped them to ‘generate ideas’. Therefore, they did not feel comfortable in responding to this question.

5. Change of perception about smart home

The concept of smart home is a stereotype.

The perception of the smart home is often limited to a hi-tech and automatic home that controls the utilitarian, communication, entertainment systems of the environment.

First of all, the perception is largely influenced by media, as participant J from the workshop pointed out. Also, the image of the home of the future often describes futuristic concepts from the past. The feedback suggested that a more realistic and feasible vision of the concept of a smart home should be introduced. The participants were inspired to seek exploring the meaning and definition of the home.

Secondly, the workshop participants also questioned the role of technology in the home of older adults. They questioned the terminology used in describing technology and the perception of the smart home known today. As suggested by participant A, *'technology should enable people not just assist people'* therefore, the definition of smarter technology should be reconsidered. Consequently, the context of inclusive design in the area of smart home assistive technology should therefore be re-considered (H) from the user's point of view as well as from the designers / developers' perspectives.

Thirdly, as participant S described, instead of a technology system, *'we should think of a human system'*. The information provided in the workshop encouraged reflection on the human-centred way of thinking and its application in the real environment of the homes.

Finally, design of new smart application for the older homes does not necessarily mean designing a new infrastructure that can refit into the physical structure of the home, as expressed by participant J in the interview. The stories presented in the workshop described the area of older homes as meaningful and valuable experiences. The concept of the 'problem with older homes' and relevant solution 'retrofitting' considered in the field of smart homes were therefore challenged.

At the end of the workshop, the participants understood that, firstly, smart homes could go beyond a vision of clean / clinical like intelligent systems. Overall, the stories help to diverge the participants' thinking towards broader issues linking to the concept of the home and, in turn, opens up opportunities for the design of smart technology products.

4) Who will benefit from this process?

From a developer's point of view, the participants pointed out that the knowledge generated from the workshop can be invaluable for designers of products and services in the wider context, including decision makers of marketing, public health and care and architectural professions.

In addition, this co-creation process could help the potential audience of this research to understand the role technology can play in their later life and, more importantly, to celebrate their way of life at an older age.

5) Effect of the qualitative stories

The qualitative stories have sensitised the perceptions of the workshop participants and challenged their approach to design for older adults and their homes. The result of the workshop indicates that a new development process based on shared values and meanings, as such, can be benefited, especially at the beginning of the development process. This sensitising tool and process can facilitate a creative platform where user-centred values are emphasized from the start, between the users and designers, as well as between the team members of multi-disciplinary backgrounds.

5.4.2.3 Limitations

The questionnaire also provides some limitations of and recommendations for the creative workshop held. The feedback is also discussed here.

Amount of information and limited time

The presentation and communication of qualitative data in the workshop reflected challenges of ambiguity and interpretive of information often presented by qualitative data. Two limitations were highlighted in the workshop; the first concern questioned the amount of information delivered and the second raised the issue with the limited time available in the workshop.

Although the preliminary analysis has helped to contextualise important and interesting insight gained from the field research, it was challenging to include detailed insight without over complicating the main concerns of the stories. In the workshop, sixteen stories were presented. They are cases of each individual participant in this study. Participants were very enthusiastic about the stories throughout the presentation, but felt that some part of the stories could be narrated using techniques, such as Persona, to help manage the amount of information delivered within the limited time.

The need to clarify the use of stories

A concern raised by one of the participants was whether these stories could be enhanced with more comprehensive data, such as quantitative market survey or anthropometric data, for the purpose of validity and reliability. Several observations are discussed here.

1) The purpose of the stories needs to be clarified

The users of the qualitative information need to be informed clearly of the purpose and use of this data. Although it was emphasized by the author at the beginning of the workshop that this information is designed specifically to inform 'vision' and ideas, the stage in the NPD process, of which these data should benefit, was not clearly indicated. Therefore, the participants were left unsure of the use of the data in the core vision exercise task.

2) Users need to be aware that the information is not conclusive. The particular strength of these data lies in the depth of the qualitative materials.

The insight shed light on a variety of issues in older homes from the consumers' perspectives. In comparison to traditional statistical data, this research helps the consumers to show their 'faces' to the researchers, as described by workshop participant B. However, the users of this information need to be aware that the information is not conclusive and was not designed to be a representative sample of research. The use of this information should therefore not be mistaken for a quantitative type of data.

3) This information is not conclusive also because of the nature of the home.

Home is a constitution that constantly evolves with the needs of the participants and other influences from the outside world. In other words, the stories do not intend to represent the end to an investigation. On the contrary, it is also designed to appropriate the beginning of concept development and selection. The users of this information should therefore be informed about the nature of the subject in order to better identify the potential of this data and also the further research development required for this subject.

4) The participants were unsure how the outcomes generated from the workshop could benefit the development process of a new product. It was suggested that further development session(s) may be required to establish the use of the data and, more importantly, may help to visualise how the effort put into the workshop can be translated into more tangible experiences for the NPD process.

As a result, participants should also be informed that this workshop is designed to generate ideas, not to evaluate ideas. The subsequent evaluation of ideas should take place in the later session, suggested by de Bono (1982). This may help to avoid confusion over the purpose of the workshop or such creative processes.

5) A step closer to understanding the users

In a sense, this research has drawn out important themes from the field, and focused on the process of ‘understanding the users’, instead of designing for the user at this stage. The workshop should include a clearer statement of intention, emphasizing the participants’ role as researcher of a new product development process who are to explore and identify new domains, directions and understanding of the user. The intention of the workshop, the tools utilised and the process introduced should be clarified throughout the duration of the workshop. This is to ensure that the purpose and tasks of the workshop are maintained with clarity. The development of ideas can therefore be introduced as a means to visualise their understanding of the qualitative outcomes, not to only to solve problems at this stage.

6) The stories could also be supported with quantitative data at the preliminary stage before the qualitative field research. These data, if introduced as a means of support for the qualitative stories, may have enhanced the validity of the information presented.

5.4.2.4 Summary of the evaluation

Two research analysis processes were evaluated. Firstly, the computer-assisted analysis of data with the NVivo software was evaluated in four stages; peer debriefing, pilot study of the creative workshop, the creative workshop and,

finally, a clustering technique to analyse the outcome after the workshop. As a result, the taxonomy of nodes was created, consisting of one hundred and thirty-seven nodes clustered into 10 themes. The taxonomy of nodes is discussed in the next chapter (chapter 6).

Secondly, the creative workshop was evaluated in the interview-based questionnaire. Nine out of the ten participants gave feedback on the process and outcomes of the creative workshop. The results are summarised below.

- Designers appreciate the rawness and the details of the stories.
- Because the stories are based on real life cases, *'you feel you can trust it.'*
- The stories make you reflect on your own thoughts and personal experiences.
- The participants shared the values and meanings identified in the workshop and gained respect towards older adults and their existing way of life.
- The stories help to facilitate a shared language between the team members.
- The participants was sensitised with the qualitative information provided by this research and understood that the users generally have a positive attitude towards their home; they don't see their 'home' as a problem to be solved.
- The process of the workshop was, described by participant A as, 'about understanding, not just designing'

Designers are trained as problem solvers. The stories presented a sensitising opportunity for the conventional problem solver. It was intended to introduce an opportunity for the workshop participants to gain better understanding of older adults and their attitudes towards their existing home environment. The evaluation of the workshop has confirmed the contribution of the qualitative stories and the process which they were presented. The limitation of the workshop is also outlined.

5.5 Chapter summary

This chapter presents the analysis and evaluation of the qualitative data collected from the field. The first part of the chapter discusses the analysis strategy in dealing with the raw data collected using the methods of home probe, semi-structured interview and video tour. The computer assisted analysis with the software NVivo 8 was introduced as the first stage of organising, managing and most importantly, understanding the data. The techniques of peer debriefing was also employed to establish the credibility of the analysis process and outcomes. Secondly, a creative workshop was employed as a second stage of analysis to examine the data in the setting of a multidisciplinary product development team. This section discusses the design and deployment of the pilot and formal creative workshop. This stage more importantly was designed not only to examine the usefulness of the analysis with NVivo but also to evaluate the usefulness and potential applications for such qualitative design research.

This chapter presents an important process of how data are analysed and interpreted, also, on a practical level, how such data were utilised in an idea generation session of a creative workshop. In the next chapter, research findings will be illustrated to help the readers of this thesis understand older adults and their existing homes.

CHAPTER 6 RESEARCH FINDINGS

6.1 Introduction

In this section, the findings are presented in the format of stories. Each story is a persona that described the experiences of these older adults in their older homes. These stories are also supported by the analysis outcome of the research. The taxonomy of nodes provides a structure for the narrative of each story.

The stories have been shared and understood by the participants of a multidisciplinary team in the creative workshop. The feedback from the workshop suggested that the qualitative information identified in this research has helped the workshop participants to gain respect towards older adults, relate their own experiences and reflect on design practices. The result therefore indicated an intrinsic value which may benefit the development process of smart technology products. This chapter focuses on the description of each persona. But, firstly, the taxonomy of nodes is briefly explained.

6.2 Taxonomy of nodes

The main research findings are composed of two parts. The first part illustrates the results of qualitative analysis, the taxonomy of insights. The second part illustrates the personas, which is the narrative information describing lifestyles, attitudes and everyday life of the older adults who participated in the study. In this section, the taxonomy of nodes is described.

One hundred and thirty seven nodes (N=137) are generated. As illustrated in the chapter five (data analysis and evaluation), the taxonomy of nodes describes a good classification system to bring a mass of concepts together (Bazeley, 2007). Here the taxonomy of nodes serves as the basic framework for illustrating personas identified in the study.

In total, under the main taxonomy, ten themes were identified. They are ‘*Being human*’, ‘*Continuous homemaking process*’, ‘*Growing old*’, ‘*Home as it is*’, ‘*Home is more than a house*’, ‘*Homes are connected island*’, ‘*Life changing versus home changing*’, ‘*My cave*’, ‘*Rules of the tribes*’ and ‘*The role of the tools*’. Under each theme are the associated 127 nodes (Figure 6.1).

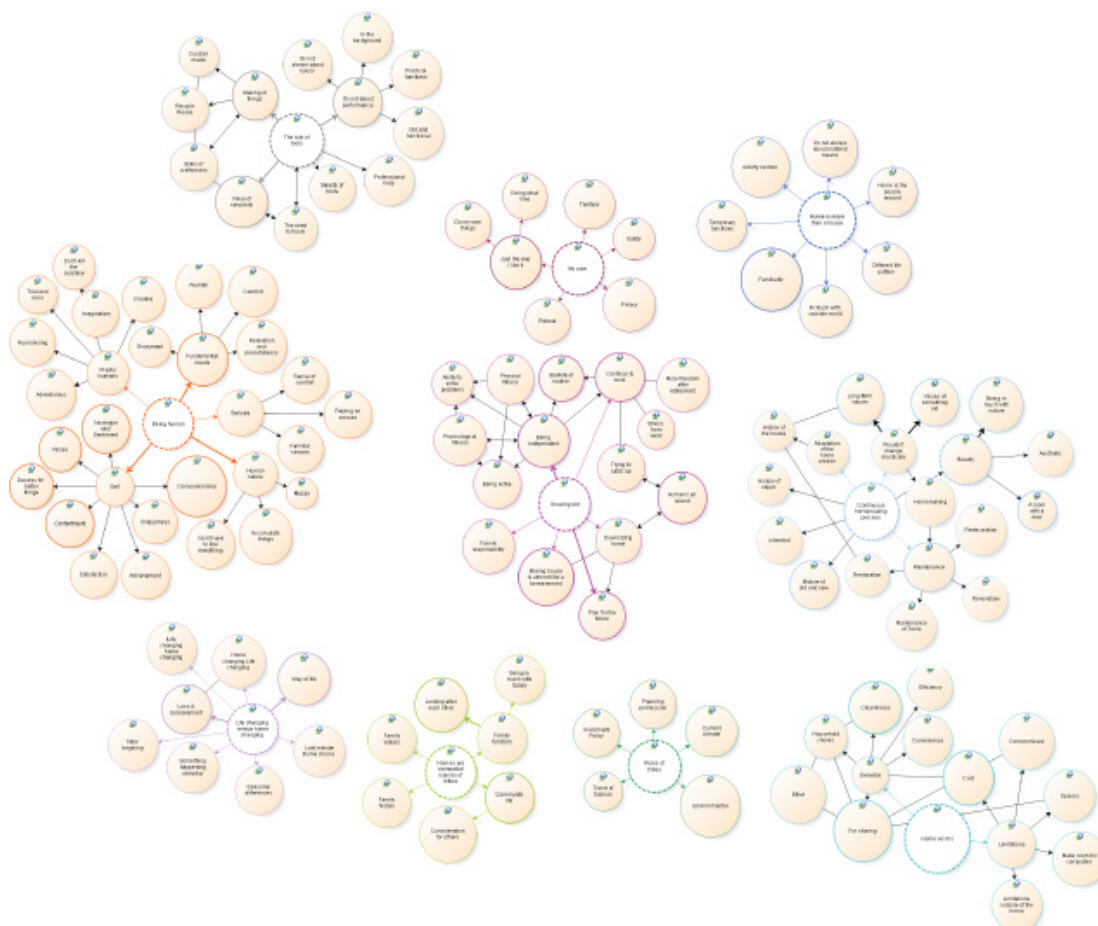


Figure 6.1 Taxonomy of nodes (The figure here is to give an example of the basic taxonomy structure of the nodes. A larger figure is supplied in Appendix J)

The model illustrates the ten themes identified in this research. The themes were the results of clusters of a rigorous process of data analysis and peer debriefing. Each theme is clustered by its correlated nodes. Each node is the idea derived from the life stories, experiences and attitudes of 18 people who participate in this study. The insights identified from the field are captured by the coding process and clustered according to similarities, differences and correlations. This model demonstrates, visually, the insights identified from the field. In the next section, ten personas are presented and narrated using these nodes.

6.3 Personas

The design of the persona

In this second section, the stories are presented. The use of ‘persona’ or ‘story’ is one of the common methods to present qualitative or ethnographic findings. The design “requires the construction of authentic and compelling narrative of what occurred in the study and the various stories of the participants” (Janesick, in Denzin and Lincoln, eds., 2000, p.386)

The personas used in this research provide the following information:

- Background information of the person
- Written replies from the home probe
- Quotations from audio and video transcripts (verbatim)
- Photographs generated by the person
- Still images of video tour

The characteristics of each persona are structured by nodes. These nodes are the result of the qualitative analysis that represents not only the narrative of each story but also the correlations of the personas and their relations to the overall findings of this research. In each persona, the nodes represent ideas or concepts derived from the individual case (Figure 6.2). Some ideas are shared by most of the personas and some are more specific to individual cases. As a result, each persona has its unique story and emphasis.

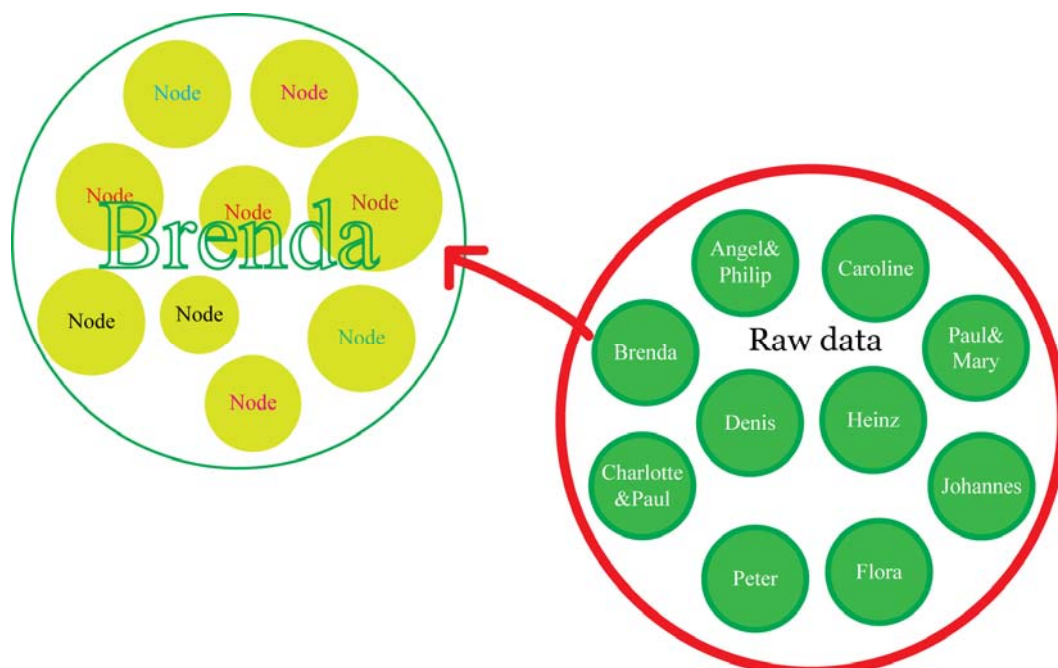


Figure 6.2 The persona Brenda was constructed with nodes that represent the main ideas and concept derived from her case

There are ten personas presented in alphabetical order in this section. These ten personas represent the essence of the stories derived from the 18 older adults. At the end of the stories, a summary of the persona will be discussed.

6.3.1 Angel and Philip

Angel and Philip's house was built 33 years ago. They have lived in the house for 25 years. Both Angel and Philip grew up in this neighbourhood. Most of the family live in the same neighbourhood.

The house they are living in now is a two bedroom semi-detached style house. It was part of a new housing development project a few decades ago. When they moved into this area, there were no big superstores nearby and there were plenty of open fields around.

Home is more than a house

For Angel, Philip is her home (Figure 6.3). They have been married for 25 years. The meaning of home to Angel is not a physical structure of the house.

*'H: What makes you feel at home? A: Phil Yeah, **Phil is my home**, one of them, so really wherever he is. What we were saying if he really want to go aboard earlier on, I'd have gone.'*

I mean wherever he wants to work, I'd go too. You know, that is my home. So there wasn't anything else to say on that one.'



Figure 6.3 Philip poses for Angel for the task of 'what makes you feel most at home'

Homes are connected islands

Most of Philip and Angel's family live locally. There is a very strong relationship between the family members. They often host family functions at their place. Their home is like the centre of their family network. Angel and Philip also visit his parents every other week.

'A: All family are here for Christmas. They come for everything here; they come for birthday and things.'

Lost and bereavement and Nostalgia and sentiment

Sadly, Angel lost her mother 25 years ago and quite a few members of her family. She has a photo collage of all her family members displayed in the hallway (Figure 6.4). The paragraph below illustrates how Angel felt towards her lost family members when talking about the photo display in her hallway.

'A: It's not the same thing though, isn't it? P: No, it's not like the regular thing. A: I don't think unless, unless you've actually loss your parent so to speak, I don't think you really, when you see most of your family pop off who you are really really close to, I don't think till that happens to you, you realise what is, you do feel alone sometimes, I do feel that sometimes. Not because I am lonely and I haven't got friends and I haven't got people I can talk to. But you feel where you come from is missing. P: You still saying now sometimes I've got to tell my mum that, and oh I can't. A: Yeah, I do, I mean something, I must tell mum. I mean

my mother died before we got married. So my mum's been dead 25 years in October...With P's family, I am really really lucky because they sort of just inherited me really. But it's still not your family.'



Figure 6.4 The collage of Angel's family portrait in the hallway near the landing on the first floor

Family life includes often the loss of the loved ones. Angel would love to give her family photos a magical property so that the photos would become interactive and she could talk to her lost family as if they were alive, *'like the picture frame in the Harry Potter films'* said Angel.

The role of technology

Angel's father lives with her stepmother 3 hours drive away. It has not been easy for them to visit because of the distance.

She keeps frequent contact with her father by emails every other day. Email is more suitable than telephone for her father because he is nearly deaf. If she needs to speak to her father, she has to speak through her stepmother.

Downsizing home and A room with a view

Downsizing home means reducing the cost, maintenance work and often the challenges that come with ageing. However, downsizing a home does not have to be an unpleasant event. In the case of Angel and Philip, there is generally a positive outlook towards moving into a smaller and more manageable environment. But, more importantly, they will be looking for a place where Philip can continue his fitness regime and Angel can relax with a great view of the sea.

Before they moved into the current house, they lived in a flat above the local high street, which was particularly restricting for them because there was not enough space outside. As the years went on, they continued to modify their choice of house to their choice of lifestyle. The current setting of the house has also been modified when they moved in.

'A: But living in the flat didn't really suit either of us. We didn't like living in the flat at the time. H: Why is that? A: Especially where it was, we just feel very constricted. And there is nowhere to sit on the balcony. You had to go out, you just wanted to go out, you had to go out. But I think it's funny how now, looking forward to our retirement, the one thing that we know we are going to buy ((laugh)) is probably an apartment with balcony, you know, somewhere nice, different part of the country. So we sort of come full circle I guess.'



Figure 6.5 The view of the garden. The picture was taken for the task 'something beautiful'

Physical fitness and Being active

The downsizing and the change of the home are influenced by fundamentally the physical and psychological needs of the inhabitant. It is also important to acknowledge the fact that the alterations, adaptation or downsizing of the environment is also influenced by the constant change of the needs. Angel has an experience of an unstable period when she had hip replacement surgery a few years ago. As a result, she has difficulty walking. Hence, the decision for downsizing of their home is more likely to include a long-term plan that combines their needs for physical stability and other psychological needs.

'A: I think health is the only thing that you can't sort out. That's my, anything else you can get by, if you loose your health.'

Relaxation and peacefulness

Angel and Philip's home is a place of sanctuary where they can relax and retreat from the outside world. The physical property of their home provides comfort, safety and a display of their way of life.

*'A: This is why **my home is my sanctuary**, where I need to be.'*

6.3.2 Brenda

Brenda and Paul's house was built in 1790. They have lived in the house for 28 years. They also rent some of the rooms out for paying guests.

Brenda and Paul did not plan to acquire this house. They only came by this property by chance. It took them nearly a year to finalise the contract with this house before they moved in.

History of the house and Value of something old

Brenda's house is full of history. Brenda and Paul acquired the house 30 years ago. They decided to move because there was not enough space for Paul's collection of books. Part of the reason why they chose this house is for the large space in the basement, which was a kitchen in the Georgian time.

*'**It's a Georgian house built in 1790.** It has a fairly major alteration done on to it and I think 1886 was the date which was etched on the glass, one of the alterations. And there was another period of alterations in the 1930s and we haven't really done much to it. H: Why? B: Well, it is a listed building so being able to do something, you have to ask all sort of permissions. The only thing that we really done is when we moved in, the basement was largely abandoned, and the reason we bought this house is because my husband has a seriously large collection of books. It's very heavy so we wanted somewhere which had a dry basement which we turned into a bookstore, which is what it is. But **the original kitchen of the house is down in the basement.**'*



Figure 6.6 The front of the Georgian house

History of the object and Inherited

Brenda was also very interested in knowing more about her house, particularly the 300 years of stories. She was contacted by the previous owner of the house when they first moved in. She and the previous tenant, who was in her 70s at that time, discussed the changes of the house, inside and outside.

Brenda has also come to know about the house through a postcard that her friend gave her. The house was used in the First World War as a military office. These histories have become part of the living story of the house. During the video walk through the house, Brenda enthusiastically showed the history of the house, such as the original bell systems, marks of the structure changes and objects or decoration left by the previous tenant.

*'B: **The bell is there. This was, the original use of the house**, they probably use it as a nursery. They used to keep the children right on the top of the stairs so this was probably a nursery, or children's bedroom and probably the room next to here as well'*

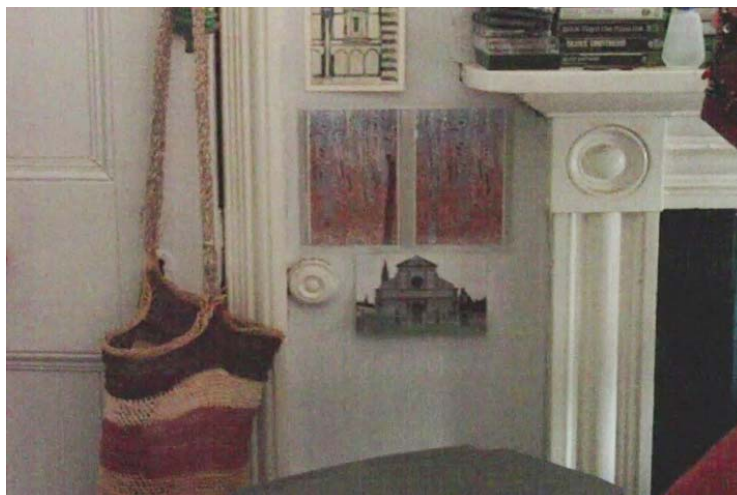


Figure 6.7 In this picture, the bell (painted in white) is located in between the postcards and the shoulder bag. It is on the third floor in Brenda's work room. The bell is connected to the main system which is located in the basement of the building where the kitchen and servants' quarter was in the Georgian time.

Maintenance and Cost

However, the major challenge that comes with a 300 years old house is cost. In order to reduce the cost of maintenance, Brenda and Paul often carry out these tasks by themselves.

'H: So have you really decorated the house? B: Well, yeah, I have I have been around every single room in this house has been repainted and a lot of them obviously more than once in the time I have been here. But it's a long time, although we've been able to buy this house with the money we sold from the house we had in London, it didn't leave any money for us to employ anybody to do anything. So everything has been done, every inch of wallpaper and every lick of the paint has been put on by me.'

Planning permission

In particular, any maintenance works involving changes to the physical structure of the house would have to follow strict guidelines laid down in the 1960s when the building was listed for its architectural and historical importance. These outdated guidelines could sometimes conflict with the standards and needs of today.

'H: How does listed building work? B: Somebody came around before we have moved here, I think in the 1960s and decided this

building is of architectural interest and importance and literally listed all its features, structure features including the window in the next bedroom, which is in fact a 1950s replacement window, which we said we would like to take out and replace with matching Georgian sash windows, like the windows in this room and we can't do it. Because on the day when the building inspector came around, he listed that window as it is, it's a horrible window it's not an aluminium frame, it's an iron frame which goes rusty through paint every couple of years. H: Is it a human error? B: No, it works on all listed buildings, a record of a moment in time, and just because it's not original to the original building, does not mean that you can alter it in any way back to the original building anymore than you can decide that you like to rip it out and replace it with modern one. There are late 19th century windows and downstairs at the back of the house, but anything was down to the house prior to the date it was taken by English Heritage to be a listed building has to stay as it was. If I wanted to do anything about that window, I would have to get the building inspector to come and see it and he would have to agree with me that it was finished, gone, worn out and they would have to go to a big committee meeting and decide that I had to replace that window with a window like that window. But because that window functions as a window and because it was listed as it is now, although we'd like to take it out and replace it with a Georgian sash at vast expense, our vast expense, not anybody else's vast expense. and we are not allow to do it.'



Figure 6.8 The 1950s window. Next to the window on the right is the great bolt painted in white. The bolt was installed in the 1950s for safety reason and was used by people to hoist themselves out of the window in the event of fire.



Figure 6.9 Brenda holding the great bolt



Figure 6.10 The rope for hoisting from the bolt was still stored in the cupboard space next to the window

Accumulate things and I don't have to like anything

Brenda and Paul have collections of personal possessions such as the old grandfather clock. The accumulated collections also represent how, as individuals, they use, share and negotiate the spaces in their home.

'H: Why you think the clocks represent your home when you don't like them? B: There are lots of things in this house that I don't like. He owns this house as well as me, he can spend his money on whatever he chooses to spend on, I don't have to like it. H: I was intrigued that why you didn't choose something you like. B: I enjoyed thing I like which he doesn't like. Some of these things he brings home I do like but quite a lot of them I don't like. We don't have to like everything, do we. H: So you mean

they are all part of your home. B: Yes, but the house is big enough for me to ignore them and step over them.'



Figure 6.11 The old grandfather clock is located in the dinning area



Figure 6.12 Chamber of horror. Brenda calls her basement ‘the chamber of horror’, a place she does not particularly like. Paul converted the old Georgian kitchen into his library for his massive collection of books. In the picture is a corner in this chamber of horror and it is only a tenth of the whole space.

Have to share

Brenda does not like to use the computer and there are three reasons for this. First of all, the email account is in Paul’s name. In other words, all incoming and outgoing email from her will be inconveniently in Paul’s name. Secondly, the

computer is located in Paul's office that, in a sense, keeps her away from using it. Thirdly, even when Brenda was encouraged to use the computer, especially when Paul is away, she feels reluctant to be responsible for it in case it breaks down.

'H: So how are you getting on with computers then? B: mm, I personally don't use it. I use it while he is away, just send a couple of emails. I am a bit, I am on my high horse about this, because our email address contains only his name, therefore, I won't use it. H: Would you like to create your own email? B: I know I could create my own but just the fact that WE now have email and this is THE address, the only name on it was HIS. So, fine, it's yours.. If I need to send an email, I can do it, it just coming back and receiving it, I might not get it, I do use it while he is away to communicate with him. I don't touch it, if anything goes wrong with that and I touch it, it's gonna be my fault. I do receive emails; they go to somebody else's email.'

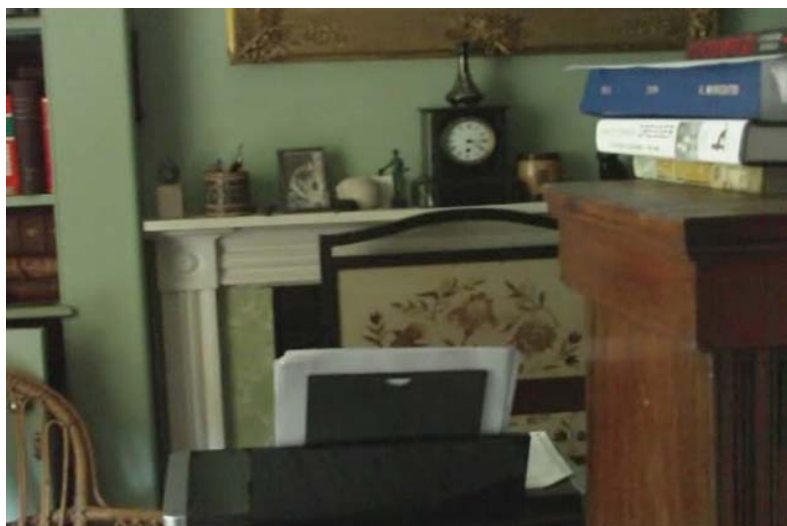


Figure 6.13 This is Paul's office where he has the computer. The computer is hidden in between the big cabinet and the fireplace.

Trying to catch up

Despite their efforts in learning and using new technology in their everyday life, technology such as mobile phones creates problems instead of helping them to communicate. Not only are they sometimes in the position of trying to catch up with new technology, but they also have to make efforts to help each other to cope with learning the new technology.

'I mean I have been known to send him occasional text messages to his mobile phone when I am away which he doesn't get because he has no idea how to get his text message out of his mobile phone. But that's his problem, not mine, so when I come home, he said you didn't communicate with me, and I said give

me your mobile phone would you, just give it to me, and I would hack into it and I would show him date and date, text messages, “(B pretend to be her husband) Well I don't know how to get them out”. Perhaps you should find out.’

These experiences can be used as metaphors to represent Brenda and other participants’ experiences with technology at home and outside of their home.

One may say that older users find it more challenging to adopt new technologies in comparison to younger consumers today. It is, however, ignorant to stereotype an older adult, such as Brenda, as someone who has personal access to technology and has access to unlimited broadband service support.

‘I have a mobile which is usually in my pocket, it may not be switched on because some of the places I worked, we have no signal at all. When I worked in Wales for instance, one of the sites I worked on, in order to check whether I have had any communication with anybody, I had to drive 5 miles to the forest street car park where it will work. But the rest of the time until sheep needs to use mobile, there will be no signal there. ((laugh))’

In reality, Brenda’s experience involves sharing a personal computer with her husband, helping him to learn how to use a mobile phone and dealing with the limited signal provided.

These are all parts of Brenda’s experience in coping with technology. For her, the concern for technology goes beyond personal benefit and the usability of a single product.

Value of simplicity

Sometimes, simplicity is in using old fashion methods, such as the appreciation of the telephone.

‘There are other ways of communicating although some people do think to forgotten, if they want to speak to me, I am on the other end of my telephone’

Looking after each other

The task of looking after each other involves, not only caring physically or psychological for each other, but also, more importantly, the resources that are available for the task. Brenda faces the dilemma of caring for her mother.

'B: My mother is in the nursing home just up the road that I go and see her twice a week. She needs full time care so that I can't give her. She can't even get in and out of her bed herself. They have this awful hoist thing that she hates. At least they have it and she is well cared for up there'

6.3.3 Caroline

The bungalow Caroline lives in was built 30 years ago. She moved into this house about 6 months ago. This house belongs to her 80 year old mother.

Her mother, Lilly, acquired this house through her friend after she was divorced. Since separation, she has lived in this house.

Being active and Way of life

Caroline has been living a very active life. Because of her profession as a musician, she has travelled all over the world and lived in different continents. She has just moved back to the United Kingdom to start a research degree. She is a full-time mature student and aspires to as be active as possible, even till a very old age.

'I do see myself being adventurous in taking risks, trying things of not knowing what's on the corner, active, that's for sure, I am a very active person, both physically and mentally, dedicated, that was the hard one, in a sense dedicated to my art, to what I do. I think that will always continue. Even if I live to a very old age ((laugh)).'

My home is where I am

'I've always liked living in different cultures and different languages. Because it just makes you feel on the edge of things, it gives you perspectives, a finer perspective, I don't feel insecure; my home is where I am. I don't have a sense of one place being home.'

Home is more than a house

Interestingly, when Caroline was asked to take a picture of her home, she took a picture of her room. For her, the meaning of home is about the belongings and possessions she has accumulated over the years.

'H: How about a picture of your home? C: It is that one. H: your room? C: yes because for me, this is my home, this room. H: is that why you didn't take a picture of the house? C: Yeah. H: Did you think of taking picture of your house? C: No, I didn't think of doing that. Because (1.0) for me, the house is not my home. This room is my home.'



Figure 6.14 Caroline took this picture for the task of 'Take a picture of your home.'

Companionship and Family network

After years of travelling, Caroline has settled back home in England. This was a blissful occasion, especially for Lilly to have her daughter back at home again. Caroline now helps with most everyday chores, especially cooking.

'C: I think she found it very nice to have someone there. Particularly somebody who likes cooking because she doesn't like cooking very much. So she would live on toast. ((laugh)) And I always insist on having some nice wine and something hot to eat on the table. And I think she likes to have the company to talk, to know someone is there.'



Figure 6.15 Caroline's sister who lives nearby paid a visit to them at the house. She picked Lilly up from the station and also brought some shopping back. They came in the house during the video tour and greeted each other.

A room with a view, Being in touch with nature and Senses

For Caroline, one of the fundamental requirements for a home is space and closeness to nature. The feeling of being at home also includes enjoyment of visual and sensorial qualities of her room. Her room is characterised by, not only the personal objects she acquired over the years, but also the sensorial qualities such as 'sight' of the "big expansive sky", the 'smell' of garden in the night time, the touch of the tactile lamp shade and the 'warmth and glow' of the lamp. These characteristics add qualities, colours and textures to her small room. And because of these elements, the room becomes a place for rest as well as for Caroline to create and enjoy things she does as an individual.

'I love expanses of greens and water. And open sky. I love big spaces. If you can see a lot of sky, I feel very happy. You mentioned your room is kind of small, how do you find it? C: I find it OK simply because of this window, because I can see lots of sky if I sit there. Big expansive sky, and even from the bed. You can see a lot of garden sky. I spend a lot of time looking at it. Yes, I always put my desk in front of the window. Otherwise it would be very small, it's a small room.'



Figure 6.16 The view of the garden from Caroline's window



Figure 6.17 The velvet covered lamp shade she acquired from a charity shop



Figure 6.18 Caroline switches on the lamp and was feeling the texture of the shade and the warmth emitted by the lamp



Figure 6.19 Caroline showed the texture of her music scroll



Figure 6.20 The view of the expansive sky

Value of something old and Inherited

Caroline inherited her father's grand piano when he passed away. The piano has travelled with her all over Europe to wherever she settles. The piano is now in her sister's front room because there is insufficient space for the piano in this house.

Caroline also inherited 3 rugs from her father. These rugs have travelled with her and are still being used today in her room. The rugs are valued by Caroline for practicality and craftsmanship as well as for sentimental reasons.



Figure 6.21 One of the rugs which Caroline practices yoga with.

6.3.4 Charlotte and Paul

Charlotte and Paul's house was built in 1929. They have lived in this house for 10 years and renovated it when they moved in. Their house was tailored to both their needs. The idea of home goes beyond the personal boundaries in the space and physical entity of the house.

Physical fitness, Home changing life changing and professional help

Although Charlotte needs good wheelchair access around the house, it is not to say the idea of her home is all about things that can provide for her physical needs. Charlotte and Paul decided to renovate the house to create a better kitchen and living space. In comparison to other participants of this study, who have become involved in the renovation work, they had an opportunity to involve an architect to design the extension for them. This was a life changing event for them.

'H: What was the reason that you involved an architect? C: Because I used an architect before and he was a friend and I knew what a dramatic different it can make to your life, to get somebody else involved. Because a lot of people think, I have a idea and this is what I want to do. I actually think it's good to get an expert. P: To get a professional, who has different idea. C: And he has changed our life. Quite literally. P: He saw the possibility of developing this end of the house, in terms of light. He asked what we wanted. So we can flap our arms around and oh, we want light, we want space, and he translated our vision, what was in our head to this. So, we could never have done this on our own without the designers.'



The Garden Room

Figure 6.22 This is the garden room the architect designed for Charlotte and Paul. It is the main living area where they spend most of the time.

Enjoyment and Activity centre

This living space created a centre for Charlotte and Paul's enjoyment, comfort and relaxation. They called this extension their 'garden room'. It is also part of the open plan that is connected to the kitchen. For Paul, this joint space is his pride and joy, a place where he can make fresh bread for Charlotte and cook the vegetables they grow in the garden.

'P: By the heart I mean this is where all the social, this is the social centre of the house. It's where foods come from. C: So we have a lot of friends around. P: So people sit around at the table, I cook while people sit at the table or they sit here in the sitting room area. We play music, bands here; people are here, so this is the kind of where it all happens. This is a theatre, this is the stage.'

The interview took place around the kitchen table. Charlotte insisted the author to sit on the side of the table where she always sits so that the author can understand the feeling of the space and the beauty of the view. When Paul cooks, Charlotte often sits by the table and chats with Paul.



2/ CHEF'S "D" u

Figure 6.23 The kitchen with fuel efficient cooker and reclaimed floor boards from an old gymnasium

Environmental and Cost

Charlotte and Paul are also very environmentally conscious. They have given thoughtful consideration to a more eco-friendly and cost affective way of living. This was shown throughout the features of their home.

'H: So is this original floor? P: No, I bought this, it's reclaimed, from an old gymnasium, from a school gym and I bought. Because this is maple and maple flooring is very expensive. So you can but reclaimed maple flooring for a third of the price. C: So it's still got the marks of the gym.'

Being in touch with nature and Aesthetic

During the field visit, Charlotte and Paul proudly showed the author their garden. Their garden consists of flowers, plants and water features that have been constructed specifically to their taste. This garden is what Paul calls 'soft landscaping'. In particular, their lifestyle is, in a sense, on display through the choice of assistive facilities around the house and the beauty of their soft garden.



9 OUR HOME

Figure 6.24 This is a picture of the view taken from the back of the house. All the pictures and written replies were carried out by Paul.

Uniqueness / individuality and Learning and making

The possessions in their home reflected not only their tastes and styles but also their beliefs and values. Many objects, as they described, have aesthetic qualities, but, more importantly, possess the efforts of the craftsmanship and time dedicated by their makers. These unique attributes are appreciated regardless of the price.

One good example is the burr elm dining table located in the kitchen. This table consists of the burr elm wood top that has been prepared over a year to allow the wood to adapt to the condition of temperature, moisture and so on in the room. The table was then constructed by a local carpenter to make a leg stand. The other example is an inexpensive ceramic mug made by Charlotte's friend which Charlotte uses everyday morning.

'We built this room, because we both like big spaces and we are both into unusual things like the lighting in the ceiling.'

'P: I suppose in short terms, we both hang out with people who make things. People who make furniture, people who make pottery and people who make cloth. People who make music, people who paint. When you hang out with artisans, you learn about stuff. And I think that's what people are disconnected from today, in modern life. And I think it's part of designers responsibility.'



*↳ OUR BURR-ELM
KITCHEN TABLE*

Figure 6.25 Charlotte loves the view from the right side of the table. She even insisted to have the author sat at where she often sits in order to better enjoy the full view of the space.

Nostalgia and sentiment, Value of something old and Mixture of old and new
 Their home is, more importantly, a combination of great nostalgic and sentimental objects which they inherited from families. There are two objects that Charlotte inherited from her grandmother. One is an Indian table curved with vine leafs and is now used to put their indoor plants on. The other is a delicate screen which she has displayed in the bedroom.

'C: yeah, but I've know it all my life. So I suppose if you like, it's like been in my head all my life. But I own it for about 20 odd years. I just think it's a lovely table. It means a lot to me. Paul teases me cos I love old things. P: She likes old things. C: Many old things are beautiful.'



8/ VINE-LEAF TABLE
"MAGICAL"

Figure 6.26 Charlotte inherited this table from her grandmother. It is situated in the garden room by the big glass window.

It's a mixture of old and new things.

'P: how would we describe it? As a relaxed, colourful and interesting place. ((P laugh)) P: It's a mixture of old and new. C: Yes, lots of old and loved items around us and some new and loved items. C: Like the screen, my grandmother brought from India, so we have some old and P: And the table, which is new but interesting and a very high-tech fridge, Australian, which is. C: Has computer. P: Has computer in it which detects your behaviours and predicts your behaviours.'

The role of the tool

With all the old objects in their home, new things such as their hi-tech fridge are nevertheless very much appreciated. The fridge has, as Charlotte described, an intelligent function that memorises the time when they open the fridge door. So before they open the door next time, the temperature inside of the fridge is lowered to reduce the drop in temperature, which, in turn, makes the food last longer and stay fresher.

In a sense, Charlotte feels the quality of the intelligent fridge is almost like a considerate friend who cares for her. Although the function of the fridge maybe simple and mundane, Charlotte appreciates the convenience and the meanings behind the convenience the fridge brings to their table.

'C: Most people have small fridges and they don't have space in them whereas our fridge is huge and everything goes in it. H: So how long have you had the fridge? C: We got it as a present when we got married. P: 2002. C: It's called Fisher and Paykel. ((Charlotte showing the author the fridge)). C: So you see, you can have lots of space. It's just a great fridge. P: It's just a fridge. C: It's more than a fridge. P: It's Charlotte's friend. C: It's our friend. P: It doesn't answer back, it doesn't speak back to her'

Limitation outside of the home

Unlike the public space in Edinburgh, which is full of hills and stairs, their home, in many helpful and encouraging ways, allows Charlotte to do what she likes without much compromise. Many of Charlotte and Paul's friends live in multi-storey apartments. So instead of Charlotte going out to them, most of them come to their house for social occasions.

6.3.5 Denis

Denis moved into his flat about 3 years ago. This flat was part of a new housing development in the area. Denis's previous house was 300 years old. He was born in the house.

Being independent and Physical fitness

At the age of 83, Denis has a clear understanding of his needs in the near future. In response to those needs, he decided to downsize his home. Denis moved into the current flat three years ago. This flat is much easier to maintain in comparison to his previous house. Living alone, he tries his best to maintain his everyday needs and stay independent.

'H: How do you see yourself in the future, please describe it in the minimum of three words. D: That's:::a difficult one. H: I think people often find it quite difficult actually. (0.3) Disable probably, my legs. That's the only thing I will think. I can see myself difficult to walk, possibly, in the future...My knees, arthristis, that's how I can see myself. Difficult to get out and about, really, you know.'

Denis' aspirations and, to some degree, frustration were also expressed during the field visit. 'Birds have more freedom than human.', Denis poetically described:

'D: I think the birds have more freedom than human race. I think the birds can do what they like, where they want. They just fly along. Although they worked hard all day because they got to feed themselves but they are more relying on themselves and they have better quality of life than human'

being in some ways. H: You think so. D: I am sure so. They can just nip off, they don't have to catch a train or wait for a bus or anything. H: And they don't have to buy groceries. D: No, not when the weather is good. ((laugh))'



Figure 6.27 A shot of the video tour when Denis was talking about birds.

If he could be fit again, he could go out more and enjoy a more active lifestyle.

'D: Give your favourite object and a magic property, what would you do?... I just want myself to be fit again. That's what I would do...If I had a wish, I wish I can have my youth back again and play cricket, sports.'

Do my own things

However, living alone also gives a positive outlook of the freedom of 'doing what I like' from Denis' point of view.

'D: What makes you feel at home? (0.5) you can do as you wish ((laugh)). It's your home, you know what I mean. H: Yes. D: What makes me feel at home is I can do what I like. Living on my own, you know, you do as you want. H: Do you enjoy living on your own? D: No, not particularly, but you have to get used to it. I am used to it. You will find things, you finally get used to it. It will be difficult to live with anybody else again I think. Tricky because you are used to doing what you want without people coming (to share), and you can go back to your routine.'

Limitation outside of the home

Although the surrounding environment may present a great degree of limitations and physical challenges, Denis utilises whatever he has to make the environment work. One interesting observation during the field visit at his new flat was a great example of how he deals with these limitations.

As he lives on the first floor, there are two sets of stairs for going up and down if he goes out. When he goes out, he puts his shoes on in the hallway by the door and goes outside the front door to use the higher steps of stairs to tie his laces. He then goes down the stairs by doing one stair at a time.

'It's OK, I do one at the time'

By going through a set of routines, Denis has good control over maintaining his independence and carrying out necessary tasks in everyday life.

Routine

Denis spends most of his time in the living room. This space consists of his chair, electric fireplace, television and coffee table...etc, which he brought with him from the previous house.



Figure 6.28 This is Denis' favourite chair where he spends most of his time. The chair came together with other furniture to this new flat.



Figure 6.29 The front room. Beside the chair which Denis uses, he sometimes uses the sofa to have a nap in the afternoon.

Most of the things he needs during the day time are set in place and within reach. For instance, the remote control for the television is often placed in front of him on the coffee table. Other objects, such as his daily newspaper, glasses, TV guides, are placed around this activity centre (Figure 6.29)

'H: How long do you stay in this room in your routine? D: How long? most of the day, apart from when I am in the bathroom, in the kitchen, I spend it in here, nowhere else, or in the bedroom, it is pretty compact as you know. I spend most of my time in that chair, in that corner. ((laugh))...D: It's OK, it suits me'

Maintenance, Comfort and Practical functions

Living in a new flat is undoubtedly different from living in a 300 years old house. For Denis, it is the fundamental things that are most relevant to him in order to maintain his way of life. Everything should be quite simple and, as he described, '*minimalistic*', although compromises have to be made on some occasion.

'D: Well, it's not so easy living away because you got people above you, you know, you don't get living on your own place. But otherwise, I am much better off, easy to maintain, easy to look after than the other place. The other place is old. It was built 1700 approximately. H: That's very old. D: It's easy accessible to shops. So I can walk down the town...Dentist, doctors, optician, everything is in walking distance at the moment.'

Enjoyment, Companionship and Trying to catch up

Denis expressed that the most valuable thing in his home is the television because it keeps him '*company*' and provides him with entertainment.

'D: when you are old, you can't get out. And that (TV) takes you all over the world. Sometimes, viewing things, goes pass the world I will never go.'



Figure 6.30 Denis' son bought this new digital television. His son Douglas chose this TV for him.

He acquired this television when he moved into this new flat. His previous TV was the analogue type and one which you need to physically turn the nodes in order to switch channels. He likes his new digital television but does not use the new functions that it came with. He is satisfied with the basic functions and does not spend any more time watching television.

He watches 30 minutes of 'Count Down' every afternoon, a popular programme in the UK, and, in the evening, he watches a few films or documentaries before going to bed. He goes out on the bike if he can.

Values of simplicity and In the background

Denis' attitude towards technology in his home is quite simple; as long as it does its job and as long as it is easy to maintain, he is satisfied.

For instance, Denis has an electrical fireplace that he brought from his previous house. The fireplace was acquired about 7 or 8 years ago. In this brand new flat, Denis does not have much problem at all with central heating, but when it is not strong enough, he tends to switch on the fireplace for extra comfort. This electric fireplace is more or less a plan B or, as Denis described, in the background.



Figure 6.31 The electric fireplace is Denis's background heating in the winter.

Interestingly, this attitude goes across many participants of this study, where the mentioning of technology is more often as an aid to, for example, comfort and enjoyment in their everyday life. Technology is very much valued for what it can provide on the practical level.

6.3.6 Flora

Flora and her partner, Simon, built their house 5 years ago. This house was built on the ground of a listed building. All of their children have grown up and left home. Simon is retired and Flora works occasionally as a seamstress.

Long-term value

It was one of the chances in their lifetime to build their own house. As Flora and Simon described, it was an opportunity of investment for creating a home and a place where they can grow old together.



Figure 6.32 Flora's house

Planning permission

Flora and Simon adopted the building plan for this house. This was a coach house for the listed building next door. The design of the building followed the original features of a coach house for Lincolnshire; for instance, the brick-top arched windows.

'Did you design the house yourself? F: We didn't actually design the house because we bought the plot of land with planning permission already on it because somebody was already living in caravan in it. They had done all the plans. So we actually had to go with their plans. We bought the plot with all the services laid on and stones were already there, already built in. We had to stick to the plans we are already on it...we had to get permission for everything we had to change. Oh, we actually had to be careful because we are in the grounds of listed building, next door, the hall is listed, so because we are in the ground so effectively, we had to be careful with things.'



Figure 6.33 One of the features, the brick window arches, that the coach house is required to maintained.

Familiarity and Nostalgia and sentiment

What makes Flora feel at home are the familiar objects and the combination of senses such as the warmth of the Aga, the texture of the wooden dining table or the smell of her two dogs. The feeling of her home can be the pleasant smell of the flowers in the garden or the odour of her two dogs. For Flora, all these senses, including the odour of her two dogs, describe her experiences of being and feeling at home.

'H: What makes you feel at home and why? F: Familiar objects make me feel at home and familiar furniture and the smell of my own house, familiar sound, yeah. That's really funny cos it just strikes at the right time. H: What do you mean by familiar object, what do you mean by familiar? F: Well, just things we, I've collected over the years. I remember where they came from and where we bought them and why we bought them and things people have given me, you know, things that make you feel at home.'



Figure 6.34

The Aga. Simon's mother used to have an Aga. When Flora and Simon built this house, they installed an Aga because they both liked the idea.



Figure 6.35 A corner in Flora's kitchen that display things she collected over the years

Familiar senses

A good example to describe Flora's experience of being at home is the ticking sound of the old grandfather clock.

'H: What does it mean to you to hear the clock ticking? F: I don't know but it's really funny coz the way, you don't notice it it's just there. But when it stops cos you forget to wind it, it's really quiet and it doesn't really feel

like the same place. It's like the heart beating I think, which is very strange'



Figure 6.36 Simon was given this clock when they moved into this house five years. Interestingly, the clock never used to ring correctly. However, Flora and Simon found the clock 'amusing' because it sort of has its own personality.

Continuous homemaking process

Flora has created her home with a mixture of old and new objects collected over the years. Some of objects were acquired specifically for this new house and others were given by family and friends over the years. Regardless of how Flora acquired these objects, it is all part of her life and is involved in her process of making a home.



Figure 6.37 The stained glass was collected by Flora before they built the house. Once they built the house, Flora was very please that this glass finally has a place in the house.

Cleanliness

Interestingly, six out of eight women in this study mentioned cleanliness of their house. If they could give the whole house a magical property, these six women all mentioned having their house or windows clean themselves.

Like Flora, the cleanliness of her home may not be as important as her sentimental possessions or her dogs, it is however an important element for maintaining the comfort of her home.

'F: I am not house proud, but I like a nice, tidy house normally. When there are two of us, it's quite nice cos it does get untidy when you've got people here. It always seems messy and untidy so, not I am not house proud. And I've got two dogs and you can't be. I do like a tidy clean house.'

'F: How does it feel when you clean your kitchen? F: I tried not to use bleach too much because we've got septic tank and you are not supposed to put much bleach but I like it, when the kitchen is clean and you wipe it all down with bleach and stuffs, I feel better. H: How do you feel about the smell of the bleach? F: No, I don't like the smell at all but if you done your drains with bleach, it's just feels clean.'

Aesthetic, The Beauty of tools and In the background

There are several hi-tech installations in the house, for instance, under-floor heating, surround sound systems and the temperature control system.

The desktop computing was one of the technologies she would like to 'update', since the aesthetic of the home is an important part of Flora's homemaking process. The aesthetic of the computer therefore does not fit into the interior of the home, as Flora expressed. She would like to change it by putting the desktop computer away in a cupboard hidden in the background.

'H: You have your computer there as well. F: yeah, that does need moving. We either move that into the top bedroom or we gonna move it somewhere. But at the moment, we have got () so it has to stay there. Oh, I want to put it in the cupboard. H: Why is that? F: Cos I don't like to have it in display and I think in your diary, what would you like to change. I think this is what I would like to change. I would like to get rid of my workroom completely and I would like to change it back to a study.'

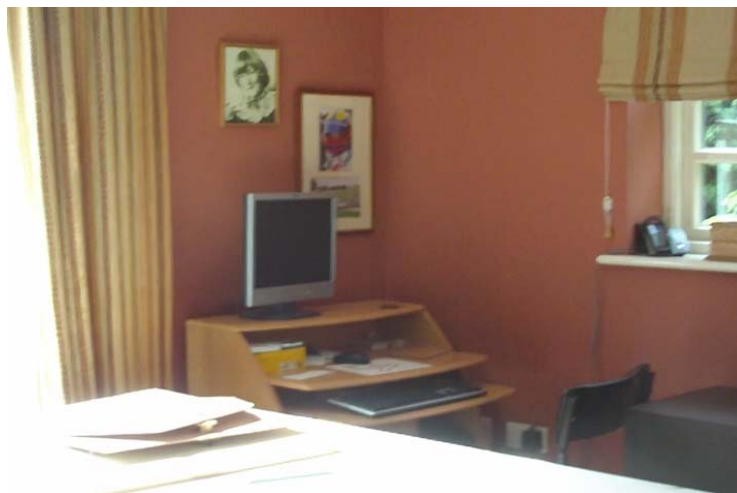


Figure 6.38 The workroom and the ugly computer

Enjoyment after retirement

Flora and Simon are almost retired. They get their simple pleasure from walking their dogs, growing their own vegetables and reading a good book.

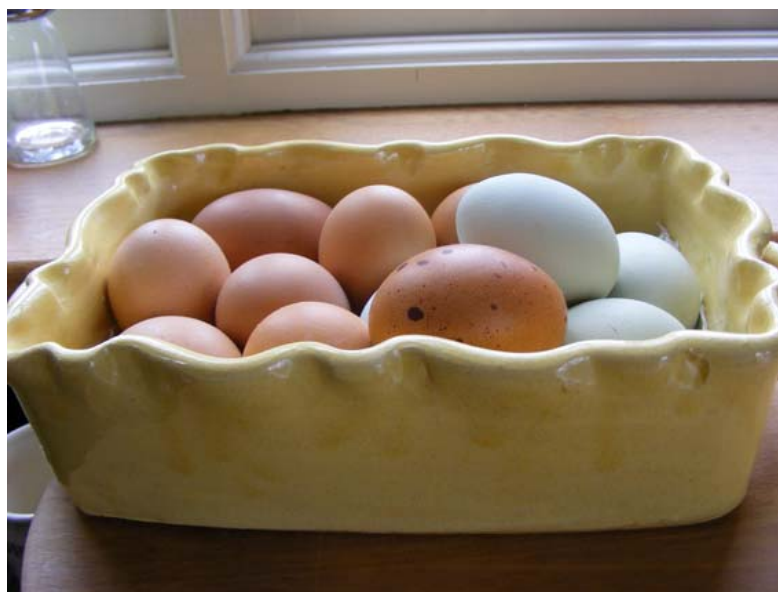


Figure 6.39 One of their simple pleasures is to collect fresh eggs from the farm nearby. They would like to keep their own chickens in the future

6.3.7 Heinz

Heinz and Nora are in their 80s. They have lived in their house for 23 years. They moved to this neighbourhood to be closer to where Heinz works.

Heinz works full-time and commutes to work by car everyday. Nora is a full-time housewife. Their children have all grown up and moved away from home.

Their house has three floors and is approximately 80 years old.

Being independent, Being active and Continue to work

Heinz describes himself as a very active person who has taken risks over the course of his 80 year life. He is passionate about what he does and plays an active and important role in his work still today.

'H: I think keeping busy and doing things you enjoy and particularly if there are a lots of different kind of things. I've got my finger in lots of different pies. Yes, I am busy.'

'H: Magical property. HE: If I wanted to have magical property, it's me. I want to be a wizard. ((both laugh)) H: What do you think you can do if you were a wizard? HE: Well, I think I can presumably do things like appear in different place. I hate travelling. So if I could I now want to be in Manchester, 1, 2, 3, 4, I am in Manchester. I would like it very much. Also, I think I would be a good wizard and on the whole try to make people happy with my wizardry.'

Familiarity and Home is the people around

The comfort of home is the people and familiar objects around which Heinz and Nora created over the last 60 years. Heinz's image of the home now is the image of his wife Nora and the physical environment of the place.

'H: What makes you feel most at home? He: a familiar comfortable environment which we have after all produced for ourselves. If I have to think about if I was on an aeroplane flying back from America and think of home, this would be one of the things... it is to a certain extent where I would find my wife and at one time when we had a big dog, where I would find my big dog. I was often quite home sick for my Alsatian. I had a dog this size and he grew up with my children really and so it was people, not now of course, there is only my wife and myself and the physical environment would be the image of my home.'



Figure 6.40 The picture Heinz took for the task, 'What makes you feel at home'.

Family responsibility, Family network and Homes are connected islands

'They are all over 20s now so we have run out of teenagers completely and we are a closely knit family we like each other and fortunately we don't live too far from one other so it's possible for us on a Sunday afternoon or Sunday lunchtime to all sit around the same table.'

Heinz's family has very strong relationships. Metaphorically, the family home is an island of Heinz's tribe that connects to other family islands across the ocean. They have their way of communicating with each other and hold regular meetings to continue family traditions, enhance relationships between generations of islanders and celebrate the tribe of Heinz.

Unsurprisingly, the elders of the tribe, Heinz and his wife Nora, feel strongly about their role in their family. They feel that it is their responsibility to maintain the bond of the tribes and share their experience of building the family with the younger generations.



Figure 6.41 A corner in Heinz's living room. Apart from the pictures of family members, there is also a collection of art work created by the family.

Looking after each other and Home is an island

Home could be an isolated island if needs are not met. These challenges could come internally, from within the life of the island, or externally from other neighbouring islands. As Heinz illustrated, if one of them fell ill, the condition of the home could be very unpredictable and become unstable really quickly.

When challenges occur, members of the tribe have a duty to look after each other and share the responsibilities. Often, this requires the tribe to respond quickly, efficiently and to utilise their personal resources in order to resolve problems.

'We felt that it was unfair. We both have problems with walking now because of arthritis in the back of the knee so as long as we are in reasonable health we can manage. We are like two ladders leaning against each other. If one of us is ill or really needs a lot of care our situation would become unstable. I've coined the word some years ago called metastable people. It's very much like having a pencil stood up on its end. its alright as long as once you disturb it, it goes and falls over.'

Moving home is almost like a bereavement

Moving home could be a traumatic experience for some. In a sense, it is almost like moving away from years of efforts in personalising and adapting a house. More importantly, there are sentimental values and meanings created over the years of living that go beyond the physical importance of the environment.

Heinz and Nora have discussed the possibility of downsizing their home due to their increasing difficulty with stairs. Although moving home is almost like a bereavement for Heinz, after 23 years of their inhabitancy, they see the downsizing happening inevitably.

'Its on three floors so I think I have had various discussions with my wife, because both of us not being very good on our legs we should really think about seriously about getting ourselves somewhere to live which is on one level, rather than having lots of stairs, but moving house is almost like a bereavement. It's a major problem, particularly if you have lived in the house for over 20 years, and every room is full of books of this kind. We would have to reduce our property vacancy if we wanted to move. Sooner or later it has to happen. Sooner or later one of us will need more care or won't be able to climb stairs at the moment we are reasonably stable.'

Community life

The aspect of community life was reminiscent by Heinz in the conversation about the previous house they inhabited in the 1990s. The social organisation outside of the physical environment of the home is important to his family life. Heinz expresses his experience of benefitting from the social setting of the community and considers this an important aspect of home life.

The building of home today seems to have less consideration for the environment outside of the house. However, many participants of the study, especially those who have lived in the same neighbourhood for more than 20 years, have all expressed the value of having good neighbours, and, to a bigger extent, the benefit of a good community.

'I used to live in Hampstead Gardens, North West of London. She (the architect) wanted to create a community which would represent all social classes. Hampstead Heath is an open area. I guess I was at the edge of Hampstead suburb, including some very good basic thing, hostel, matron, it was a concept. And there was a special place for old people. We moved there very soon after we were married and brought up our children. It includes a primary school, so children could walk to school. It was absolutely ideal for children cos there was back garden between them so there were no cars so the children could safely go to see their friends without going on the streets.'

The role of tools, It's not about performance and It's not always about luxury

Heinz has been a top scientist in his career. When personal computers were made available, he was one of the first academics to acquire them for his employees. At home today, he has several second hand computers and electronic components that he has acquired over the years. Interestingly, with considerable knowledge about technology at the age of 82, Heinz's decision of acquiring tools is not determined solely by the power, performance or the aesthetic appearance of the tool. For Heinz, the computer is a tool. He uses computers to type documents, to send emails and to perform other office duties.

'Then again, with all these technologies, I don't live in luxury in a sense.'

Mixture of old and new and Value of simplicity

Heinz's collection of computer equipment is a mixture of old and new parts. He utilises the skills he acquired from his profession to update his computer. He enjoys the task and the process of maintaining his tool.

Heinz also has a collection of microscopes and cameras. These items are appreciated for the beauty of their simplicity. It is not the advanced performance of these tools that attracted Heinz in acquiring them in the first place. For instance, Heinz loves the practical function of microscopes or the beauty in the mechanism of his old fashion camera.



Figure 6.42 This microscope in Heinz's tool collection.



Figure 6.43 The picture of the camera was taken for the task of 'something beautiful'

Heinz is an individual who has been at the front end of technological development throughout his life. Again, he is very clear about the role technology plays in his way of life.

'Again, tools are like books, you don't throw tools away. Tools for me are a very fundamental thing, which is this marvellous thing, is our hand. It makes you more marvellous by having this good, having the right tool. Tools are not just tools. Again, throughout all my life, I've always gained

great satisfaction from mending things...And I've always, always gone some pains to find out how things work. So I can mend pretty much everything.'

6.3.8 Johannes

Johannes rents a 'granny's annex'. He has lived in this flat alone. This flat is an annex connected to a main house where the landlord and landlady live. Three years ago, Johannes's friend was leaving this area and he, in a sense, inherited this rented accommodation from her. The landlord family shares a huge back garden with him. They also have an occasional lunch together at the weekends. In a sense, Johannes was introduced to his current living arrangement by chance and his relationship with the landlord and landlady is very much based on trust without a legally binding contract.



Figure 6.44 The Granny's annex

Johannes also has two other homes he maintains. One is in Texas, U.S. and the other is in Germany. The home in Texas is a place where he lived and worked for more than 20 years before he moved to the United Kingdom. The home in Germany is his childhood home.

Long-term value and adaptation of the home environment

Johannes' father and uncles built the house in Germany for the family. After both of his parents passed away, Johannes inherited the house. He pays for the maintenance of the house while he works away in London and goes back to the house every summer.

The house Johannes' father built embodies long-term visions that many investors or developers of new technology may be lacking. New systems, as a technological network home, are more likely to attract the attentions of the consumers if they have potential to meet consumers' long-term values and help them to achieve their life time goal.

'My father made a lot of things, so he built the house...He built the house himself with his brothers. So he did all the walls, he did the wallpapers, plasters and all that. And he basically wanted make this house, his house. And he thought he would live there forever, which he did, he lived there forever until he died.'

In addition, Johannes is a case selected in order to reflect the diverse lifestyles of older adults today. It is also important to acknowledge that long term values of older adults can be diverse according to their unique lifestyles. The concept of the home is no longer a fixed location.

Way of life and enjoyment

Older adults such as Johannes have more freedom and opportunity to travel. Work is his enjoyment and who he is as an individual. The flat in London is a 'work home', where he comes back to rest and continues to work. He does not have a strong attachment to this flat.

'I can't live in one place because I am always moving. So I don't want to invest in building something here because I don't want to become attached to it...Well, I think I don't know what family life is like. In my life, of course, the most important thing is the pursuit of my artistic career or my career as a creative person.'

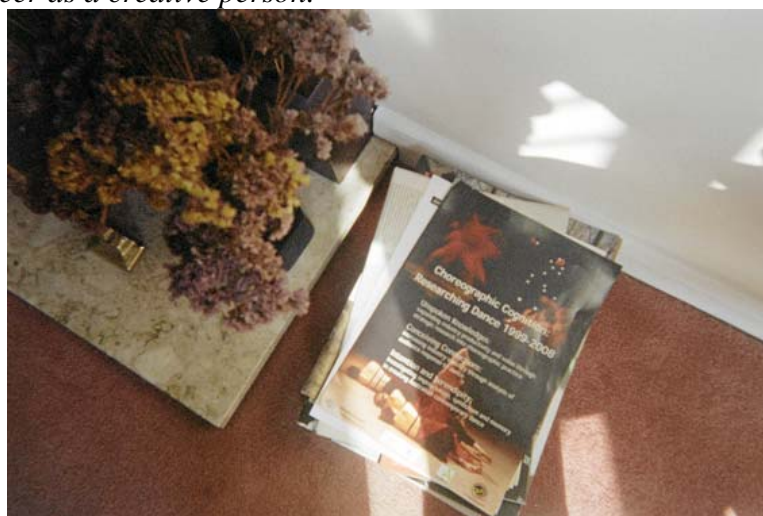


Figure 6.45 A snap shot by Johannes. He took this picture because he likes the lighting and because the arrangement of the books, dried flowers and the light, and because it describes his lifestyle.

Being independent

Living alone, Johannes' way of life is also very much influenced by his independence. His independence plays a crucial role that enables his career. He expresses if one day he loses his independence, he will not be able to enjoy the simplest things such as freshly pressed coffee in the morning. Although a freshly pressed coffee may sound insignificant to some people, Johannes considers these routines almost as a ritual that made him who he is everyday.

'J: Well, I love making coffee when I come home, so the reason I have the French press is because I like breakfast and coffee in bed. H: What does that mean to you to have it? Do you do that every morning? J: That's like home, yeah. Every, well, most mornings. When I don't have to rush somewhere, I tried not to have any commitment in the morning. So all of this would be destroyed if I lost my independence. Cos how can you have a peaceful morning unless you are alone?'



Figure 6.46 Johannes' joy of freshly pressed coffee and croissants every morning

Familiarity

Johannes often gains a sense of his home in Texas when he speaks to his friend who is living in that house at the moment. Every time they speak through the webcam, he sees his familiar collection of books. The meaning of home to him is the books he has collected over the years. He calls the large collection of books his library. When he travels, he always brings a couple of books with him.

'You know, I have to tell you something. This is something I only recently began to feel emotionally. I talked with my friend, maybe you know once a week on skype and she is now using my desk, which is fine, you know, because it's the best place. So when I looked at her because of the camera,

yeah, the camera goes into my bookshelf. So I actually look into my books. So when I talked with her, I see all my books ((laugh)). I see my friend and I see my books. And it's wonderful.'

Adaptation of the home environment and Activity centre

Johannes transforms his dining table to a place on which he often writes. On the day of the interview, he has several books that he is currently reading scattered across his dining table. In the corner of the table, a chair is also transformed into a shelf for his stack of books.

'J: So in a way, I associate with this thing of retreating to a place where you are able to think, to write with my home. And if I were a writer I would certainly, you know, have you noticed that in the Guardian, they always show you what the writer's room look like, yeah. I find it very interesting, you know, how people choose a room to write in. And of course, I love to write in a room with books. Here I don't have so many so I just write on my dining table. So now where I normally eat I now write.'

'J: The Guardian always, every Saturday, invites a writer, this is Richard Sennet ((Johannes shows the article to the author)) to make a photograph of their writing place and describe what we see so he talks about the suitcase and this thing and this thing and he, what he owns and so on. So I wouldn't have much to describe except the fact that I transform my dining room table into my writing table. So this is my writing.'



Figure 6.47 Picture of the writer Richard Sennet's room for writing. Image copyright - The Guardian. This is the picture Johannes showed to the author.



Figure 6.48 On the right is the dining table with stacks of books. In the opposite corner is the chair which Johannes uses as a bookshelf.

Johannes has not altered this rented flat in any way. He kept everything as it is and feels no need to change anything. As long as he has a place to rest, he is content with this environment.

Just the way I like it and Priority in the home is different from the workplace

Johannes describes his friend's way of life. It is a very good example of how home life is not always composed of perfection and precision like that of the workplace. It is also not a finished product. Things can be added, space can be altered and temporary functions are appropriate.

Homemaking is a continuous process. It is not determined by standards of the public place.

'I know for example, my best friend in Texas who is a painter. The most important aspect of his life is to paint. So every morning after his coffee, he goes into his studio, so the studio is the central place of the house. And then he recently moved from Huston to a small place in the country where he was able to buy a large piece of land. There was a house standing there and he has to modify that because it was older. And he now has a big studio and basement, and then the upstairs, because he ran out of the money, it's under construction. It has been under construction for three years, so there is no ceiling. He made it larger so the carpet and () and the wood goes on and the windows have been moved three meters. It hasn't been finished yet. But it's perfect and he doesn't have a dining room table so he uses two of this riders. We called them riders I think...And he put a board on top. So it's like a carpenter table. And put a table cloth on top then it becomes a beautiful dining table. But it's actually just a work bench. But it's perfect and it's OK. And he actually likes cooking, so in the

evening when we are winding down the day, we cook a meal and we eat. So he also has developed strange hobbies. I don't have that kind of strange hobb; I only love sports and dancing. But he collects snakes. In the bedroom, he has all this snakes in glass cases and also rocks. There is a rock collection. So the next important thing for him is next to the studio, where to put those collections. I think, depending on the person, you know, the house must be a place for the collection. Or in my case, must have room for books'

Home is an overrated concept

It is fair to say that Johannes's lifestyle does not represent an average lifestyle of older adults as one may consider. But it is important to acknowledge that the concept of home is not always appreciated in the same way.

'J: What I didn't tell you before it's actually home is a very largely overrated concept because it doesn't interest me at all. In another words, I don't think I've attached my values to a stable home...I am happy to go and meet new people, new situation and it's a situation where you work, you make art, you create a studio.'

'H: And apart from that, how do you see your house in Germany? Do you plan to keep it, and also your house in Texas? J: I keep it for now yeah but eventually, I will be very happy to not keep it. H: Why is that? J: Because houses are huge burden. Properties are burden and I hope I do not have any burden. H: Even the house your father built? J: It's a burden yeah. H: You mean the cost and J: Well, it's a constant needs to repair and it needs care because otherwise it over grows. Nature takes over. It needs a little bit of care.'

The concept of home is interpreted differently depending on the individual.

'My mother had the tendency to decorate the house and make it look very nostalgic and I don't like it...when she passed away, I waited for a year,...I removed all the furniture. I created some kind of senses of air.'

6.3.9 Paul and Mary

Paul and Mary moved into this house when they got married. This house is 75 years old and they have lived in it for 38 of those years.

What make you feel most at home



Figure 6.49 The picture was taken for the question, ‘What makes you feel most at home’. It is the fireplace that Paul considers most comforting.

Paul is a collector. He feels most at home when he is surrounded by his collection of things like the lamps on top of his mantelpiece (Figure 6.48).

Familiarity and Accumulate things

‘P: Being surrounded by all the things we've collected. I feel quite at home with my little oil lamps and my watering cans and my little lawn mowers, it makes me feel at home.’

The collections are part of Paul and Mary’s life, how they came together and created a family. Some items are collected from car boot sales by Paul and others are given by other members of the family. These items are valued more highly for their sentimental meanings rather than what they are worth.

‘I might take them to the museum (Paul volunteers at a local museum), they ask you to bring quirky collection one night, they have a collection night so individual members can take their collection and see people and say, oh, fancy collecting that. Things like that. As I say somebody's got to collect it. I don't mind, I don't mind collecting it. H: Are you proud of your collection? P: I am yes, cos that's the thing about collecting things. I go to boot sales a lot and it's just nice to suddenly find what you are looking for. It's really really nice you know.’



Figure 6.50 In the photo is Paul and Mary's cabinet. On the top level is Paul's collection of miniature lawn mowers. On the second level is Mary's collection of tea pots and cups.



Figure 6.51 The picture was taken before they started the renovation. The space on the wall will be used for a display cabinet for those paraffin lamps.

Being human

Home environment is a place of living for human beings. The natural behaviours of humans are accepted and, in Paul and Mary's case, celebrated through the choices they made in creating their home.

Home is a place where humans can be humans. The rules in the home are made by the inhabitant of the space. There is no right or wrong way of doing things.

Nostalgia and sentiment

Older homes also have evidence of living left by the inhabitants. These could be simply the traces of wear and tear, decorations, or physical alterations of the household structures. In other words, older houses rarely start with a clean slate in comparison to a purpose-built new house.

If the concept of home is more than a house, this means that the creation of a home also rarely starts with a clean slate. We carry our nostalgic and sentimental possessions from house to house to create our homes. The creation of the home is therefore an occasion of merging and dividing of things.

'We still got a lot of things from our children. P: the loft, it's got lots of toys in the loft. M: In the box room, we've have lots of boxes in there so in the bedroom here, Andrew's stuff is all in the wardrobe. P: They left home and left things behind so we just sort of left them there. M.: I think two of them are in there, but Sam's got her own house. So we still got it. Still got everything.'

Warmth

Paul and Mary get a great sense of comfort and pleasure from his log burner. The log burner is more than a piece of equipment that provides warmth. It also provides a focal point for evening relaxation after a long day at their full-time jobs.

The element of warmth is an important requirement for any home, as expressed by all participants. It relates to the fundamental needs of human beings. For Paul, the physical sense of warmth and the visual sensation of fire add 'heart' and creates, in a sense, meaningful quality to his home.

'It's very relaxing and the fire can be friendly, you know. I can look at the fire and you can be on your own. And have a fire, you feel, you don't feel alone'

The visual quality of the fire and log burner or, in Mary's case, the use of carpet, seems to play an important part in acknowledging the presence of comfort. It is, as Merleau-Ponty (1962) describes, an experience that embodies all senses.

'But I always think the carpets are warmer. Carpets always look warmer. P: and quieter. M: Cosier.'

When they first moved in, there were no fireplaces or log burners in the house. They restored the fireplaces to create their sense of home.

'M: I just put our old style brick fireplace (Mary's answer to the postcard question 'What makes you feel at home?'). Cos I feel it's the heart of the house. It's the focal point where we sit around in the evening. I just feel that, fireplace somehow, just nice, it's the centre of the house. Cos the 1970s house didn't have a fireplace. P: It's horrible. M: And it would just be blank wall and I just feel that P: It's so cold, isn't it. M: The house is a bit chilly cos you didn't have doors in some of the rooms. P: seems an empty house. M: Cos somehow you sort of sit around the fireplace, P: It was heartless, really. A heartless house, it didn't have a heart in it.'



Figure 6.52 The log burner

Government policy

Interestingly, the use of a log burner in their house was not informed at first by their own choice. Many decisions in the household could be externally influenced, such as in Paul and Mary's case, the 'Clean Air Act'. They therefore had to install a log burner.

'H: Have you always had the log burner? P: No, I've only had that for a couple of years. We used to have an open fire there before. But really, it's illegal to burn logs in the open fire because of the Clean Air Act. So really, they should be burned in the stove'

Just the way I like it, It's not always about luxury and Effort

Home living is about comfort, relaxation and doing what you like. Paul and Mary have maintained their way of life for many years. For instance, Paul collects logs from local resources that he built up over the years. This simple pleasure keeps them warm in the winter and also makes him feel good about himself by making

the effort to collect wood. Their home life is not about organization or luxury; rather, it is about making effort and community life.

Relaxation and peacefulness

For Paul, he has very little interest in watching television. Home life is also about doing less, not more.

'P: Yes. M: Cos he is not a great television watcher. P: So nice evening when I go in there and listen to, I don't like watching telly you see. So I can relax and sometimes fall asleep.'

Stability of Routine

The simplicity of a cup of tea is another example that is appreciated by Mary in her everyday routine. They also have an old fashion 'automatic' tea pot set next to their bed. Before they go to bed, they put a tea bag in the teapot and put water in the kettle. The pot and the kettle are connected by a pressure switch. When the kettle is filled with water, it automatic 'switches on' for the morning. They set the tea pot twelve minutes before they get up. Although, in comparison to the modern kettle, their old fashion teapot takes longer to brew tea, they do not consider it out of date or inefficient.

'Because that's how long it takes for the tea to be ready.'

This routine has been carried out almost like a ritual for over 38 years, since they were married. The tea pot has been replaced several times with similar models over the years, and they were given one recently by Mary's sister as a wedding anniversary gift.



Figure 6.53 The electric teapot set which Paul showed to the author during the video tour

Family network and Maintenance of technology

Many participants like Mary, acquire help from family, friends or even neighbours to deal with new technology and updates of these technologies. Mary's sons, Richard and Andrew, helped her to put together her computer a few years ago. She uses her computer for emails, Internet browsing and shopping.

Mary trusts her sons' decisions in updating and improving her computer. Although many components were a 'pass-down' or second hand from her sons, she is perfectly content with the equipment and is happy about the arrangement because it is based on trust.

'H: How about your computer? How long have you had the computer? M: Well, quite a while, one time we had three. Well, we've got two now because Richard still got one of his, cos the boys sort of built their computers. We had one to start with especially Andrew is doing his computer course and then they made their own. So we are quite lucky really, cos when they got new bits for theirs, they get passed down to mine. We got sort of update.'

At one time, all the computers in the household were networked as Mary enthusiastically recalled. The concept of a network of computers in the home is different from the networked computers in the workplace. The purposes and tasks of the home network therefore should be different in many ways. Most importantly, the role of networked computer in the home will have to consider appropriate interfaces and applications for different generations of users, and ultimately share a common goal in supporting family function while encouraging freedom for individual lifestyles.

'At one time, we had three computers and we were networked. Cos Richard networked it cos one day I was sitting at my computer and the little arrow was moving it by itself. I said what's going on here cos the little devil upstairs was making me wonder what's going on. It's very spooky. But now he just left his old computer upstairs and I have got mine.'



Figure 6.54 Mary's computer locating in the front room.

As for Paul, although he does not use the computer, he also 'inherited' his son's stereo system. He is also content with the system because it works fine.

Old and functional

There are other items that have been acquired by their joint decision such as the old but functional garage buzzer. This old garage buzzer is often used by Mary to call Paul back from the garage. Paul spends some of his leisure time in the garage at the end of their garden. This buzzer was installed in the 1970s and has since continued to work without failing.



Figure 6.55 Paul talked about the buzzer and demonstrated how it works enthusiastically.

Moving home is almost like a bereavement and Community life

The memories that come with their possessions are part of the reason that they do not want to move or downsize. For Paul and Mary, to maintain their good family network is extremely important. They do not see a need to move anywhere else.

'P: They think we want to retire and go to the country. I wouldn't want to do that. I wouldn't want to live in the country...I do not aspire to that at all. M: A lot of couples when they retired they move and they lose one or the partner dies. P: I am quite happy just staying. M: We are sort of miles from my family and you are miles from yours. So, it's quite good.'

Paul and Mary have lived in this neighborhood for decades. They also feel reluctant to move away from familiar resources and the community life they have built over the years.

'M: If you are in trouble, you go to the neighbour, don't you?'

6.3.10 Peter

Peter's house was built in 19th century. Peter and his wife Heather have lived in the converted barn house for 30 years. He works part-time.

Peter's daughter lives in Australia and they visit her every year.



Figure 6.56 The converted farm house.

Wouldn't change drastically

Peter and his wife Heather live in the rural part of the West Country. They renovated this converted barn and have carried out several maintenance works. They have plans for further maintenance work in the near future.

For Peter, the home environment changes and does not stay the same. However, it would not change drastically.

'When you are actually talking about changes and things, if you want to change things, well, it's a constant process of change, I would say. I wouldn't leave any part of the house exactly as it is now. It will change, even when you redecorate.'

'H: Would there be any thing that you want to update because there are so much technology around? P: Well, we will probably change, we gonna have digital television in August so we've got to buy new television things like that. There is always gonna be something new, quite modern, it would just replace the existing television. I don't see any drastic changes, or you will suddenly wipe out one end of the house and put something completely different in. suddenly a jacuzzi or something like that. It's unlikely to happen.'

Also, changes in and for the home can be a positive thing.

'H: A memory from your home long ago, you describe building the house, windows and half the stairs. P: You will certainly find that we are not afraid of taking things down, demolishing stuff, knocking them out, so we actually put the window in, back in the landing, half way up the staircase. Just the feeling that we are doing something positive, rather than all the negative things, knocking things down.'

Downsizing home, Home is an island and Being independent

Peter and Heather live in a rural part of the country. They have very limited public transport and are isolated in a sense by the location.

It would be difficult for them to maintain the lifestyles they have now if they lose their independence, especially with their transport. This is one of the reasons they would consider downsizing their home in the future.

'One of the problems with the home, you like the home to be great, one of our problems is there is very little public transport here. It's fine if you can drive but if you can't drive, you became isolated. so eventually, I know, I would have to move to a village where there is more facilities. H: You think so. P: Yeah, exactly, and realistically. So we've got one bus a week on Tuesday, that comes back at the end of the lane about a quarter of mile away. So looking at the bus that actually runs to nearby town that is actually about 12 miles away and then comes back and it does that twice so you can actually go into town and do your shopping in town and come back, it's very restricting. so the only time you can be out is every Tuesday for an hour. So realistically, we are thinking about moving into a community where there is more facilities. You know, our nearest neighbour is quarter of a mile away.'

However, there are limitations with moving into a ready made community.

'H: Do you think you both will consider moving in the future if you have to then? P: yeah, we've always bear in mind that we would move, but I don't want to move, I see that something inevitably will happen. H: Cos you have big inside and outside spaces around your home, I guess moving into a city or in a town will be a different lifestyle. P: Yeah, cultural shock, yeah. But I can live up here and die here and nobody would know. But in the town, you have to think about your neighbours, you can't just do what you want to do and when you want to do'

Moving home is almost like a bereavement

Moving home can be considered a bereavement for Peter and Heather. They love the location of the house because it is in the heart of a very well-preserved nature resource in the Western part of the country. As Peter expresses, *'we live in the place where people go on holiday!'*

Moving home could mean moving away from the privilege of being in this part of the country. More dauntingly for Peter is the downsizing of their natural resources, their freedom and their possessions. However, for many participants, it is an unavoidable process to combat challenges that comes with physical and mental needs.

Trying to catch up

For Peter, the use of a computer is not a problem that he needs to cope with. However, it is the Internet broadband connection that has disappointed him.

'We have broadband connection for a couple of years, but it's down the bottom end. If I work in the office in the department, I will have 100 mega bytes, it's completely different. I found it easier. During the snow this year, I built a snowman and I went outside and took a video of it and try to send the video down the broadband connection. It took so long, it was actually quicker to burn it onto a disk and post it to her. ((laugh)). Things like broadband connection, good idea providing all got nice fast connection.'



Figure 6.57 Image taken by Peter for the task of ‘something complex’

Value of simplicity

As Peter expresses ‘a spanner is a spanner’, a tool that is valued by Peter for its simplicity because, firstly, anyone can pretty much understand how to use it and, secondly, no special training is required to use it. There is no need to rely on external resources to use this tool.



Figure 6.58 Peter took this picture for the task of ‘something simple’

In addition, although consumers may not have problem with operating new technologies, they could find it more confusing in choosing and retrofitting new technology with the existing facilities and available resources such as the broadband connection. Figure 6.56 shows a laptop computer, telephone, fax machines, which could all be substituted by an all-in-one printer with fax, copying and scanning functions. Unless one of the machines has broken down or the new

functions can add practical value to their existing way of living, it is less likely that older consumers will be attracted by the advanced functions of new technology based solely on the performances or novelty of the equipment.

Warmth, Comfort and Enjoyment

Peter enjoys cooking and eating, and spends a lot of time in the kitchen, which is located in the centre of their house. Like in the old days, a lot of the household activities are centred around the source of heat in the house, especially in these types of farm houses. Today, the centre space of his house is still a great source for warmth as he often finds himself leaning against the cooker.

A lot of their daily activities also take place in this space. For instance, Peter likes to work on the kitchen table. He occupies the table with his laptop, telephone and paper work.



Figure 6.59 The things that Peter finds ‘most comforting’

‘Things are all over the table and I normally get my laptop on the table, piles of paper works and research I am doing, is scattered all over the table. But when I finish, it will go back into the office space but it's just nice to work in here, the central of the house. I mean most farm houses, the kitchen is the centre of the house.’



Figure 6.60 The kitchen table is often used into a work station because of the space and the warmth of the location.

Territory

'My home – my own territory'

For Peter, home is, in one word, his 'territory' and the possessions are the bricks of his values that has built up this unique territory.

The task of creating a territory one calls 'home' requires continuous effort, time and devotions over the course of his or her lifetime. The creation of this product for instance, Peter's home, therefore, it's not constrained by a deadline in time or a standard of the public building. Consequently, one can say that home is a 'prototype' that is continuously moulded into aspirations of life which does not require a perfect finish.

Everyone has his or her unique experience of a prototype of home. This experience therefore cannot be reproduced or evaluated in the perspective of mass produced products.

Experiences of interaction in the home are important. These experiences include interactions with people, objects, the sensorial and tactile feeling of the space or intangible history. This is something that computers or new technology cannot replace.

'P: The recent generation have all been textile designer. My brother and I are not involved in the textile industry at all. Textiles industry in West Yorkshire is actually dead. It was on the decline when we were younger. So I am aware and brought up with awareness of the background of textile

design. So I appreciate that sort of thing. That's something you can interact with which you can't do with computer.'

6.4 Chapter summary

The ten personas presented insight into stories of home lives of older adults and their existing homes. To summarise,

- Home is more than a house. It is about long-term values.
- Homes are connected islands. The islanders' utilise their tribal beliefs through their shared rituals, routines and values. However, the life of the island can still be influenced by others outside of their home.
- The advance findings of Bell et al. (2005) states that, 'No home is an island', however, home can also be an island when needs are not met.
- Personal, physical and emotional needs are the priorities in the home, in comparison to the workplace. The tool for the home is not acquired solely for its performance or novelty.
- Sensorial experiences can describe the characteristics of a home. Home is a place where humans can be humans and their personal preferences are celebrated.
- Home does not start with a clean slate. Homemaking is a continuous process. Objects can be added, space can be altered and temporary functions are appropriate.
- Home is a prototype of a lifetime product. It is an unfinished project without the constraint of time.
- For older adults, there are diverse ways to live independently. More fundamentally, home life is about comfort, enjoyment and companionship.
- Home is not perceived by older users as a problem that needs to be solved.
- The concept of home is not always appreciated in the same way.
- Home is an overrated concept and sometimes a stereotype.

In the next chapter, a design tool is discussed. This tool illustrates a sensitising process which utilises the findings of this research and, in particular, the personas discussed here in this chapter. This sensitising tool is designed to specifically

inform the ideation stage of new product development for smart applications in the home.

CHAPTER 7 THE SENSITISING TOOL

7.1 Introduction of the chapter

This chapter presents the design tool for developers of smart technology products. In the literature of this research, two main problems were identified. From the outset, the original review identified the area of older housing as a problematic challenge which developers of the smart home have come to face in recent years. This challenge is coupled with the lack of product development strategy in the area of new technology research.

The previous chapter discussed the employment of qualitative methodology and methods as strategic research approaches to address the emerging needs of understanding the concept of home. The design of the data collection, analysis and interpretation process has also been illustrated. As a result, ten personas were generated as the main research finding in the previous chapter.

In this chapter, the design of a sensitising tool is explained. It addresses the objective seven of this research, ‘To develop a strategic tool, informed by the user-oriented and participatory method and process, for designers of new smart home technology’. This tool aims to sensitise the designer’s approach to the subject of home and improve their understanding of older users and their existing way of living. In particular, this tool is developed to address the ideation stage of a new product development process. At this front end of the innovation process, such a sensitising process can help a multidisciplinary team to develop new ideas and concepts based on the shared understanding of the field narrative presented as part of the tool.

This chapter addresses, more importantly, the contribution, significance and uniqueness of this research. This is concluded with discussion of the practicality of the tool. Limitation of this research is also discussed in this chapter.

7.2 Introduction to the sensitising tool

‘Designers are in a uniquely creative position to leverage technology’ (McCullagh, 2003 cited in Walton, 2003). It is designers’ responsibility to seek a balance between “what is technologically feasible and what users value in a technology” (Walton, 2003).’ However, designers are not necessarily the users of technology and therefore need to acquire knowledge about how users value, not only the technology, but also their experience of life in the home. Beyond the acquisition of knowledge or information, more importantly, the movement of Critical design (Dunne and Raby, 2001) and Reflective design further suggests that an “on going reflection by both users and designers is a crucial element of a socially responsible technology design practice” (Sengers, et al., 2005). It is therefore vital for designers for the home to have an opportunity to engage in a creative and reflective process, to change existing perceptions and look at existing things from a different perspective (de Bono, 1992).

Home is a challenging domain for designers. Designers have their own intimate knowledge and experiences of their home and are familiar with the concept. However, that is not to say that, to understand homes of others’, such as the older adults in this study, and be able empathise with these homes, is unproblematic. As Heinz illustrated,

‘I think we must not over emphasize and get used to anything. After a relatively short time you become relatively insensitised to the (home) environment. You are much more sensitive to what actually happens in your life, in your work and things of this kind which are the changing things in your life. The home is in a sense one of the unchanging things in your life. It’s a well known physiological fact that our whole physiology is really designed to notice change and to customise’ – Heinz Wolff, founder of the Institute of Bioengineering, Brunel University (quoted from an interview, May, 2009)

This unchanged environment seems to contribute to the prospect that, to understand such an environment and the inhabitant of this environment, critical measures need to be made in order to identify appropriate insights to this environment. This measure should, in a sense, challenge both the inhabitant of the

home as well as the designers of the home when the concept of the home has become mundane, familiar and indifferent.

As a consequence, there is a need to employ appropriate methods to understand this familiar and yet unfamiliar territory and defamiliarise (Bell, et al., 2005) it for the purpose of designers as well as the inhabitants of the home environment. The creative workshop was a result of exercising and evaluating a sensitising technique. It was designed to, firstly, examine participants' responses to the challenges posed by the ethnographic research methods in regard to their home and, more fundamentally, to sensitise designers through real life stories observed.

Sensitising concept

The concept of sensitising is not new. As discussed in previous chapters (Chapter 2 Literature review), the use of ethnographic techniques to inform system designers has significantly influenced the development of more appropriate and human-centred products and services. The table below (Table 7.1) highlights some of the key sensitising approaches in the field of human computer interaction design.

Table 7.1 Some of the key sensitising approaches in the field of smart home.

Sensitising approach	Research examples
1. Traditional approach to ethnography for HCI research. Ethnographic research has been used to sensitise developers about the context of the researched.	The importance of home in technology research (Hindus, 1999)
2. Adaptive ethnographic approach (as discussed in chapter 2, p.40) - The concept of <i>sensitising focuses on the use of ethnographic information for knowledge production</i> . Ethnographic research is used as <i>an informative tool</i> to generate <i>implications for design</i> .	Unremarkable computing (Tolmie et al, 2002)
	Information probe (Crabtree, Hemmings, and Rodden, 2003)
	Domestic routines and design for the home (Crabtree and Rodden, 2004)
3. Innovative approach (as discussed in chapter 2, pp.40-43) - ethnographic information and emergent methods such as cultural probe are employed to <i>sensitise designers</i> . The concept of <i>sensitising shifts</i> from sensitising to gain information to sensitising to <i>reflect on design approaches and design thinking</i> . The goal is to generate <i>deeper understanding of the users</i> .	Designing cultural probe (Gaver, Dunne and Pacenti, 1999; Gaver, et al., 2004)
	Empathy probe (Mattelmäki and Battarbee, 2002; Mattelmäki, 2005)
	Reflective design (Sengers, Boehner, David, Kaye, 2005)

The influences of ethnographic related research have demonstrated considerable efforts by researchers to gain better understanding of the users and their home, and to be better sensitised by the real world contexts. However, little research has recognised the need to devise a practical ‘sensitising tool’ for the stage of ideation in the new product development process, although a similar approach has been mentioned, for example, in the work of Tuuli Mattelmäki (2005).

The sensitising tool of this research

“The purpose of sensitising techniques is to feed ideas into the mind in order to allow our thinking to take new and creative lines’ (de Bono, 1992). The purpose of the sensitising tool proposed in this research is to sensitise designers in order to

stimulate new thinking surrounding the issues of *older adults*, *older housing* and *the concept of the 'home'*.

The sensitising tool is the unique contribution of this research. It is developed from and tested in the pilot and the creative workshop, and its impact is evaluated in the interview-based questionnaires with the participants of the workshop as discussed previously in chapter five (section 5.4.2).

In addition, this chapter focuses on the formulation and the key values and contribution of the sensitising tool. The discussion of the evaluation of the sensitising process (in the creative workshop) and the result of the evaluative questionnaires are summarised here to give a sufficient indications of the credibility and trustworthiness of the tool.

The main findings of the research, the personas, have been presented in the previous chapter. In the next section, the formulation of the tool is discussed.

7.2.1 The formulation of the sensitising tool

The sensitising tool is developed to sensitise designers of new smart applications for the home. It is designed for the 'Front End' of the new product development process - before product concepts are developed and selected. The use of the sensitising tool challenges the existing perceptions of (1) the concept of the home (2) older housing in the UK and, most importantly, (3) older adults and their existing way of living. The benefit of employing such a tool is to inform and improve strategic directions for user-centred based innovations for smart homes.

The outcome of the workshop indicates that the process of sensitising can be leveraged by a sensitising 'tool' that clearly explains the purpose and use of the sensitising process, for the development of insightful ideas and visions. The proposed sensitising tool therefore is designed to establish a clear platform that hosts the sensitising process presented in the workshop.

The formulation of the tool is informed by the evaluation of the workshop in chapter 5 (5.3.3.4 Observation), from the author's observation of the workshop, as

well as by evaluation with the workshop participants (5.4.2 Evaluation of the creative workshop).

The sensitising tool consists of two stimuli; 1) the personas and 2) taxonomy of nodes (Figure 7.1). Figure A illustrates the sensitising process that this tool addresses.

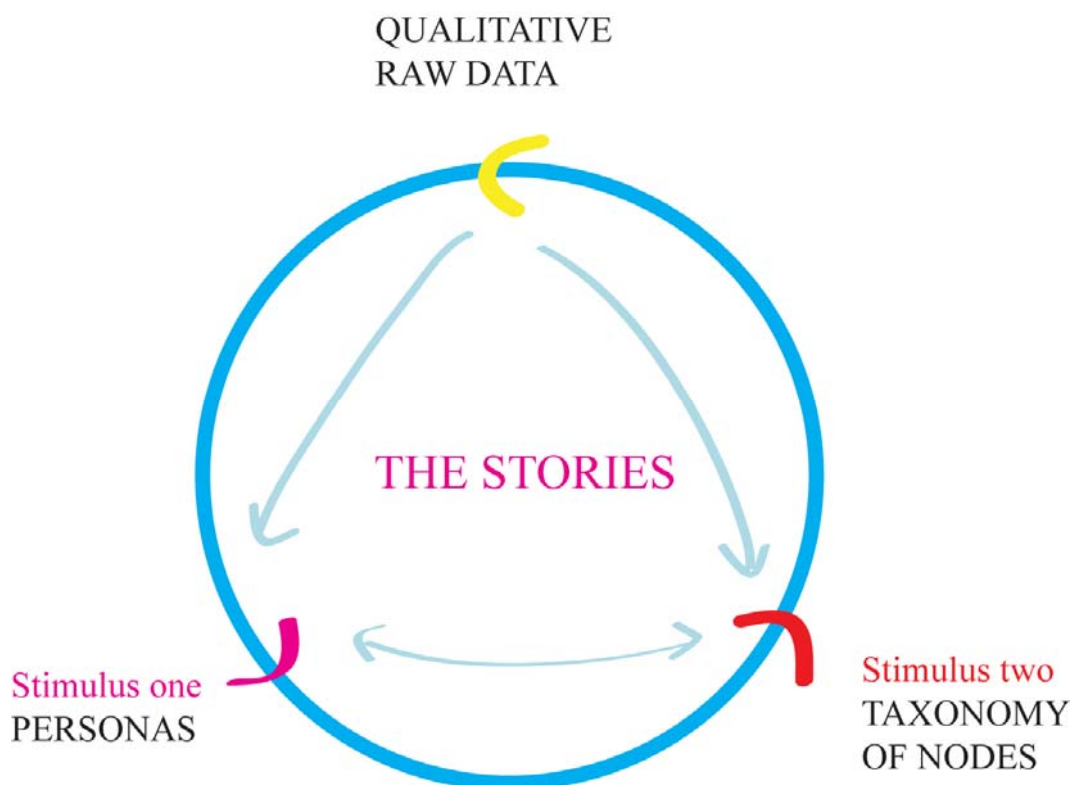


Figure 7.1 The sensitising circle

The sensitising circle (Figure 7.1) symbolises a platform that hosts two stimuli. The integration of the stimuli is a non-linear process that represents a direct link between the qualitative raw data, personas and taxonomy of nodes.

Stimulus one, personas, comprises of the stories describing participants' background, lifestyles, experiences and aspirations towards their existing homes and the concept of the home. It is also a narrative of insights identified in the field research. The design team at this stage is offered visual and textural stories of the

field research which can help then to stimulate ideas (Böker, et al, 2000, cited in Mattelmäki, 2002). The personas offer a rich and thick description of the qualitative data collected from the field research.

Stimulus two is the taxonomy of nodes. It is a classification system that facilitates ideas, concepts and themes derived from the raw data of the field research. The taxonomy of nodes also forms an important part of the sensitising tool as it facilitates a link to the original raw data which designers are most inspired by. More specifically, the taxonomy provides individual nodes as stimuli for ideas. These are used in the creative workshop as a medium to understand the data in detail, as well as a whole when the stimuli are clustered in meaningful groups.

The tangible aspect of this tool is demonstrated in the personas and the taxonomy of nodes. These tangible probes are tested in a creative workshop that simulates an ideation process of new product development.

The sensitising process

The sensitising tool also describes a sensitising process. The personas and taxonomy of nodes serve as physical evidence of the process. The sensitising process begins by introducing the purpose of this tool and the potential gain of using such a tool. It is followed by the first stimulus, the personas.

In the second step of the sensitising process, taxonomy of nodes is introduced. It is employed to clarify the focuses of the data and provide a structure of ideas in relation to each persona.

This process furthermore illustrates a transitioning process of ethnographic raw data to product ideas. Through the process of storytelling, ideas mapping, clustering of concepts and brainstorming, the development team transforms the ethnographic information into useful and usable ideas for creating new product visions. The stimuli of personas and taxonomy of nodes help to translate the complex inspirations from the field by giving context (stories) and structure (the nodes) to the field findings. Instead of trawling through a massive amount of data,

this tool helps to shed light on the domains investigated by this research and identifies emerging and interesting concepts.

This process also allows links to original, and more importantly, individual data through nodes. The process of translating, therefore, is open and transparent in the sense that interesting or unusual insights remain in the taxonomy.

Stimulus one has ten personas (Figure 7.2). Each persona is a synergy of visual and audio information, as demonstrated in the centre of the circle. The second stimulus describes ten insights generated from the analysis of the stories. These ten insights are elaborated into 39 themes. The detail of the personas and the 10 insights are discussed in more detail in the following section.

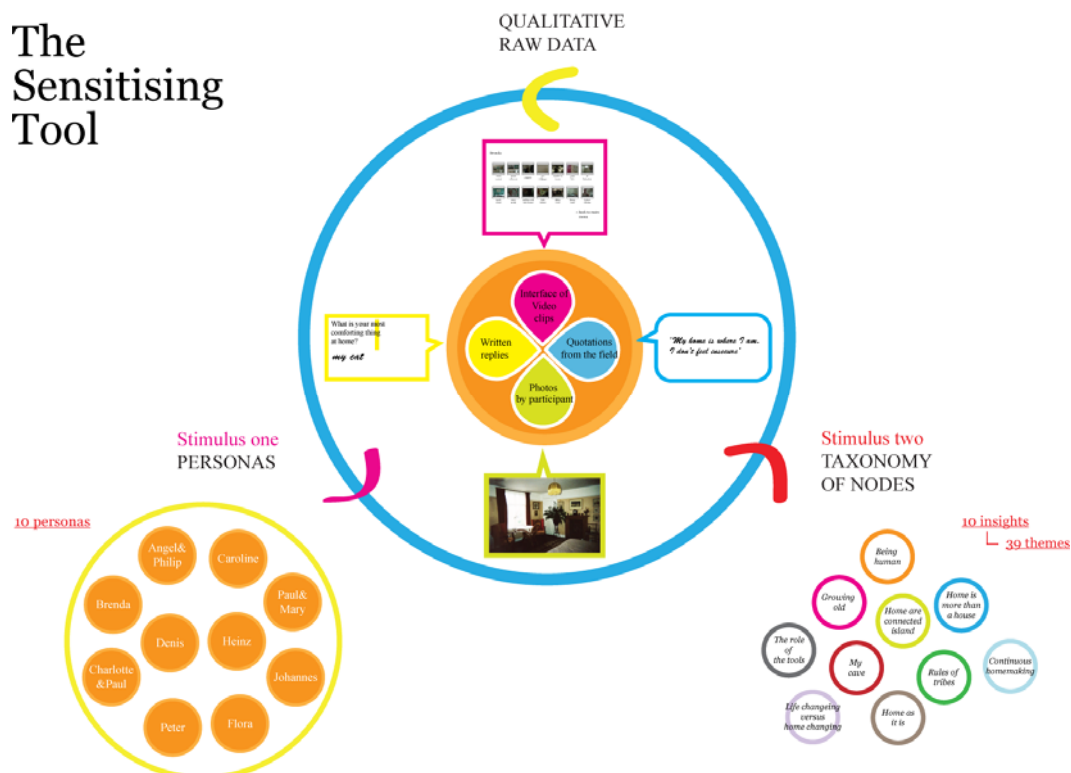


Figure 7.2 The sensitising circle in detail (Appendix A)

7.2.2 The personas

The stories are the first step of the sensitising process. As demonstrated in the workshop, the stories are used to firstly engage the attention of designers. Secondly, in this first sensitising process, the storytelling technique is employed

to tell the designers stories about the life of older adults in their older homes. This process asks designers, through listening to the stories, to identify experiences of the users and reflect on their own experiences. The personas are part of the tool to inspire designers and host a base for a brainstorming session for ideas generation.

Each persona includes written and visual information; this includes written replies of the home probe, photographs taken by the participant of the ‘probe’ and quotations from the audio and video transcripts (Figure 7.3). The stimuli are also supported by a video interface (Figure 7.4). The video interface provides information of what happened in the field. It is introduced to facilitate description of the natural environment with audio-visual data. The video also helped to capture non-verbal expressions of the participants, and sensorial qualities, such as the sound of the old grandfather clock in Flora’s front room. In addition, the video also helped to describe the actual proportion of the space visited.

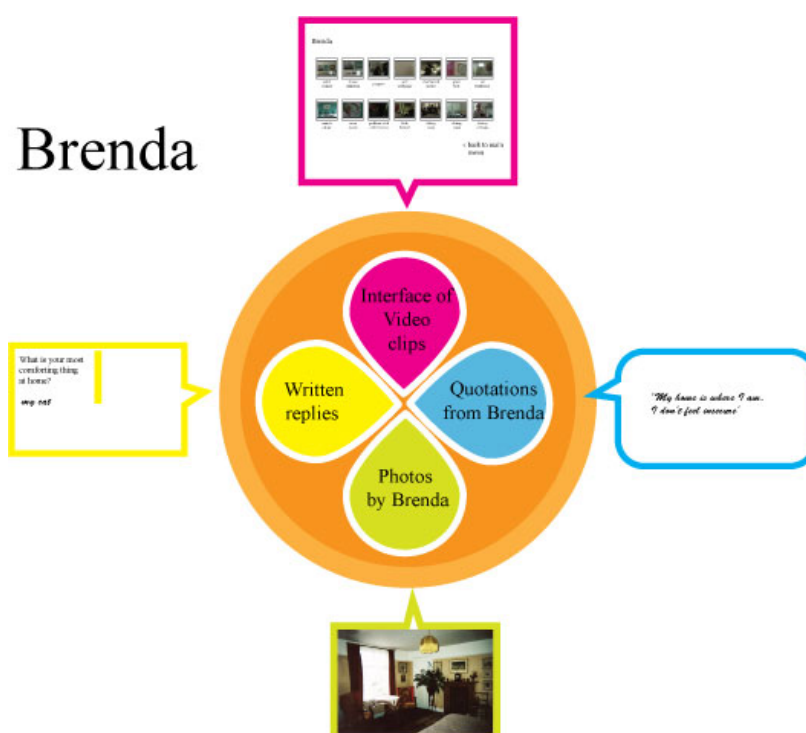


Figure 7.3 Example of the component of a persona. This figure describes the components of the persona ‘Brenda’, an example of one of the ten personas of the first stimulus. There are four main components; written replies from the home probe, photographs taken by Brenda, quotation of the interview conversation and video clips from the home tour.



Figure 7.4 The video interface of ten personas

Brenda



Figure 7.5 An example of the video interface for the persona 'Brenda'

The stories presented in the previous chapter of research findings are personas employed in this sensitising tool. The stories form a platform (Figure 7.6) of real life user experiences. The stimuli simulate the multimedia installation presented in the workshop.

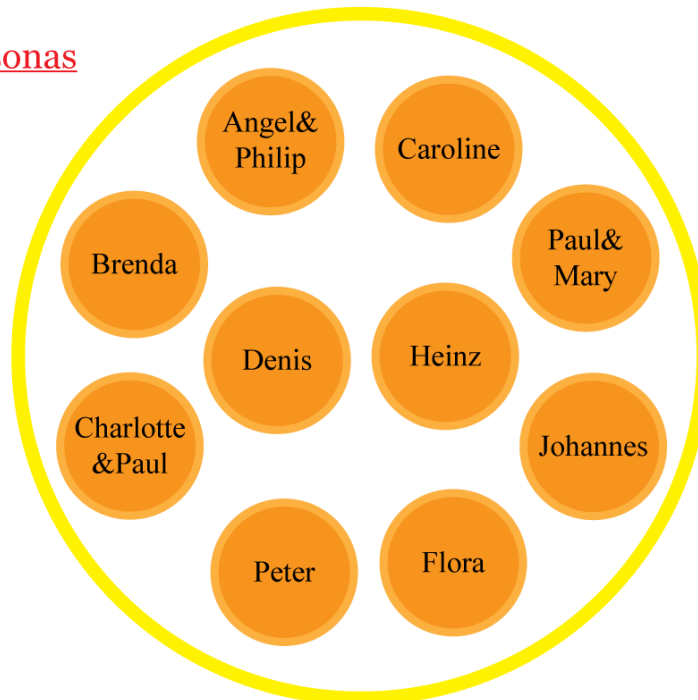
10 personas

Figure 7.6 The ten personas

7.2.3 Taxonomy of nodes

The taxonomy of nodes gives focus and frame to the stories. These are the additional two results of the data analysis, besides the personas. The taxonomy of nodes draws out the important and interesting insights identified from the raw data (See the full details of the Taxonomy in Appendix J). Ten insights (Figure 7.7) were drawn to represent the main focus of the research.

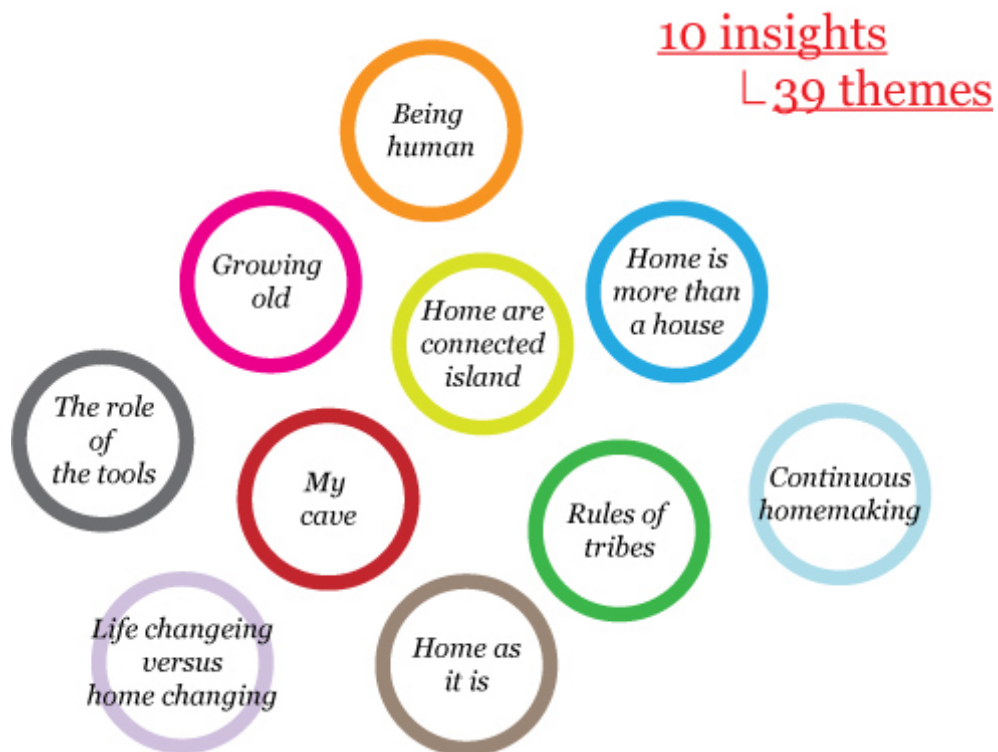


Figure 7.7 Ten insights derived from the Taxonomy of nodes

Each insight is further illustrated with several themes. There are 39 themes (Figure 7.8) in total. These themes were selected because, firstly, they represent an idea that is shared by the majority of the stories, for instance, nodes such as Comfort, Being independent or It's not about performance are shared by all participants. Secondly, other themes were selected to represent different and unique perspectives from individuals such as Continue to work.

39 themes



Figure 7.8 39 themes

The figure above shows the map of the ten colour-coded insights. There is no specific correlation with regard to how they are positioned on the map. The map presents the contextualisation of the insights supported with relating themes. The themes are selected according to their dominance throughout the study as well as their uniqueness. Therefore, the supporting themes are varied in numbers.

This second stimulus is used to sensitise designers with the insights generated from this research. The 39 themes identified are designed to help designers to identify important and interesting insights that relate to the stories presented. Each team member can exercise their interpretation and understanding of the stories and use nodes as a way to share their ideas. The nodes can be used as a physical evidence to stimulate new ones and help to put ideas forward as an individual as well as a team. In summary:

- 1) The nodes can help to identify important and interesting insights relating to the stories,
- 2) The nodes can help to exercise interpretation and understanding of the stories as an individual as well as in the team
- 3) As a tangible tool, the nodes help to facilitate discussion and interaction in the team, to stimulate creative thinking that is based on the stories shared in the process.
- 4) As a result, individual team members or the team as a whole can use nodes as base for generating and developing ideas.

More importantly, instead of grasping intangible and abstract ideas from the rich and thick description of the personas alone, the taxonomy of nodes provides tangible channels to contextualise phenomenon the designer wishes to describe. In other words, the nodes assist the *translation* of ethnographic field research to potential tangible ideas and concepts.

The detailed nodes of the taxonomy provide an intimate view of the field-ideas relationships. The structure of the taxonomy gives a holistic view of potential design directions.

The first stimulus used a storytelling technique to inspire designers to generate ideas. The second stimulus helps the designers to ‘bounce off’ ideas with the keywords (nodes) within the team. By selecting and clustering with those nodes, designers can exercise their understanding of the story and exchange new ideas.



Figure 7.9 After the storytelling session, participants worked in teams to exercise their understanding of the stories. The colour coded nodes (keywords) were introduced in this session. The participants were asked to use these keywords to generate ideas.

7.2.4 Summary: The sensitising tool

The sensitising tool presents a practical yet transparent process of sensitising designers with cultural probe and ethnographic inspired and informed methodology. Two key stimuli 1) Personas 2) Taxonomy of nodes facilitates a strategy to utilise qualitative field data and more importantly, a link to the real life cases of the users who participated in this research. Crucially, this tool incorporates video interface of audio/visual descriptions of the home environment. The tool offers dynamic information beyond the format of ethnographic written report.

This sensitising tool offers a clear strategy that helps designers of smart homes to improve their understanding of older adults.

7.3 The value of the sensitising tool

The sensitising tool is designed specifically for the ideation stage of the new product development process (Figure 7.10) in the area of smart applications for the home.

The tool offers a knowledge platform of ten personas that presents insights into the home life of older adults.

The sensitising process

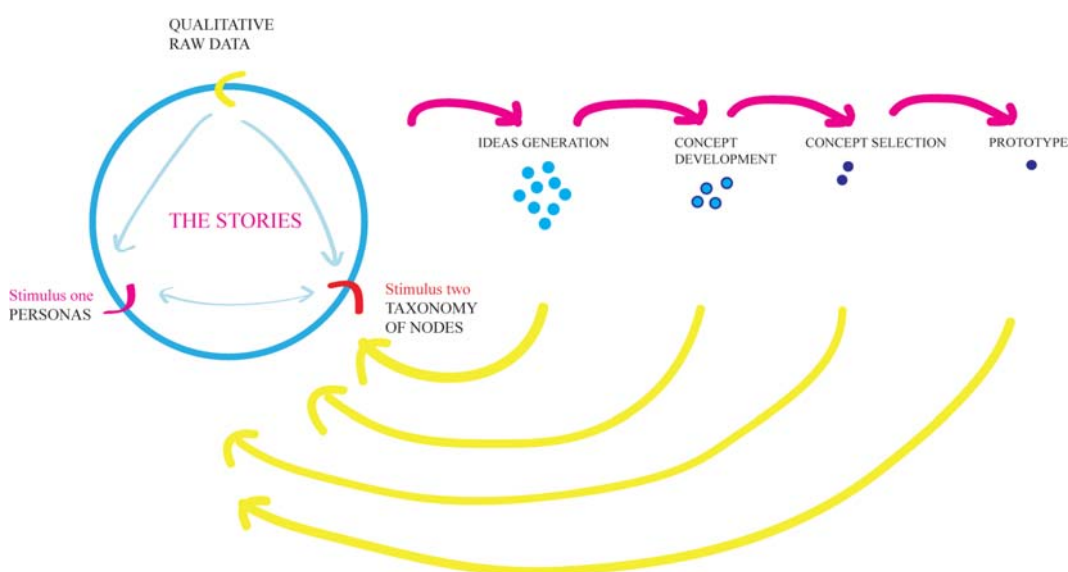


Figure 7.10 The blue circle represents the sensitising tool. It is designed to be employed at the beginning of a new product development process. (Appendix B)

7.3.1 The sensitising tool can sensitise designers and stimulate ideas

As shown in the figure above, the sensitising tool sensitises designers with insightful with inspirations from the home probe and the ethnographic information generated from semi-structured interview and video tour. The content of the sensitising tool represents older adults' attitudes, values and concepts of home in relation to their existing way of living.

The sensitising tool is developed for the purpose of ideation as shown in the figure above. The term 'designer' describes people who are involved in the development process of new smart technology product. This may include the project manager,

designer, engineers, computer scientist or any member of a multidisciplinary team.

7.3.2 The sensitising tool takes human-centred approach to user research

The sensitising tool benefits new product development process with a human-centred approach to user-inspired and participatory research. More significantly, this process helps designers to generate product ideas based on an empathetic and respectful view of the users.

Human-centred approach to user research places users firmly in the centre of the research and development process of new products in the new product development process. The sensitising tool invites older users to participate in the front end of the innovation to generate appropriate ideas and concepts. This places users' contributions at the beginning of radical innovation where insights make an impact.

7.3.3 The sensitising tool can benefit the new product development process from ideation to potential product prototyping

The process, although taking place at the beginning of the product development process, may also prove useful for refocusing and re-examining ideas suggested in the creative workshop. Thus, the tool may carry the potential for feedback and evaluation at all stages of a product life cycle.

The workshop participants utilised the stories in discussion, for generating ideas, producing concepts and selecting concepts. They also returned to the stories at the end of the discussion to examine their design scenarios. As *participant A* suggested, this process can be useful for examining concepts at the beginning of the development and also may *be valuable for evaluating product prototypes at a later stage*.

7.3.4 The sensitising tool adds important value to innovation process by creating insightful new directions

The sensitising tool can be used to inform development of vision, to probe into future directions for new product development strategy. The value of the sensitising tool can be explained by the result and evaluation of the creative workshop. These two examples have been discussed in chapter 5 (data analysis and evaluation). The purpose of summarising the discussion here is to illustrate specifically how the sensitising tool was employed to create ‘visions’: in other words, insightful directions for future developments.

[Example one]

Team two generated a core vision called ‘love’ (Figure 7.11). They envisaged a direction for new product lines that helps to communicate ‘love’. This leads to the creation of four design scenarios. Instead of designing a specific product as a solution to a problem, these scenarios of ‘love’ indicate several opportunities for new concepts.

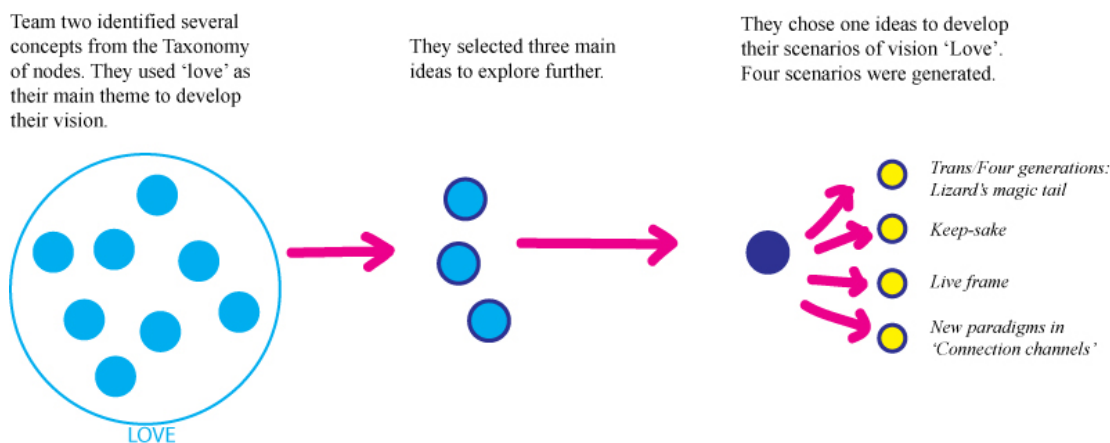


Figure 7.11 An example of the idea generation process tested in the creative workshop

As shown above, after the delivery of the stories, team two developed their visions based on the main concept ‘love’. They used this concept to develop their ‘map’ of the concept (Figure 7.12). As a team, they then selected three main ideas to put it forwards. These ideas were formulated with the nodes they used in the map.



Figure 7.12 The map of nodes created by team two

In the second phase, they selected one main idea to develop their vision. This idea selected includes the nodes of 'In control', 'Physical ability', 'Family network' and 'Enjoyment' (Figure 7.13).

This idea then helped team two to brainstorm and develop four scenarios. The four scenarios are 1) Four/Trans generation: Lizard's magic tail 2) Keep-sake 3) Live frames 4) New paradigms in 'Connected Channels'.

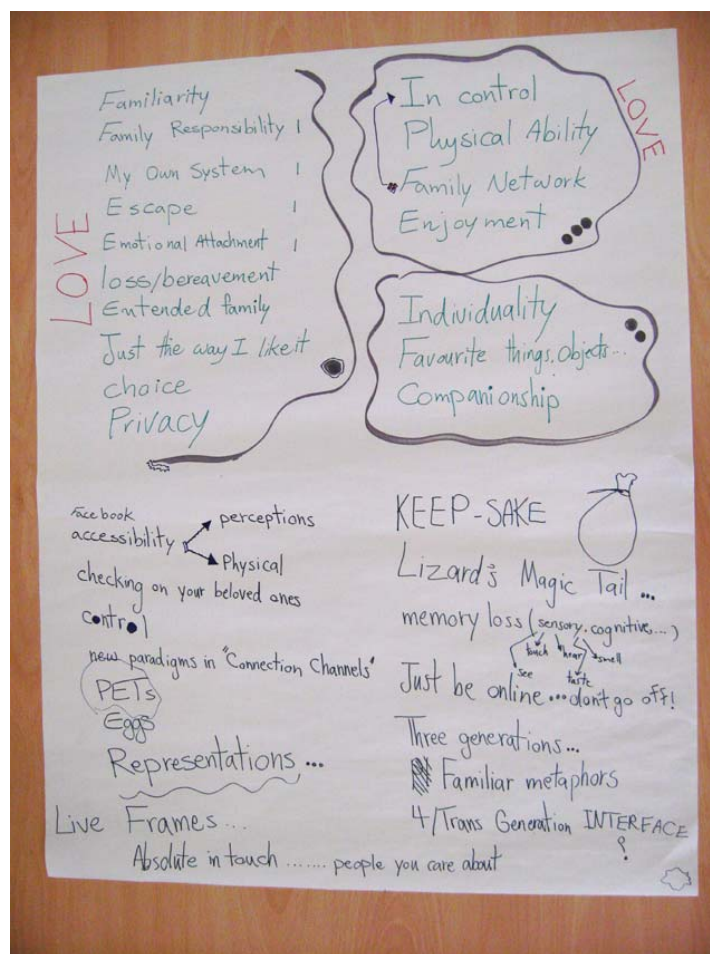


Figure 7.13 Team two's selection of ideas and development of concepts

For instance, the Four/Trans generated scenarios was used to describe the concept of multiple and adaptable interfaces for different generations in a family. Each generation would have a suitable interface for communicating with other generations. This scenario therefore leads to the development of four types of interface to integrate new functions with the existing and familiar objects such as a land line telephone. Team two suggested that, by adopting the existing object in terms of the design of the interface, which different generations are satisfied with, the new technological innovation is therefore created by providing a novel service instead of an alien interface to the existing way of life. Team two was able to utilise the stories and nodes presented in the workshop. With the limited time given in the workshop, they have developed several ideas using the ethnographic narratives. This experience also allows them to reflect on their perceptions towards older adults and older homes. It can be said this sensitising process was effective. In the follow up interview sessions, some participants reflected on their

own practice as carers or public health practitioners. Some, especially those who have been trained in the design profession, have since used ideas identified in their team. For instance, after the workshop, ideas were developed further for teaching the design undergraduate course. One of the participants is a design lecturer at Brunel University. In the evaluative interview session, she expressed that several ideas from the workshop were very useful. She has since employed the information learned from the workshop for teaching undergraduate students.

[Example two]

Team one identified two themes, 'Home is more than a house' (Figure 7.14) and 'ageing'. They used these two themes to support their development of ideas once the personas were presented.

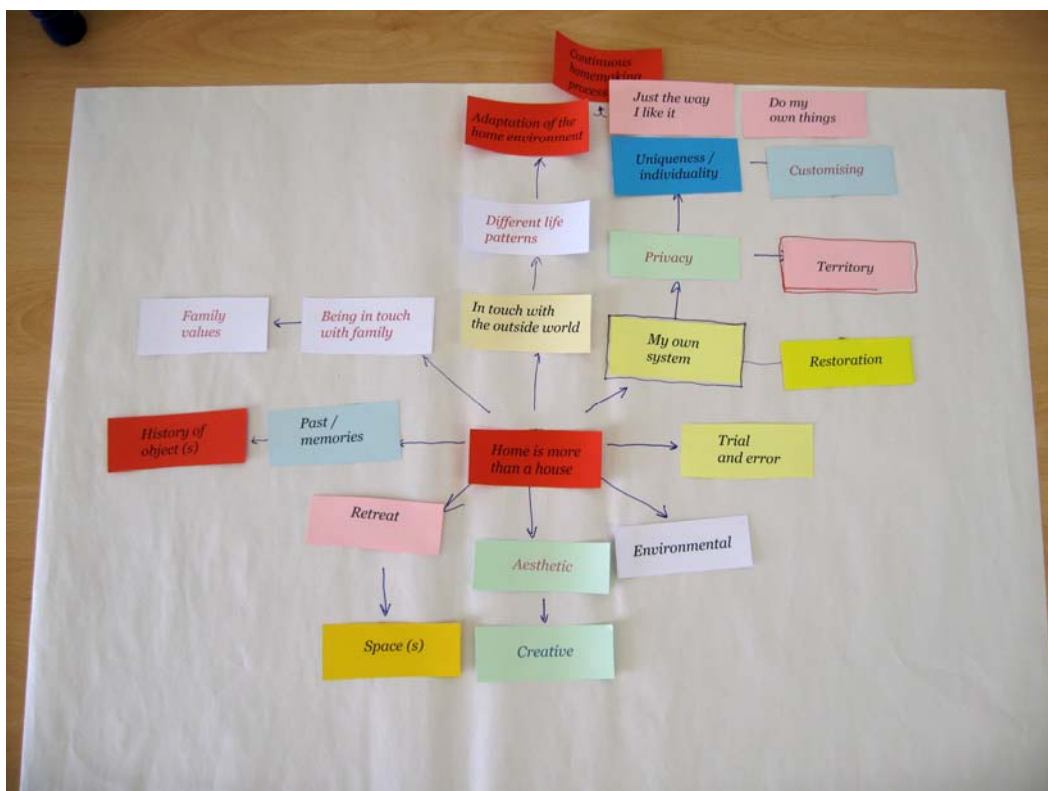


Figure 7.14 The theme 'Home is more than a house' identified by team one.



Figure 7.15 Ideas generated by team one to support their theme 'Home is more than a house'.

Figure 7.15 shows that, in the following stage, team one developed the theme 'Home is more than a house' with several touch points including 'territory', 'limitation', 'making yourself at home' and 'personalisation.' These points allow them to devise their vision for three product development concepts, namely, virtual packages, services packages and offline packages (Figure 7.16).

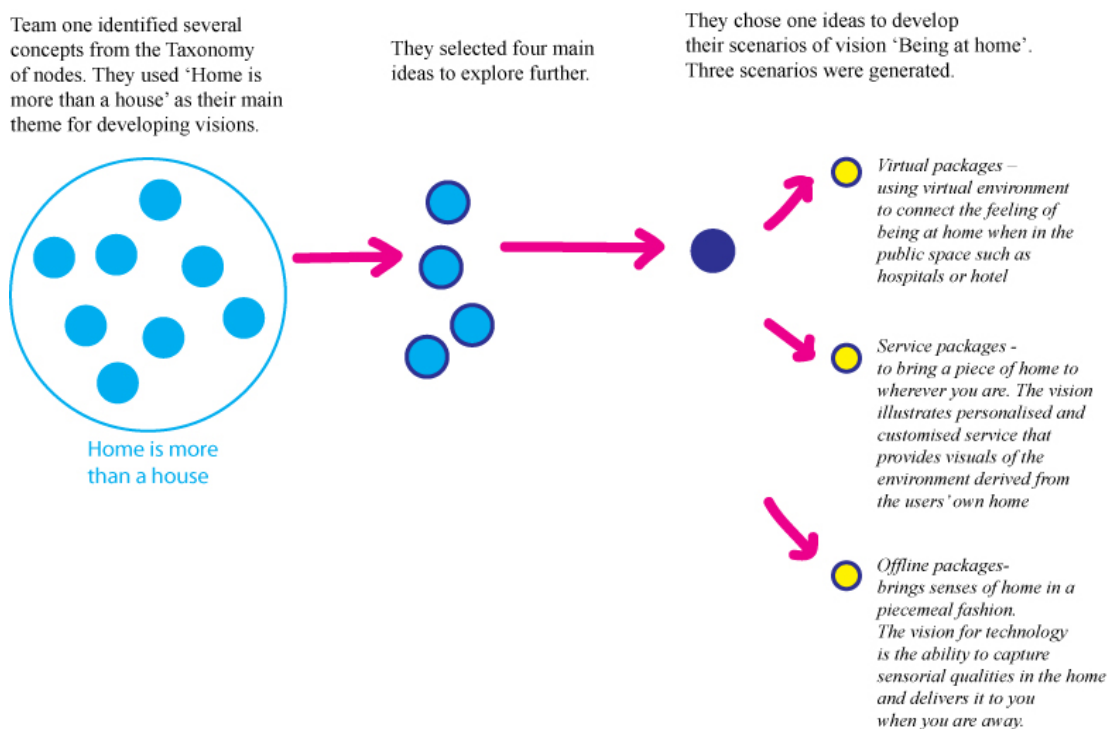


Figure 7.16 The ideation process of team one. They utilised the ethnographic data provided in the creative workshop to generate their development directions.

Taking one of their visions, 'Offline' packages for example, this is developed based on the idea of 'being at home'. The idea describes a vision of delivering the sensorial qualities of one's home using new technology while one is away from home. Team one understood that the concept of home is more than a house. They decided to develop a concept that facilitates the feelings of 'being at home', which were derived from the Personas as well as from nodes (keywords) presented. They generated ideas based on what they have learned in the workshop and developed their visions from the insights they have identified as a team. In the evaluative interview session after the workshop, the results show that the workshop experience was not only useful for generating ideas, but also, more importantly, effective to help them to 'understand' older users.

7.3.5 Evaluation of the influences of the sensitising tool on design thinking for older adults and their homes

The interview-based questionnaire was devised to evaluate the impact of the sensitising process as well as the consequent sensitising tool. The workshop served not only to test and evaluate the ethnographic insights presented, but also

to establish the design of the tool. The evaluative questionnaire posed several important questions to the workshop participants in order to examine the impact of the process and the stimuli presented in the tool. The questions with the key responses from the workshop participants are presented here to emphasize the influence of the sensitising tool on design thinking.

- Question: ‘How much have these stories made you more aware of the nature of the home.’ This question evaluates the influence of the sensitising tool on the subject of the nature of the home. For instance, workshop participants were sensitised to the concept that ‘home is more than a house’.

‘House is no longer a house, this process changes some part of my perception’ - participant A

- Understanding older adults and their older homes. This question evaluates the influence of the sensitising tool on the subject of older adults and their older homes. The sensitising tool helped the workshop participants to improve their understanding of the home life of those older adults, in particular, from the point of view of those older adults.

‘We are after all similar in some way’ - participant A

‘How they look does not always equal what they are feeling’

- participant B

*‘You also get to understand that the well-being and psychological part of a personal space are also important...design should be subtle, with a strong mental view, not only what you provide in it’
- participant B*

- Design for the home. This question evaluates the influence of the sensitising tool on the subject of design for the home. The tool helped to reinforce a human-centred attitude towards design

‘You can’t think strategy without people in mind’ - participant B

*‘Stories make you relate to your own thoughts’ – participant J,
product designer*

*‘Putting a human face on policy, not just the numbers’ –
participant B*

- Change perception about smart homes. This question evaluates the influence of the sensitising tool on the subject of smart home. The tool helps to achieve a crucial understanding regarding the concept of smart home, as participant J suggested, more realistic vision of smart home should be introduced, instead of the much hyped up vision of hi-tech and clinical like intelligent systems or smart homes. Other participants also reflected on the issue of technology in relation to the home.

‘Technology should enable people not just assist people’ – participant H

‘We should think of a human system’. – participant S

Overall, the stories help to diverge the participants’ thinking towards broader issues linking to the concept of the home

The sensitising tool influences design thinking and in particular address the subjects of older adults, their homes, and smart home. The tool challenges existing conceptions towards the users and their existing home environment and provocatively asks designers to relate their own experiences. More critically, designers are offered an opportunity to reflect on their own design practice and their understanding of the users.

7.3.6 Evaluation of the impact of the sensitising tool on ideation process

The sensitising tool offers an insightful look of home life for the older adults. This tool utilised the experience identified in the field to help designers to create ideas that are based on the meaningful aspirations of the users. What is valuable in this sensitising process is that it *helped the workshop participants to develop ideas **divergently***, based on an insightful understanding of the home life of the older adults presented in this research.

The evaluative interview also examines the issues relating to idea generations. The question posed was ‘Did the workshop influence your breadth of ideas?’.

However, the sensitising process, more importantly reinforces the purpose and impact of such tool - to improve the understanding of the users. Workshop participants were sensitised by the ethnographic information presented and valued such tool as a method of generating ideas, '*The answers are in the story itself, they are also the trigger* (participant H)', and more crucially, an opportunity to improve their understanding of the older users. '*This is about understanding, not just designing* (Participant A)'.

Whilst the tool set out to demonstrate the value of a sensitising process and how designers can gain insights consequently through such process, the ultimate evaluation lies in the quality of idea at the beginning of the design process. The objective is not to emphasize on the quantity of ideas alone but quality of the ideas and their insightfulness.

7.3.7 The sensitising process helps users to reflect on the context of their home

Similar to the outcome of the empathy probe by Mattelmäki and Battarbee (2002), for the users of this sensitising tool can also provoke them in some ways, as demonstrated during the field study. The sensitising tool is an opportunity to reflect on the unchanged issues in their life and challenge their perception of the home. At an altruistic level, some self esteem is generated from making their contribution to a better future.

Recent establishment of 'older people reference group' organised by charity or government body in the UK reflected, also, the older consumers' growing interests in contributing to developments that improve the quality of life in the older age. For instance, the Camden Council in London invites older adults of age 50 and above to join their growing reference group. To date, there are 700 registered members who volunteer to contribute towards issues relating to services for older adults (Camden Council, 2009).

7.3.8 The sensitising process is the end of the beginning of user research

The tool is designed for the ideation of the ‘fuzzy front end’ (FFE) (Smith and Reinertsen, 1992) in a general model of a new product development (NPD) process. This ‘fuzzy front end’ is where “customer needs are understood, needs are creatively translated to technical possibilities, and creative solutions are generated” (Griffin et al., 2009, p.225). In this front end, ideation is the first gate of development. The sensitising process in particular is proposed to sensitise designers and challenge their original assumptions in the ideation stage with qualitative insights presented in this tool.

This tool offers, specifically, a process to generate ideas based on a sound ethnographic investigation of the relationships between older adults and their older homes. As tested in the creative workshop, it helps the designers to generate ideas divergently. This tool can also be designed to improve the product development research in the early stage. It is said that formal market research can be leveraged by ethnographic findings (Griffin et al. 2009). The sensitising tool works in a similar manner. To use the sensitising tool before formal market research, it can facilitate an important opportunity for a survey to focus on emergent dimensions that are otherwise overlooked. It complements market research by indicating vital insights derived from the customers. This combination has been examined and suggested by Griffin et al (ibid) in two industrial studies, namely the Panasonic Lady Shaver and Fishing Motors.

The sensitising tool can also inform innovation activities “where ethnographic findings are presented and where their meanings for product innovation are discussed” (Griffin, op. cit.). In particular, this sensitising tool offers the merit of a clear process that translates ethnographic results for ideation of the NPD process. The two stimuli of this tool, the Personas and the Taxonomy of nodes, offer designers a rich and contextualised resource for creating ideas. This tool is derived from the core of ethnographic research but, more specifically, was developed with designers in mind.

This tool does not intend to represent the end of a research and development process. Dourish (2006) criticises the HCI designer's attitude towards ethnography data, as designers are often positioned as the gatekeeper of the ethnography inquiry. The rich descriptions generated from ethnographic research in this case are couched down to 'implications for design' or end-user requirements.

In response to Dourish's criticism, this sensitising tool is positioned in the NPD process to open up space for innovation that includes further development of concepts, selections of concepts, development of resources and so forth. It is seen as a vital gate to provoke exploration of concepts and ask questions laterally (de Bono, 1992).

This sensitising tool is seen as part of a continuous process of research and development. It is also valuable for connecting and encouraging collaboration between designers and users, in particular, to help designers to react to the changing nature of users' needs and their home environment.

To summarise, the sensitising tool does not intend to convey detailed representation of social facts. It is designed for generating ideas, produce concepts, and, on a wider scale, to build vision that informs the NPD strategy. The tool asks the designers to pause, to reflect and to rethink their approach to design for the home and, more significantly, their approach to user research. This is not a process that can be taken alone to formulate an end product.

7.4 The contribution of the sensitising tool

The contribution of this research is the sensitising tool that provides an insight into the relationships between older adults and their older homes. The tool is constructed with two stimuli. Stimulus one is the ten personas illustrating research findings in the format of narrative. Stimulus two is the taxonomy of nodes that illustrated ideas and concepts generated from the field research. More importantly, the sensitising tool is developed to address two research problems. One is the lack

of product strategy in the field of smart home. In parallel, it is the increasing challenge with older housing in the UK.

As a result of this research, a sensitising tool is created to assist designers of new technologies, such as the smart home, to firstly understand the existing home environment and, more importantly, to utilise knowledge gained in this sensitising process to create ideas and inform new designs.

The contribution of the sensitising tool can be examined from four perspectives. They are the rigour of the outcomes, the significance of this research, and the uniqueness of this tool and the practicality of the sensitising tool.

7.4.1 The ‘trustworthiness’ of the outcomes

The sensitising tool is informed by in-depth field research. The design of the research is constructed with qualitative research findings triangulated by three research methods, namely, home probe, semi-structured interview and video tour. It is formulated with the aim to gain ‘trustworthiness’ of the ethnographic research.

More importantly, this research employed a rigorous process of analysis and evaluation involving assessment techniques, such as peer debriefing, to improve the credibility, dependability and conformance of a qualitative research process, as explained in the research methodology chapter (Chapter 3). The tool therefore is created based on a solid foundation of qualitative findings. The sensitising tool is trusted by the users of the tool as participant F expressed, *‘you feel you can trust it.’*

7.4.2 The significance

This design tool can sensitise designers and stimulate ideas. The feedback from the creative workshop suggest that the value of such a process reinforces the issue of human-centred design in the area of new technology development and provokingly asks the designer to reflect on their perception towards the concept of ‘home’, ‘older housing’ and ‘older users’ in this environment. The feedback from the workshop also indicates a potential for this sensitising tool to significantly help designers to reflect on what have been considered as ‘problems’ in the conventional technology-push environment and provoke them to look at issues in

the new light of socially responsible technology (Sengers, et al., 2005). In particular, the sensitising tool makes a significant connection between the ethnographic data and the ‘probe’ inspirations generated from the field to the ideation stage of new product development.

The analytical process of this research was formulated to establish the trustworthiness of the ethnographic data. The sensitising tool is one of a few tools that could capture and present the richness of the data that are otherwise lost in the research and/or the analysis process.

To distinguish the contribution of the sensitising tool from the cultural probe (Gaver, Dunne and Pacenti, 1999) and the associated probes, such as the empathy probe (Mattelmäki and Battarbee, 2002), this research provides a transparent explanation of the design and interpretation process of the home probe. This is to argue that, unlike many other probe approaches, which are criticised for their lack of transparency in the articulation and development process of the ‘probes’ (Dourish, 2006; Boehner et al., 2007), this research presented a process, informed by the tradition in ethnographic investigation, that is designed to crystallise the development of the home probe, semi-structured interview and video tour.

Furthermore, this research has demonstrated that the probe is an invaluable tool to open up new directions and to provoke reflections in the early phase of a new product development process, and more specifically, the ideation stage. It is not only an “alternative account of knowledge production” (Boehner et al., 2007, p.1978), or an opportunity for reflection (Mattelmäki and Battarbee, 2002), but also a further step towards appropriation of ethnographic data in a design and development process of Human Computer Interaction.

7.4.3 The uniqueness

Uniquely, the sensitising tool reinforces the human-centred approach in the area of user research with a participatory and collaborative approach. By involving materials generated from methods such as the home probe, the sensitising tool challenges the role of the designer in the research process and the importance of users in participating at the front end of the innovation process.

Secondly, this tool utilises insightful knowledge generated from the older homes of older adults in the UK. It reflects diverse issues and lifestyles these older adults face in their everyday life. While potential issues have been identified, the sensitising tool more uniquely provides an alternative way to uncover positive and playful meanings in the life of the older adults and, in turn, suggests new perspectives for improving the quality and well-being of their life.

From the perspective of communicating user data, the sensitising tool proposes a unique process to translate the rich and thick description from the deep end of the field to, and for, the purpose of generating product ideas. The combination of personas and taxonomy of nodes are the tangible probes that assist the generation of new product ideas, as examined in the creative workshop.

7.4.4 The practicality of the tool

The sensitising tool is a transferable process for the design of new products and services for the home. Designers can utilise the ethnographic ‘inspirations’ with little training. And it aids the ‘phase zero’ and ‘phase one’ stages in the generic new product development process. According to Ulrich and Eppinger (2003) ‘Phase zero’ is a stage where planning of new corporate strategy, assessment of new technology, and market objectives takes place. The sensitising tool here assists the development of product strategy by indicating directions and opportunities informed by the ethnographic study of older adults in older housing. ‘Phase one’ is the following stage where concepts are developed. This stage is also called the ‘Front End’ of the development, where needs of the customers are identified and alternative concepts are generated and evaluated. The sensitising tool here helps to generate ideas and concepts. In this ‘fuzzy front end’ (Rhes, in Laurel ed., 2003), the sensitising tool assists, in particular, customer-based innovation. The stories and taxonomy of nodes of this tool can assist to generate ideas divergently, as tested in the creative workshop.

On the practical level, this tool helps designers to generate grounded research and development directions for the purpose of customer-focused innovation and, more importantly, to develop strategic new product platforms and architecture.

7.4.5 Practicality for new product development: a comparison of the sensitising tool to cultural probe

What is different from the approach of the home probe in comparison to cultural probe is that the home probe is used in conjunction with two other qualitative research methods in order to convey ‘meanings’. The outcome proposed in this research is the Personas and Taxonomy of nodes instead of design prototypes, which Gaver, Dunne and Pacenti (1999) produced as a result of the cultural probe. The purpose of including these two extended layers of interpretation is to add texture, colours and depth to the researched subject. One may argue that, by adding an additional interpretation process with personas and the nodes, the ambiguity and interpretative quality generated from the probe may be lost in such a triangulating and translating process. However, this research argues that the sensitising tool provides a tangible process of transforming raw data with the personas and the taxonomy of nodes that is different to the cultural probe as these data is used to sensitise designers. To be sensitised by ‘meanings’, further methods for identifying life histories, attitudes and experiences of the home is required. By combining the probe approach with other research methods the quality of the data has been compromised in the process, although the representation of such data may be less spontaneous in comparison to the ‘probe’ return.

The practicality of applying the sensitising tool in the NPD process this research proposed is that designers of commercial products also need a way to understand and be challenged by the philosophical and political approach of the ‘probe’ in the NPD process. The benefits of involving such a tool, as demonstrated in the result of the creative workshop, are the perceptions challenged and reflections of the concept of home and smart home, and, more importantly, the respect gained towards older users. From a perspective of custom-based innovation, this process can be seen as invaluable to a new product development process and to the success of user-centred products.

7.4.6 Practicality in addressing research problems identified in the literature review

Finally, this tool attempts to address two research problems identified; (1) Older housing in the UK and (2) Lack of product strategy for smart homes. The ethnographic information generated from the field challenges the perception of older homes, and more importantly, the meanings and values of the existing ways of living in the household of older adults. The tool helps to open up discussions about the concept of home and the existing approach to the design of smart homes from a user-centred perspective. To address the second research problem, the tool can contribute to the strategic development of products and services for smart homes. Ethnographic information can be used to inform development directions inspired and informed by new products that do not yet exist in the marketplace.

7.5 The limitation of the sensitising tool

There are limitations within the use of the sensitising tool. These limitations are examined by the methodological design of this research, data collection and the practicality of the tool.

First of all, methodologically, this research is conducted by a researcher working in an independent environment. Therefore biases and subjective interpretation of the data are difficult to avoid, although methods such as peer debriefing, in order to validate the research, have been implemented.

Secondly, in terms of the design of the research, the use of the non-probability sampling technique can be improved if a wider network could be explored. The majority of the participants of this research were between the ages of 50 to 65. The sample, therefore, has less information about the older adults who are in categories of very old age; age 80 and above. The results of the research, as a result, are limited to the younger spectrum of older adults. Although information about the older family members of the participants was included, they are not the immediate research participants and therefore were not researched during the field study.

Thirdly, less emphasis was placed on the differences of social, economical and cultural backgrounds. The research findings, and the subsequent sensitising tool, are therefore limited to particular results generated from the participant group researched.

The sensitising tool proposed is limited to particular contribution to a new product development process. The tool does not propose to be an exclusive application for generating product ideas. Further development and evaluation session(s) are required to assist the selection and evaluation of the ideas.

7.6 Chapter summary

This chapter discussed the development of a sensitising tool, the formulation of the tool and, more importantly, the value of the tool.

The sensitising tool is about understanding the users and allowing a development team to be sensitised by user-centred approach to user research and design. This research tool plays to its strength in the human 'face' value and represents an opportunity to involve end-users in the new product development process, from the beginning, through concept development, product prototyping, evaluation and testing.

Based on the feedback of the creative workshop, this sensitising tool has added intrinsic value to the new product development process by providing, firstly, better understanding of the values and meanings of older adults and their homes. Secondly, it sensitises designers to the concept of diverse lifestyles, experiences and values in the home and, consequently, opens up new directions for the next stage of new product development

To conclude, the design of the sensitising tool therefore contributed uniquely as a design tool for the developers of new and smart application for the home. It is a product that is tailored to the needs of designers and based soundly on the insights of older consumers.

‘Design research methods are themselves “product” that need to be designed for different audiences, purposes and contexts- it really does all depend on what you want to do.’ (Eric Dishman on ElderSpace for Intel, Laurel, ed. 2003)

CHAPTER 8 CONCLUSION AND FUTURE WORK

8.1 Introduction of the chapter

This doctoral research investigates technology development in the area of smart home and user research methods relating to ethnography. In particular, this research is motivated by emergent research techniques such as the cultural probe that explores new possibilities for computing for the home that are outside of the notion of work. As a result, this research investigates and develops a product design research tool to improve designers' understanding of older users in the home environment and consequently helps designers to generate new insightful ideas.

The aim of this research is '*To develop a user-oriented product design research tool that improves the understanding of the home life of older adults*'. Seven objectives were devised (see Figure 8.1) in order to accomplish the aim. The contribution, as a result is a sensitising tool based on founded field research into the home life of older adults in the UK.

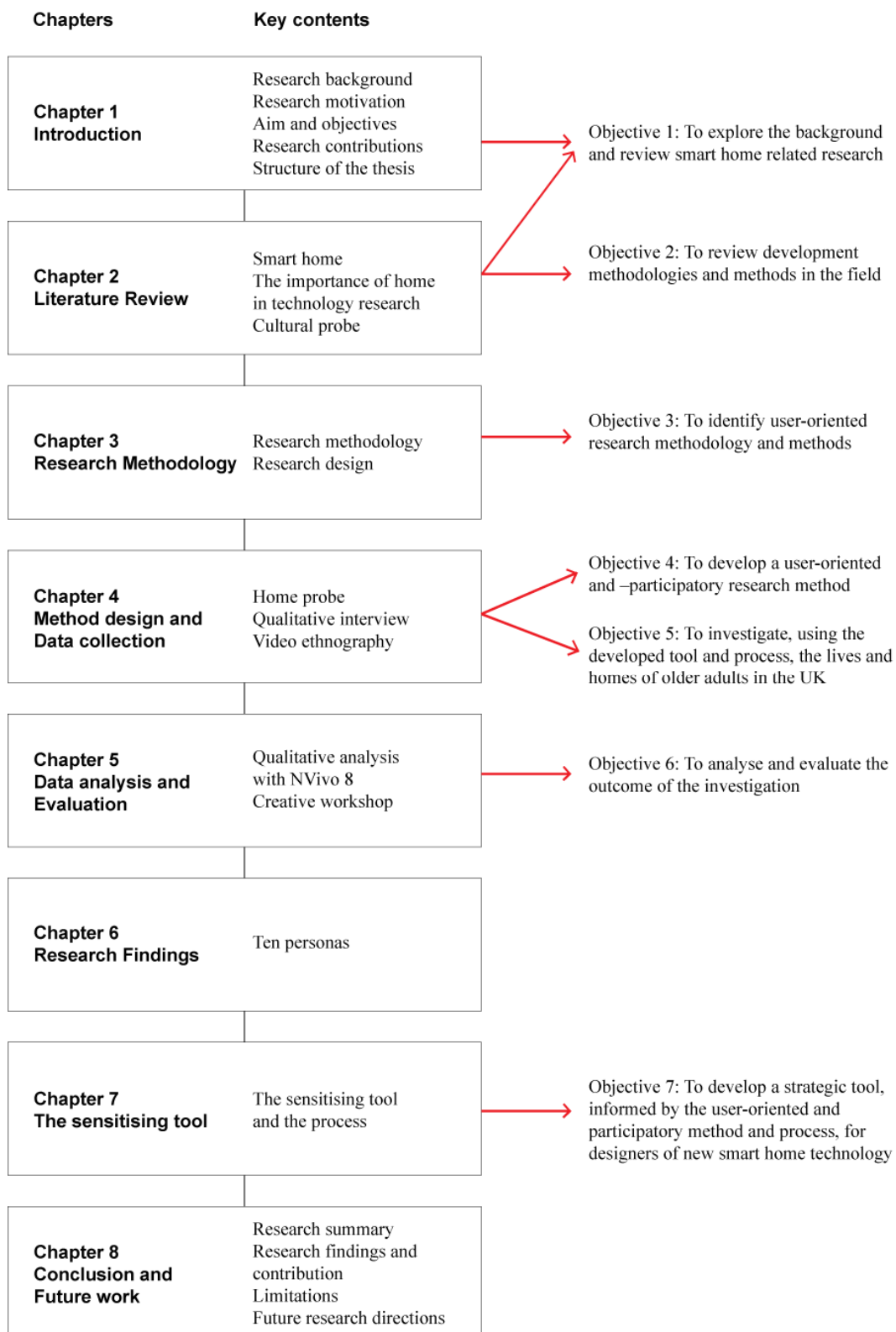


Figure 8.1 The objectives of the research addressed in the chapters of this thesis

The purpose of this chapter is to summarise this thesis, conclude the findings, contributions and limitations of this research. Future direction of this research is also discussed in this chapter.

8.2 Research summary

The development of new products requires an innovative approach to research in order to succeed in the marketplace. Innovative research can be led by technology, operation and designer but, more importantly, by users or customers (Rhea in Laurel ed., 2003). The development of smart home technology reflects a growing challenge of new product development and, in particular, the push and pull relationship between innovation of technology and customers.

This research was motivated by research in the area of smart homes and, in particular, emergent disciplines of research methodology and methods. The initial background and literature review suggests that there is a need to employ ethnographic related strategy and methods to understand the home; in particular, through the deployment of new qualitative research tool such as cultural probe and critical reflection on the importance of user informed and participatory research in the process of new product development. After the review of smart home research in the field, three qualitative research methods were selected and formulated to investigate the home life of older users. The result of the ethnographic investigation generated ten personas for design. This qualitative data was analysed with the assistance of computer software (Nvivo 8). The user-informed and -inspired scenarios were then employed to develop a sensitising tool. The sensitising tool is examined in a creative workshop in a multidisciplinary setting. The research findings and results have been disseminated through conference paper and posters. Detailed research findings and contribution are discussed in the next section.

8.3 Research findings, contribution and discussion

This research contributes to the debate in the field of Human-computer interaction design in the area of emergent ethnographic and related research methods. More specifically, this research discusses the value of qualitative research tools such as

the cultural probe and how it can benefit the front end of the new product development process. The ethnographic research was conducted with 18 participants aged over 50 across the United Kingdom. The sample is selected using a non-probability technique of networking, as well as recruitment through placing posters in public places.

8.3.1 Research findings

The result of the field investigation includes ten personas. The personas are the findings of this research eliciting insights identified from the field investigation. The main questions address topics of ‘the home’, ‘changes over time’ and ‘sensorial experiences’. Participants participated through three qualitative research methods, namely cultural probes, semi-structured interviews and a video tour. Each persona was drawn based on the textual, visual, as well as audio/video information, generated from the three research methods during the study. Each persona has shared insights relating to the concepts and meanings of their homes as well as unique sensorial, personal and family life experiences.

The ten personas are supported by the taxonomy of nodes generated from qualitative analysis with NVivo 8, and the peer debriefing and clustering techniques. The two findings of this research, the ten personas and the taxonomy of nodes, were evaluated in a creative workshop participated by two multidisciplinary teams composed of product designers, design managers, academic lecturers and design researchers. More critically, the creative workshop is designed to test the formulation of a new design tool – the sensitising tool.

8.3.2 The sensitising tool

The contribution of this research lies in the sensitising tool and process proposed (as presented previously in chapter 7). The sensitising tool is founded on sound field research designed to combine the merit of traditional ethnographic research and the design research tool cultural probe. Research techniques of ethnographic tradition were employed to inform the credibility and trustworthiness of the qualitative data. The cultural probe is employed to open up new spaces, not only for designs, but also on the methodological level, to critically and reflect on design research thinking as a whole.

The quality of the ethnographic data generated from the field is translated in the form of ethnographic writing, as personas. They were described with written texts, the photographs taken by the participants as well as video footages captured from the field by the author.

Uniquely, the sensitising tool established a clear process of translating qualitative data for the purpose of ideation in the new product development process (Figure 8.3). The sensitising tool includes two elements, the stimuli Personas and the stimuli Taxonomy of nodes. In the process of translating raw field data to new product ideas, the sensitising tool assists the designer in 1) understanding the home life of those older adults participated in the study, 2) reflecting on their understanding of those older adults, who, potentially are the users of new technology such as smart applications and smart homes, and 3) generating ideas based on the qualitative inspirations / information for the purpose of design. The sensitising tool is unique because it can be used to sensitise designers at the front end of the innovation process with real life stories of those older adults, their needs, values and aspirations. More importantly, it can be used to challenge preconceptions of the older users and their existing home and lifestyles which, from the perspective of customer-based innovation, are vital in the new product development process.

The tool is designed in response to 1) the growing market of older adults, 2) older housing in the UK, 3) the need to explore playful possibilities for computing for the home, and 4) more importantly, the need for a development strategy for smart homes. The result of this research therefore contributes a tool that investigated the lives of older adults, older home environments, playful and reflective approach for new technology design and, more significantly, contributes a tool that assist in the strategic design direction of new smart products.

The Sensitising Tool

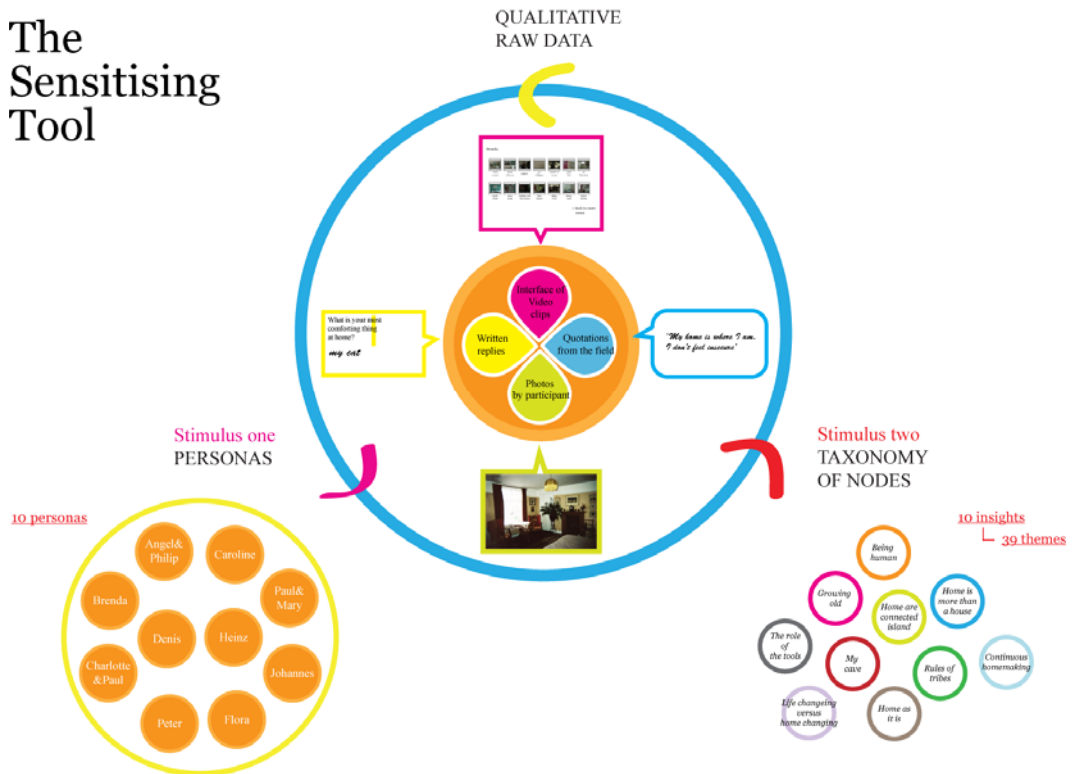


Figure 8.2 The sensitising tool. This figure is discussed in detail in Chapter 7

The sensitising process

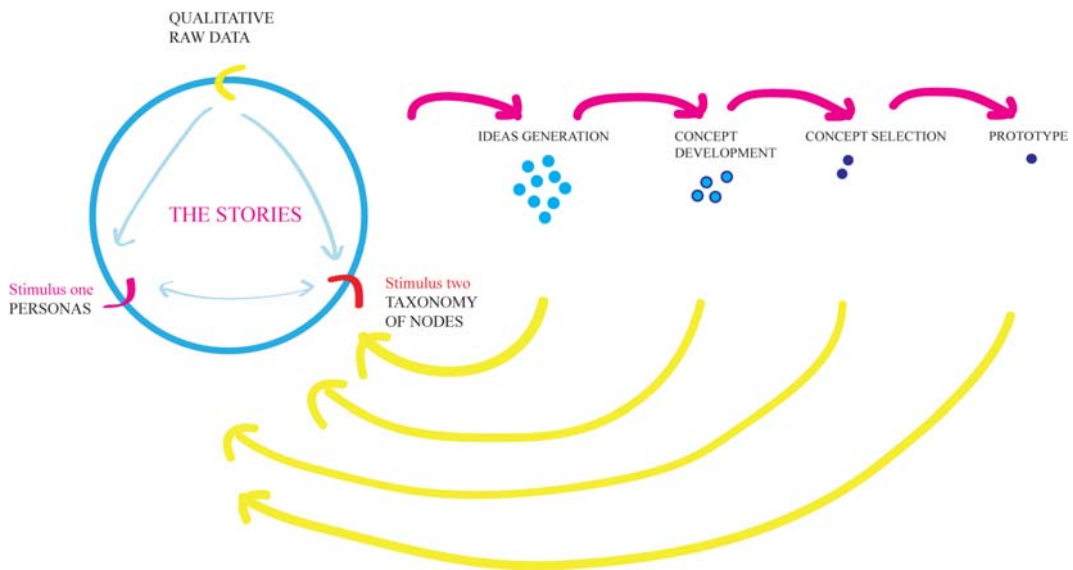


Figure 8.3 The idea generation process using the sensitising tool (This figure is discussed in detail in chapter 7)

8.3.3 Cultural probe

The tool home probe designed for this research adopted the philosophy and approach of a ‘cultural probe’ (Gaver, Dunne, Panceti, 1999). ‘Probology’ has

been adopted in the field of human-computer interactions design and has been developed for the purpose of field research.

The home probe has several similarities to some of the previous research approaches (e.g. Gaver et al., 2004; Hemmings et al., 2002; Mattelmäki and Battarbee, 2002); 1) the design of the home probe values qualitative approach to research, it often combines with other research methods such as interviews or brainstorming workshops with the aim to identify insightful knowledge about the field researched. 2) The use of a ‘probe’ also has a clear purpose of generating inspirations/information for the purpose of opening up spaces for design. Previous researches were interested in employing such playful methods to involve users to participate in a co-design process. 3) The home probe also shares the similarity of challenging the approach of research in HCI in regards to the growing debate of validity and reliability of research, particularly from the perspective of ethnographic tradition.

8.3.4 Contribution of the home probe

This research fundamentally contributes firstly to the growing debate of the validity and credibility of ‘probe’ related research in HCI. This research more importantly pointed out the value of qualitative approach (i.e., particularity) should not be evaluated from the perspective of the quantitative tradition. The value of the ‘probe’ or related method should, more appropriately, be examined from the perspective of qualitative tradition in terms of the trustworthiness and credibility (Lincoln and Guba, 1985) of research, the role of the qualitative researcher, as well as the ‘particular’ insights research contributes.

To address the issue mentioned above, this research employed the disciplines of qualitative tradition in order to establish the trustworthiness of the findings. The inspirations generated from the home probe is crystallised with the second (semi-structured interview) and the third (video tour) qualitative research methods. By crystallising (Richardson, 1994, p.552, cited in Janesick, Denzin and Lincoln, 2000, p.392), it refers to “combines symmetry and substances, transmutations, multidimensionalities, and angles of approach. Crystals grow, change, and alter,

but not are amorphous...Crystallisation provides us with a deepened, complex, thoroughly partial, understanding of the topic”.

This research also contributes the sensitising tool as the result of the probe research. The home probe was uniquely designed to generate inspirational insights. The use of the ethnographic writing technique not only helps to produce real life stories (in the format of personas), but also supports the philosophy of both ethnography (reportage) and the cultural probe (inspirational stories). This research, in particular, is distinguished from the previous probe related research by its approach to the use of the qualitative data generated. Unlike previous research using probes to produce design implications or product prototypes, the probe research addressed a sensitising process; a process that is vital for designers to understand, empathise and respect the users, as well as to reflect on their attitude towards to the field researched.

More practically, this research establishes a clear link between the cultural probe and the new product development process. The potential use of probe for ideation in the NPD process has been discussed briefly in previous research (Mattelmaki, 2005). This research further suggested a process of translating raw data to product ideas, with the stimuli Personas and the stimuli Taxonomy of nodes, which are dedicated for the purpose of ideation. Although Gaver and his colleagues (2004) argue that the purpose of the probe lies in provoking design thinking rather than producing commercial products, this research has demonstrated that such a probe approach is worth employing if applied with appropriate intention; as demonstrated in this research, to sensitise and challenge designers.

8.4 Limitations

The PhD research is limited by a number of factors. First of all, research biases and subjective interpretation are difficult to avoid as this research relies largely on qualitative approaches and conducted by the author working in an independent environment. This factor may affect the outcome of the research findings.

Secondly, this research employs a non-probability sampling technique. Therefore participants of the study are limited to the networks where the author is based, as explained in the previous chapter (Chapter 7 The sensitising tool). As a result, the sample has less opportunity to address social and cultural groups of older adults that are outside of the networks of friends and family. The research findings and the subsequent sensitising tool therefore are limited to results based on the user group researched.

Thirdly, the design of this research may also affect the outcome of the research and the sensitising tool. This research relies largely on an overt approach of data gathering such as the cultural probe and the face-to-face interview. Participants therefore responded to what they consider as appropriate and relevant to the research questions posed by the author. Issues that participants did not wish to explore may not be identified consequently. This research, as a result, can only represent particular findings that were discussed in and occurred during the study.

Finally, in regards to the evaluation of the research, in particular, the creative workshop is limited by two factors. Firstly, the workshop participants were assembled to simulate a new product development team. The simulation was limited because there are still some gaps between a simulated and a real sensitising process. Secondly, the workshop is constrained by the time given. Therefore, the research findings and the sensitising process were examined only in a single setting during the session of the workshop. Finally, the workshop participants evaluated the research findings and the sensitising process as a team during the workshop. Participants were not given an individual session to evaluate the findings.

The sensitising tool proposed is limited to contribution to a new product development process for smart application for the home based on the particular qualitative findings. The tool does not claim to be an exclusive application for generating product ideas. However, it provides a platform for further research and development of suitable tools. Further development and evaluation session(s) are required to assist the selection of ideas and evaluation of the ideas.

In addition, the findings of this research and the proposed sensitising tool were generated from particular information about the perspectives and experiences of the older adults who participated in the study. Therefore, the result cannot be interpreted as a sample that represents the population of older adults in the UK.

8.5 Future research direction

There are a number of potential directions for future research. Future research directions are identified from three perspectives; 1) the perspective in response to limitations of this research, 2) the design of the sensitising tool, and 3) the practicality of the sensitising tool.

1) In response to the limitations of the research designs

Future research can be conducted in the multi-disciplinary manner. The involvement of multiple perspectives can reduce the risk of bias and subjectivity during the process of data gathering, analysis and representation. Furthermore, by involving team members from different research backgrounds, future research can enhance the capacity of such qualitative resource by adding perspectives from a multidisciplinary team. This, in turn, broadens and deepens perspectives of the ethnographic findings, for the purpose of ideation in NPD.

Secondly, future research can also benefit from a comparative study of different social, cultural and economical samples of older adults in the UK. This direction may broaden as well as reconfirm some of the gaps of the findings identified in this research.

Thirdly, future research can also employ a mixed methods (Creswell, 2000) strategy to develop the research findings. The combination of a qualitative method, such as prolonged observation in the field, and quantitative methods, such as the survey questionnaire, may help to clarify potential development directions in the later stage of the new product development process.

2) In response to the design of the sensitising tool

Future research can explore the possibilities of developing a web-based resource for sharing of information in the new product development team. This resource may further assemble written, visual, and audio/video information in a multimedia format that allows instant retrieval, clustering and mapping of the original information. In this case, a web-based resource not only can benefit the development activities for individual, but also facilitate a critical channel between the team members to communicate using the original raw data. The channel is important because it serves as a source of reminder that the information provided in the sensitising tool are real life stories of the older adults who participated in the study.

The resource may also benefit from connecting the results generated from the sensitising tool to later user research such as market surveys. Future development of such a resource is also suggested to incorporate other research resources from the later stages of the new product development process.

3) The practicality of the sensitising tool

On the practical level, future research for the sensitising tool and process can benefit from simulations in the educational setting; for instance with design students. It was interesting from the perspective of the design educator how this tool can sensitise and challenge design students, their perceptions towards users and, in particular, older adults. The sensitising tool, more critically, challenges the role of user informed research in the environment of design education, but also reflects on the importance of a user-centred and participatory approach in developing new product ideas.

Future research should also consider simulation of the sensitising tool and the process in the industrial setting, in order to reduce the gap between the simulated and the real sensitising process. Further development of the tool can benefit from deployment of the sensitising tool with design companies exemplified in the work of Mattelmäki (2005). By doing so, the sensitising tool and process can be further refined to accommodate the needs of the users of this tool, both in team and independent situations.

Fundamentally, future design academic research can benefit from investigation of the significance of qualitative methodology and methods for design. The use of the cultural probe exemplified the difficulty and challenge in validating the use of ambiguous and subjective data in academic research, which is scientific in nature. This research set out to demonstrate that the significance of design academic research can also derive from, and be valued by, ambiguity and subjectivity information that are collected, analysed and represented in a trustworthy and credible procedure of research. As demonstrated in this research, rather than defining scientific facts of social life, this research demonstrates that such a sensitising tool can be valued for its subjective but trustworthy findings.

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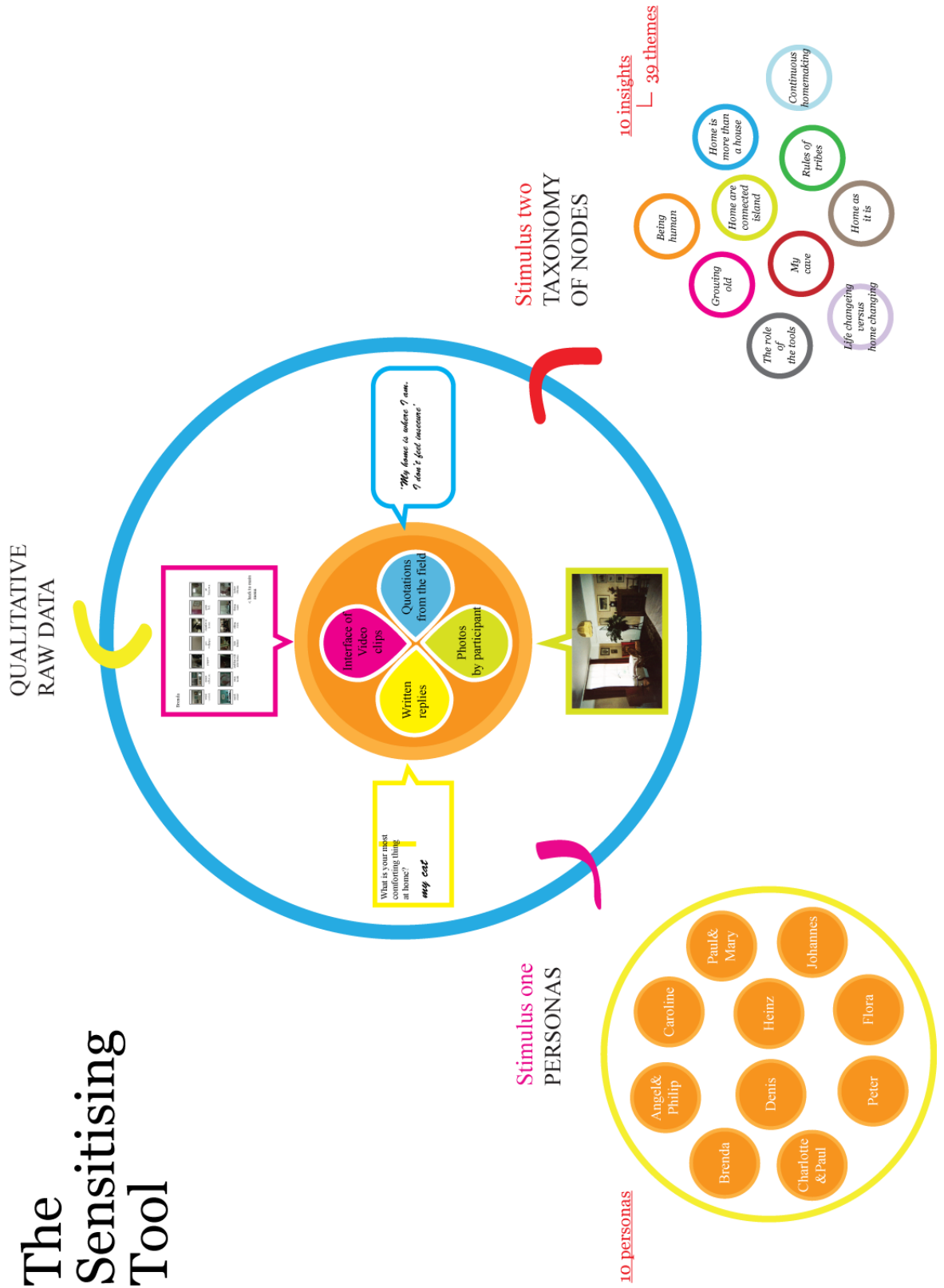
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APPENDICES

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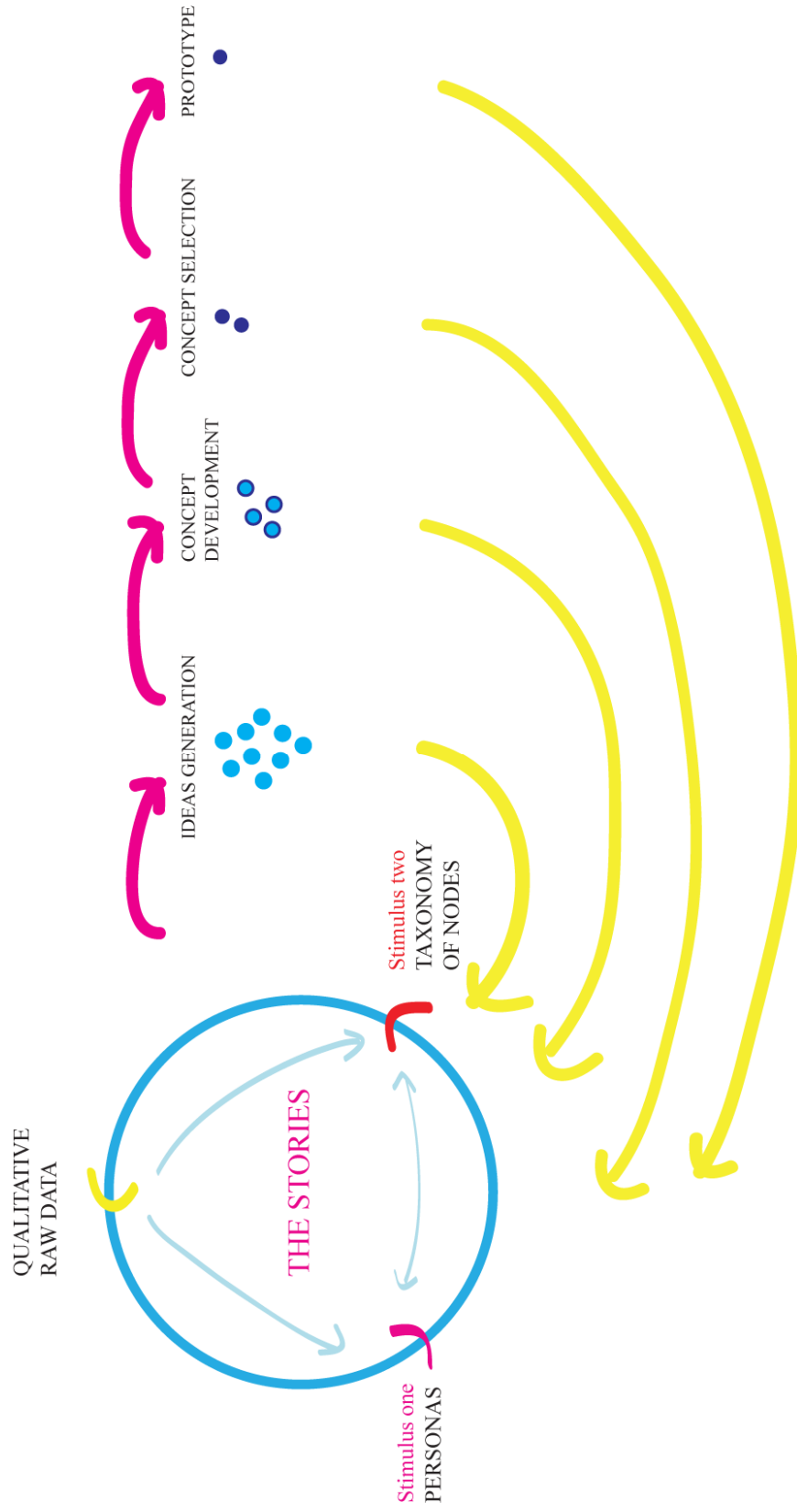
Appendix A The Sensitising Tool

The Sensitising Tool



Appendix B The Sensitising Process

The sensitising process



Appendix C

Research information sheet and consent form: Home probe



Researcher:

Title of research: Home Probe

Date: / /

Dear

You are invited to participate in a design research project 'Home probe'. It is a research tool that consists of nine postcards, an easy photographing task and a disposable camera, and a diary. The purpose of this tool is to find out about your opinions about 'your home'.

We would like to ask to participate by completing the probe tasks over the next one to two weeks in your own home. You are encouraged to contact the researcher regarding the tasks. We would also like you to know that, if under any circumstances that you do not feel comfortable completing the tasks, you have the right to do so. Please also take care of yourself when conducting any tasks. Thank you.

All information provided by you will only be viewed by me and a social scientist. The information and communication between us will be strictly confidential and will be protected by the 1998 Data Protection Act. We will not share any information with any third party unless it is agreed by you.

Information about the pack

What is in this pack?

9 postcards

A photographing task

A disposable camera

(Alternatively, if you have a digital camera and prefer to use it, please let us know.)

A diary

Pens

What type of questions will be asked?

The concept of home in general

Your view about the home
Things you do

Where and how long

Please carry out the probe tasks in the comfort of your home in the next week.

Contact

Please do not hesitate to give me a call if you have any questions.
Thank you.

Sonia Wang

Email: dtpghpw@brunel.ac.uk

Mobile: XXXXXXXXXX

* All information provided by you will only be viewed by myself for research purposes. The information and communication between us will be strictly confidential and will be protected by the 1998 Data Protection Act. We will not share any information with any third party.

Consent form (Participant's copy)**Researcher:** Hsueh-Pei (Sonia) Wang**Name of research:** Home probe

I confirm that I have read and understand the information sheet dated _____ for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. I agree to take part in this study.

Home Probes

I would give permission to the researcher to show the materials generated from this study if it is pre-approved by me.

Name of participant_____
Date_____
Signature_____
Name of person
taking consent_____
Date_____
Signature

Consent form (Researcher's copy)

Researcher: Hsueh-Pei (Sonia) Wang
Name of research: Home probe

I confirm that I have read and understand the information sheet dated _____ for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. I agree to take part in this study.

Home Probe

I would give permission to the researcher to show the materials generated from this study if it is pre-approved by me.

Name of participant

Date

Signature

Name of person
taking consent

Date

Signature

Appendix D

Research information sheet and consent form: Interview and video tour



Researcher:

Title of research: Home probe

Date: / /

Dear

Thank you very much to have participated in the first part of our research. In the following part, we would like to ask you to give a more detail description of answers you have given in the Probes. This interview will take about an hour.

We will visit you again at a pre-arranged time that suits you. In this session, we will interview first for an hour followed by a little tour of which the researcher ask you to show us place in your home This will also take an hour and be recorded with a video camera, with your permission,

Please kindly inform me about a suitable time for you, your consideration is greatly appreciated. Thank you.

With your permission, we will like to visit you at your home, collect the probes from you and go through the probes in the interview session. This will be recorded with a voice recorder. Please kindly inform me about a suitable time for you, your consideration is greatly appreciated.

Information about the interview

In the session

We will like to discuss about your answers to our probes. This session will be recorded, only with your permission.

Where and how long

At your home

One hour

Contact

Please don't hesitate to give me a call if you have any questions. I would very much like to hear from you.

Sonia Wang
Email: dtgphpw@brunel.ac.uk
Mobile: [REDACTED]

* All information provided by you will only be viewed by me and a social scientist. The information and communication between us will be strictly confidential and will be protected by the 1998 Data Protection Act. We will not share any information with any third party unless it is agreed by you.

Consent form (Participant's copy)

Researcher: Hsueh-Pei (Sonia) Wang
Name of research: Home probe

I confirm that I have read and understand the information sheet dated _____ for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. I agree to take part in this study.

Interview
Video tour

I would also give permission to the researcher to show the materials generated from this study if is pre-approved by me.

 Name of participant Date Signature

 Name of person taking consent Date Signature

School of Engineering and Design, Brunel University
 The authorising and review party

 Date

 Signature

Consent form (Researcher's copy)

Researcher: Hsueh-Pei (Sonia) Wang
Name of research: Home probe

I confirm that I have read and understand the information sheet dated _____ for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. I agree to take part in this study.

Interview
Video tour

I would also give permission to the researcher to show the materials generated from this study if is pre-approved by me.

Name of participant Date Signature

Name of person Date Signature
taking consent

School of Engineering and Design, Brunel University
The authorising and review party

Date

Signature

Appendix E Pilot home probe

The pilot version of the home probe consists of 1) Postcards, 2) The picture book, 3) The book of house work, and 4) the treat yourself diary

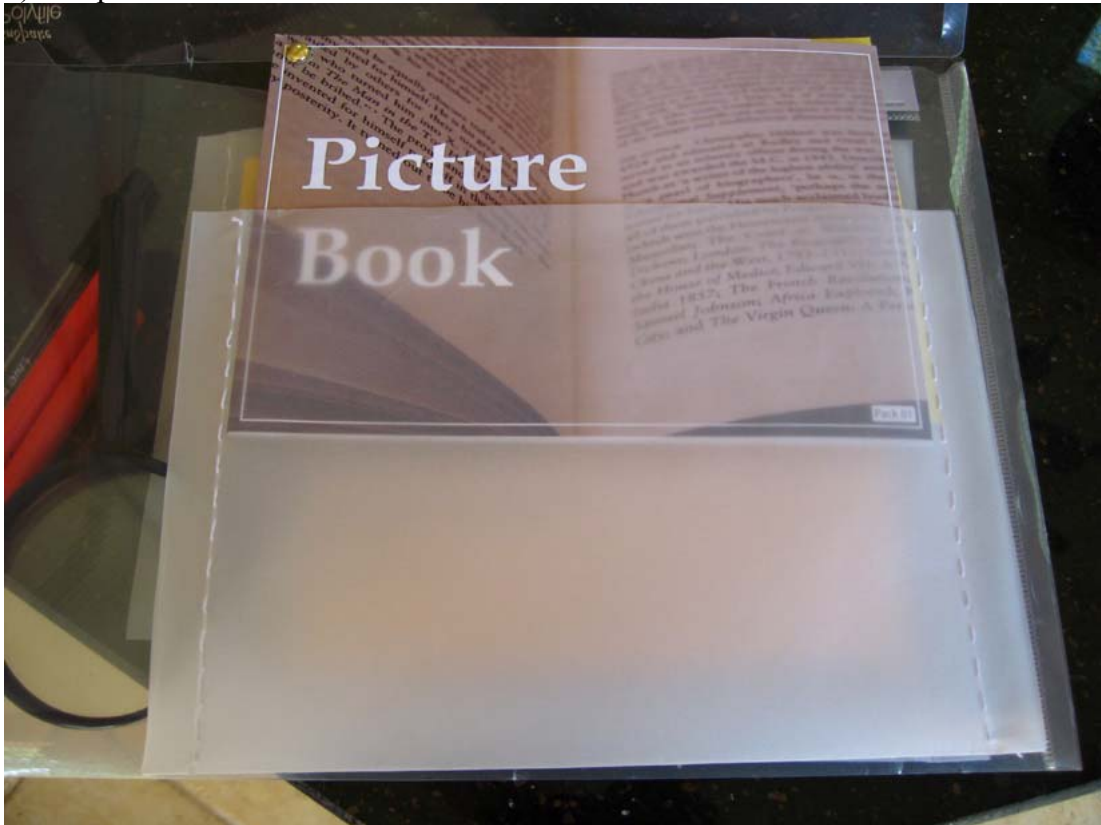
The pack of pilot home probe



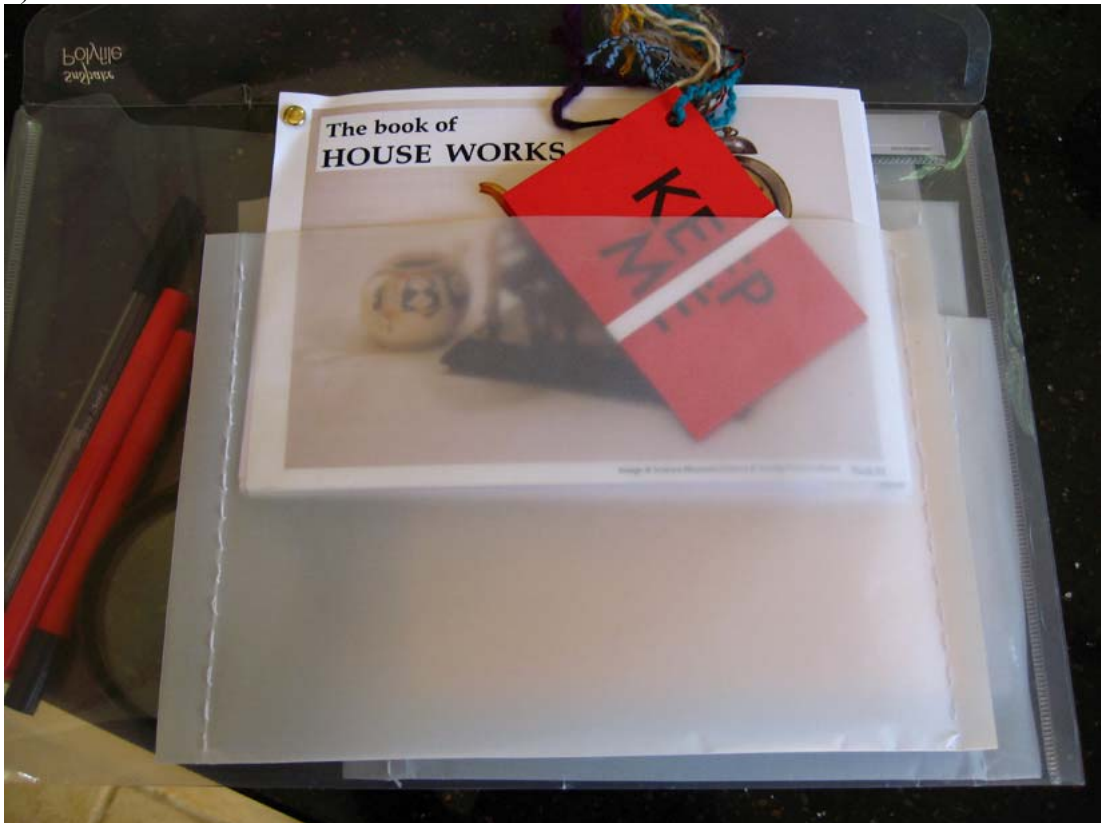
1) The postcards



2) The picture book



3) The book of housework



4) The treat yourself diary



Appendix F

Questionnaire for the evaluation of the pilot home probe



Feedback on pilot Cultural Probes (Home Probes)

Researcher: Sonia Wang

Informant:

Supervised by: Peter Evans and Ray Holland

Date: / /

Overall:

- Time scale

- Quality of the probes
Overall design/colour/textural/cultural/do these images work for you?

Use:

- Use of language
Phrasing of the questions

- Difficulty
To interpret
Getting the answers?

- Any assistance needed? with the tasks?

Preferences:

- Like/dislike

- Unusual

- Discomfort

Location and time:

- Where do you keep the pack?

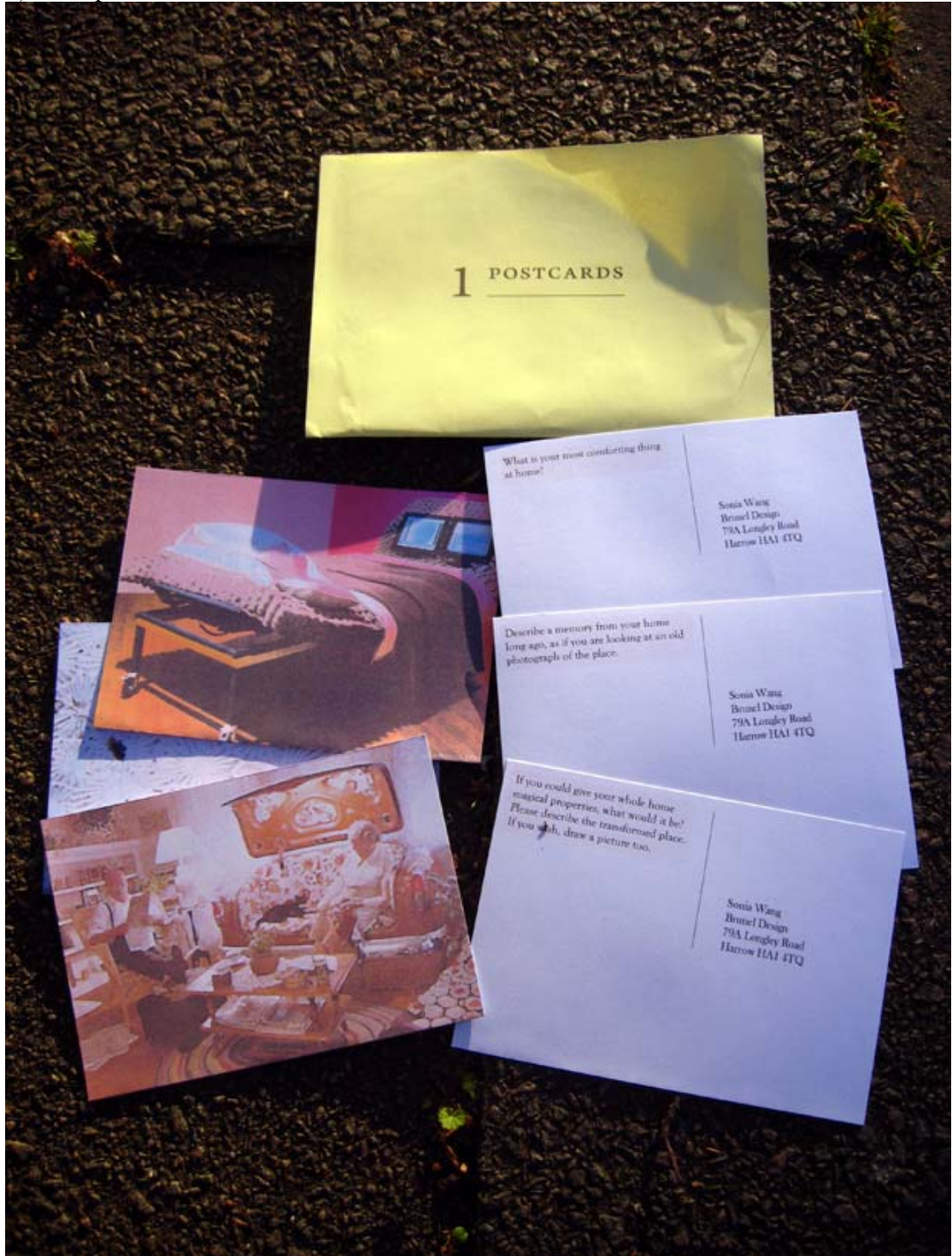
- When did you have the time to do it?
What time of the day and week?

- What do they think is important for us to know about 'home'?

Appendix G Home probe

The home probe consists of 1) nine postcards, 2) a easy photographing task and 3) a sensory diary.

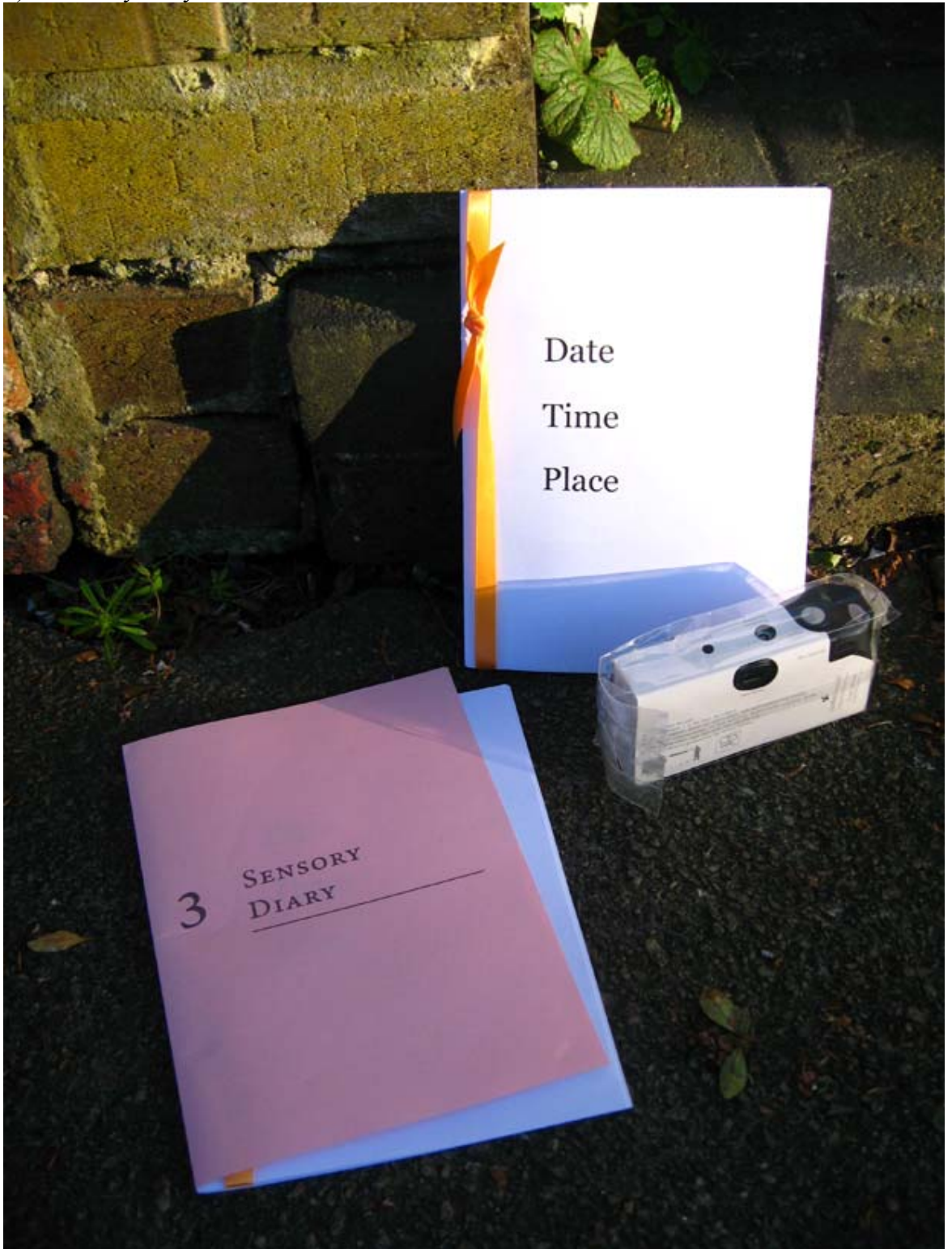
1) Nine postcards



2) Easy photographing task (with instructions)



3) A sensory diary



Appendix H

The poster for recruitment of research participants

The poster was displayed in the public space. This poster was designed as part of the sampling strategy to recruit participants from multiple starting points.



Call for volunteers

Project: 'sherlock HOMES'
Department: Design, Brunel University

Purpose of the investigation:
 We are interested in new designs for the home.
 We are also interested in finding individuals who love to share their everyday ideas and like a bit of a challenge.

Time of this investigation:
 Oct- Nov 2008

What're your tasks:
 We will provide you with a collection of puzzle-like tasks organised in the form of postcards, treasure map, photo album...etc.
 You just need to solve those tasks around your home and enjoy the process.

Where and when
 Those probes will be given to you to take home with. You simply carry out the tasks in your own home and at the leisure of your own time.

What happens next:
 After the process, we will look for ideas inspired by your replies. These inspirations will then feed into our tank of knowledge. At the end of this investigation, we hope that this tank of knowledge can contribute to and have influence on our direction for future-proof homes.

Please contact
 Sonia Wang
 Email: dtgghpw@brunel.ac.uk
 Tel: [REDACTED]

Appendix I

The flyer for recruitment of research participants

The flyers were distributed to the public. This flyer was designed as part of the sampling strategy to recruit participants from multiple starting points.



Call for Participants

We are interested in designing for the home. We are also interested in finding individuals who love to share their everyday ideas and like a bit of a challenge.

What is this project?
A design research project 'Sherlock Home' that investigates the everyday home.

Time: March-May 2009

How to help us:
We will provide you with a collection of probing questions organised in the form of postcards, easy photographing tasks and a diary which asks you to write down your experiences of your home. You can help us by answering the questions and sharing with us your opinions about the 'home'.

Example of question:
'What makes you feel at home?' or 'Take a picture of something beautiful'

How long will it take
You will be given the Home Probe to do at home. You have a period of one week to complete them. The tasks will only take about a little less than 2 hours of your time. It will really help us in our project if you could answer the questions.

What happens next
We will go through the answers with you in an interview session either by phone or in person. This will take about an hour. At the end of the investigation, we will organise a design workshop inviting people who has participated to discuss valuable issues raised in this process. A light lunch will also be provided.

Call Sonia on [redacted]
Email her at dtgphpw@brunel.ac.uk

Appendix K

Information sheet for the creative workshop

Stories People Tell About Themselves and Their Homes Workshop

Date: Thursday, July 09

Location: DEC, Tower A, Brunel University

Time: 10:00 – 14:40

We would like to invite you to participate in a design workshop on July 09. This workshop offers a rare view of stories people tell about themselves and their homes. This is an opportunity to join a debate to discuss important issues when designing new technologies for the existing and older home environments.

Practitioners of various backgrounds including design, human factors, engineering, social and computer science, and psychology are encouraged to participate. This should be an exciting chance to reflect on challenges developers face today. At the end of the workshop, we wish to propose future direction for design of smart home design.

Outline of the workshop:

10:00-10:15 Workshop registration

10:15-11:00 Introduction of the workshop

11:00-12:30 Storytelling session / discussion

12:30-13:10 Lunch (Refreshment will be provided)

13:10-14:40 Discussion / brainstorm

14:40 Concluding summary

Please

Please bring a special object or a photograph of the object with you that you think best represents your way of living now and the possible future

Workshop background

Older homes in the UK present a major challenge for developers of smart homes. Designers of systems struggle to find ways to retrofit new technologies in the existing

environment while users have doubts about the real benefits of so-called smarter way of living.

This research re-examines the meanings and values in homes and explores the possibility for retrofitting new technologies into the existing way of living. Three research methods namely home probe, interview and video ethnography were selected and deployed to investigate qualitative insights in older homes.

Eighteen people of over age 50 participated in this study with two participants over the age of 80. The information generated from the qualitative methods consists of field notes, written texts, drawings and photographs generated by the participants as well as audio recordings of the field interviews and video recordings of the home visits. At this initial stage, the rich information is analysed with an aid of qualitative analysis software (Nvivo8) to be presented at this workshop.

Aim of the workshop

To identify meaningful insights that informs design of smart applications for the home

Objectives

- To reflect on the meaningful experiences generated from the field study of older adults and their older homes
- To evaluate the important insights generated from the field
- To identify core opportunities and advantages for new smart home products

What you can expect:

- To joint in a debate on important issues in the existing homes
- To understand the diversity of home lives through an installation with written words, photographs, sound and voice recording, and video recording of what happened in the field of those homes
- To contribute to new product strategy for smart homes

Workshop organised by

Hsueh-Pei (Sonia) Wang, School of Engineering and Design

Supported by Dr. Ray Holland, Dr. Busaywan Ariyatun and Dr. Peter Evans

*Please contact us before 30th of June if you would like to participate in this workshop.

Contact

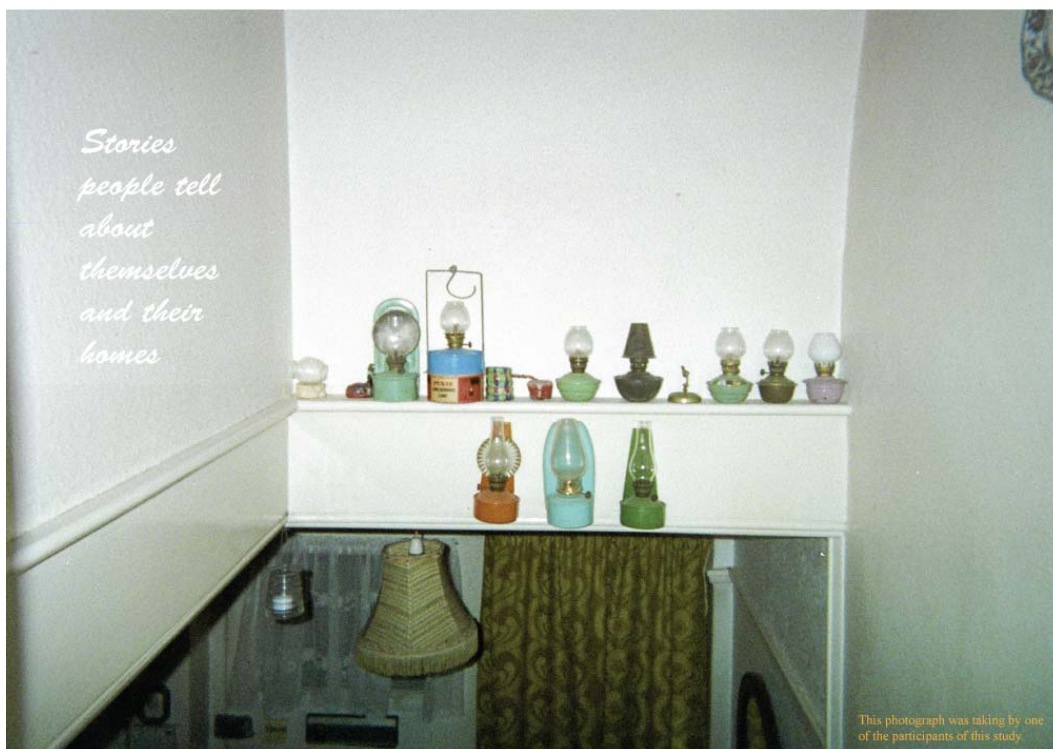
Hsueh-Pei (Sonia) Wang

Email: dtpghpw@brunel.ac.uk

Tel: [REDACTED]

Appendix L

The invitation of the creative workshop



You are invited to a design workshop

We would like to invite you to participate in a design workshop on July 09. This workshop offers a rare view of stories people tell about themselves and their homes. This is an opportunity to join a debate to discuss important issues when designing new technologies for the existing and older home environments.

Practitioners of various backgrounds including design, human factors, engineering, social and computer science, and psychology are encouraged to participate. This should be an exciting chance to reflect on challenges developers face today. At the end of the workshop, we wish to propose future direction for design of smart homes.

Share an object

Please bring a special object or a photograph of the object with you that you think best represents your way of living now and the possible future.

Contact

Sonia Wang
email: dtgghpw@brunel.ac.uk
Tel: [REDACTED]

Date Location Time

July 9th (Thursday)

DEC, Tower A,
Brunel University

10:00 – 14:40

Outline of the workshop

10:00-10:15
Workshop registration
10:15-11:00
Introduction of the workshop
11:00-12:30
Storytelling session /
Discussion
12:30-13:10
Lunch
13:10-14:40
Discussion / Brainstorm
14:40-
Concluding summary

* Lunch and refreshments will be provided.

Appendix M

Workshop agenda

Outline of the Workshop

10:00-10:15
Workshop registration

10:15-11:00
Introduction of the workshop
Agenda: Research presentation
In this session, the story about this research and its background will be presented. This will be followed by a simple exercise of 'what is home' to warm up the day. You will have an opportunity to also get to know each others' interests and backgrounds.

11:00-12:30
Storytelling session / Discussion
Agenda: Understanding the experiences
In the first part of the session, the stories from the field study of older adults and their older homes will be told.

You will be expected to work in teams to evaluate interesting insights from the stories told and to link and create narratives based on your identified themes.

12:30-13:10
Lunch
Agenda: eat and drink!!
* Lunch and refreshment are provided.

13:10-14:40
Discussion / Brainstorm
Agenda: Core vision exercise
In this afternoon session, each team will first present their results from the morning explaining what they have identified, how and why they choose these themes.

In the second part, you will again work as a team to develop 'Core visions' based on the themes you have presented. Imagine yourself as a group of elders of a Sci-fi film who are going to use what you have learned to advise which direction(s) your hero should fly towards.

14:40-
Concluding summary

Appendix N

Storyboards for the workshop

Angel Phil

Age of the house: 33 years
Home occupancy: 25 years

The story:

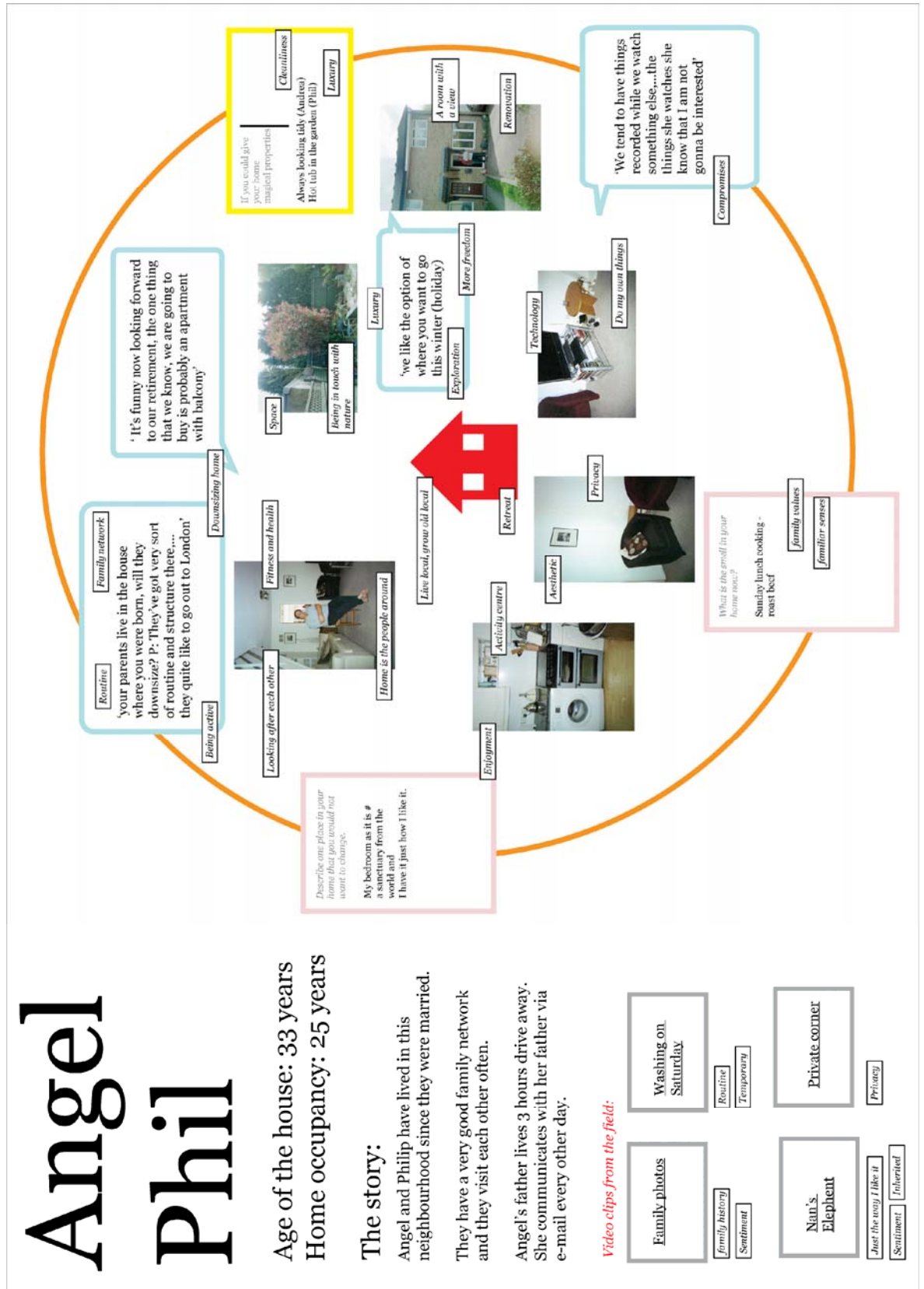
Angel and Philip have lived in this neighbourhood since they were married.

They have a very good family network and they visit each other often.

Angel's father lives 3 hours drive away. She communicates with her father via e-mail every other day.

Video clips from the field:

Family photos	Washing on Saturday
Family history	Routine
Sentiment	Temporary
Nan's Elephant	Private corner
Just the way I like it	Privacy
Sentiment	Inherited



Brenda

Age of the house: built in 1790
Home occupancy: 28 years

The story:

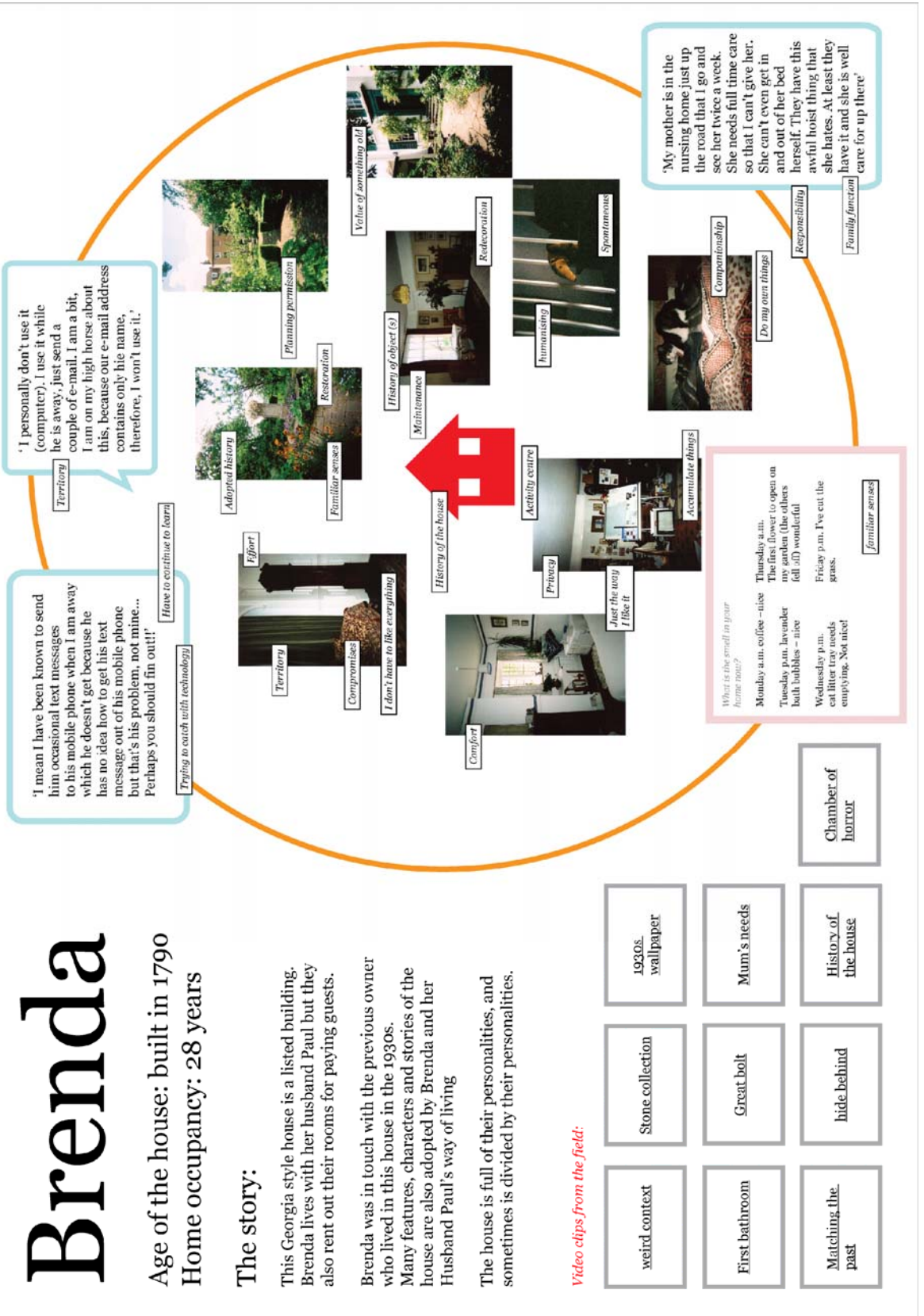
This Georgia style house is a listed building. Brenda lives with her husband Paul but they also rent out their rooms for paying guests.

Brenda was in touch with the previous owner who lived in this house in the 1930s. Many features, characters and stories of the house are also adopted by Brenda and her Husband Paul's way of living

The house is full of their personalities, and sometimes is divided by their personalities.

Video clips from the field:

weird context	Stone collection	1930s wallpaper
First bathroom	Great bolt	Mum's needs
Matching the past	hide behind	History of the house



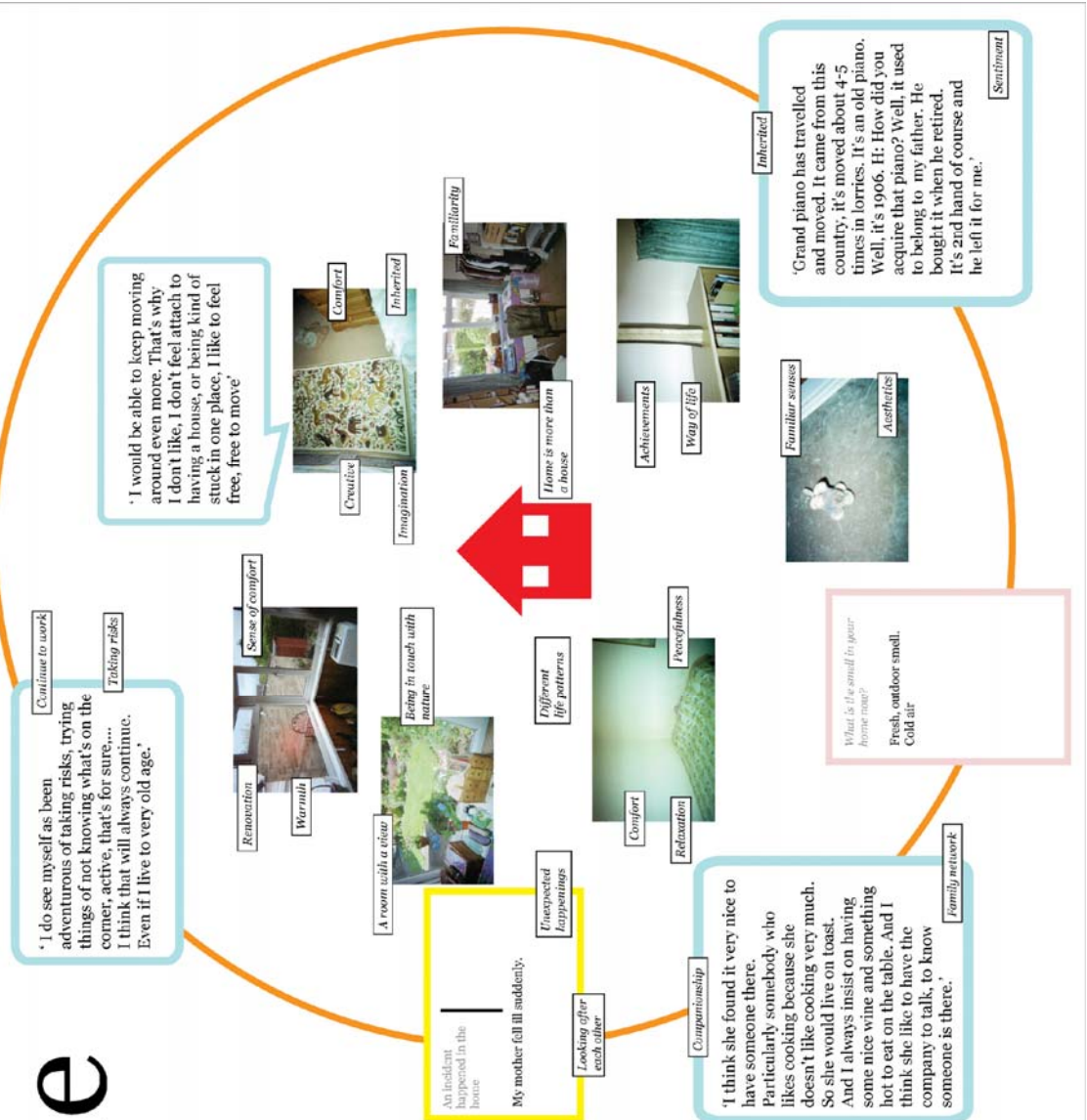
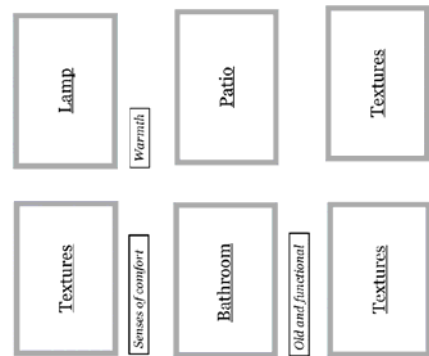
Caroline

Age of the house: 30 years
Home occupancy: 6 months

The story:

Caroline just moved back to England. She is living with her 78 years-old mum at the moment. To her, her home is all the possessions she travels with.

Video clips from the field:



Denis

Age of the house: 3 years

Home occupancy: 3 years

Age of the previous house: 300 years

Home occupancy of previous house:

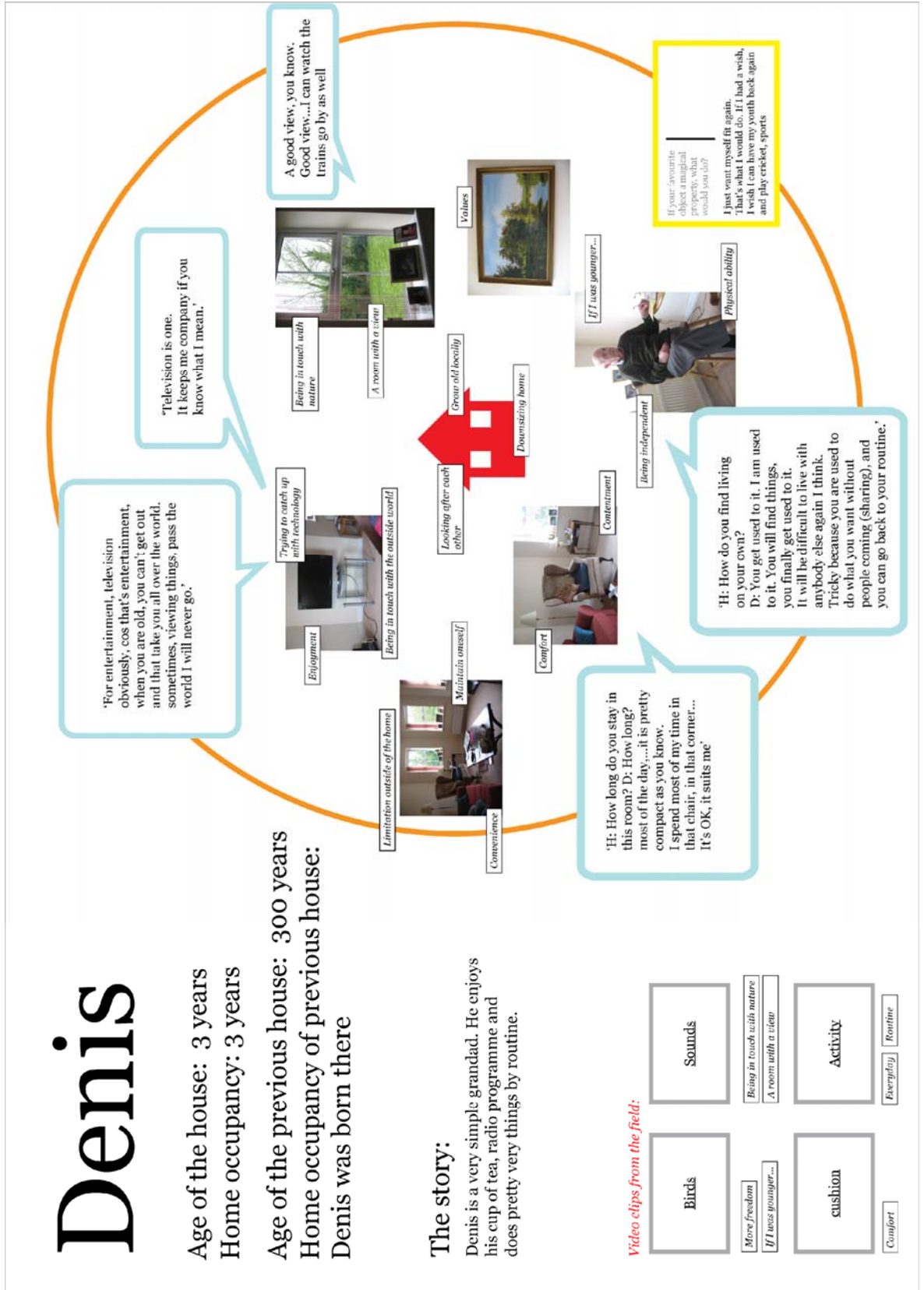
Denis was born there

The story:

Denis is a very simple granddad. He enjoys his cup of tea, radio programme and does pretty very things by routine.

Video clips from the field:

Birds	Sounds
More freedom	Being in touch with nature
I/I was younger...	A room with a view
cushion	Activity
Comfort	Everyday Routine



Flora

Age of the house: 5 years
Home occupancy: 5 years

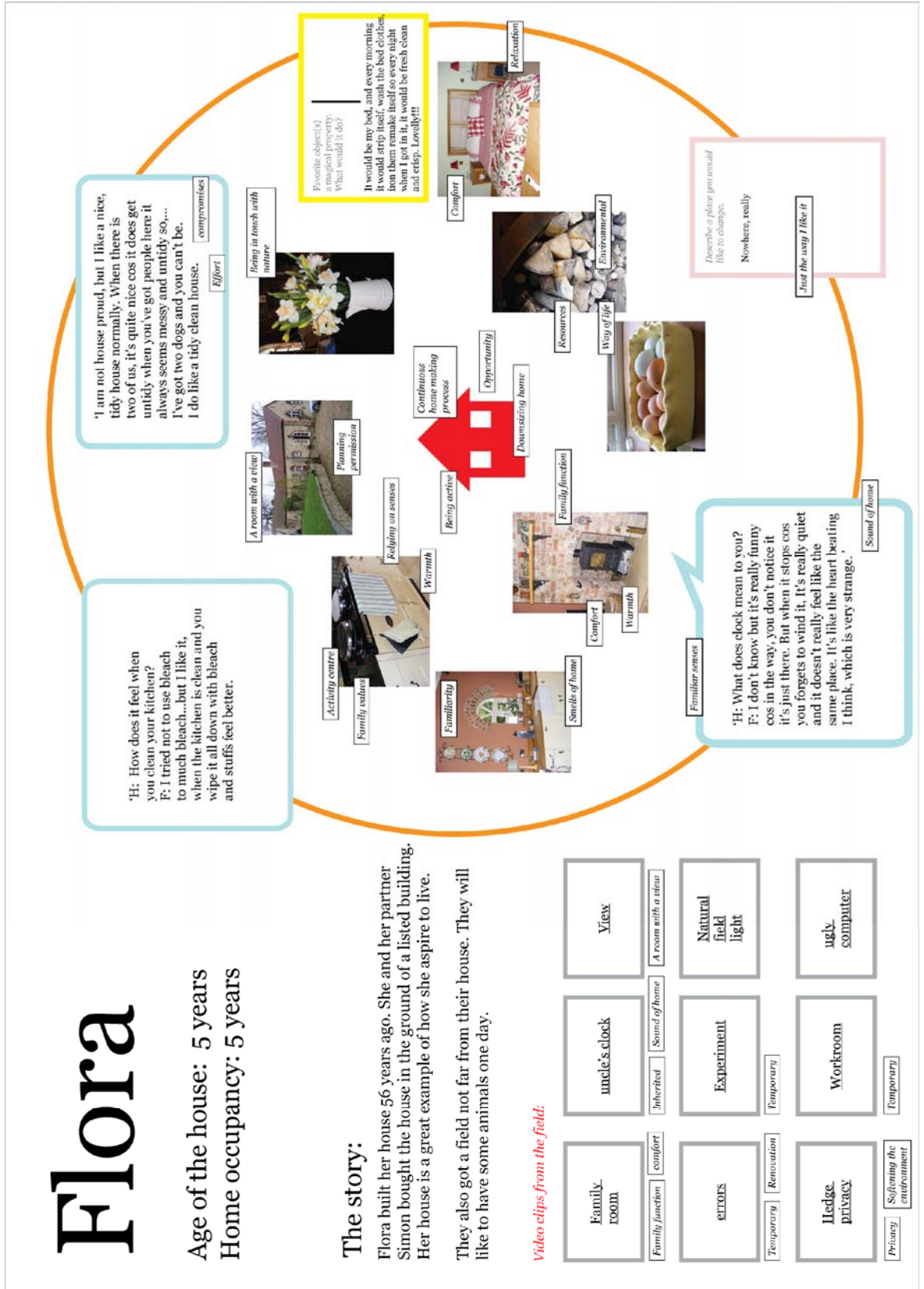
The story:

Flora built her house 56 years ago. She and her partner Simon bought the house in the ground of a listed building. Her house is a great example of how she aspire to live.

They also got a field not far from their house. They will like to have some animals one day.

Video clips from the field:

Family room	uncle's clock	View
Family function	Inherited	A room with a view
comfort	Sound of home	Natural field light
errors	Experiment	ugly computer
Temporary	Renovation	Workroom
Uedged privacy	Privacy	Softening the environment
	Softening the environment	



Johannes

Age of the house: unknown
Home occupancy: 3 years

The story:

Johannes travels a lot. He has 3 homes that he currently maintained, Texas is always his home. London is a for work and Germany is where he was born.

He is not attached to a house or any possessions that come with family.

'Home is an overrated concept!'

'My mother had the tendency to decorate the house and make it look very nostalgic and I don't like it...when she passed away ...I waited for a year, ...I removed all the furniture. I created some kind of senses of it.'

What is the best source you heard through?

Near silence

Silence

Familiar senses



Comfort

Relaxation



Unchanged

Stability of life

Physical abilities



Self

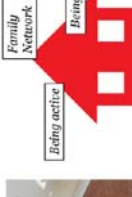
Values

Way of life



Aesthetic

Being active



Family Network

Being independent



Warmth



Being in touch with nature

What is the smell in your home now?

Freshly washed clothes are distributed around the room to dry, the apartment is very clean.

Adaptation of the home environment

Resources



Enjoyment

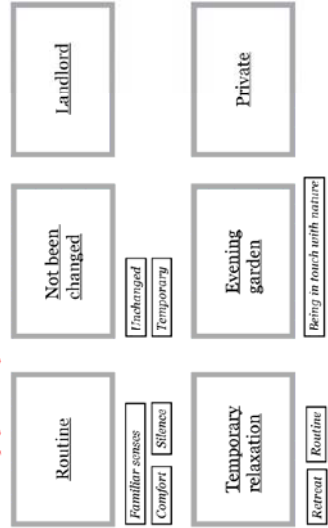
What would you want to change?

I would not change anything, since I arranged it to be as it is. I like space to be clean, and nearly empty

Just the way I like it

Cleanliness

Video clips from the field:



Paul

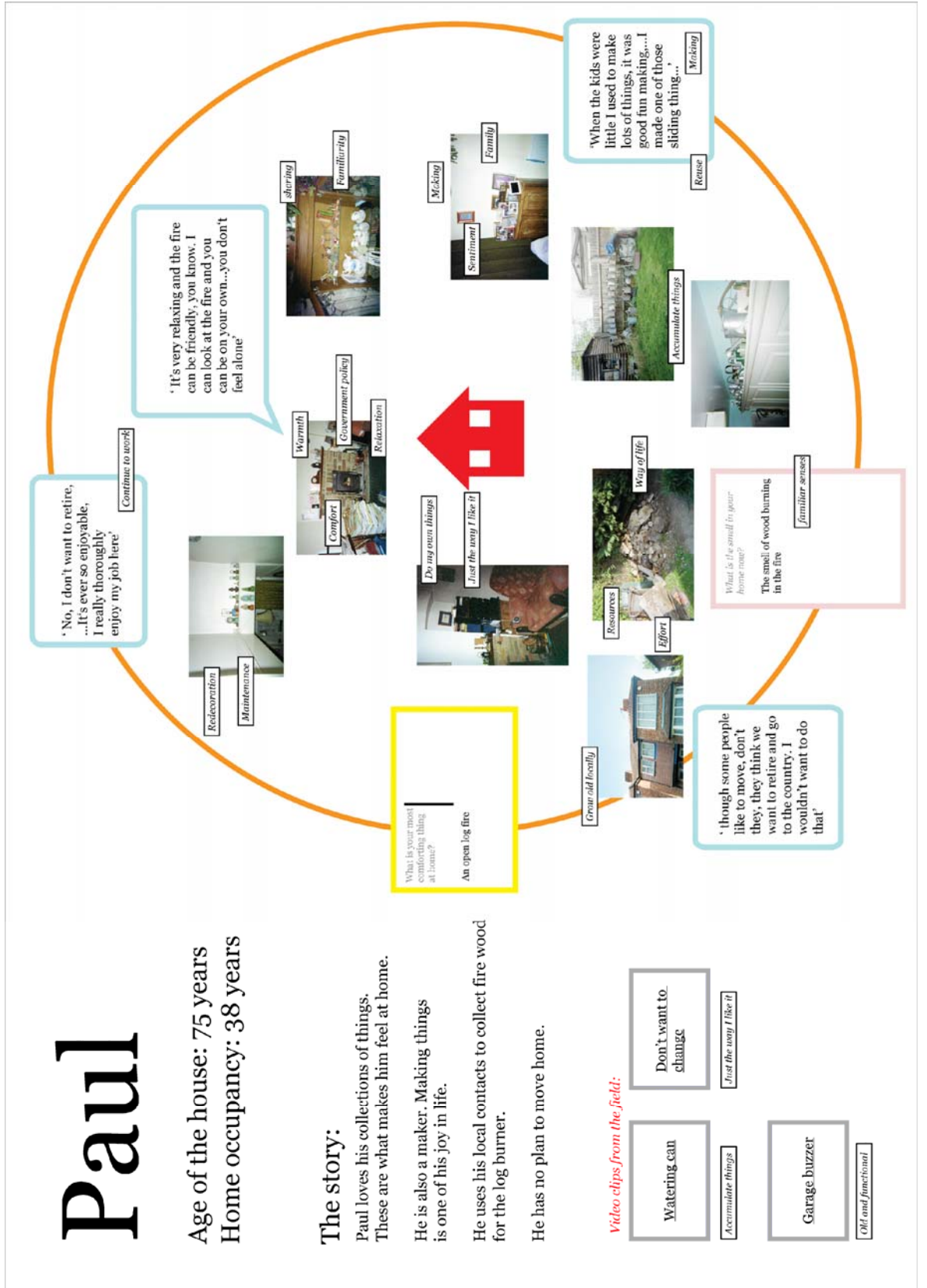
Age of the house: 75 years
Home occupancy: 38 years

The story:

Paul loves his collections of things. These are what makes him feel at home. He is also a maker. Making things is one of his joy in life. He uses his local contacts to collect fire wood for the log burner. He has no plan to move home.

Video clips from the field:

- Watering can
- Accumulate things
- Garage buzzer
- Old and functional
- Don't want to change
- Just the way I like it

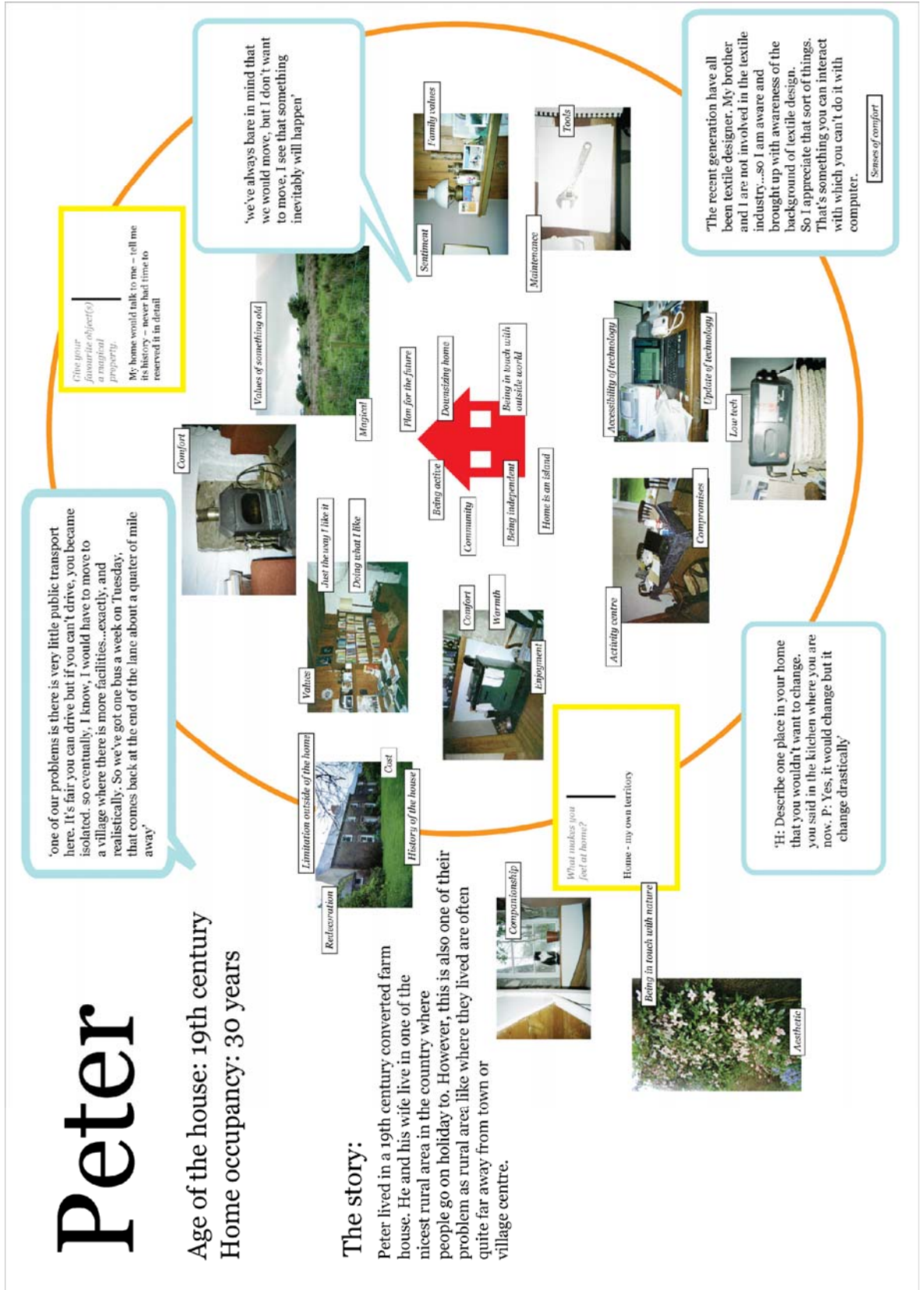


Peter

Age of the house: 19th century
Home occupancy: 30 years

The story:

Peter lived in a 19th century converted farm house. He and his wife live in one of the nicest rural area in the country where people go on holiday to. However, this is also one of their problem as rural area like where they lived are often quite far away from town or village centre.



Appendix O

Questionnaire for evaluation of the creative workshop

Evaluation questionnaire for

'Stories People Tell about Themselves and Their homes'

As part of a sensitizing tool for the design of smart applications for the home

Part one: Participant's profile

1. Name:

2. What does your work involve?

3. Working experience

1-2 years

3-4 years

5-9 years

More than 10 years

4. Are there other kind of activity you are actively involved in but not related to your professional work? If so, what are they?

Part two: Evaluation of workshop

*** Reminder of the workshop**

Agenda One:

Research presentation

'What is home' exercise

Agenda Two:

Storytelling

Discussion

Agenda Three:

Core vision exercise

Installation:

Story boards

Keyword boards

Video interface

5. How did you carry out your task?

Agenda Two: Storytelling and discussion (You and your group)

Agenda Three: Core vision exercise (You and your group)

Now you had a period to reflect on the subject presented in the workshop, how do you find the workshop?

6. What do you find useful?

7. What do you find less useful?

8. How much have these stories make you more aware of the nature of the 'home'



1
It didn't make
my
a difference
perceptions

2
It made very
little
difference

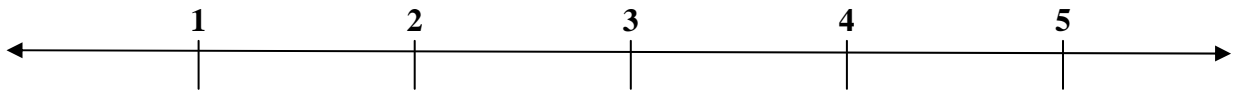
3
Made me
more aware
of the issues

4
Made me
very aware
of the issues

5
Changed

Add comment if you wish...

9. How much do the stories make you reflect on your perceptions towards the older adults and their older homes?



It didn't make
my
a difference
perceptions

It made very
little
difference

Made me
more aware
of the issues

Made me
very aware
of the issues

Changed

Add comment if you wish...

10. To what extent the workshop has changed your perception of design for the home, what has been changed?



It didn't make
my
a difference
perceptions

It made very
little
difference

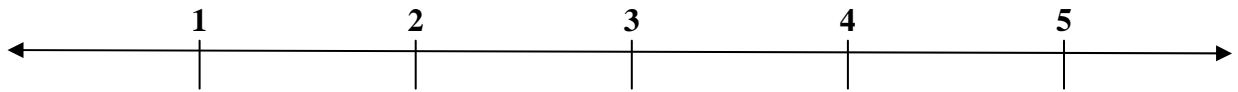
Made me
more aware
of the issues

Made me
very aware
of the issues

Changed

Add comment if you wish...

11. Did the workshop influence your breadth of ideas



<p>It didn't make a difference inspired, I since my practice</p>	<p>It made very little difference</p>	<p>I was inspired</p>	<p>I was very inspired, I want to know more</p>	<p>I was very have used it in own</p>
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Add comment if you wish...

12. a. Which part of the workshop did you find most useful for creating ideas? (The workshop consisted of storytelling session, keywords from the stories and the core vision exercise)

b. Which part did you find most difficult for creating ideas?

13. Overall, what do you think you have gained from the process?

14. Do you have any suggestion for the workshop?

Part three: Final few questions about smart home

1. Briefly describe your perception of smart home before the workshop?

2. After the workshop, what do you think of smart home now?

3. Does the workshop help you in any way to refocus some issues you already have in mind in relation to design of new product? What are the issues?

4. Who do you think will be benefited from this process?

5. If you are a top manager of a project for designing new technology in the home, what story you would like to share with your fellow designers, engineers, business developer and other parties in the team?

Appendix P

Publications

- 1) Wang, Holland, Evans and Ariyatun (2009) 'Lesson learned from older homes', Proceedings of the conference Designing Pleasurable Products and Interfaces, DPPI'09: held at Compiegne University of Technology, Compiegne, France, 13-16 Oct, 2009, pp.518-530.
- 2) Wang, Holland and Ariyatun (2009), 'Using meaningful experiences from the past to inform the design of the future', Extended abstract in: Proceedings of the 5th International conference of the AM's Brand and corporate reputation SIG: held at Gillespie Centre, Clare College, University of Cambridge, UK, 1-3 Sept, 2009, p.130.
- 3) Wang, Holland, Evans and Ariyatun (2009) 'Lesson learned from older homes', Poster presentation in the 1st conference of the Brunel Institute of Ageing Study, held at Brunel University, UK, 22 June.
- 4) Wang, Evans and Holland (2008) 'Smart home, retrofit', Proceedings of the 1st SED Research conference 2008; held at Brunel University, 25-26 2008, pp.97-98.
- 5) Wang, Evans and Holland (2007) 'The meaning of home: A review of smart textile technology for the home', Poster presentation in the proceedings of the Include 2007: held at Royal College of Art, London, UK, p.37

INTERNATIONAL CONFERENCE ON DESIGNING PLEASURABLE PRODUCTS AND INTERFACES, DPPI09
13- 16 OCTOBER 2009, COMPIEGNE UNIVERSITY OF TECHNOLOGY, COMPIEGNE, FRANCE

LESSONS LEARNED FROM OLDER HOMES

Hsueh-Pei Wang¹, Ray Holland², Peter Evans³, and Busayawan Ariyatun⁴

Brunel University, UK, School of Engineering and Design,

¹Hsueh-pei.wang@brunel.ac.uk

²Ray.holland@brunel.ac.uk

³Peter.evans@brunel.ac.uk

⁴Busayawan.ariyatun@brunel.ac.uk

ABSTRACT

In this paper, we examine opportunities for new technology products in older homes based on an investigation into meaningful experiences in this environment.

Older homes dominate the UK housing market today. While many new technologies like ‘smart home’ suggest new ways of living, to retrofit such products and services in the existing environment is challenging. Recent research have demonstrates the importance of home in technology development. Ethnographic methods in particular have been purposefully employed in order to understand insights in the home.

Three methods were selected to pose questions, raise awareness and to investigate the complexity as well as the simplicity of home life. Firstly, home probe was designed to open up new space for development. Secondly, semi-structure interview was deployed to further investigate social, cultural and personal meanings identified in the probe. To complete, video ethnography was introduced to evaluate information gathered in the previous methods and is further used to capture audio, visual and non-verbal clues from the field.

Preliminary results suggest that meaningful experience of the homes can be used to inform new product development. Homemaking is a life long project. This means that major renovation of homes will have to benefit the lifetime values of the consumers.

Design research assists the development of new technology to re-address and reinforce important issues in the changing society of today. The results support designers in considering the role of new technology in the existing culture of the home and furthermore to translate inspirations from the field in the design process of smart homes.

Keywords: Older homes, meaningful experiences, design research, home probe, new product development

1 Introduction

Home is not constrained by a fixed location, nor is it limited to a physical space of four walls. It is a place where one has the right to return [22] and to retreat from the outside world.

Home is also a place where sociologists can study the material cultures and patterns in modern society. Today, the home environment presents an opportunity for designers to understand the use of new technology products and to investigate new space for design.

Designing products that do not yet exist requires strategic vision to lead innovation. What is problematic with new smart homes is that the introduction of such products and services seem to be portrayed as a radical way of living while in reality, innovation for the home is more likely to be brought in incrementally.

In this paper, we first introduce the concept of smart homes. Several key obstacles namely older homes, the technology-push approach and consumers' reluctance towards new technologies are identified. We suggest that there is a need for a retrofitting strategy for the existing environments. To address the issues raised, three qualitative methods are employed to investigate meaningful experiences in older homes.

1.1 Smart home: a vision for the future

The vision of a smart home is generally associated with automation and ubiquity of technologies. In many cases, the term 'smart' describes the character of a technologically networked environment capable of sensing, responding and reacting to the inhabitants' everyday needs through personalized assistances and services.

While domestic appliances provide conveniences, efficiency and comfort to the household, a technologically automated home has the potential to offer multifunctional services that aid advanced communication, work, education, healthcare and entertainment facilities to the inhabitants.

Early visions such as the electronic cottage [10], the computer home, the electronic house, and the smart house [14] discuss the use of computers for the home and illustrate many opportunities opened up by them. These pioneering concepts reflect a growing trend in domesticating technologies and more, a growing interest in the role technology can play in the home.

However, technology often emphasizes the improvement of utilitarianism, productivity, and efficiency of domestic functions and seems to sever home life from its real social, political, economical, technological contexts [3]. Consumers are consequently left unclear of the real benefits that a 'smarter' home could bring to their everyday life.

1.2 Older homes

The housing market today illustrates one of the main obstacles in adoption and appropriation of new technology in the home. To begin with, '80% of the home we will be living in by 2050 is already standing by.' [19]. Furthermore, the

purpose built homes represent only the minority of the housing stock and there is an undersupplying of new homes [4]. Although measurement has been made by government agencies to improve the physical quality of the older homes, it is to say there is clearly a gap between the adaption of emerging technologies in older homes and the design of new ones [5].

Secondly, for most people, home is the single biggest purchase in their life time. It is more likely that consumers' attitude towards their home is different from for example, the purchase of computing technology. Improvement of homes requires long-term commitment and bigger financial investment. More importantly, such 'update' also required long-term planning as renovations of homes are often dictated as the household size expand and contract as people move through their lifecycle [5].

Unsurprisingly, consumers' reluctance to commit to new technologies such as smart home reflects their concerns over its long-term benefits. It is difficult for them to foresee how these new systems or new ways of living can be integrated into their older homes.

1.3 Technology push

The development of computing and information technology has influenced household activities but has not always taken into account the everyday needs of people who live in the environment.

First of all, there has been a 'technology push' approach to the design of smart home. The anticipation of sustained technological progress seems to focus on transforming the physical and technical features of the products rather than addressing the social needs of the home inhabitants[16]. What is problematic is that the technology-push products 'requires people to behave in machine-centred ways, ways for which people are not well suited.' [24]

Secondly, the majority of new products are often challenged by spatial, economical, and social constraints within the existing environment. Consumers rarely adopt new products and services based solely on the technical advancement. Their purchase decisions are need-driven. Hence, to design technology that focus on single user or location undermines people's ability to make their house their own.

Technology-push products may succeed because of their unique ability to solve problems. However, if there is not a need for such advanced facilities, the possibility for success of the product is limited. 'Unless people start to respect the full range of values that make us human, the technologies we build are likely to be dull and uninteresting at best, and de-humanising at worst.' [11]

1.4 Consumer's reluctance

The consumers also have mixed feelings about smart homes [9]. They respond to the push of technology with reluctance in investing and adopting new technologies. The attitude towards purchasing new consumer electronic products is quite different from the purchase of new smart homes. For domestic technologies such as a washing machine or refrigerator, they are considered as

part of the everyday functions of the household. They are only replaced when broken and updated when there are clear benefits in using new technologies [17]. For other electrical brown goods such as home entertainment systems or personal computers, consumers can see clear benefits with these products and there are fewer demands for the initial investment and upgrade. In comparison to white and brown goods, most of the consumers have doubts about the benefits of a smart home network and worry about not only the initial investments of purchase but also the further investments required to maintain and upgrade systems after the point of sale.

Consumers' reluctance towards new smarter technology also reflects their concerns with their existing systems. Consumers are generally satisfied with the existing interfaces [23] and believe computers are more likely to make their life more complex [18]. The integration of new products and services faces demands to co-exist with the existing standards and technical abilities of the older products [8]. In addition, it is difficult for the consumers to conceptualize the benefit and usage when the products do not yet exist. What is unclear also is what form the system will take and how this will impact their everyday life [19].

2 The need for a retrofitting strategy

It is widely accepted in Europe that suppliers and manufacturers must find solution for retrofitting existing homes. The use of existing resources such as power lines, radio frequency identification or wireless network continue to demonstrate a growing realization of the need to retrofit [14].

The concept of retrofitting is incorporated in Weiser's (1994) vision of ubiquity in which computers are seamlessly integrated in the surrounding environments such as wall spaces, furniture and even the clothes we wear. Ambient intelligence [1] further emphasizes on the version of the 'home from yesterday' which introduces new technologies through the existing ways of living. The familiar objects such as our chairs, tables and beds for instance become the hosts of new computing functions that aim to appropriate the use of technologies through 'objects that are most relevant to human life.' [1]

Everyday routine has also been considered as one of the most important factors in improving the everydayness [2] and unremarkable [27] characters of computing home systems. The ubiquitous computer considers the existing dynamics of the home environment by addressing basic and social needs of everyday activities to inform design of the systems. This further gives a real world approach to the development of smart homes demonstrating importance of ethnographic information from the field.

This vision of ubiquitous computing and ambient intelligence provides useful directions for appropriate design of technology. However, what is unclear is how these 'invisible in use' technologies can be implemented in the real world. Sociological research offers broad and extensive information about the use of technology and its role in the routine of home life. Nonetheless, little progress has been made towards translating real world concepts to usable and useful smart homes [7].

2.1 A retrofitting strategy

The research suggests that possibilities to retrofit new technologies can be identified from action research in older homes. In this theoretical framework, a retrofitting strategy aims to explore both tangible and intangible spaces for design with qualitative research methods. The definition of ‘retrofitting’ in this research is founded on a metaphorical perspective that explores the diverse semiotics of the home beyond the fixed and physical entity of a house. By understanding the existing qualities and meanings of the home environment, technology may consequently adopt these qualities to improve its appropriateness.

3 Research methodology

3.1 The importance of Home in technology research

The home is an important site in technology research [28]. Qualitative methods such as observation, focus groups or interview are commonly used to understand the everyday needs of people. Some studies take place in a purpose-built home created in a laboratory setting (E.g. the Aware Home and Home_lab) and others take place in the ‘field’ aiming to capture naturally occurring events and routines within.

Hindus (1999) suggests that researching for the home is different from researching for the workplace. Firstly, the home is not designed specifically to cater for technology unlike the workplace. Secondly, consumers of the home are not typical knowledge workers. They think about technology in terms of how it will fit into their private home setting and individual lifestyle, aspirations, aesthetics and values. While the functions of the home are clearly based on needs of the inhabitants, to implement the same set of priorities from the workplace in the home seems problematic.

3.2 Qualitative methods

The use of qualitative methods is a long-standing approach valued by social researchers. Qualitative methods interpret the natural setting of the world by emphasizing on the meaningfulness of the subject matter. This approach is further influenced by poststructuralist’s believes in which human life is composed with difference, complex relations and instability. The merit of qualitative data therefore demonstrates its strengths in representing diversity of life that are otherwise difficult to gain by quantitative means.

One of the main reasons for the HCI researcher to involve qualitative methods in their development process is to uncover everyday behaviours in the natural setting of the home. In comparison to a laboratory setting, this approach investigates new product concepts with the use of qualitative interview, photographic or video observations for example in order to capture social and technological interactions in the existing homes. This approach is further encapsulated by Gaver’s et al. (1999) Cultural Probe and other relevant methods that emphasize the positive values of ambiguity that qualitative methods can bring to new technology development.

What is understood from previous ethnomethodological approaches to the study of everyday routine is that qualitative methods can capture the comprehensive and unpredictable nature of the events [25] and this also indicated that home life is

composed with difference, complex relations and instability. Older homes in particular are very likely to reject the concept of sameness and require an open-ended approach to its diverse resources as well as limitations.

3.3 Research focus

Several methodological perspectives have been identified and explored in previous research in Human Computer Interaction community.

Home is a feeling [9] and the concept of the home is not limited to the material body of a house [32]. The elements of comfort, relaxation and sentiment [13] are closely linked to aesthetic, privacy and the ownership of spaces in the home [19].

The home environment also serves as a reminder for us of our experiences from the past [31]. We make sense of our world through our everyday experiences, while we also adjust to our surroundings through constant doing and undoing.

The culture of the home environment can be understood through signs existed in the material objects [6]. Using sensory attributes, we can understand the important changes of the inhabitants' needs through the embodied sensorial experiences [26].

Home is a holistic concept presenting physical, phenomenological and metaphorical meanings.

We argue that older homes reflect meanings and values of the inhabitants through the existence of physical objects and the sensorial attributes attached to them.

3.3.1 The concept of home

The concept of the Home is not limited to physical spaces, locations and presentences of time. People make places into their home and create their unique environment. The process of 'homemaking' and the evidence of these processes reflect changes in households. Wyche et al (2006) studied the changes in quality, values and experiences of domestic objects by asking users to re-examine advertisements of products from the past. Wakkary and Maestri (2008) illustrated the emergence of changes over time. The existing routine of everyday life presents the result of changes contributed by the family members of the household.

The home therefore presents physical evidence of its making. The element of time is a catalyst for change. During this process, the home environment is modified and remodeled over time to suit the on-going needs of the inhabitants. Hence, the changed environment presents concrete evidence of needs while the unchanged environment may present evidence of importance for the home of tomorrow.

3.3.2 Sensory experience

Human beings make sense of their world through their embodied senses. These sensory experiences are embedded deep in the consciousness and unconsciousness of individuals [21]. It is essential to recognize the wider sensory context of the home as 'Much of the experiences, knowledge and action that people engage with in their homes is conceived in terms of the non-visual sense.' [26].

3.4 Methods

Three methods were selected to pose questions, raise awareness and to investigate the complexity and simplicity of home life. Firstly, home probe was designed to open up new space for development. Secondly, semi-structure interview was deployed to further investigate social, cultural and personal meanings in the home. Video ethnography was introduced with an evaluative approach to information gathered in the previous methods. More importantly, it is further used to capture audio, visual and non-verbal clues from the field. The design of methods is illustrated below.

3.4.1 Home probes

Cultural Probe in particular has indicated an important trend in the community of HCI research. It was designed originally as a method for the Presence project [12] to probe into the distant participants' everyday life that implicitly encourages new possibilities for technology development. Cultural probe specifically diverted its approach from traditional marketing survey and employed artist-designer's approach to influence research on a conceptual and artistic level. The pack of probe consists of postcards, a disposable camera, a map and a media diary. Those elements were created to engage the participants with important issues in the subject area with an aim to gain insights from an unfamiliar domain. It is suggested that the 'probes' can be apply by research practitioner to inform development of new technology accordingly.

Probe inspired methods can provide useful information on users' needs and contexts as suggested by Mattelmaki (2005). In her study on the use of 'probe' with seven design companies, it was particularly useful in producing user experiences to inform the early phase of product design. This approach captures participants' written and visual perspectives on the subject of their experiences that avoids insights based solely on the use of exiting products.

Home probe was introduced with an emphasis on the concept and the fundamental elements of the home. It is designed for a period of two weeks with three 'probes'; they are postcards, a disposable camera and a sensory diary. In this research, the probe is designed to use conjointly with semi-structured interview and video ethnography.

Postcards

The main questions posed in the postcards address issues relating to the 'home', 'changes in their home' and 'sensory experiences in the home environment'. The postcards were designed to reduce the formality of conventional self-completion questionnaire. In a sense, the participants are encouraged to communicate with the researcher as if expressing their opinions and experiences to their friends and family.



Figure 1 Postcards

Pictures / photographing tasks

Participants were asked to express their opinions with photographs. This gives the participants a tool to exchange their ideas beyond text and through imagery. The approach allows the researcher to further probe into the physical characters of the subjects photographed and investigate the reasons and meaning behind the photographs taken. The instructions for taking photographs are presented in photograph format. A disposable camera is supplied for this task.



Figure, 2 Take pictures

Sensory diary

The sensory diary consists of five questions: ‘Choose your favourite spot at home and close your eyes as if you are blindfolded, what can you feel?’; ‘What is the best sound you heard today in your home?’; ‘What is the smell (s) in your home now?’; ‘Describe one place in your home that you would not want to change, and tell us why.’; ‘Describe one place in your home that you would want to change, and tell us why’. The design of the diary investigates participants’ sensorial experiences relating to their home.



Figure 3 Sensory diary

In our previous pilot study, questions that directly refer to the five senses were of interest to many of the participants and this helped to develop further conversations on the subject of senses associated with their home. The

participants generally expressed a positive attitude towards their existing sensory experiences of their home. Additionally, it is noted that an interview session can be also beneficial in probing further into the meaning of the sensory experiences described.

The participants were also asked to take a note of the date, time and place in which they record their sensory experiences. This aims to investigate any subtle changes of experience on different day of the week, times of the day and locations of the experiences.

3.4.2 Qualitative interview

The qualitative interview is a significant part of the research design as it 'particularly useful as a research method for accessing individuals' attitudes and values - things that cannot necessarily be observed or accommodated in a formal questionnaire' [28]. The qualitative interview here explores the issues generated from the home probes. Before the interview session takes place, the author collected the answers to the home probes from the participants and sent the photographic film to be developed. An arrangement was made with the participants for a future interview date at their home.

The design of the qualitative interview

The interview session investigated issues embedded within, and relating to, the responses from the home probe. It was semi-structured around the themes identified in the literature review and the pilot study. The objectives of interview are outlined below.

- To discuss the written and photographic responses generated from the home probe
- To capture detailed descriptions and expressions about the participant's home environment with the aid of audio recording
- To address and refer to issues emerged over time. For example, participants were asked to describe an old photograph from their past. The interviewer has the opportunity to probe into qualities from their past that exist today in the participants' home

3.4.3 Video ethnography

The video ethnography session was designed to capture audio, visual and non-verbal languages in the home environment. It was introduced to the participants as a tour / walkthrough of their home.

The work conducted by Pink (2004) is one of the examples using a video camera to capture the spoken and unspoken sensory attributes in the home environment. In this research, the role of video ethnography is incorporated as an extension of the sensory diary that explores the sensorial signals through the lens of the digital camera as well as from the participatory experiences of the researcher.

One of the main characters that distinguish ethnographic work from laboratory observation is the role the observer plays in the research. In this process, the observer is 'the primary research instrument' [28] who can 'access the field, establishes field relations, conduct and structure observation and interviews, write field notes, use audio and visual recordings, read documents, record and transcribe

and write up the research.’ From this perspective, the researcher joins their informants to explore the subject of research and take on a more empathetic role to part take in the experiences the participants express.

Participants were asked to show the researcher around their home. This follows a flexible structure based on the questions raised in the sensory diary of the home probe. The participants are first asked to give a tour around their household including the outdoors of the house. The tour then addresses subjects raised in the sensory diary.

Firstly, the participants were asked to show where the experiences described take place and asked to lead the researcher to the location. This was followed by a loosely structured questions relating to the subjects. For example, participants were asked to show the researcher the place regarding to the smells they mentioned in the diary. During this process, they were asked about the reason *why* they choose to express their particular experiences and *how* the role of these experiences plays in their home.

Although the use of video camera is limiting in a way that only the immediate interactions during the walkthrough are captured, the observer has the opportunities to inquire about issues regarding these experiences over time and probe into the changes of their experiences.

In summary, the home probe is designed to open up a dialogue between the participant and the researcher. It encourages exchange of opinions and ideas on the subject of home and sensory experience of the environment. The probe is used to guide the development of this empirical exploration while attempting to open up new domains for later discussions.

The semi-structured interview is used to explore the issues raised by the home probe. It takes place in-situ of the participants’ homes. In this phase, the researcher has the opportunities to probe into meanings behind the probe answers that may have been ignored.

The third part of this research is video ethnography. It is used to encapsulate the in-situ details of the environments by involving the participants to address the surrounding of their home. This also used as a tool to evaluate what have been discussed in the field.

3.4.4 Sampling strategy

The sampling strategy is designed to investigate diversity of experiences of older adults living in older homes. The participants are generally selected based on a demographic range of age being over 50 years old.

The demographic profiling is created to portray firstly, a long-term growing market of aging population in the UK. Secondly, this demographic group is more likely to be attracted to products and services such as future-proof or lifetime homes that can contribute to their independency and quality of life [23]. Thirdly, this profiling reflects changing needs, aspirations and lifestyles of older adults in

particular and aims to address the diversity of their social experiences as well as their diverse ways of living in older homes.

Additionally, an interesting aspect of the aging population is the effect of the attitude of ‘baby-boomer’ generation. They are likely to continue to use information and communication technology while more likely to be ‘living solo’ by the age of 75 [6]. This later point raised an interesting focus on ‘baby-boomers’ as the nature of their life stages of this group may present complex challenges for system designers.

3.4.5 Sampling process

We use a non-probability sampling technique. The participants are recruited through network opportunity with acquaintances and associates. We also reach out to people outside of our network by placing a recruitment poster in public places of the university where this research take place. This technique is commonly associates with qualitative work ‘when a complete and accurate sampling frame cannot be compiled. They are often used to access groups whose activities are normally ‘‘hidden’’ from public or official view.’ (Bloch, in Seals, ed. 2004)

4. Evaluation

4.1 Qualitative data analysis

Throughout the data collection process, the raw information generated from the field has been initiated in qualitative analysis software (NVivo 8). This process is guided by qualitative thematic analysis that allows the naturally recurring themes to be identified and clarified. The use of the computer software is particularly useful for constant retrieval of information; for example, with certain words, string of audio conversation, imagery with surrounding text and more importantly to prepare the raw data for the next stage of interpretation.

4.2 Design workshop

The preliminary data initiated in the qualitative analysis software will be further evaluated by a panel of professional researchers. The workshop invites practitioners of multidisciplinary backgrounds including product design, design management, human factors, engineering, computer science, and social science. The purpose of the workshop is to reflect on and re-examine the meaningful experiences generated from the field and to clarify important directions for new smart applications for the home. This will be presented in a multimedia installation. The participants of the workshop will have the opportunity to retrieve the data in multiple formats such as image boards, audio quotation from interview conversation, and film clips from the filed.

The results are yet to be formally analyzed as part of the ongoing research but a base is established for preliminary interpretation in the following section.

5 Discussion

Out of the eighteen people who participated, eight were men and ten were women. Most of the participants are aged over 55 with two senior participants aged over 80s.

5.1 Home is needs-driven. People adapt to limitations and opportunities on the daily basis.

Seventeen participants live in older homes with one living in recent built flat. The houses are aged between 300 years to 3 years old. Most of the homes have been modified throughout the years of use. The houses are acquired according to the lifestyles of the participants at the time of acquisition as well as considerations for their future needs. In reality, participants often have to make their decision based on what was available and suitable at the time.

Eighty-two year old Denis has lived in his home since he was born. He moved recently to a small, two bedroom flat close to his local town where he can ride his bike to town and go watch cricket in the sports ground. In comparison to his previous 300 years old home, this new flat is not only more manageable and convenient for him, but also allows him to have more freedom to do what he likes.

Wendy and her husband Vas live in the same building in London for almost 30 years, but in the last 14 years, they decided to move to the ground floor flat in the same building with access to a private garden. Although the flat is not as ideal as living in the countryside which Wendy really would like to do, at least it was closer to nature.

Discussion:

Design should make what consumers already do easier and enhance the positive experiences they value. It is suggested that new product strategy should go beyond incremental improvement based on the existing product. New and smarter products and services should incorporate the already valued qualities inside and outside of the home.

5.2 Home making is a continuous process

The home is also a place created by its inhabitants through years of living. The existing surroundings are modified and adapted in order to accommodate the changed and unchanged needs of their lifestyles. Most of the participants express that they are happy with their existing homes and feel as long as their fundamental needs are met, they do not consider major changes. Nonetheless, whether their plans involve minor or major renovation, this is foremost constrained by financial resources.

Discussion:

Homemaking is a life long project. This means that major renovation of homes will have to benefit the lifetime values of the consumers. Branding of smart homes needs to take on a different strategy to appeal to the diverse consumers; for example, strategy that promotes lifestyles for senior travellers, lifestyles for the refuse-to-retire professionals and lifestyles for elderly independence. The advancement of technological features will not be able to convince the consumers along.

5.3 Home tells stories about the people

The home tells narratives about the inhabitants. It describes a series of events interwoven with and by people, material objects, and physical spaces over the time of occupancy. This environment shows unspoken traces of events which occurred to-date while representing the inhabitants' sense of existence, purpose and identity. The objects in the home exist because they are all part of the

environment and part of inhabitants' everyday life. When asked about comforting object or object that represents the home, technological artefacts are rarely mentioned by the participants: what makes their house home is the people, the familiar surroundings and the intangible meanings attached to it.

For participants, their homes represent not only identities of themselves and their families but also the union of their traditional values. These are linked through for example, their family photographs, home possessions as well as things they do as a family.

Discussion:

Homo Luden, playful human are also collectors and makers of their own world. Home is also a place where homo luden 'share' their playful and accumulating habits with other members of the household. Design of smart applications will have to learn their lessons from these sharing activities of individual as well as communal perspectives.

More importantly, it is suggested that strategy for design of smart homes will have to take consideration of long-term trends of social, cultural, economical, technological and environmental factors as these also influence the activities in the household; for example, the market for the single person, elderly citizens and lone-family households, just naming a few.

5.4 Homes are connected islands.

Homes are connected islands. However, it could be as isolated as an island when needs is not met. Islanders have their own means of communication and transportation between lands. They do so to maintain their everyday life. The connected islands can also be seen as a metaphor of tribes of family. In this context, the connection between islands plays an important role in maintaining relations, traditions and family life etc. For elderly consumers who live independently, self-sufficiency is more likely to be the main concern for island life.

Discussion:

Television, Internet and computers cannot replace human contact. The home islands can benefit from localised communication, transportation and services. Technology can provide advantages that improve the working of the islanders' system.

The home life is not limited to a single household. It is also a network of other homes and the inhabitants reside in these homes. The organic structure of the household requires dynamic organisation to face expected and unexpected challenges ahead. Design should open up opportunities to rethink the concept of network and pay more considerations for local resources.

5.5 Consideration for others

Living in the modern society means having to live in the company of other homes, other activities and communities. Issues outside of the boundaries of a house also influence the activities and qualities of home life within. For example, Grace who is in her 80s often gets up at 5am in the morning to do household chores. She tries to make as little noise as possible because she does not want to disturb her neighbours. Wendy and Vas have, as they describe, nice neighbours. However,

the noise caused by the children running on the upstairs' wooded floorboards was certainly not something they would appreciate. Activities around the home are also influenced by surrounding environments.

Discussion:

Home is very private and personal. However, the privilege of 'being yourself and doing thing I like' does not always prevail in reality. Issues relating to everyday life can be challenging and troublesome. Design of new products should take broader consideration for life relating to and outside of home, for example, taking into account of one's consideration for neighbours.

5.6 Everyday has an incident

The home represents an idea of a castle that safeguards the well-being of the inhabitants. It provides an idea of a place where broken things can be restored and important values can be maintained. This requires also consistency in making sure that what have already been valued can be fixed when broken down, and can be maintained and improved upon.

Discussion:

Design for unpredicted circumstances may indicate the need for responsive and dynamic systems. However, what is often ignored is the importance of the fundamental needs in the home; these are for instance, safety, privacy, security, comfort and utilitarian function. When unexpected incident happen, not only do we may need system to help us to solve the immediate problem, but also to make sure what is already been carried out in the home can be continued, maintained and improved at best. Smart home makes people smarter by satisfying their fundamental needs.

5.7 The concept of home?

Despite the chaotic and complex nature of the home life, what divides the outside world from the home is the reassurance that at the end of each day, one can find comfort and security within the familiarity of the environment. For Caroline (age 56), home is the things that she travels with and settles with as she moved between places. The meaning of the home to her is not focused on physical entity of a house; it is a place that she created with her familiar possessions, with her rugs, lamp and musical instruments.

Discussion:

'The concept of home and retrofitting could be overrated' quoted from one of the participants. What is realised in this study is that branding of new technology such as smart homes often portrayed a stereotypical nuclear family, similar to what was portrayed five decades ago. We suggest that there are new markets to explore and new definition of home to be understood.

The role of new technology should encourage reflection on what is important in the home by maintaining values. It should also encourage new thinking in the design community and among consumers.

6 Conclusion and Future work

The aim of this research is to identify meaningful experiences to inform new design. By avoiding the obvious approach of 'what is wrong' in the concept development process, this research intends to contribute to the identification of

both what is going on and thereby, how it may be modified in the pursuit of desired ends', as described by Silverman (2004) from a social scientist perspective.

The material surroundings of the home tell a story about the inhabitant(s) and demonstrates important qualities they have remained over the past decades. The older homes provide opportunities for designers to understand and re-evaluate the purposes and places of the products they have designed.

It is important in the development process of new smart home technology to employ qualitative methods that encourage reflection on intangible concepts, intentions and meanings. Home life is needs-driven, diverse and influenced by trends of socio-cultural, economical and environmental factors. The key contribution of this research therefore underlines important values, meanings and lifestyles of the home up-to-date and furthermore helps to recognise potential strategy for development. The preliminary results will be further analyzed in a design workshop organised for July this year.

Whilst it is difficult to predict the needs and values of the people in five to ten years time, by understanding what have happened and are happening in the cultures of homes, meaningful lessons may be learned and therefore used to inform and inspire future designs of smart homes.

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USING MEANINGFUL EXPERIENCES FROM THE PAST TO INFORM THE DESIGNS FOR THE FUTURE

Hsueh-Pei Wang, Ray Holland and Busayawan Ariyatum
School of Engineering and Design, Brunel University, Uxbridge, UK

Context: Qualitative information is vital in the design process of new products. It helps designers of new technology to understand meaningful experiences of the homes today and expand brand assets into new markets and products. In this research, development in the area of smart home is employed as an example to demonstrate the importance of existing values and meanings. While older homes are often posed as a challenge for new technology, we stress that these obstacles can be used to inspire new designs that are socially and culturally more appropriate for the existing way of living.

Aims: This research investigates the meaningful experiences in the existing homes in the UK today. Qualitative methods are employed with an aim to identify important issues in the home and opportunities for new product development.

Method: The research is triangulated by three qualitative methods namely 'home probe', semi-structure interview and video ethnography. Firstly, home probe is designed to capture a broader spectrum of issues that aims to open up a discussion between the design researcher and the participants. The information generated from the probe is further explored in the semi-structured interview based on the existing issues. This is followed by a video walkthrough of the homes providing richer description of the environment. The information are initially analysed with qualitative analysis software and presented later in a multi-disciplinary workshop for discussion and evaluation.

Results: Eighteen people of age over fifty participated in this study. The preliminary results suggest that innovation for the existing homes should be introduced incrementally. This highlights important issues in the homes today such as fundamental needs, social and networking issues between older homes, greener resources, and the important values existed in the traditional way of living.

Conclusion: This research contributes insights deriving from the existing values and meanings across a diverse lifestyle of the home today. Home is a prime site for technology innovation. It is important for the designer and marketer to understand the importance of the home and be able to reflect on their attitude towards these emerging technologies. Development in the field of smart home demonstrates that it is more challenging to retrofit into the existing meanings and values in the homes. This research therefore helps to make sense of the existing qualities of homes we live in today and stress the importance of appropriate strategy for new product development.

Home is needs-driven. People adapt to limitations and opportunities on a daily basis

New product strategy should go beyond incremental improvement based on the evaluation of existing product. New and smarter product and services should incorporate the already valued activities inside and outside of the home.



Home tells stories about the people

Design of smart applications will have to learn from individual as well as communal perspectives. Strategy for design of smart homes will need to consider long-term trends of social, cultural, economical, technological and environmental factors.



LESSONS LEARNED FROM OLDER HOMES

The future direction for design of smart homes

Hsiang-Pei Wang, Ray Holland, Deepswan Aravamudan, Peter Evans
School of Engineering and Design, Brunel University

Home making is a continuous process. It is a long-term project with lifetime goals.

Promotion of smart homes needs to take on a different strategy to appeal to consumers. This means that major renovation of homes will have to benefit the lifetime values of the consumers.

The concept of home?

'The concept of home could be overrated' quoted from one of the participants.

The branding of new technology such as smart homes often portrayed through a stereotypical nuclear family. We suggest that there are new markets to explore and a new definition of homes to be understood.

The role of new technology should encourage reflection on what is important in the home by maintaining values. It should also encourage new thinking in design community and among consumers.

Everyday has incidents

When unexpected incident happen, not only do we need a system to solve the immediate problem, but also to make sure what is already been carried out in the home can be continued, maintained and improved at best. Smart home makes people smarter by satisfying fundamental needs.

Homes are connected islands.

The home life is not limited to a single household. It is also a network of other homes and the inhabitants reside in these homes. Design should open up opportunities to rethink the concept of network and pay more considerations for local resources.

Consideration for others

Issues relating to everyday life can be challenging and troublesome. Design of new products should take broader consideration for life relating to and outside of home; for example, taking into account one's consideration for neighbours.

Abstract

In this paper, we examine opportunities for new technology products in older homes based on an investigation into meaningful experiences in this environment.

Research themes

- The concept of home
- Sensory experiences

Methods

- Home probe, a method adopted from cultural probe (Gaver, *et al* 1999)
- Qualitative interview
- Video ethnography

Sampling strategy

- Population over the age of 50
- With a particular emphasis on baby boomers generation

Sampling process

- Non-probability sampling of network or so-called snowball technique
- Recruitment posters in public places

Analysis

- Qualitative analysis software (NVivo 8)

Evaluation

- Multidisciplinary design workshop

Reference

Gaver, B. *et al.*, Designing Cultural Probe. *Interactions*, 1999, January and February, 21-29

Smart Homes, retrofit

Hsueh-Pei Wang (1), Peter Evans (2), and Ray Holland (3)*

Brunel Design

Extended Abstract

Introduction

'The world is not a desktop', Mark Wesier (1994) envisages metaphorically the future of the computer. Computing technology for the home is clearly not limited to a desktop. Interface, appliances and system design for the home have embraced challenges in an effort to make the home environment more ubiquitous and smart.

For some home occupants, however, problems exist in adopting new technologies [11]. Some developers believe that the current obstacles in building smart homes may be caused by inadequate design and concerns over reliability, security and privacy [6]. Others resolve in identifying service values and appropriate deployment methods.

Developers today understand the nature of the home and seek to establish breakthroughs in innovation and in translating new concepts into practice [5]. However, there are difficulties in translating experimental prototypes into ready products, and converting older housing into new (i.e. smart) homes. We assert that whilst efforts are being made to address the first of these problems, we remain concerned that *existing home environments* are being overlooked in their potential for incorporation of smart home technology [12].

In this research, we aim to explore opportunities to facilitate technology that is economically feasible, environmentally sustainable and emotionally durable [3]. We first investigate the benefits of retrofitting smart home technologies. The review of the existing computing interfaces for the home will be given. Alternative interfaces that incorporate smart materials and textiles [1] and will be discussed.

Methodology

Many researches in the domain of Human Computer Interaction (HCI) and Computer Supported Cooperative Work (CSCW) have employed ethnography to study the patterns and routine of home lives, however, rarely do they focus on the role of material objects in the routines of homes [4].

Cultural Probes [8] is the proposed method for this investigation. The Probes consists of postcards, camera, photo album and media diary that contain visual, textual and cultural relevance to the research questions. These aesthetic designs of the probes play an important role in contributing an open dialogue between the designers and users. We believe that this form of communication could provide users with time to reflect on their material environments and also give developers opportunity to refine their design decisions over time. This method could act as a way to explore valuable inspirations which could otherwise be ignored under pressures.

We hope that by unravelling the meanings of the material objects in the domestic spheres, we can therefore identify prospects for new product development.

Findings

While advantages in developing unremarkable [10], intimate [2] and playful [7] computing are evident. This also indicates a growing interest in facilitating computer functions in more natural forms such as clothing or textiles. It is undeniable that this opportunity could ‘give designers the creative freedom to radically change the appearance and ‘‘feeling’’ of such devices’ [9]. This trend also demonstrates an increasing need for nature human interface that require compatibility to most homes.

Discussion

Smart materials and textiles have opened up opportunities for technology integration in the home. We suggest that the existing material environment could also benefit from it. Purpose-built smart homes may be ideal for facilitating new technologies, we remain confident that the market for retrofitting could play an important part in the developing paradigm of smart home sector.

Based on our findings, we propose the design of conductive lithographic printed components which could be integrated as part of the information display circuitry. To conclude, benefits for retrofitting will be outlined. Preliminary result of the lithographic printed PTC resistors will be discussed.

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Keywords: smart homes, smart materials, cultural probes, conductive lithographic films

The Meaning of home: A review of smart textile technology for the home

Hsueh-Pei Wang, Ray Holland and Peter Evans,
School of Engineering and Design, Brunel University, Uxbridge, UK

Smart textiles are capable of sensing stimuli from the environment, reacting and adapting to them (Addington and Schodek, 2005) It is suggested in this research that advanced technology such as smart materials and textiles could provide responsive and intelligent interfaces for systems in the home thereby assisting in improving the quality of life. In this context, technology is considered as a way of responding to human needs, facilitating social aspirations and improving one's physical and emotional environment. It has been claimed that the use of smart textiles in clothing has been retarded by the lack of 'killer application'. A 'killer application' is defined as one that is highly beneficial yet can be realised by a particular technology. For smart textile products in the home environment other factors also must be considered. These include manufacturability, reliability, usability and more importantly, product aesthetics, acceptability and likeability (Sade, 1999), The aim of this research is to map constructive and appropriate foundations for designing products for the home that utilise smart textiles. The meaning of home, the use of smart textiles in clothing, in smart textiles products for the home, and smart home networks are addressed and future directions for developing a smart home are suggested.