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Developing the concept of 'Shared Usability' in Product Design for Older Adults.

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"It must be borne in mind that the object being worked on is going to be ridden in, sat upon, looked at, talked into, activated, operated, or in some way used by people individually or en-masse. If the point of contact between the product and people becomes a point of friction, then the designer has failed.

If, on the other hand, people are made safer, more comfortable, more desirous of purchase, more efficient – or just plain happier – by contact with the product, then the designer has succeeded."

-Henry Dreyfuss, Harvard Business Review, November 1950

POST GRADUATE THESIS DECLARATION

ACKNOWLEDGEMENTS

My life journey has captured so much and I value and appreciate where I am now in my world. I have loved the surprise, at time the chaos, and begun to understand the value of uncertainty. Though my life journey I undertake alone, it has always had the support of family – My Mam & Dad of course accommodating the curious child who built caterpillars houses out of cigarette packaging as a child in my Grandparents house. Of course the access to the caterpillars house was a little too accommodating in offering freedom to the caterpillars who were exploring all over the sitting room sideboard the following morning!

My children - Chris, Adam, Karl & Aimee who continue to encourage my curiosity, and have offered love, support and belief in their Mam – Thank you.

Most importantly throughout this research, my Supervisors – Dr. P.J. White & Mr. Hilary Dempsey who were unwavering in their belief of my freefall and explore of 'Shared Usability', their guidance, expertise and honesty meant so much throughout.

The Older Adults that participated and accommodated my research by inviting me into their lives and their homes. They shared so many wonderful insights and narrative to the life changes that ageing brings. In addition the Health professionals who offered support, expertise and shared their belief in my research. They accommodated me so wonderfully and were always available for the various areas I needed guidance on as the research progressed.

Sincere thanks to all the Design lecturers and DesignCORE staff members in the Institute of Technology Carlow for their support and encouragement also.

The Institute of Technology Carlow has provided an opportunity for me to conduct research and enquiry; I would like to thank all the members of staff who offered guidance and assistance throughout, it has been very much appreciated.

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ABSTRACT

Globally the Older Adult population is increasing; people are living longer and in many cases with some form of physical or functional limitation in their own home. As a result, there is a requirement for support from Stakeholders (family members, neighbours, health professionals and Companies) to enable ageing in place. The concept of 'Shared Usability' proposes that Older Adults can maintain a sense of independence, choice and empowerment, even with support from other stakeholders, when using products or services. The aim of this research was to explore 'Shared Usability' in the context of a User Centred Design process that supported the research hypothesis:

'It is possible to empower Older Adults through 'Shared Usability' by mutually agreed intervention with other stakeholders when using Products or services.'

There were two stages to this research;

Enquiry - During the enquiry phase, qualitative research methods were undertaken and conducted over a nine month period. The fieldwork involved observing and understanding everyday life for the Older Adult in their own home, with specific enquiry and task observation of eight areas, as identified by the literature review.

Implementation - Design methodologies of ideation, sketching and iterative sketch models were applied in order to select one specific area for design conceptualisation. Further to this, brainstorming sessions involving the participants using storyboard and feedback were used to evaluate proposed concepts.

This research offers a definition of 'Shared Usability' that can be identified as a consideration within User Centred Design processes. It documents a process of fieldwork enquiry into eight specific areas of day to day life for Older Adults. Through practice based design methodologies the concept of the 'SmartShare App' was created. This concept promotes and highlights how a User (the Older Adult) will select the levels of engagement they have in managing heating and fuel efficiency in their home. The Older Adult agrees the varying levels of access and support with Stakeholders to maintain a sense of independence and empowerment. Finally, it discusses how shared autonomy between User and Associated Stakeholders is supportive to the Older Adult maintaining independence and self-sufficiency.

CHAPTER ONE – Thesis Introduction

Chapter Introduction

This thesis will document the development of the concept of Shared Usability in Product Design for Older Adults. From an overarching methodological structure that involves literature reviewing, user centred field research and practice based design research.

1.1 Research Overview

Literature Review

The initial enquiry was to understand and record quantitative data that displayed areas of relevance to understanding the context of research. This data was critical to identifying and understanding the scope and limitations of the research. There were numerous supportive documents published by Global and research agents researched in order to develop the areas of enquiry for fieldwork. (i.e. United Nations, European Commission, International Organisation for Standardisation, Centre for Ageing Research and Development in Ireland)

Furthermore, the literature review provided the basis to plan the fieldwork and address ethical considerations to recruiting and engaging with participants. Together with important statistical evidence to progress with this research the literature reviewing clarified the following areas:

- Identified and defined the Older Adult as purpose User to be studied for this research.
- Acknowledged areas that can be problematic for Older Adults (i.e. fuel poverty, pressure ulcers)
- Identified a qualitative method of enquiry using ethnographic methods as a means to understand day to day life for Older Adults.
- Defined a need to seek ethical approval within Institute of Technology, Carlow for the parameters of fieldwork to be conducted.
- Highlighted a need to conduct Pilot Studies as the precursor to the main body of fieldwork.

- Assisted deep understanding to specific design philosophies that explore usability and consider more than one user (i.e. Universal Design, Inclusive Design, Transgenerational Design)
- Shared insight to various areas of understanding people and the psychology of experience and behaviour when using products or services.

Finally the Literature review provided knowledge for the researcher to engage with further enquiry and fieldwork with an insight to empathise with the Older Adult.

- User Centred Design
- Practice Based Design

Shared Usability was defined as an outcome to the research. This provided a reference factor to support the process of design. The definition suggests that Shared Usability facilitates a 'User' and a network of Associated Stakeholders to manage and agree levels of interaction and usability when using products or services. Furthermore it provides autonomy to the User enabling them to remain empowered as a result of initiating levels of usability with the Associated Stakeholders.

The researcher pursued enquiry with a tacit knowledge that was enhanced further by the narrative shared by the participants during the Pilot studies and fieldwork. The research developed at a pace that often required reflective periods. This was to assess and consider the previous stages of research while anticipating the potential development for future stages and outcomes. The objective of this consideration and reflection supported the researcher during sessions that required strategy and planning.

Design thinking is an intrinsic feature to design research. It offered the researcher an opportunity to explore and analyse the project or situation and deliver creative outcomes that are not detached segments but connected sequences to the 'whole' of the project (Brown,T. 2009). The research methodologies facilitated the iterative and non-linear nature of the design research as an exploratory process. The acceptance of this exploratory process was not to indicate a chaotic or disorganised approach; instead it displayed a creative approach undertaken by the researcher. This displayed the researcher's ability to share insight from observing actual experience and behaviour of people as a means to identify unmet needs.

1.2 Research Scope

The research explored three areas that were identified and stated both in the research title and learning outcomes from the Literature review. In addition the three areas of focus created research questions:

- **The Older Adult**

  Research Questions:

  What is an 'Older Adult'?

  How can day to day activities and experiences be learned and understood?

- **Shared Usability**

  Research Questions:

  What is 'Shared Usability'?

  How can 'Shared Usability' be developed?

- **Product Design**

  Research Questions:

  What is Product design?

  Who are 'users?'

  How can Shared Usability become part of Design process?

Following on from Literature review, Pilot studies and ethical approval a period of fieldwork was undertaken. It involved the researcher using ethnographic methods to understand Older Adult behaviour in two contexts:

- Life-Logging
- Task Observations

Eighteen Older Adult participants engaged with the researcher conducting fieldwork over a period of nine months. The fieldwork concluded and the research moved into a period of conceptualisation and reflection as a means to deliver new knowledge outcomes, namely:

- Documented detail of the fieldwork study
- Product and service system outcomes
- Definition of 'Shared Usability'

1.3 Chapter Structure

In terms of chapter structure this thesis comprises of four further chapters that are summarised here:

Chapter Two – Literature review: This chapter displays the body of literature and enquired as a means to pursue research questions and fieldwork. It is broken into two parts:

- Part One: The Older Adult
- Part Two: Shared Usability

Part One – The Older Adult - defined the main stakeholder of interest to the research study: the Older Adult. In order to understand the requirement for the research it firstly discusses the effects now and into the future of Population growth and increased longevity. This defines a need to provide a design solution for everyday experience and use of products and services for Older Adults.

Part Two – Shared Usability: The enquiry of usability and the development of 'Shared Usability' are stated in Part two of this chapter as a means to understand the definition of usability as discussed in ISO 9241-11:1998 and ISO/TR 16982:2002. Part two then progresses by defining 'Associated Stakeholders' and their relationship with the Older Adult. The Hypothesis of the research is stated and clarifies how this supported insight during fieldwork and evaluation to pursue and develop research outcomes. Finally as a means to conclude and reflect on the viability of 'Shared Usability' a definition is presented to endorse further its position as a supportive mechanism to the design process, particularly in the case of the Older Adult as 'user'.

Chapter Three – Research:

This chapter was broken into three parts:

- **Part One – Research:** Discusses the limitations and potential for research and fieldwork. It reviews the ethical considerations and concludes by sharing the strategy to prepare for fieldwork and the recruitment of Older Adult participants. In addition to this it states the eight areas of enquiry selected for fieldwork

- **Part Two – Fieldwork Methodologies:** Part two discusses the methodologies that were used, and highlights ethnography as the design research method selected. It details the fieldwork sessions undertaken during life-logging and task observations.

- **Part Three – Analysis:** The final part of this chapter discusses triangulating fieldwork data within the eight areas of day to day life for Older Adults. It details the method of validating research outcomes as a means to define one area to explore for product conceptualisation.

Chapter Four – Research Outcomes:

In this chapter the conceptual phases of design to product and service system concept outcomes of the research are discussed. As a result the concept of the 'Smart*Share* System' was created. This concept promotes and highlights how a User (the Older Adult) will select the levels of engagement they have in managing heating and fuel efficiency in their home. This chapter concludes by displaying an infographic that highlights the journey of this research through to the research outcomes.

Chapter Five – Thesis Conclusion:

Chapter five offers a conclusion to the thesis. It summarises and reiterates the salient points of the research. It confirms the three new knowledge outcomes that had not been identified prior to the research journey. It discusses the benefits of this new knowledge and understanding generated as a result of this enquiry. Finally it offers insight and potential for future research and the position of 'Shared Usability' as a critical factor to the process of design – particularly for Older Adults.

1.4 Research Background

This research is a progression of findings from previous design research. This research was titled: *"Designer as Ethnographer: A Study of Domestic Cooking and Heating Product Design for Older Adults"* (White;P;J. 2012). In this research White highlighted the potential for 'Shared Usability' as a supportive method of intervention between Older Adults and Associated Stakeholders when using products or services.

The research hypothesis was developed as an outcome of the literature review and prior to the fieldwork.

'It is possible to empower Older Adults through Shared Usability by mutually agreed intervention with other stakeholders when using products or services.'

It was critical to the research that 'Shared Usability' had a definition. It is presented during this chapter and endorsed the outcomes of fieldwork and product concept outcome.

CHAPTER TWO – Literature Review

Part One – The Older Adult

This chapter will commence by defining the Older Adult, primarily through statistical evidence. It identifies the need to consider this demographic as a group requiring design led enquiry and new product intervention. It will discuss the ageing population by examining existing narrative on Older Adults and Lifespan development as they age within the community. It will examine the challenges of ageing in place and the involvement of Older Adults in their community.

The closing sections of Part One will discuss the design process, specifically designing for Older Adults. It will explore User Centred Design philosophies and will discuss the involvement of other stakeholders as a benefit when designing for Older Adults.

Part One concludes by reflecting on the position of the Older Adult and how their independence can be supported through Shared Usability.

2.1.1 Population Growth

The Global Population of adults aged over 60 is expected to exceed 2 billion by 2050. This demographic in 2012 represented 11.5% of total global population; by 2050 it is predicted to be as high as 22%. By 2050 this growth together with the continuing decline of fertility will mean that there will be a greater amount of Older Adults than children aged ‹15

(United Nations, 2013)

In the future some countries will have a higher ratio of Older Adults to children; with a working age population supporting both (Fig. 2). This is further complicated as it is predicted there will be an increase to longevity, with the average lifespan expected to be above 80 years by 2050 (Fig 1; United Nations, 2009).

With this population change United Nations have emphasised the importance of social integration for older populations:

> *"The impact of population ageing on the socio-economic development of society, combined with the social and economic changes taking place in all countries, engender the need for urgent action to ensure the continuing integration and empowerment of older persons".*
>
> (United Nations; 2002 – II section A)

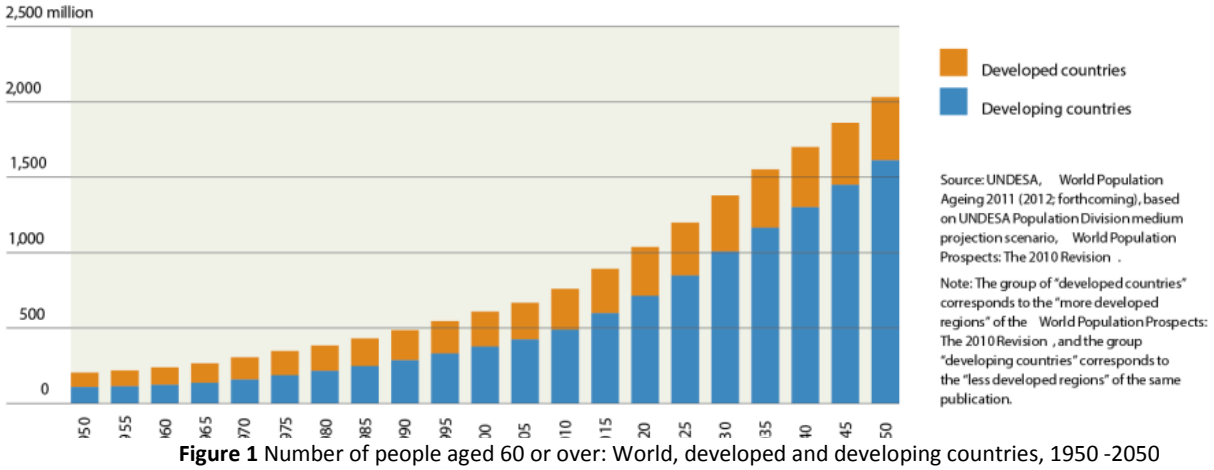


Figure 1 Number of people aged 60 or over: World, developed and developing countries, 1950 -2050

(UNFPA; Help Age International, 2012)

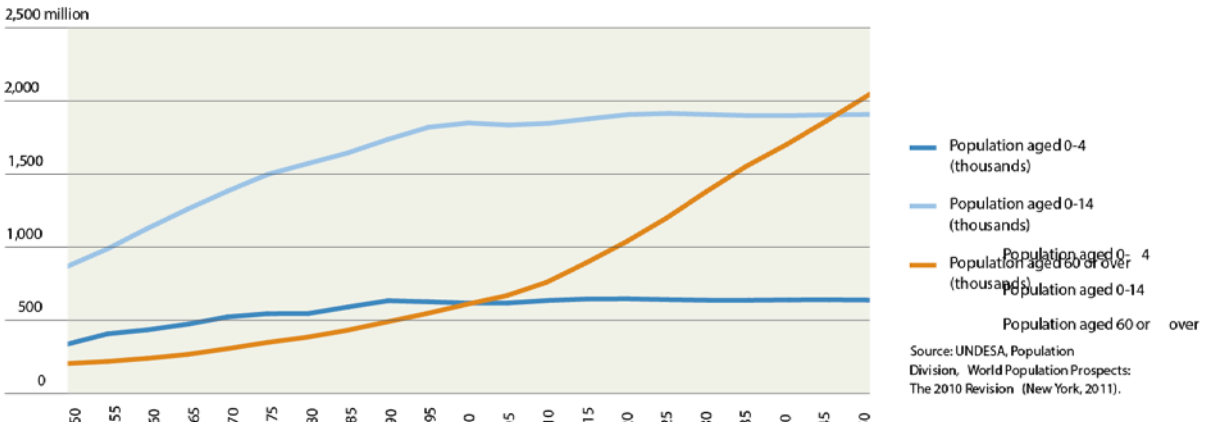


Figure 2 Population ages 0-4, 0-14 and aged 60 or over, 1950-2050 (UNFPA; Help Age International, 2012)

The predicted population growth and increased lifespan indicates the requirement for designers to be involved in the human factor needs and design research as a means to understand life and experience using products and services as we age.

Pirkl discusses how Designers, manufacturers and care providers can support the ageing process by offering products and systems that:

- Ensure we remain active and independent as we grow older
- Adapt to the changing sensory and physical abilities as a result of ageing
- Enable us to choose the means by which we accomplish our activities of daily living

(Pirkl, 1994)

2.1.2 Defining the Stakeholder

The United Nations has defined that Adults that who are over sixty years old as 'Older Adult' (United Nations, 2009; p viii) as a contrast, the World Health Organisation defines that persons over sixty five as Older Adult (World Health Organisation, 2015; p1). The Older Adult with a chronological age of sixty and above identified the Older Adult for this research. This offered the opportunity to enquire into ageing from a perspective that some Older Adult participants might still be employed. It was considered that they would be living independently in their own homes, with ability to choose and select day to day activities and interactions, with few physical or cognitive limitations.

The purpose of this selection for Older Adult user was to understand that transitional period from stable elements of certainty regarding function and ability to the more uncertain limitations that may be experienced due to the ageing process.

This ageing population may hold unprecedented concerns for the future. The European Commission have stated that in the future young people (aged 0-14) and old people (aged over 65) may become *"...too heavy a burden on younger working age people (15 to 64)"* (2011 p.15). Concerns are not just economic, as a consequence of age, our bodies change and decline (Torgé;J, 2014).

As a result of longer lifespan and medical advances we are now living longer in our own homes, often with some form of functional limitation (Haak et al., 2007). The quality of interaction with products and services within the home needs to adapt accordingly to allow for autonomous use

irrespective of age. In addition various global bodies have expressed concern that the care of the Older Adult must be considered as a means to ensure their well-being.

> *"As Europeans live longer and healthier lives, governments are looking for ways to involve older persons more in society and to keep them active; these changes could result in economic benefits for society as a whole, while at the same time promoting the physical, mental and social well-being of older members of society."* (European Commission, 2011; p.9)

2.1.3 Life Span Development

> *"Ageing affects all of us, both as individuals and as societies. As individuals, ageing is an emotional topic because it touches us so profoundly. For most people, after a period of stability during midlife, retirement and old-age present renewed uncertainty with new phases of life"*
> – (Survey of Health, Ageing and Retirement in Europe, 2013p. 5)

Becoming an Older Adult is not unlike previous life stages as there are new things to learn and experiences not experienced before. Ontogenetic development is a life-long process, and covers all course of life and the life span, the life span as a topic of study has been a recognised by psychologists, anthropologists, sociologists as valuable and offering insight to pursue and understand further. Baltes refers to Life span development as an ongoing process of change through from conception to death. (Baltes, 1987).

The popularity of life span development research according to Baltes is due to:

- The growing percentage of Older Adults in the global population.
- The emergence and growth of gerontology as a more specialised practice of study of the ageing process.
- The success of research and subjects initially involved in longitudinal child development studies in the 20th century[1].

[1] The "ageing" of the subjects and researchers of the several classical longitudinal studies on child development begun in the 1920s and 1930s (Migdal, Abeles, & Sherrod, 1981; Verdonik & Sherrod, 1984)- BALTES, P. 1987.

2.1.4 The Older Adult – the User

It is widely viewed that within a User Centred Design research project, the user needs must firstly, be identified and secondly, be involved in the process of research and design. (DreyfussH;, 2012 Ed., Papanek;, 1985, Fisk et al., 2012, Farage et al., 2012, Norman, 2002)

The Older Adult in this design research project is defined as the user[2]. In the context of User Centred Design the Older Adult must become *"Representative Users performing representative tasks within representative contexts must be the arbiters of usability"* – (Fisk et al., 2012. p.45)

2.1.5 Ageing in Place & Living Independently

'Ageing in place[3]' refers to the choice that the Older Adult makes to remain living in their home. Ageing in place has been shown to have a very positive impact on quality of life on Older Adults. Research has shown that it accommodates involvement and engagement with familiar social and community circles and allows the Older Adult and keep a sense of choice in where and how they wish to live (Intel, 2011).
For many years policy in Ireland, has acknowledged an intention to offer this consideration, for example *'The Years Ahead: A Policy for the Elderly'* Policy document (Irish Government, 1988).
Many objectives for ageing in place were listed in this policy not least the acknowledgement of choice for the Older Adult in where they lived, stating the objective *"...to maintain elderly people in dignity and independence in their own home"* (3.2 p.38)

Some objectives of the original policy document were not achieved and this is discussed in the later review document 1997: *'The Years Ahead Report: A review of the implementation of its recommendations*[4]'

[2] The term user is defined: (*'user'* in noun format is (often in combination) **a person or thing that uses** ⇒ a road-user ; *'use'* as verb being defined as to put into service or action; employ for a given purpose *i.e. the user will use a spoon to stir tea with* – Collins Dictionary*)*

[3] "The ability to live in one's own home and community safely, independently, and comfortably, regardless of age, income, or ability level." CDC 2013. Healthy Places terminology -Aging in place. *Centers for disease control and prevention.* USA: CDC.

[4] "The major challenge for strategy in the future is an increased quality of life for all groups within the older population and the full social integration of older people as members with continuing needs not only for physical health but also for fulfilment, contribution, choice and dignity"

(Ruddle, H; et al., 1997). One of the main reasons stated is the changing Regional and National Policy developments that were often unable to implement change partly due to oversights of paying "*Inadequate attention to the role of older people and their carers in the decision-making process*". (p.1)

Furthermore, an element of frustration is expressed at the slow development of the recommendations that could offer so many benefits to adults as they age. The review document recommends a legislative framework that would govern and ensure the delivery of many of the unmet needs recommended but at the time of publication were not yet addressed.

Dale Harrow states: *"With age, all of us change physically, mentally and psychologically"* (Kunar; M and Gheerawo; R, 2007 p.5). The decision to ageing in place can often be determined by a decline in cognitive and/or physical ability. These declines can have obvious implications on how capable a person is to carry out tasks and enjoy day to day living. The limitations associated with illness such as arthritis, cardio vascular disease, diabetes, Parkinsons or dementia can pose a risk to independence for the Older Adult.

However, it should not detract from the well-being individuals enjoy by choosing where they live, and the quality of care they receive through supports in society and community. Steen discusses a case study conducted in the Netherlands. It involved patients with dementia and their carers with objectives to assess and address *"met needs, unmet needs or no needs regarding twenty four problem areas"*. (Steen. M; 2008; p. 126). It references an effect of ageing on the stakeholders involved in our lives. Steen further discusses this referencing a marketing campaign by the Dutch Alzheimer Association (see fig 3) pointing out –

"He suffers from dementia" and *"she has it"* (Steen. M. 2008, p127)

Figure 3 Campaign visual for Dutch Alzheimer Association (Steen. M., 2008)

2.1.6 Older Adults & Transgenerational Design

Older Adults are an integral part of our communities and can continue to offer additional economic and social value (European Commission, 2011). Fundamentally Older Adults are entitled to "*live in an environment that enhances their capabilities*" (United Nations, 2002p. 33). Likewise, when they engage with products or service systems, they are entitled to enjoy the user experience. Pirkl posits the mantra "*accommodate instead of discriminate*" (Pirkl,J.J., 1994, p.25), positioning the argument that 'transgenerational design' should consider not just one user but appeal to users of all ages.

Transgenerational design is; *"the practice of making products and environments compatible with those physical and sensory impairments associated with human ageing, which limit major life activities*". (Pirkl, J.J., 1994, p.25). He further states how this Design method creates a unique interaction between users and products that also accomodates the abilities and limitations of the user.

To consider transgenerational design we must understand natural human decline as we age. Farage et al., classify these as sensory function, mobility, balance and memory (2012). If we take these into account within the 'operational' day to day life for the Older Adult, Parker et al classifies these as follows:

- Mobility (Indoors & Outdoors).
- Eating.
- Personal Hygiene.
- Toileting.
- Dressing.
- Transfer (from bed to chair to standing),
- Communication

(Parker and Thorslund, 1991)

2.1.7 Product Design- Designing for Older Adults

For many years there has been push for the designer to consider the user or human that will engage with products and services. As an early example Dreyfuss introduced 'Users' 'Joe' and 'Josephine'. These were archetypes to be used for human factors. Joe and Josephine were male and female users with measurements relating to human physiology and various positions re sitting, stepping, standing etc. They were created to assist designers when considering product outcomes.

> *"They remind us that everything we design is used by people, and that people come in many sizes and have varying physical attributes"* (Dreyfuss, H; 2012 Ed. P. 26)

User Centred Design by its name supports Human considerations, and in addition allows to position 'people' in this instance the Older Adult as a critical contributor to the design outcome.

Important considerations for User Centred Design research are as follows

- Listening and observing real people in real contexts
- Using an empathetic stance to understand users
- Define issues or problems during user fieldwork
- Present solutions back to users to gain further insight to pursue research and conceptual outcomes.

"Researchers are encouraged to integrate the input of older adults into the design process." (Farage, M., 2012. P10).

In addition to User Centred Design Methodologies, Farage suggests the principles of Universal Design are best suited to accommodate the needs of Older Adults.
Universal Design is defined by 7 principles (The Centre for Universal Design, 1997). These principles were devised as a response to economic, social and demographic changes. Universal Design Principles are intended to:

> *"Evaluate existing designs, guide the design process, and educate designers and consumers about the characteristics of more usable products and environments"*. (Story, M. et al., 1998. p.32).

These principles acknowledge and seek to accommodate the diverse needs of the user in the process of design. The diverse needs as discussed in the Universal design file (Story, M. et al., 1998) are grouped as a spectrum of human abilities and are displayed in figure 4:

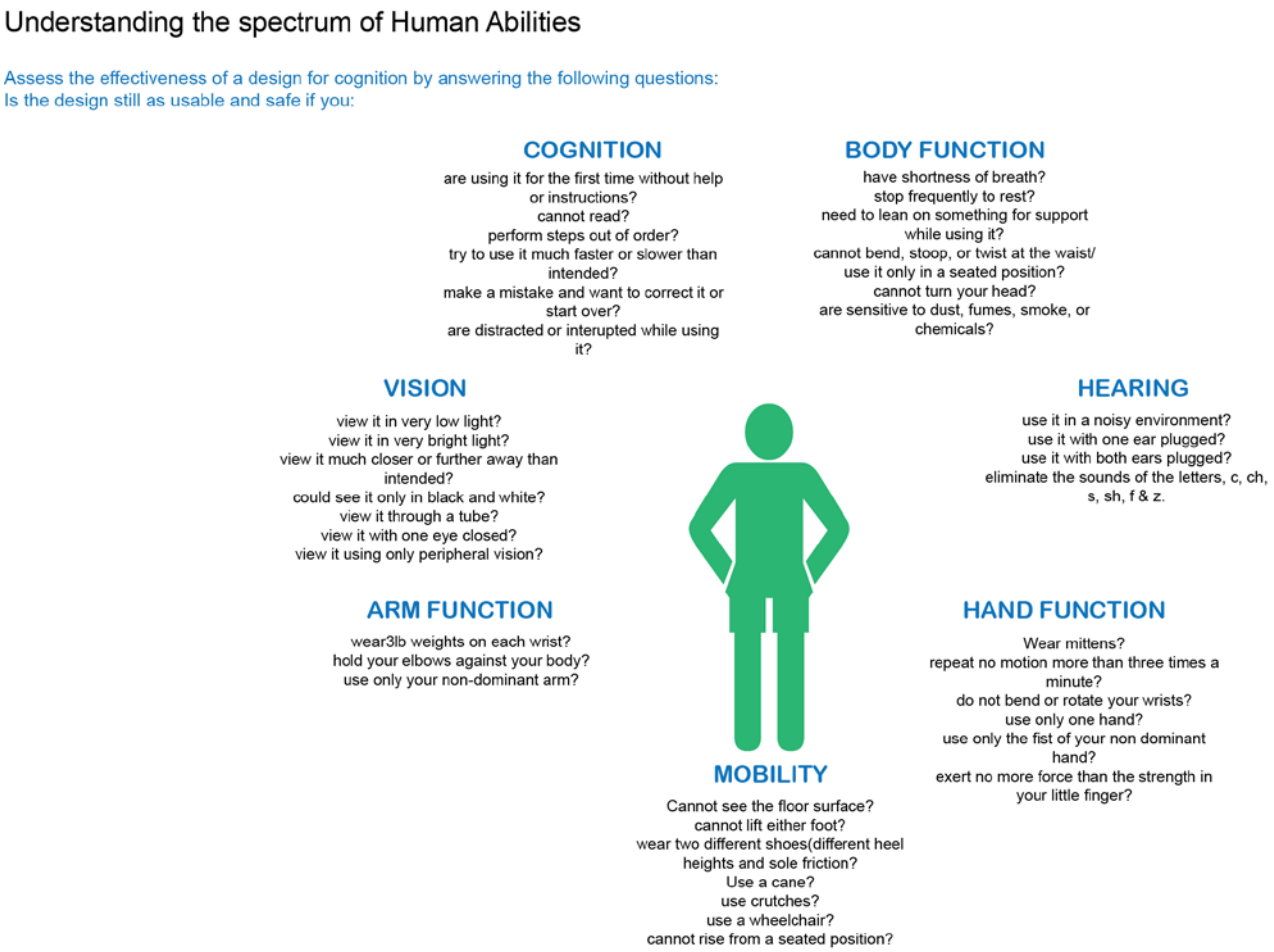


Figure 4 Interpreted from The Universal Design File: Designing for people of all ages and abilities, 1998 (Authors own)

The seven principles of Universal Design are as follows:

- **Equitable Use**: that all users maintain and enjoy the same usability experience, and do not segregate or stigmatise and user.
- **Flexibility in use**: For example includes considering the left/right handed user, accommodates the user's ability and precision for use. Considers the pace of users operation as well as the choice in methods of use.
- **Simple and Intuitive use**: considers the usability of a product and or service and ensures the users experience is not lessened irrespective of the user's learnt experience, knowledge, language skills, or current concentration level.
- **Perceptible Information**: Irrespective of environment or sensory abilities of the user, the design is still able to effectively communicate to the user all relevant and necessary information
- **Tolerance for error**: potential hazards are considered and minimised in order to lessen and remove risk or harm to the user.
- **Low Physical effort**: Does not fatigue the user in normal user conditions
- **Size and Space for approach and use**: considers the size and space required to ensure ease of approach, reach, manipulation, and use, irrespective of the user's body size, posture, or mobility.

Adapted from (Story et al., 1998)

There are other channels of 'User Centred Design', namely participatory design, co-design and inclusive design All these share a common ground - interconnect the importance of user involvement in the process of design.

Part One Review

Part One has positioned and stated the various needs for the demographic ageing population to be explored. It discussed how ageing can present limitations to our ability to function independently as we grow older. In addition the predicted rate of population growth highlights a position for designers to be influential in creating positive experiences for older users and their use of products and services.

Designers have ability to empathise and define product and service requirements with an objective to enhancing the quality and experience of ageing. With specific reference to ageing and design considerations, the model of 'Transgenerational design' was suggested by James Pirkl, as a means to consider the unique needs of the Older Adult as the 'user'. In addition the value of Universal Design must be considered because its principles and reference to the spectrum of human abilities are critical to designing for the Older Adult. The challenges of ageing require understanding of a demographic with unique needs that may be met, unmet or identified with no required needs in a particular context of day to day living. Finally the concept of Shared Usability must be explored within the context of day to day experience for the Older Adult and their interaction with other stakeholders who may support them and "*add life to years" (ESRC, 1999).*

Part Two – Shared Usability

The global ageing demographic highlights the need to address future requirement for an evolving Older Adult population. Fundamental to this are the products packaging, media, information technology, workplace features, transportation and private and public spaces needs that must be considered (Farage et al., 2012) Products and services need to be designed with consideration to how, and in what way Older Adults are supported in their everyday lives. Usability will be discussed in this chapter as an important factor to consider in the design of products for Older Adults.

The concept of 'Shared Usability' will be introduced and discussed as an empowering concept that provides autonomy to the Older Adult whilst offering a supportive aspect of mutual agreement with a network of Associated Stakeholders.

To support the development of 'Shared Usability' two ISO Publications were selected that define and discuss usability. These facilitate expansion of 'usability' to incorporate the position of other stakeholders and their support to the Older Adult user.

The conclusion of Part Two will present the research hypothesis in addition to a definition of 'Shared Usability' that directed the researcher throughout fieldwork and through to research outcomes.

2.2.1 Usability Definition

The International Organisation for Standardisation is a global body with technical committees that work with International Organisations, Government and Non-Government bodies. It defines and determines standards of quality and expectation to Industries and other related groups. Publications from this organisation were used as a means to develop the concept of Shared Usability. Definition and understanding of usability were offered from two main publications –

- **ISO 9241-11:1998** - Ergonomic Requirements for office work with Visual display terminals (VDTS) - Part 11: Guidance on Usability.
- **ISO/TR 16982** – Ergonomics of human-system interaction – Usability methods supporting Human Centred design.

2.2.2 ISO 9241-11:1998

To understand usability more formally, this standard part offered two supports to this research:

- It offered a definition of usability.
- It offered guidance to plan for usability as part of the design process.

Definition of Usability:

The ISO 9241-11:1998 defines usability as follows:

> *"[the]…Extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use".* (ISO, 1998, part 3, 3.1)

The User is defined in ISO 9241 as *"the person who interacts with the product"*. (Part 3, 3.7) The intended goals are the outcomes of the use or interaction with the Product. The effectiveness, efficiency and satisfaction are gauged based on the context of use and experience for the user.

The usability framework in figure 5 as displayed from the standard (ISO 9241-11). It describes the components of usability and the relationships between them to the user.

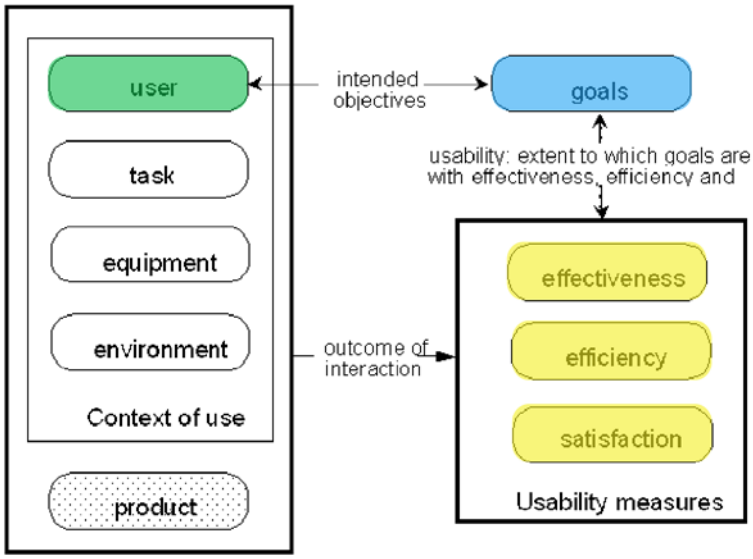


Figure 5 Usability Framework - ISO 9241 - 11: 1998.

User Centred Design process prioritises the Users objectives of use when interacting with a product. ISO 9241 states the following information is required to identify the context of use as part of the design process:

- Description of intended goals
- Description of context of use components (users, tasks, equipment, environment)
- Intended or actual values of effectiveness, efficiency and satisfaction for intended context of use

Planning for usability:

This Standard part refers to guidance on usability and visual display terminals (VDT's) however it also states how the guidance offered can apply to *"other situations where a user is interacting with a product to achieve goals"*.(ISO, 1998. part1-scope)

The awareness and planning for usability needs to considered and implemented as part of the design process as a critical factor to positive experience for the user

> *"Planning for usability as part of the design and development of products involves the systematic identification of requirements of usability, including usability measures and verifiable descriptions of the context of use. These provide design targets which can be the basis for verification of the resulting design."* (ISO 1998. 9241-11. 1998. p.2)

2.2.3 ISO/TR 16982: 2002

This technical report highlights the importance of support for usability evaluation and consideration through the process of design. It discusses existing usability methods that are used individually or collaboratively. Furthermore, it details the advantages, disadvantages and any other relevant factors to the range of human centred usability measuring methods that need to be considered for design outcomes.

> *"The benefit of a Human centred Approach includes increased satisfaction and productivity, enhanced quality of work, reductions in support and training costs and improved user health and wellbeing."*(ISO 2002, p.2)

The technical report gathers information from four other standards, namely – ISO 9241 (all parts), ISO/IEC 12207, ISO 13407:1999 and ISO/IEC14598 (all parts) Referring to ISO 13407, the report highlights the four basic principles in deploying usability methods (ISO, 2002, p2)

- Appropriate allocation of function between user and system, based on an appreciation of human capabilities, and demands of the task.
- Active involvement of users in order to enhance the new system and its acceptance.
- Iteration of design systems to entail the feedback of users following their use of early design systems.
- Multi-disciplinary design teams to allow a collaborative process which benefits from the active involvement of various parties, each of whom have insights and expertise to share.

This, in turn identifies four key human centred design activities: (ISO 2002, p2)

- Understand and specify the context of use. This information can be gathered via a variety of methods.
- Specify the user and organisational requirements.
- Produce designs and prototypes.
- Carry out user-based assessment.

These are undertaken from the outset of a process and are reflected on and iterated or modified throughout the process of design until the usability objectives are achieved.

In order to carry out usability understanding and testing it is important to "*determine users' knowledge, capabilities and limitations relative to the tasks for which the product or system is being designed*" (ISO, 2002, p 3). By using the information gathered the report states usability will be maximised.

A second focus mentioned in this technical report is the importance of evaluation. This area covers the need to assess "*design on a particular dimension or against a model*" (p.3). For example interface features, other standards, any recommendations or relevant statistics or data gathering, even the measure and use of other models similar for the particular context of use being defined (examples of information gathering usability methods are interviews, observations, error logging, questionnaires to name a few). This focus can deliver quite defined and accurate reference areas that the designer can use to support the design focus or understanding of the User and in turn diagnose problems to facilitate design and redesign.

From this report it is clear that various usability methods can focus on design and evaluation collectively or individually. The active involvement of users is seen as a key factor to the process, however it also states and shows how methods may or may not require direct involvement of users.

Developing a concept of Shared Usability creates a challenge to empower an individual user (the Older Adult) in their use and experience of a product or service. It requires clarifying how they can be supported further by the input or assistance of other stakeholders if required. This technical report assists with this consideration because it discusses the relevance of usability methods to various areas, from the environment of use, user characteristics, task characteristics and knowledge and/or experience of use.

The two usability standards described provide a useful guide and an important understanding of usability; however these cannot be used in isolation. Involvement of end users in design research needs to be central to the creation of any new product or service, moreover the evolving, redesigning or iteration of something already in existence. (DreyfussH;, 2012 Ed., Papanek;, 1985, Norman, 2002, Demirbilek, 1999)

2.2.4 Product Design Usability

Reiss describes successful or positive usability as a natural accepted way of behaviour that is "*not talked about*" (2012 P. xxii). Usability is a nuanced and subjective human activity. Defined statements of usability are required to gain understanding; however subtle human behaviours and qualities are also required to be understood.

Reiss discusses usability holistically, expressing how usability is a factor in products and services that we engage with daily "*from the way my can opener works in the kitchen to how my passport works in a distant country*". (2012, P. xviii)

Usability is not a "*single, one dimensional property of a user interface*" (1993, p.26). The components of Usability listed by Nielsen are broad and complex including, "*learnability, efficiency, memorability, errors and satisfaction*" (1993, p.26)

- ***Learnability:*** *The system should be easy to learn so that the user can rapidly start getting some work done with the system.*

- ***Efficiency:*** *The system should be efficient to use, so that once the user has learned the system, a high level of productivity is possible.*

- ***Memorability:*** *The system should be easy to remember, so that the casual user is able to return to the system after some period of not having used it, without having to learn it all over again.*

- ***Errors:*** *The system should have a low error rate, so that users make few errors during the use of the system, and so that if they do make errors they can easily recover from them. Further catastrophic errors must not occur.*

- ***Satisfaction:*** *The system should be pleasant to use, so that users are subjectively satisfied when using it; they like it.* (Nielsen, 1993, p. 26)

If Positive Usability is not the experience the User has it could be then called Negative Usability - by this it is an experience deemed not productive and prevents a positive and enjoyable experience for the user. This could also express a lack of quality or consideration for the User and their entitlement to enjoy use.

Further discussing how Usability can perform and impact on the experience the User has, Jordan also defines principles that relate to User Experience, and if these principles are considered and implemented it can lead to positive User experience and Usability.

Ten Principles of Usable design (Jordan, 1998)

- Consistency
- Compatibility
- Consideration of user resources
- Feedback
- Error prevention and recovery
- User control
- Visual Clarity
- Prioritisation of functionality and Information
- Appropriate transfer of Technology
- Explicitness

According to Jordan, each of these principles are valid during the design process in ensuring positive usability experience for the User providing each principle has been acknowledged and placed appropriately . These principles are not the only ones to consider; ISO 9241 also refers to further attributes to context of use in Annex A (ISO 9241-11:1998 –Annex A)

In order to develop positive 'Shared Usability' it is important to note the diversity of all users involved in order for a successful positive usability outcome. Endorsing the point of User involvement and consideration, Human Computer interaction design as having to

> *"be concerned with understanding user's current situations or practices and with envisioning future or alternative situations or practices"* (Steen, 2008, P.30)

In product Design terms User involvement must be seen as central in the creation of any new product or service and likewise, the evolving or iteration of something already in existence.

> *"After all, a user centred design approach to design is meaningless without knowing who the users are."*
>
> - (Jordan, 1998, P.39)

Engaging and encouraging users to be curious and expressive of products can create a feeling of empowerment or independence in what the user uses, and how they use it. This confident approach indicates how the involvement of others supporting the User/Older Adult in the operation of a product or service through Shared Usability as acceptable and not undermining.

To work towards a positive usability experience, the designer also needs to specify and identify fully the user, and their needs. With this in mind Jordan further discusses how User characteristics, namely – Physical and Cognitive need to be fully assessed and understood.

(P) Physical characteristics:

- Height
- Weight
- Reach
- Strength
- Ability

(C) Cognitive characteristics:

- Existing and/or specialist Knowledge
- Attitudes and Expectations around use
- Consistency
- Compatibility

To further develop product with these characteristics, the methodology and requirements capture become a priority to developing and defining a design solution.

(R) Requirements capture:

- Usability Specification
- Iterative design & Prototyping
- Product specification
- Visual Prototypes
- Models
- Screen Based Interactive Prototypes
- Fully working Prototypes

In summarising if the designer approaches the design process with an outcome consideration for Positive usability, to achieve this

P + C + R = Positive Usability

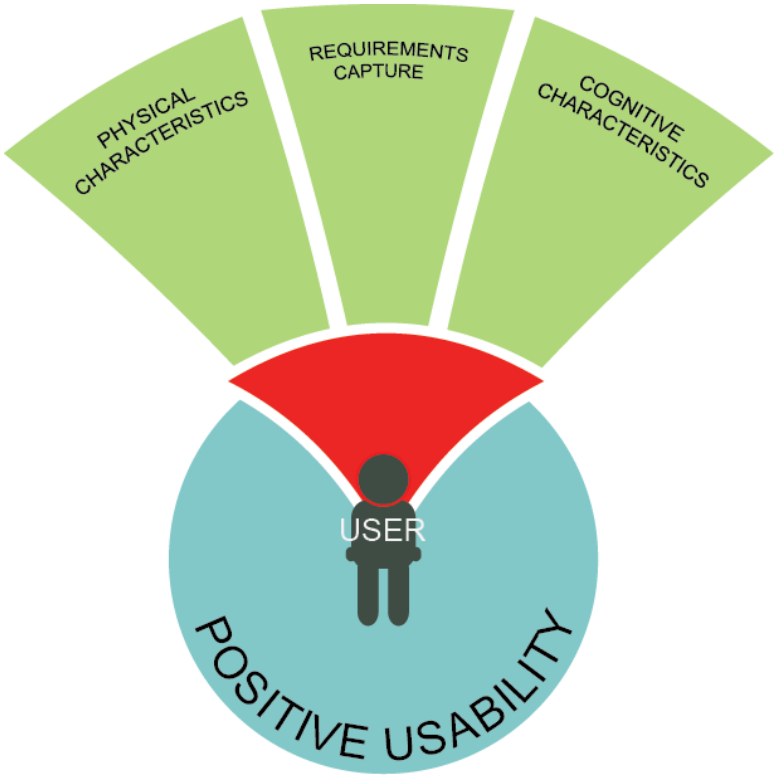


Figure 6 Formula interpreted from Jordan as a means to develop positive usability (Authors own)

Physical and cognitive elements were placed also as a priority in the design process. The image in figure 7 displays a funnel of wellbeing needs for the Older User by White. This framework design illustration was intended to show how 'Shared Usability' could be developed with the Older Adult as central to ensuring perceived independence and empowerment even if there was a requirement of intervention from other stakeholders.

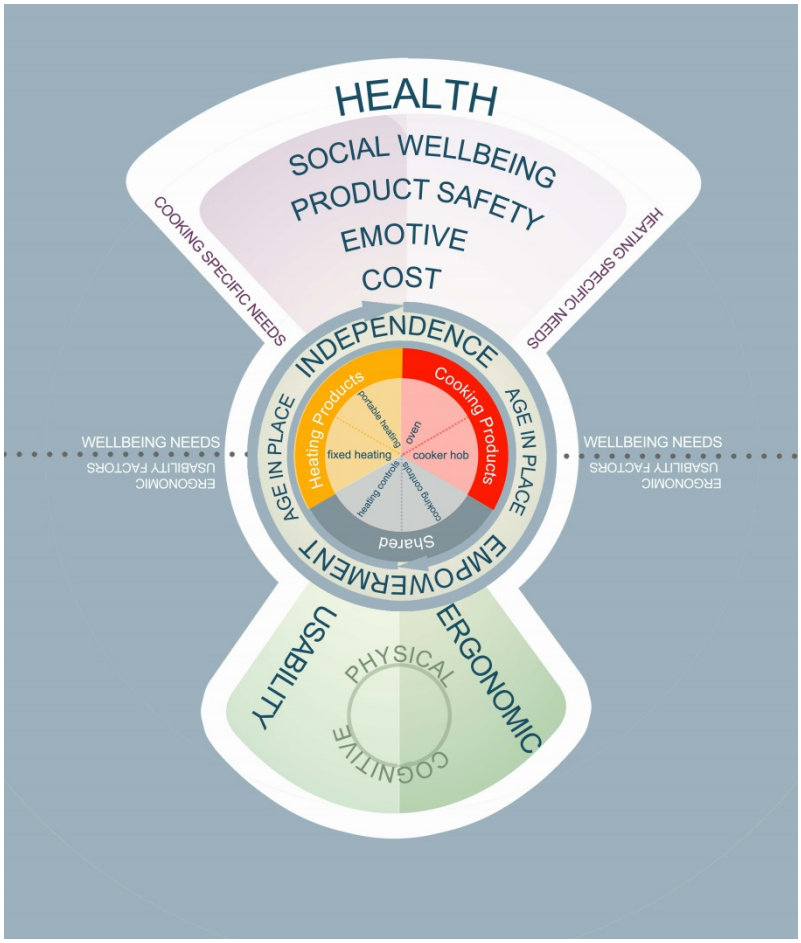


Figure 7 Framework design illustration – (White,PJ. 2012)

Shared Usability as a concept has benefits for the Older Adult, knowing there is a support structure around how a product or service is provided (a network of support from Family & Friends, professionals, as well as smart devices and Company or Service providers). This will offer reassurance to maintain confidence and perceived independence in product or service use.

To consider or focus on the User specified, that being the Older Adult, it should be acknowledged that by defining the 'user', the principles that allow for usability need to be incorporated ensuring the experience for this user is as emotive and positive.

2.2.5 Sharing Usability – User Autonomy

The concept of 'Shared Usability' offers the Older Adult potential to remain empowered and independent by choosing whether or not to seek support from Associated Stakeholders when using a product or service. It suggests a provision of"*...levels of usability assigned to products. ...involve[ing] an agreement by both parties as to what levels of usability are controlled and by whom and assigned into a functional input on the product."* (White;P;J., 2012, P.192)

Shared Usability should not restrict control for the Older Adult user. Shared Usability should offer the Older Adult assertions to selecting how they engage and interact with products daily to maintain" *independence and age in place with dignity and self-sufficiency*"(White. P.J., 2012, p.192)

Freedom of choice for the user is fundamental to Shared Usability. The motivation for the user to participate collectively offers an awareness of choice and control over participation. Wikipedia and the NASA 'Clickworkers program'[5] are examples of user autonomous involvement and choice to engage in a project.

Yochai Benkler and Helen Nissenbaum (H; 2006) in their paper titled 'Commons based Peer production and Virtue' discusses the motivation behind people offering to participate collectively. They list and highlight the choice users have, as volunteers to engage in a project. This choice and freedom also allows the Users to be aware of their control over participation – they are free to participate or stop when they choose.

"People contribute for a variety of reasons, ranging from pure pleasure of creation, to a particular sense of purpose, through to the companionship and social relations that grow around a common enterprise" (Benkler;Y. and Nissenbaum;H., 2006, p403)

The User for this research has been defined as the Older Adult. The question of motivation they have to use and engage with products and services needs to be explored. This determines research requirement to enquire and discover how the concept of 'Shared Usability' that comprehensively offers insight to its validation.

[5] 'Clickworkers' was a collaborative project involving tens of thousands of volunteers that classified and documented the craters on the Planet Mars as part of a larger based project involving NASA scientists. This project as discussed by Benkler could have taken many months for Ph.D science researchers alone to document and analyse the data. During the first six months of the program over 85,000 people visited the site and assisted the program.

2.2.6 Associated Stakeholders

Krippendorff & Butter refer to a '**network of stakeholders**' as one of the four conceptual pillars that support Human Centred Design. (2008) This section will discuss the network of stakeholders as described by Krippendorff & Butter. They discuss how, in addition to the user there are various stakeholders that become the 'network of stakeholders' relevant to the design outcome.

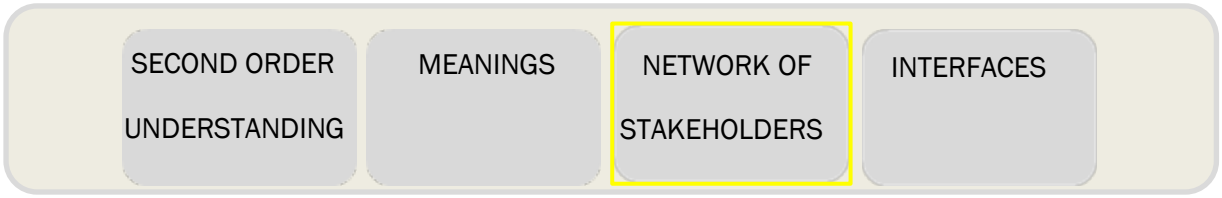


Figure 8 Four Pillars that support Human Centred Design as interpreted from Krippendorff & Butter 2008 – (Authors own)

The User is described by Krippendorff & Butter as almost a figment built out of a "*rhetorically convenient illusion that designers offer their clients in justifications of their design*" (2008, p.358). There is a hierarchy of priority placed around the other considered stakeholders from clients who represent the business, financiers, engineers, market researchers, merchants, governmental agencies, buyers (not the user), repairpersons, recyclers, ecological activists, and others who will "*variously experience a design and collectively affect its fate.*" (2008, p.358)

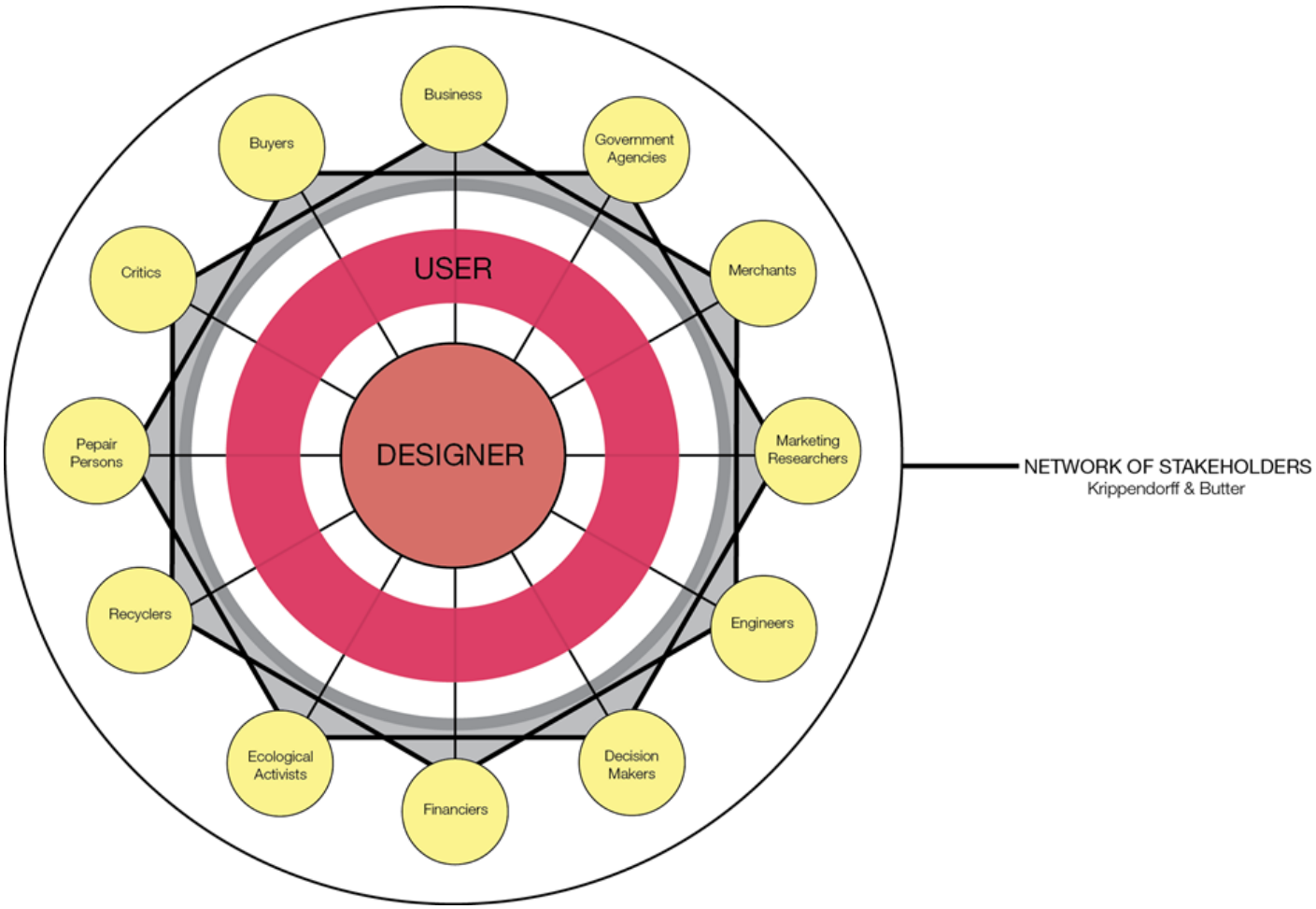


Figure 9 Network of Stakeholders Krippendorff & Butter 2008 (Authors own)

> *"Human-centred designers must acknowledge the critical role of stakeholders – supporters and opponents – welcome their active roles in bringing a design to fruition, and see themselves not as masterminding the process, but as active participants in such networks as well."*
>
> - (Krippendorff & Butter, 2008, p.358)

The development of Shared Usability must offer an evolve from the transfer of network of stakeholders as described by Krippendorff & Butter, to be a network of 'Associated Stakeholders' that are more directly involved in the life of the Older Adult.

Krippendorff & Butter's **network of stakeholders** expresses the responsibility of the designer to consider more than the user in the process of design, but from the perspective of the stakeholders involved in the development and delivery of concept to product development for the user.

This research evolves the network of stakeholders to one that provides a support framework for the user through the network of **Associated Stakeholders** for Shared Usability when using products or services and is displayed in figure 10.

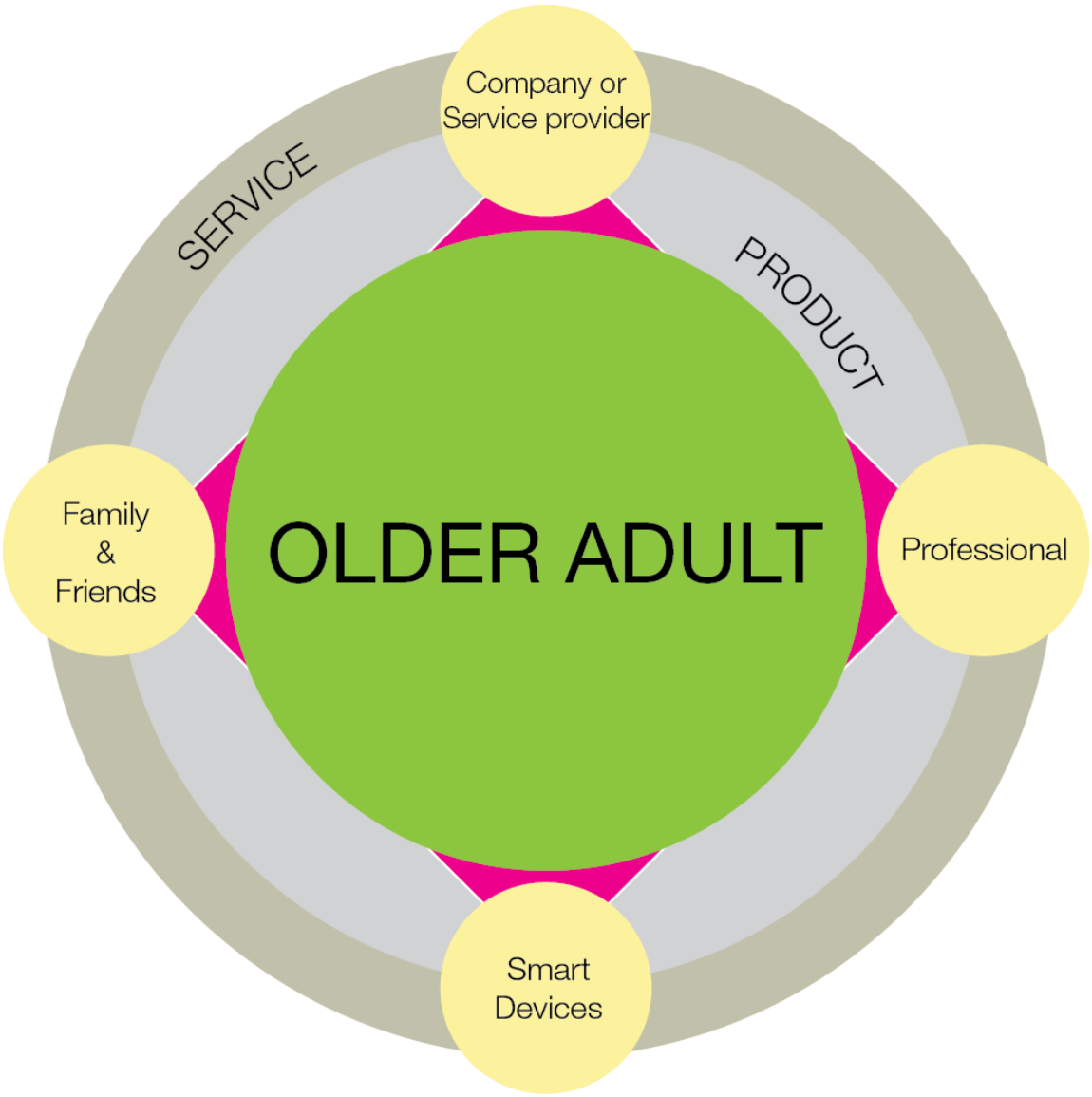


Figure 10 Network of Associated Stakeholders -Shared Usability – (Authors own)

The Older Adult user is positioned in an autonomous central position that can seek support from Associated Stakeholders (Family & Friends, Professionals, Company or service providers or Smart devices[6]) when interacting with products or services.

[6] An electronic device generally connected to other devices or networks via different protocols such as Bluetooth-NFC-WiFi-3G- etc. that can operate to some extent interactively and autonomously – Collins Dictionary, 2015

2.2.7 Shared Usability - Hypothesis

Prior to conducting further research including field research a hypothesis was created. The hypothesis framed the research and offered direction to conduct fieldwork sessions. This also supported evaluation and rationale to pursue design outcome to research.

Shared Usability involves the participation of the User agreeing levels of usability with the network of Associated Stakeholders (3.6). The research hypothesis needed to highlight the potential of Shared Usability as an activity that empowered the Older Adult, while offering support from Associated Stakeholders.
The literature review was clearly identifying reasons to pursue and understand Shared Usability. In addition it also highlighted the requirement to study and observe Older Adults as a means to understand and define Shared Usability.

The research Hypothesis states:

"It is possible to empower Older Adults through Shared Usability by mutually agreed intervention with other stakeholder(s) when using products or services."

Figure 11 illustrates the hypothesis prior to field research.

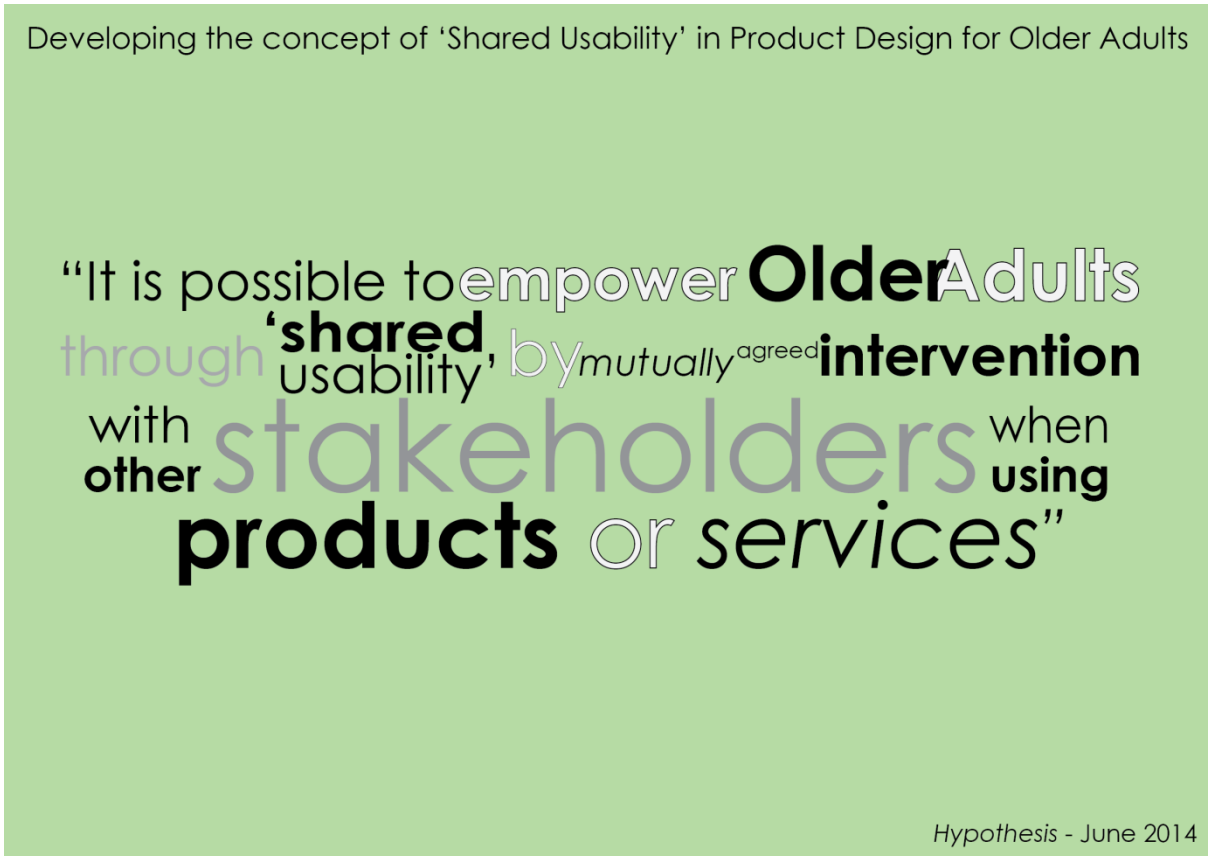


Figure 11 Research Hypothesis – (Authors own)

2.2.8 Shared Usability - Definition

The Literature review supported the concept of 'Shared Usability'[7] as a feature of day to day behaviour and experience that is often determined but not defined.

Usability and its definition- *"extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use."* (ISO 1998, Part 3., 3.1) provided guidance to supporting the user and their experience with use of a product.

The fieldwork determined that the development of Shared Usability in Product Design required the involvement of a network of 'Associated Stakeholders' with the Older Adult, if required, as a means to experience positive usability when using products or services.

[7] Shared Usability was introduced by White as *"levels of usability assigned to products. This could involve an agreement by both parties as to what levels of usability are controlled by whom and assigned into a functional input on the product"*WHITE;P;J. 2012. *Designer as Ethnographer: A study of domestic Cooking and Heating Product Design for Irish Older Adults.* Ph.D, National University of Ireland, Maynooth..

A more inclusive or universal approach to User Centred Design process would accommodate the definition of 'Shared Usability to support

> "*understanding and looking beyond the aids and adaptations of the past to a mesh of new products, services, environments, and information that could support lifestyles of choice, delivering real quality improvements and pleasure in use.*" (Coleman 2011, p. 21.1)

Universal design[8] principles were considered for the conceptual stage of research. However an argument that positions a 'Design for all' approach as discussed by Kercher, 2008 suggested a more supportive developer to 'Shared Usability' in design.

> *"Design for all relies on the involvement of potential users, where this means not only the end users, but all those involved in the design, development, production and marketing processes."* (Krauss 2011, p. 13.2).

The main area of difference relates to the fourth Universal Design principle –

> *"The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities."* (Story, Mueller et al. 1998, Principle four., p34)

For the fieldwork the researcher used a Design for all approach to be inclusive of the User and their autonomy to involve Associated Stakeholders. The outcome of these mutual levels of use is intended to provide positive usability experience for the Older Adult through the mutual agreed levels of use.

Knowledge gained from the fieldwork concluded that 'Shared Usability' was experienced in day to day tasks and life for Older Adults. However 'Shared Usability' was undefined and not identified as an activity by the participants. If 'Shared Usability' was to become a tangible consideration for a design process it required definition.

[8] Universal design was defined and created by the wheelchair limited Architect, Ron Mace, defining it: *"Universal design is the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design."* NATIONALDISABILITYAUTHORITY 2012. http://universaldesign.ie/What-is-Universal-Design/Conference-Proceedings/Universal-Design-for-the-21st-Century-Irish-International-Perspectives/. Ireland. He was one of the creators of the principles of Universal Design as developed in 1997 by North Carolina University. This was an outcome of research that had defined a *"concept that addressed the common needs of people with and without disabilities"* FOLLETTE-STORY, M., J.L., M. & R.L., M. 1998. The Universal design File.

The definition of Shared Usability provided validity to pursue the conceptualisation stage of this research.

Mutual agreement between the User and Associated Stakeholder(s) on the levels of management or interaction required with a product or service as an objective to achieve positive usability.

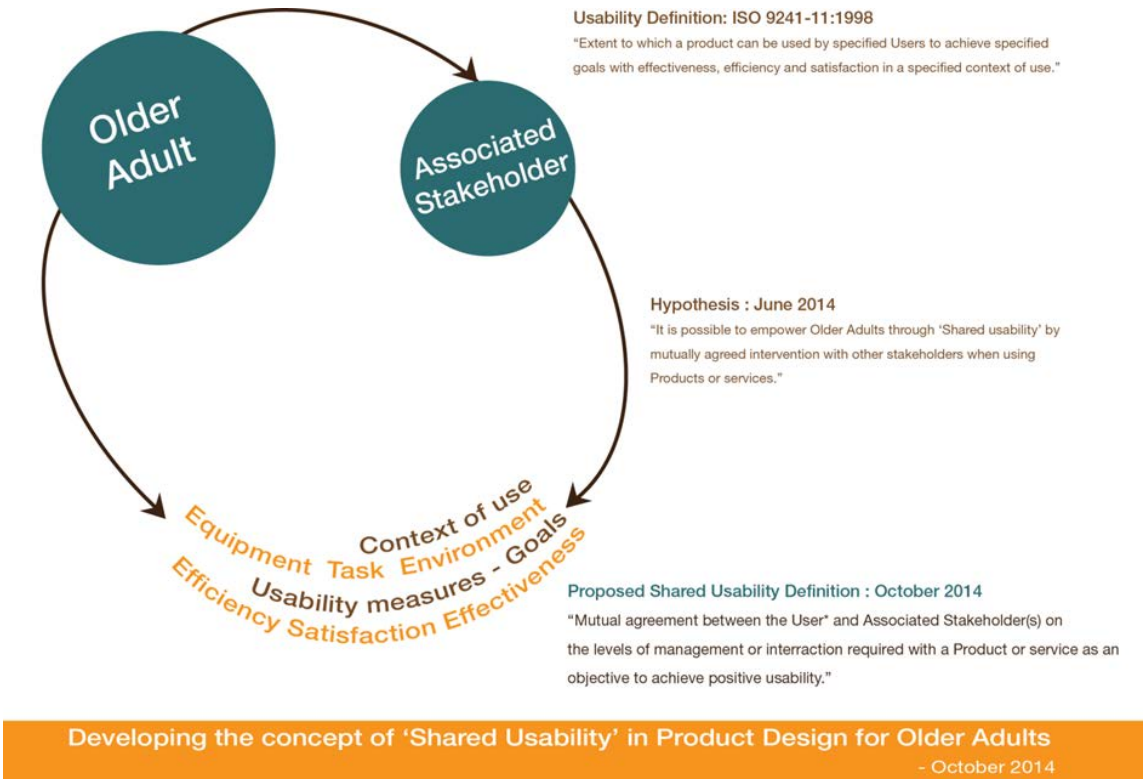


Figure 12 Infographic displaying the definition of 'Shared Usability' development.

In conclusion, the definition of Shared Usability promotes the involvement of the Older Adult, and the agreed support with the Associated Stakeholder in the positive use and experience of products and services. This would provide empowerment to Older Adults, despite the challenges that ageing can present.

> *"If executed correctly it could allow older people maintain independence and age in place with dignity and self-sufficiency."* (White.,P.J. 2012., p. 192)

Part Two Review

Part Two reviewed the definition of usability through ISO Publications (ISO 9241-11:1998: ISO/TR 16982: 2002). It followed by positioning these in relation to Product Design and how Shared Usability could offer relevant insight to future product design consideration.

In addition it discusses the autonomy of the Older Adult and their ability to remain empowered and independent should they require assistance or support from associated stakeholders when using products or services.

It continued with a hypothesis that directed a requirement to conduct fieldwork study as a means to understand the Older Adult and their day to day experience. In addition the Hypothesis became the catalyst that would seek to affirm the findings of the Literature review by the activity of gathering information and seeking a process to develop the research outcomes.

Finally a definition of 'Shared Usability' is presented which the researcher relied on as a support guide to the conceptual development and design outcomes of this research.

CHAPTER THREE - Research

Chapter Overview

The home of the Older Adult is central to ageing in place; it was also identified during the literature review as the domain where most natural behaviours could be observed.

This chapter will discuss the methods chosen to explore eight areas of day to day life for Older Adults living independently.

There are three parts to this chapter:

- **Research** – the considerations prior to fieldwork.
- **Fieldwork Methods** – the methods and activity of practice based research.
- **Analysis** – The defining, analysis and outcomes of fieldwork and product design areas.

The chapter will conclude with a review of the practice based research conducted. It will offer an account of the design process concluding in concepts. Finally it will express the benefits of 'Shared Usability' (White. P.J., 2012) as a positive empowering act for Older Adults when engaging with products or services.

3.1 PART ONE - RESEARCH

3.1.1 Areas of Research Enquiry

As a result of decline in sensory function, mobility, balance and memory ageing can have an impact on our ability to remain independent, (Farage, Miller et al. 2012). The Madrid plan of action on ageing states the requirement to support the desire an Older Adult has to age in a home of their selection and type (United Nations, 2002). These factors, combined with reduced fertility and birth rates determined the requirement to explore the viability of 'Shared Usability' for Older Adults.

The broad intent of this research was to identify unmet product and service needs within the day to day lives of Older Adult participants. At this stage of the research project there was a need to define the research methods to be conducted, for example, what areas of day to day life of Older Adults that would be researched within their home environment. To commence, a broad literature review was conducted to understand limitations people have in living at home in later life.

The International Classification of Functioning, Disability, and Health (ICF – World Health Organisation; 2001) offered a frame of reference to understand this (see Figure 13).This classification gauges individuals health or disability in context to their environment or ability. It offered support and guidance to the research by stating definitions and limitations to activities and experience a person may have throughout life. The classification is outlined in the 5 points as follows:

1. **Activity**: the execution of a task or action by an individual.
2. **Participation**: involvement in a life situation.
3. Activity limitations are difficulties an individual may have in executing activities.
4. *Participation restrictions* are problems that an individual may experience in life.
5. **Environmental and Personal factors** make up the physical, social and attitudinal aspects of the user. Defining the areas to observe the day to day life for Older Adults was identified further by the Information matrix published by World Health Organisation.

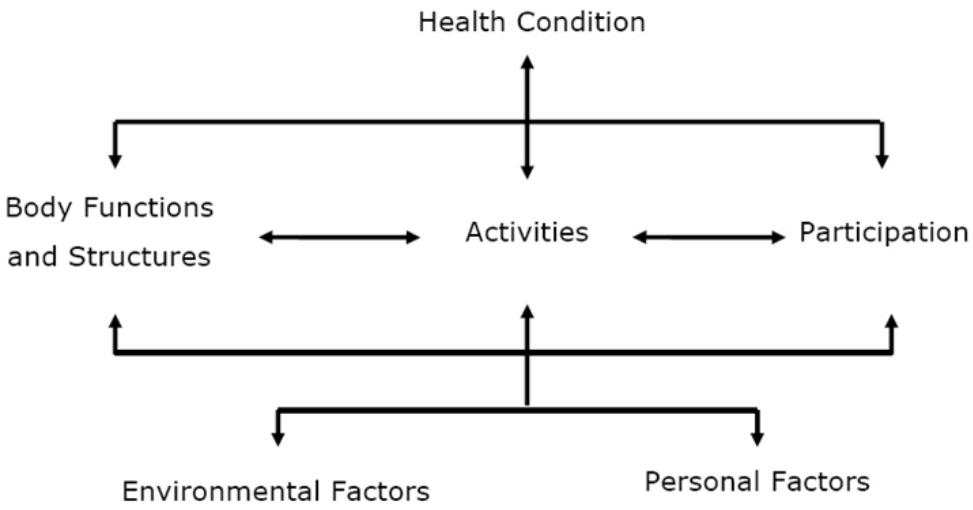


Figure 13 Framework for ICF - WHO, 2001

In addition to the International Classification of Functioning, Disability, and Health (WHO; 2001), the Information matrix (Figure 14) offered classification guidelines to consider the human factors need for this design research. It highlighted the potential enquiry areas associated with Activities and Participation, and how these can relate to contextual needs of the environment and person. This would assist the developing of the enquiry template (Life-logging template Appendix B 4) that would be used as a memo tool during the fieldwork.

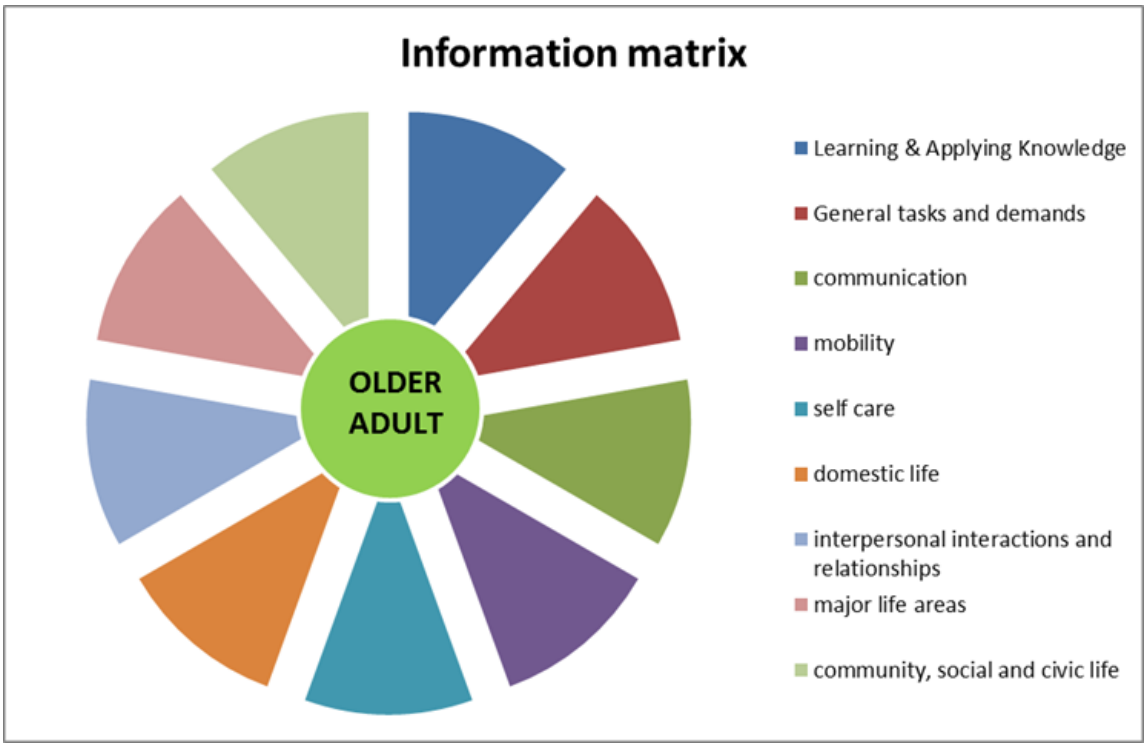


Figure 14 Information matrix as listed per ICF 2001 - WHO as interpreted visually (Authors own)

Finally, Parker and Thorslund's study of disabled elderly people in Sweden further assisted with defining areas of enquiry. It discussed the use of technical aids as a facilitator to ageing independently(Parker & Thorslund., 1991). Figure 15 was designed by the researcher as a means of interpreting the requirement needs of fieldwork for this project and was adapted as per the areas of enquiry conducted by Parker and Thorslund.

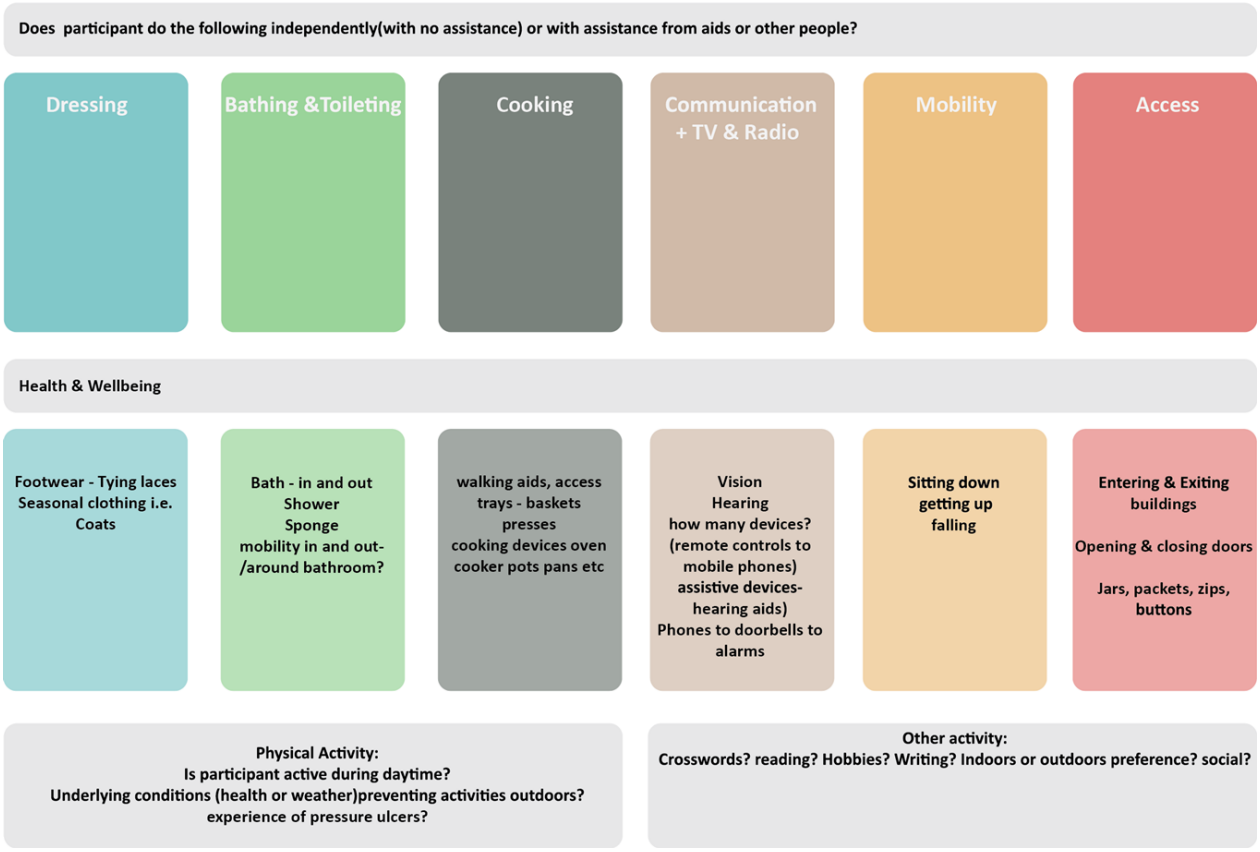


Figure 15 Adapted from 'The use of technical aids among community based elderly' Parker,M.G; Thorslund, M; 1991 (Authors own)

The opportunity to develop and define the concept of 'Shared Usability' now had a format and frame of enquiry. A format that would allow the Older Adult participants narrate their day to day life and experience. This format would allow to capture 'uncertainty 'and allow the 'User' to be involved in the process of research and design(Papanek; 1985, Demirbilek 1999, Button 2000, ISO; 2002, Norman 2002, DreyfussH; 2012 Ed.)

The first six areas to explore in fieldwork were seen as direct activity, and necessary to function independently:

- **Dressing**
- **Bathing & Toileting**
- **Cooking**
- **Communication, TV &radio**
- **Mobility**
- **Access**

The remaining two areas were considered more selective to choices and priorities people place in their day to day activities:

- **Interests & Activities**
- **Physical Functions/Limitations**

3.1.2 Ethical considerations

Prior to conducting any field research study it is important to understand ethical considerations required. Central to this research was a Human centric approach, involving users and considering their requirements, goals and tasks when using products or services. (Fisk, Rogers et al. 2012) Krippendorff also discusses the importance of users experience to design research.

> *"Human-centeredness acknowledges the role of humans in actively constructing artefacts – conceptually, linguistically and materially – being concerned with them, handling them, and putting them to work."* (Krippendorff & Butter, 2008. p.354)

As a result of this there was a clear requirement for this research to involve a sample of Older Adults participants.

Ethical considerations needed to be documented and authorised to support the parameters of enquiry. As the enquiry would be conducted within the context of the Older Adults domestic environment it has particular sensitivities. Furthermore ethical approval was essential to gaining access to participants, gatekeepers and other associated stakeholders.

The Information and consent form was created in consultation with the Ethics Committee at the Institute of Technology, Carlow and mindful of the obligation of care and duty to the participant, the Institute and the personal integrity of the researcher (Appendix B 3).
Considerations within the document included informed consent, privacy, harm, exploitation, consequences for future research (Atkinson et. al 1983/3rd ed 2007, p.209) to respect for the participant, confidentiality, minimising risk and *blood specimens*[9]

The consent form advised the participant comprehensively of the research project, it offered the participant choice to engage with or decline invitation. Additionally, it was clearly stated, that at all times the option and right to withdraw was available at any time. There was no requirement to consider the area of '*covert participant observation*[10]' (Atkinson and Hammersley, 2007, p.73). The times and schedules were agreed between researcher and participant as to when and how observation studies would take place. The gatekeepers (Associated Stakeholders) of the Independent living centre were informed of times or days when meetings were conducted.

3.1.3 Participant recruitment strategy

The recruitment of participants in order to 'sample[11]' of Older Adults was based on a Qualitative research approach.

> *"[whereby]..The researcher makes a strategic decision about what or who will provide the most information rich source of data to meet their analytical needs"* (Birks, M; Mills, J, 2011, p.11).

Invitations were extended to Older Adults known through friends or family circles living in two Counties (Dublin and Kilkenny) Family member(s) and Health professionals. The Manager of an Independent Living Centre in Kilkenny allowed the researcher access to invite residents to participate. One further Associated Stakeholder, a Health Professional, engaged with the fieldwork. This 'Initial sampling' (Robson, 2011) was defined to support and frame the activity of fieldwork and the emerging theory.

[9] considered not relevant for this research project

[10] Conducting the research undercover, the participant is unaware they are being observed or studied.
[11] The participants of this research would be Older Adults, as defined in Chapter one. For the purpose of fieldwork they are referred to as the 'population'.

The final sample for fieldwork included:

- Two Associated stakeholders (Independent living centre Manager, Occupational Therapist)
- One Associated stakeholder (family member)
- Eighteen Older Adults[12]

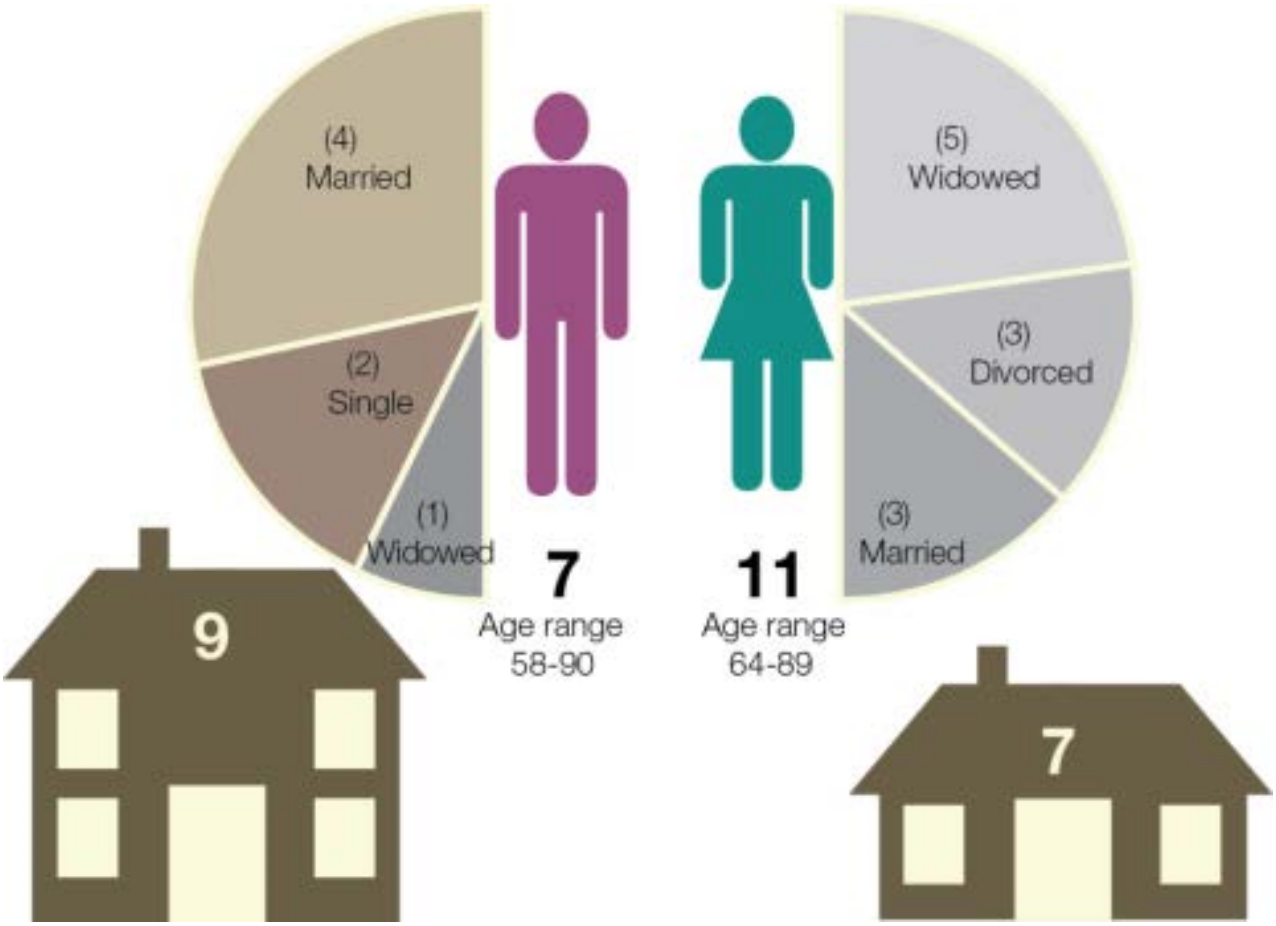


Figure 16 Infographic displaying breakdown the of Older Adult participants and their home types for this research (Authors own)

[12] Two of the Older Adult participants were observed conducting the 'Cooking' Task Observation in a Nursing home.

3.1.4 Data collection and storage

The gathering of data during fieldwork was recorded by written, audio and visual means during the Life-logging and Task observation sessions.

Specific ethical consideration was given to the anonymity of the participants, and their home environment. The 'Confidentiality/Anonymity' section of the Information and consent form notified the participant of the use of their information and imagery (Appendix B 3) during the life logging and task observation sessions. It also stated how data would be stored and destroyed, after an appropriate time or when the information is of no further significance to this research.

Part One Review

The preparation and planning of the first part of this chapter was crucial to understand the limitations and access required to conduct fieldwork.
The Fieldwork section of this chapter will explore the research methodologies and discuss the selection of methods suitable to the qualitative recording of data. The research design will demonstrate the benefits of these methodologies in relation to the fieldwork of unstructured enquiry and narrative between the researcher and participants.

3.2 PART TWO – FIELDWORK METHODS

3.2.1 Research Paradigm

This research is based on a grounded theory[13] approach. It was determined that a Qualitative study with an ethnographic approach would be an appropriate paradigm for this project.

> "*Qualitative research is endlessly creative and interpretive*"
>
> (Denzin, N.K, Lincoln, Y. S., 2005. p.26)

An ethnographic approach within Grounded theory was applied because - "*It crosscuts disciplines, fields and subject matters*" (Denzin, N.K, Lincoln, Y.S., 2005, p.2). Qualitative research accommodates an inductive approach to gather information, identify generalisations or themes from the data whereby theory becomes the "*end point*" (Cresswell, J.W., 2014, p.67).

Furthermore it has a constructivist approach whereby "*concepts and theories are constructed by researchers, out of stories that are constructed by research participants.*" (Corbin, J; Strauss, A., 2008. p.26).

3.2.2 Research Design

This research was divided into three main areas of enquiry. The *Introduction stage* involved the researcher learning and understanding what areas needed to be explored and was split into four areas:

- Literature review
- Ethics Committee approval
- Participant recruitment
- Pilot studies

[13] Grounded Theory was developed as a research enquiry that generated theory from data or information gathered during research. It was introduced by Glaser & Strauss in 1967 as an alternative method to developing research theory. It was further developed by Strauss & Corbin with a consideration that prior to fieldwork or research it was appropriate to consider existing theory.

The *Second stage* of enquiry involved the researcher conducting fieldwork with Older Adult participants. There were two parts to this stage:

- Life-logging sessions
- Task Observations

The *Third stage* of enquiry was one of triangulating the data gathered in the previous two stages as a means to formalise research outcomes. This stage was the implementation of the knowledge gathered resulting in three clear outcomes:

- A recorded in-depth fieldwork study of sampled Older Adults
- Conceptual product outcome
- Definition of Shared Usability

As these stages were conducted, it was important to incorporate periods of reflection and review to ensure activity was being measured to research outcome objectives.

3.2.3 Introduction stage

This introduction stage of enquiry involved the composition of a Literature Review together with conducting informal observations of people to generally understand the concept of 'Shared Usability'. At this point there were initial discussions with the Ethics Committee, IT Carlow to seek guidance and discuss the ethical issues to be addressed. At the conclusion of this stage, and the beginning of the second stage of research, the Ethics Committee, approved the plan for fieldwork. There were three Pilot studies conducted prior to the main fieldwork in order to define the appropriate method of enquiry supported by the Literature Review.

3.2.4 Second stage

The Second stage involved the researcher conducting enquiry with Older Adult participants. The researcher used qualitative methodologies with an ethnographic approach to observe and develop understanding of Older Adult day to day experience and behaviour. Ethnography *"involves the researcher participating, overtly or covertly, in people's daily lives for an extended period of time."* (Atkinson, P., & Hammersley, M., 2007, p.3).

The researchers own experience and building of knowledge throughout the fieldwork would support the development of the research. Through interaction between the participants and the researcher it would provide beneficial insight that would develop empathy as an objective measure to research outcomes (Denzin,N.K., & Lincoln, Y.S. 2005). The researcher analysed the depth of knowledge gathered from the life-logging and task observation sessions as a means to underpin and define data. This data was then coded and indexed resulting in conceptual outcomes.

3.2.5 Third stage

The Third stage of this research triangulated the gathered field data and correlated it with the knowledge and learning from the Introduction and Second stages. To commence this stage; data was divided into themes and evaluated using design matrices to support evaluation and decision making. Three knowledge outcomes were identified as a result of this approach. This new knowledge was shown to support the Hypothesis at the conclusion of this research.

3.2.6 Qualitative Methodology – Ethnographic Approach

Frankel and Wallen state:

> *"The intent of ethnographic research is to obtain a holistic picture of the subject of study with an emphasis on portraying the everyday experiences of individuals by observing and interviewing them and relevant others."* (Creswell, 2013. p.207)

Ethnographic methods for this research involved interviews, observations, together with video and listening sessions with Older Adult participants. This allowed the researcher to "b*ecome intimately familiar with a way of life through learning its language and culture and living according to its regime"* (Anderson.B., 1997. p.6)

Ethnographic research allows for the ability to observe and deliver theory or outcomes based on learning from observing and experience (Collins, H. 2010). Furthermore, it focuses on the –

> *"broad patterns of everyday life that are important and relevant specifically for the conception, design and development of new products and services."* (Salvador, Bell et al. 1999. p.36)

Contextual Interviewing (Blomberg, Giacomi et al. 1993) was the main selected means of enquiry, specifically during life logging sessions with participants. Within this the fieldwork was allowed to be of an unstructured nature at times with a view to deliver elements of spontaneity. This form of method is encouraged by Woods & Roesler, (Schifferstein & Hekkert., 2008). This is seen to be beneficial to understanding human activity and behaviour in a user involved, or user centred design research process (Blomberg, Giacomi et al. 1993).

3.2.7 Fieldwork Equipment

A wearable camera the 'Autographer' was selected as the primary data collection device. Once the Autographer was switched on, it passively captured images during the life logging and task observation sessions. This allowed for real time capture of moments without invasion. An iPad and iPhone were used as secondary visual and audio recorders. These devices would be placed with the approval of the participant. The iPad and the iPhone facilitated comprehensive capture of the fieldwork sessions.

This supported the researcher during reflection and transcription of data gathered. Furthermore, the researcher engaged in taking notes, and occasionally sketching ideas and details offered by the participant, all of which created holistic recording of the fieldwork.

3.2.8 Pilot Studies & Experiential understanding

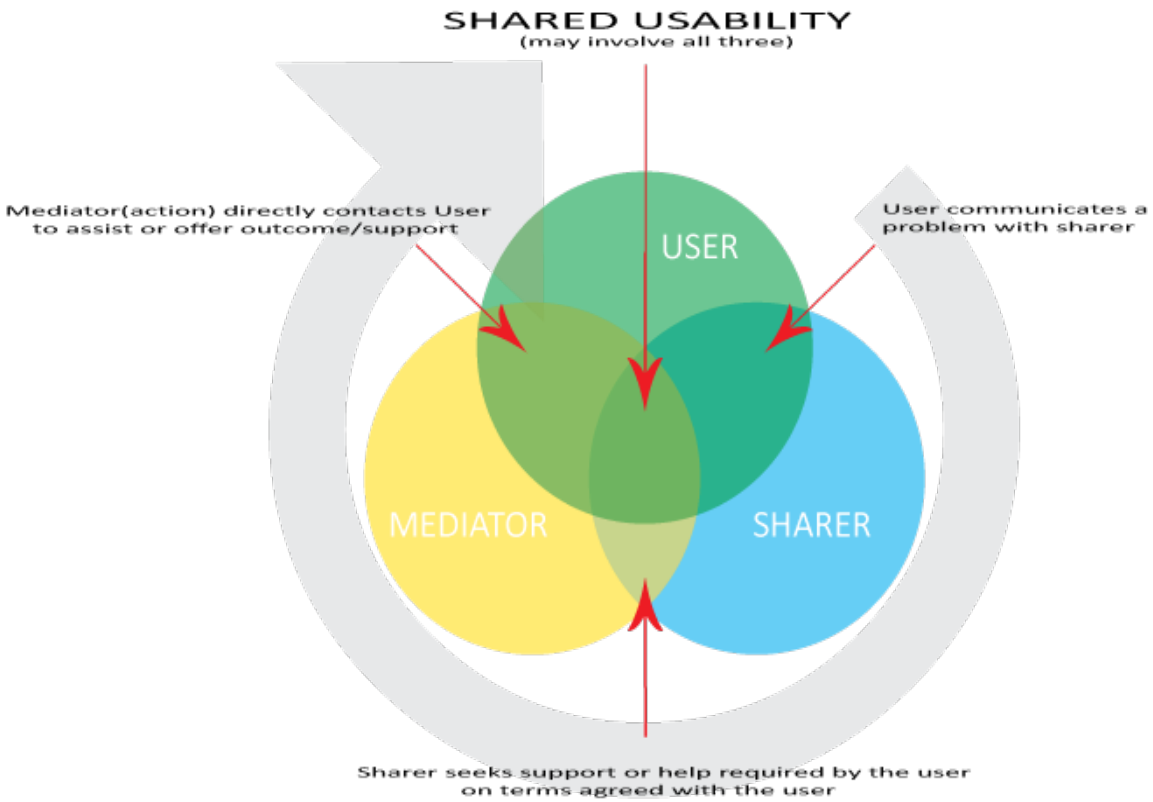
Pilot Studies were conducted prior to the main fieldwork as a support to the planned method of enquiry with the Older Adult participants. Pilot studies in Qualitative research are considered a formative driver to the broader fieldwork. Yin discusses the value of Pilot studies as a support to refining the *"data collection plans with respect to both the content of the data and the procedures to be followed."*(2013., p.92). Three Pilot studies were conducted:

1. Older Adult.
2. Associated Stakeholder.
3. Older Adult & Associated Stakeholder together.

In addition, a validation Field trip (Appendix C 4) to a specialist retail outlet was undertaken at conclusion of conceptualisation phase as a means to endorse research outcomes and knowledge.

3.2.9 Older Adult

The first Pilot Study involved an unstructured interview with an Older Adult. The researcher encouraged the participant to discuss and share some of her day to day activities. The primary intention of the researcher was to put the Older Adult at ease in their home, and to listen to the narratives offered by the Participant. This unstructured interview approach delivered deep holistic insights in preparation for fieldwork. During this Pilot study it was noted a first possible example of 'Shared Usability'. The participant was in the process of seeking a Home Insurance quote. The researcher created a conceptual map to capture this. This example is displayed in figure 17.



This framework is as a result of a meeting 18/02/2014.

The participant who is a 75 year old woman, lives alone but has daily contact with her son who is based in the UK.
The Participant shared how her home Insurance was due for renewal and she was experiencing difficulty getting a quote based on the fact her extended Kitchen has a Flat felt roof.

When she shared this with her son, he contacted a friend working in the insurance industry in Ireland.
The friend visited the participant and he went through all the information required directly with the participant in her home.

She is now awaiting upate/quote that will be sent directly to her.

Communication path framework - Shared Usability

Figure 17 Shared Usability example based on First Pilot Study (Authors own)

3.2.10 Associated Stakeholder

In the second pilot study the researcher met with a Health Professional. This meeting was a more structured interview than previous. The specific focus of which was to gain knowledge from a Health professional's perspective of caring for Older Adults. The Health professional discussed how Older Adults are assessed every three months in the Independent Living centre to ensure they are still defined as 'independent'. The assessment of 'independence' is applied from the 'Barthel Index of Activities of daily living'[14] (Appendix C 3). This is not the sole assessment tool used; however it is a primary collector of recorded data that can be gauged and assessed from previous indexes for a particular client.

The Associated Stakeholder shared a story of a recent change to the residential units in the centre as follows:

A new central heating system was installed and was the cause of some uncertainty for the tenants. The new system would create two 'zoned' areas and allow for better management of the home unit. Each digital control was set up by the Associated Stakeholder collaborating with the Older Adult residents heating needs for their personal home unit.

Once each control unit was set up, the occupants needed to do nothing more to manage the heating. However, a few of them came back to her saying this new system wasn't working, the Associated Stakeholder attended the home unit to investigate. The room temperature was set at a comfortable temperature range for the room, and also supported by a room temperature guide provided by Electric Ireland. However, the occupant was insisting they were feeling cold. The Associated Stakeholder commented how Older Adults like to sit close by the source of heat and when the new system would switch 'off' because it had hit the required room temperature it left the occupant feeling cold.

This story displays the activity of Shared Usability supporting Older Adults with the agreed intervention of the Health professional, and Electric Ireland as Associated Stakeholders. It also suggests a need for further design enquiry to consider The Older Adult and their perceptions of heat and comfort within the home.

[14] The Barthel Index is a simple to administer tool for assessing self-care and mobility activities of daily living. It is widely used in geriatric assessment settings. Reliability, validity and overall utility are rated as good to excellent. Information is gained from observation, self-report or informant report.{RACGP, 2015 #160}

3.2.11 Older Adult & Associated Stakeholder

The 3rd Pilot study was conducted with an informal approach. In this instance the Older Adult and her daughter were present. The meeting was conducted in the Older Adult participant's home. The Older Adult is widowed and aged 81. The daughter (aged 51) no longer lives in the same county as her Mother, however she visits regularly. The daughter is married, and has a family, she is very conscious of the reduced health quality of her Mother. On occasion she will ring her brother to check 'all is ok'.

Figure 18 Pilot Study Three; Older Adult & Associated stakeholder.

Despite the Mother having a number of health concerns, she has a good network of friends and family support living in the village. A question asked by the researcher to the daughter near conclusion of the session was what she admires most about her Mother. The daughter's reply: *"The will to live, to keep going and staying on the road, she likes to be in the middle of it all – to be involved".*

3.2.12 Product 'Experience' Session

In addition to the Pilot studies the researcher engaged in sessions experientially. The purpose of these sessions was to build understanding of products or activity conducted by Older Adults and is displayed in the series of images (Figure 19). This understanding was explored as 'experientially' or as 'contextually' as possible. An 'assisted' bath was experienced by the researcher from an Older Adult's perspective. Assistance and support was offered by an Associated Stakeholder in this instance a health professional.

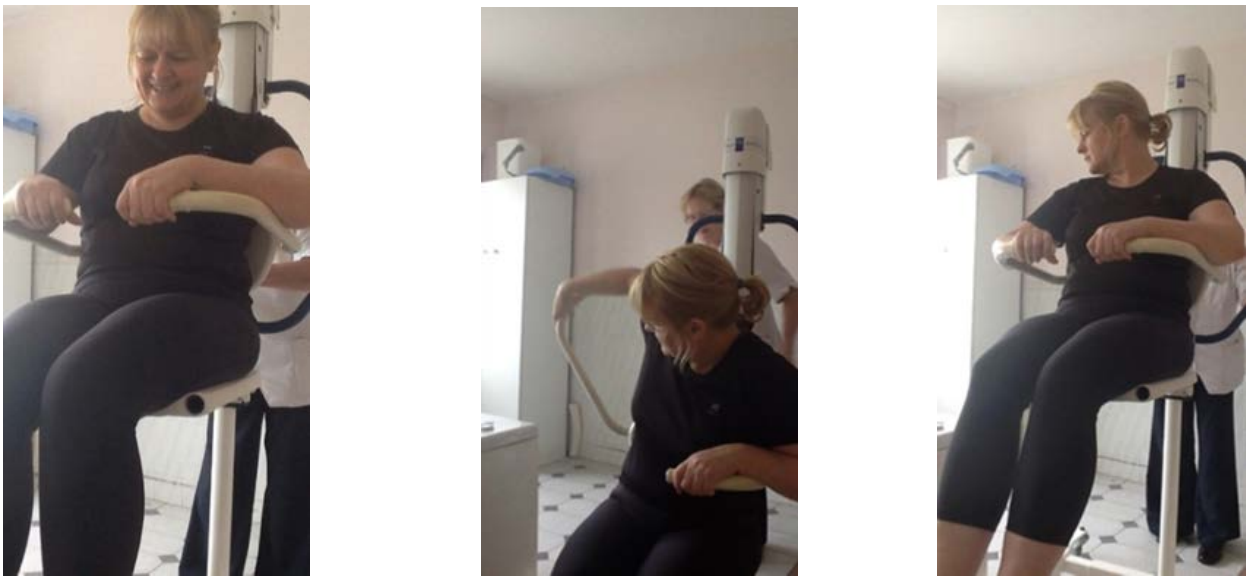


Figure 19 Assisted bath experience - researcher & Associated Stakeholder.

3.2.13 Field Research

The main field research was commenced after the pilot studies and product experience session

The format of the field research would involve two particular themes –

1. Life-logging sessions.
2. Task observations.

3.2.14 Life-logging sessions

Overview

Life-Logging was conceived by Steve Mann[15] as a method to record daily activity. Life-logging was used in this research to support an ethnographic method that could passively record Older Adult behaviour within the natural setting of their home. There was a total of sixteen life logging sessions conducted as part of this enquiry.

Firstly, a template was created for the Life-logging sessions (Appendix B 4). This was used to memo and document all notes or sketches during the sessions. The format of the template was structured into eight areas of enquiry. As can be seen on the template, there were no prompted questions, a series of 'random words'(Collins, H., 2010) listed with each area of enquiry supported a strategy to explore the eight areas with open-ended questions that encouraged rapport, trust and storytelling with participants.

The Autographer camera was selected as the Primary tool for image capture during participant sessions.

The advantages of the Autographer camera are many:

- It camera can be worn, indoors and outdoors.
- It can be positioned in context within a room, and is small in size.
- It is unobtrusive as it has three settings that capture images passively without sound.

The Autographer can capture between 120 and 360 images during an hour. It was a critical piece of equipment to visually record and capture the essence of sessions.

Much consideration was given prior to fieldwork as to how the Autographer could be best utilised. The images displayed were part of test sessions conducted by the researcher.

[15] In 1994 he wore a webcam and broadcast a live feed about his day to day experiences. Lifelogging is defined as - *"the activity of producing a continual record of your everyday life by carrying a portable camera and/or other digital device around with you"* MacMillan Dictionary – Life-logging Definition.

There were two sessions conducted –

- **Figure 20**: Taking a journey from home in the car. The camera was worn and recorded the journey in the car to an outdoor activity. (This was just a small sample of in excess of one hundred images captured during a three quarter hour session)
- **Figure 21**: Placing the camera in a room and carrying out tasks as normal behaviour, the researcher conducted tasks within her kitchen.

Figure 20 Journey in car - sample pictures using Autographer.

Figure 21 Researcher conducting task - sample pictures.

In addition to the Autographer camera, an iPad and iPhone camera were used. Collectively they captured video, audio and often secondary images during life logging and task observation sessions. The purpose of the life-logging sessions involving the Older Adult participants was intended to build rapport and trust as a means to fulfil the more detailed task observations.

The participants reacted well to this format of enquiry. During these sessions a number of stories were shared that offered insight into day to day life for Older Adults. The meetings would commence with ensuring that the Older Adult was happy to engage and also that at any time they

could opt out of questions. All of the participants that had agreed to participate with the fieldwork engaged fully in the life logging and task observation sessions. There were no declines to questions or tasks. A selection of images with some participant's quotes from the Life-logging sessions can be seen collectively numbered Figure 22 & 23.

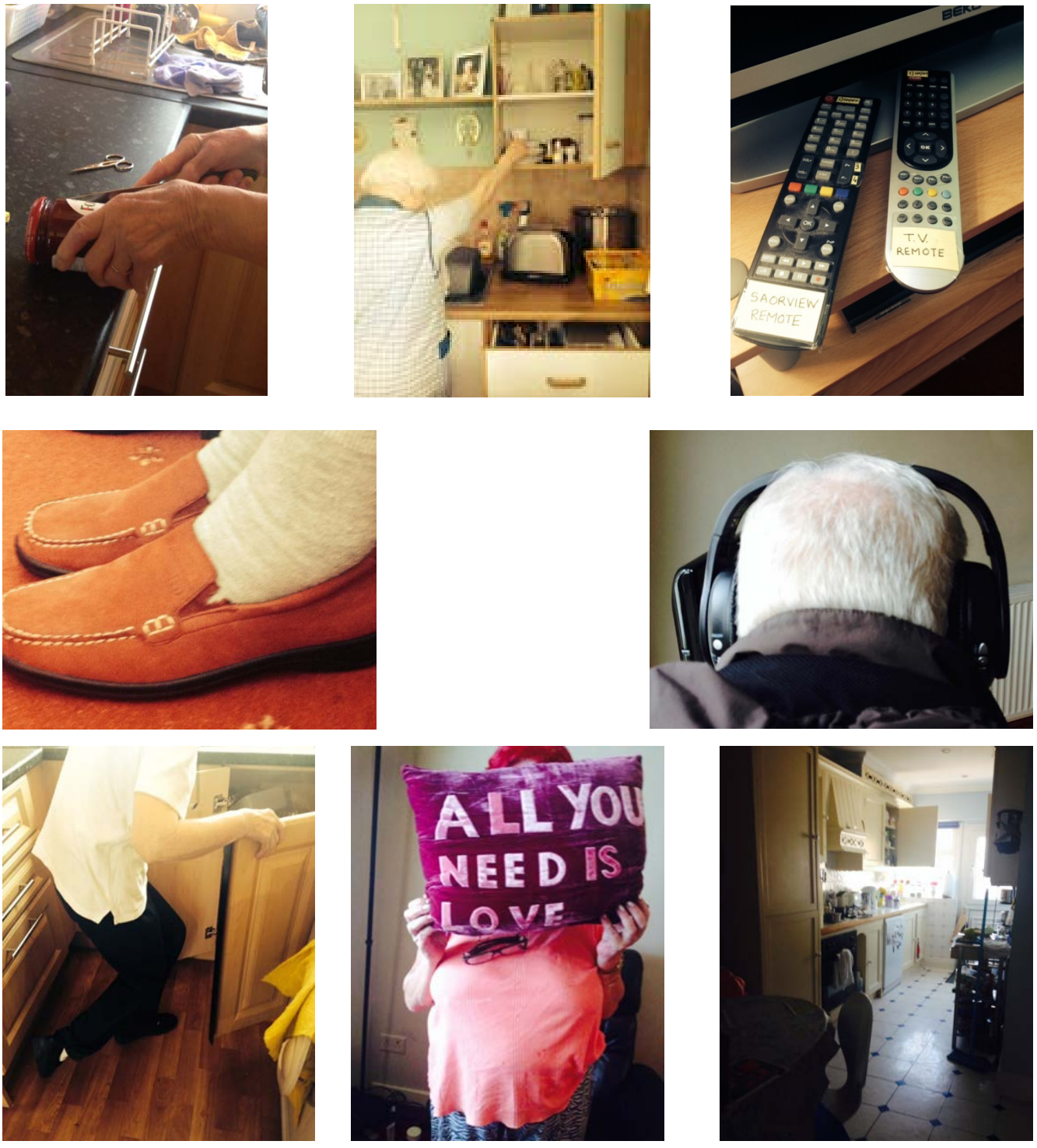
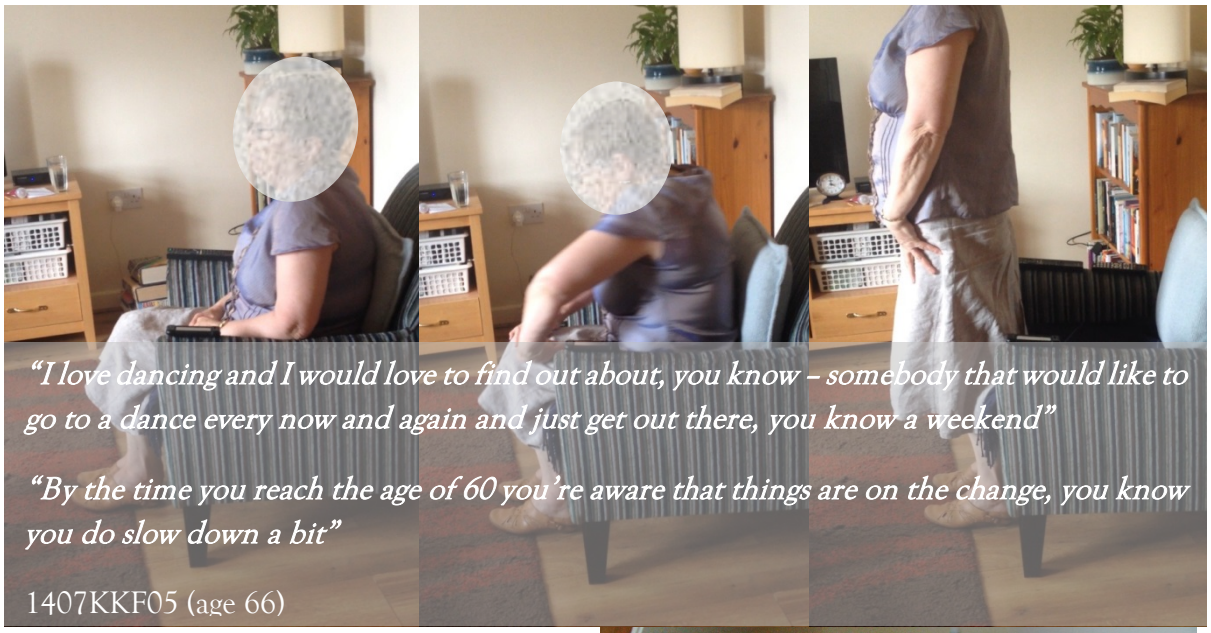


Figure 22 Sample images gathered during Life-logging sessions.



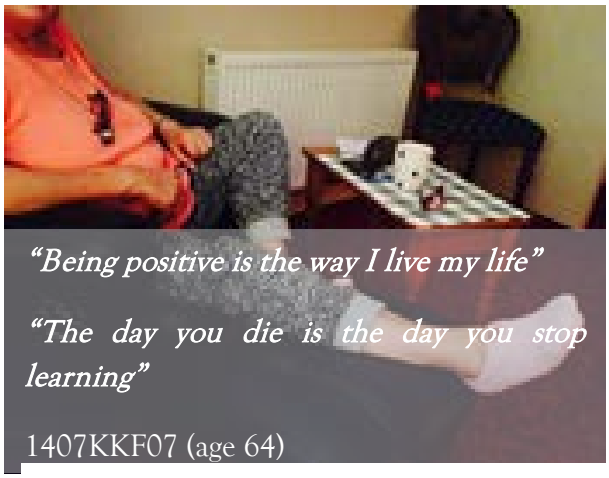


Figure 23 Selected Images with participant quotes during Fieldwork.

3.2.15 Task Observation sessions

Overview

Observation is *"...the fundamental base of all research"* as discussed by Angrosino (Denzin and Lincoln 2005. p.729)

Task observation sessions[16] were arranged with eight participants. Each of the participants would conduct a physical task linked with one of the eight areas of enquiry. The Task Observation sessions were an extremely rich source of contextual enquiry. They recorded human factors and ergonomic considerations. The participants were observed manoeuvring steps, furniture and fittings in order to complete tasks. In observation sessions the researcher used a non-directed approach with the participants with the intent of conducting sessions that did not interfere with the participant's activity being observed. However, during sessions there were moments of direct interaction between the researcher and the participant. This direct interaction was seen as a positive development in the research because it supported the research hypotheses, whereby the Older Adult was inviting the researcher to engage or assist with the task, but on their terms. 'Shared Usability' was presenting itself to the researcher through the direction of the Older Adults.

Eight task observations were conducted to observe participants executing a sample daily task they were familiar with. These were identified from the areas discussed during the life logging sessions. The Older Adults naturally immersed themselves with the researcher within the focus of the task. Often the narrative from the participant would digress from the task being conducted to other subject matters important to them. This was beneficial to further understanding other aspects of day to day life. An example of this was when one participant shared the story of a house extension he and his wife decided to add to their home a number of years ago. At the time of construction, they decided to incorporate ramps as part of the outside access paths into the home. This insight demonstrated forward thinking of this participant and his wife. The rationale being that should they require mobility devices in the future, the familiarity of the ramps will be less intrusive as they adjust to a new means of mobility and independence.

[16] The task was discussed and agreed between the researcher and participant, and scheduled at a time of convenience to the participant. Similar to the life logging sessions, the task observation sessions were unstructured and led by the Participant.

The eight task observations were conducted in an unstructured format and led by the participants. The researcher discussed the proposed task observation with each participant prior to the activity. This was to ensure the participant was in agreement and also to discuss any other considerations necessary to the task (i.e. weather permitting for task outdoors)

3.2.15.1 Mobility

Task: this task involved the participant washing his windows, indoor and outside. The equipment used for this task was an extendable squeegee, a bucket, step stool, soap liquid and cloths.

Location: Participants home

Human Factors: there was some physical challenge to this task. It involved climbing up and down steps in order to achieve reach. It also involved times when the participant needed to bend or stretch to fill a bucket, wash windows etc. The hazard potential of water and soap was noted also.

Shared Usability? The participant, on more than one occasion, sought interaction with the researcher, examples were: asking the researcher to assist with the carrying of equipment, or to gather his phone because he was expecting a call.

Figure 24 Selected images captured during Mobility task Observation.

Researcher observations:

The mobility task was discussed with the participant, he advised he would be washing his windows and invited the researcher to observe the task. The task involved the Participant reaching, getting up and down from a step stool lifting and managing the bucket of soapy water and the cleaning device. In addition the potential of wet surfaces and the participant's safety were noted.

As the task began the Participant engaged and asked the Researcher to assist with the gathering of the window washing items. There was a general discussion how he normally conducts this task. He normally fills the bucket in the bathroom, and leans around the shower to gain access to the bath water taps.

Once indoors the participant used the step stool to get up and reach across to clean the windows. The depth of the worktop sink unit prevented the participant getting close to the window. At times he needed to reach or stretch a little further.

When the indoor windows were cleaned we moved outside, and the participant shared some more stories while he was up on the step stool. As he concluded the task and shared a cup of tea with the researcher he commented how it is not always a pleasurable task but the shared conversation had taken his mind off the task.

Shared Usability was an obvious factor here, the participant on two occasions the Older Adult participant asked the researcher to assist:

- moving equipment outdoors.
- To retrieve his mobile phone from inside his home as he was expecting a call.

3.2.15.2 Communication, TV & radio

Task: The task involved the participant powering On and Off his TV and radio. Typically his companion dog –Midge accompanies the participant when he relaxes on his armchair in the sitting room.

Location: Participants home.

Human Factors: this task involved some movement and accommodating the armchair – a recliner model for the participant and his dog. It was also observed the participant reaching to switch on or unplug devices had some obstacles preventing a free movement. In addition the participant appeared to 'bypass' all paths or interfaces to using each device by simply unplugging.

Shared Usability? The participant had received a letter from a Government department. He requested the researcher to read it. This engaged a shared conversation as to what action he would take regarding the letter. At no time did the researcher lead the participant. The participant arrived at a decision, but expressed appreciation that the researcher had viewed the letter.

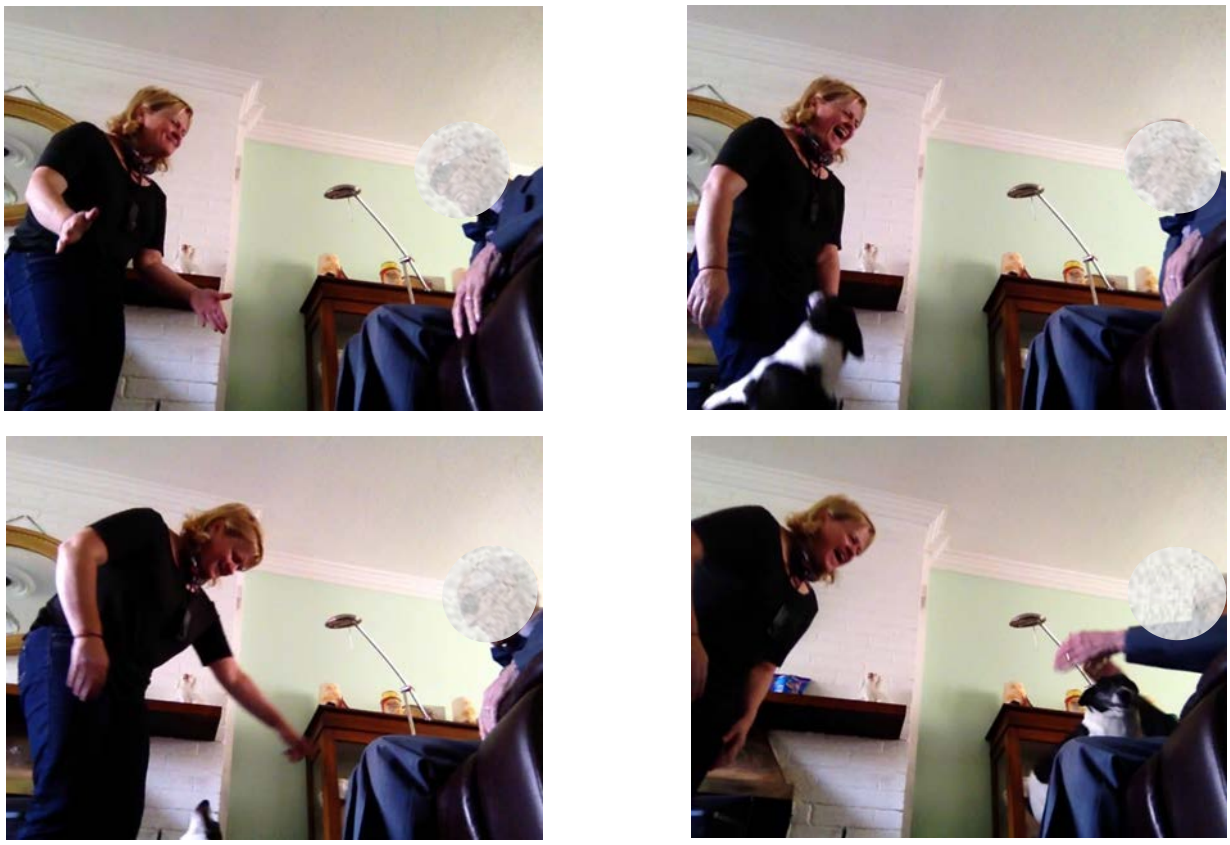


Figure 25 Selected images captured during TV, Communication and Radio Task Observation.

Researcher observations:

The Participant shared his daily practice of access to TV and radio. As the task began and as part of general conversation, the participant asked if the Researcher would look at a letter he received from State body, and what did I think he needed to do. The participant had already completed the enclosed form and it was all ready to be returned. It appears he appreciated a second set of eyes on the document before returning in the post.

In addition to the participant and researcher, the Participants dog 'Midge' was present. When discussing use of TV and radio, the participant explained that normally during the day he will turn on the radio and *"have the news on because it's on every hour."* In accessing the radio stereo, the participant needs to go behind the TV to plug in the stereo.

I asked the participant does he plug it out each evening and he said no, what he normally does is turn it on and off by plugging in and plugging out the stereo. I asked were the on/off buttons not working, he just said he doesn't know, and that is how he always has done it this way. The participant explained normally that he does not turn on the TV until the evening. He appeared to be comfortable seeing and operating the remote control on the TV. As a scenario, he turned on the TV and returned to his recliner armchair to watch TV. Normally at this point 'Midge' will jump up and get comfortable on his masters lap. However on this day Midge appeared to be very interested in the researcher as a visitor and would not get up on the chair, however after a little coaxing he eventually jumped up on the lap of his master.

3.2.15.3 Interests & Hobbies

Task: the participant goes for regular walks and the route was agreed prior to the task.

Location: This task began at the participant's home and routed approximately 2km before returning back to participants home.

Human factors: The participant had shared a decline in his health with the researcher. This has forced him to reconsider routes he may walk or tasks he might engage in. He shared the anxiety of descending a series of steep old limestone steps before handrails were introduced.

Shared Usability? The participant enjoyed the company on the walk. He shared many stories, and spoke at times reflectively on tasks he could no longer engage in, and some tasks that he would avoid because of the possible impact on his health. Shared Usability could offer the potential to support the participant by providing products that offer the experience without the physical exertion.

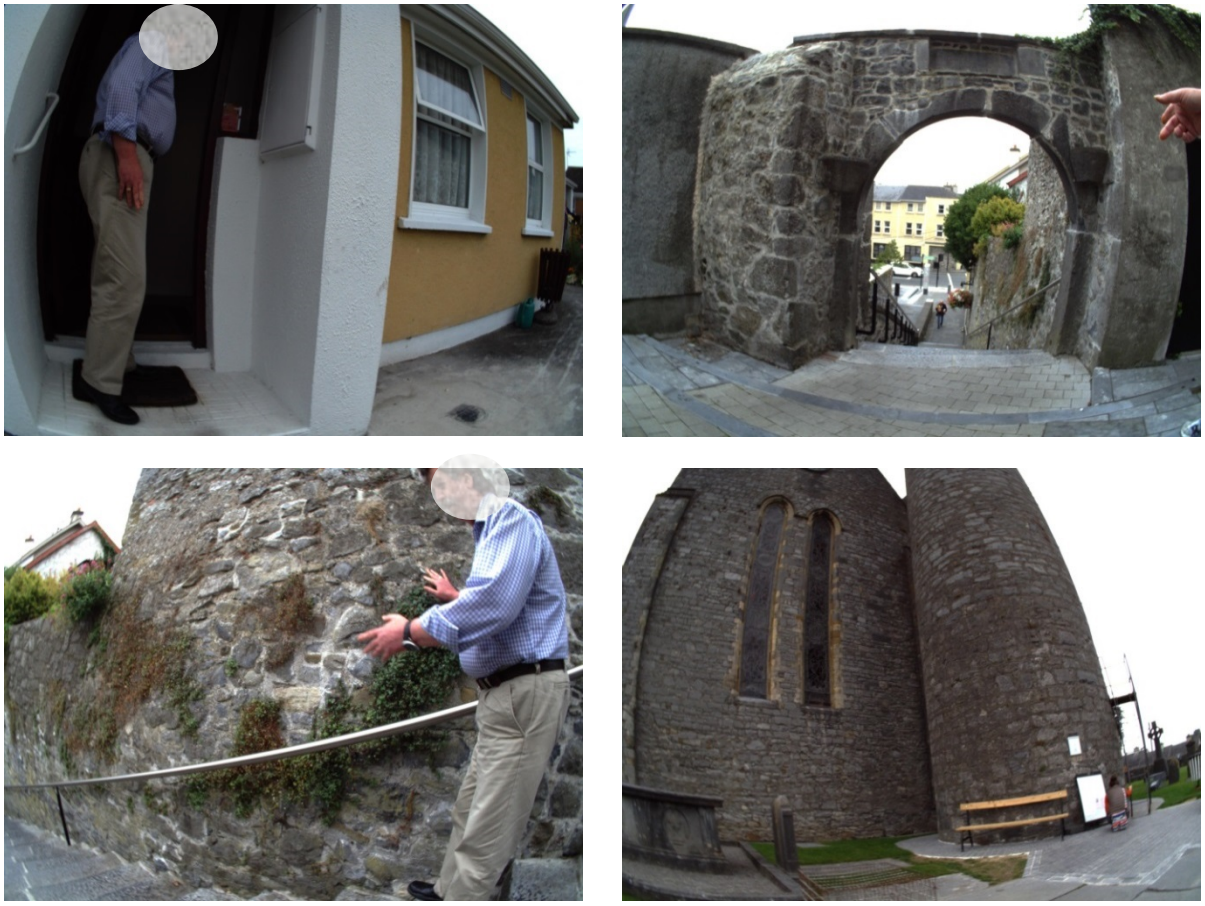


Figure 26 Selected images from Interests & Hobbies task observation.

Researcher observations:

The Participant had indicated an enjoyment of walking during the initial life-logging sessions. He does not own a car and for health reasons does not drive. One of the items noted regarding the initial interview was his decline in health and an episode in hospital a couple of years ago. He does consider himself to be active but is also mindful of his health.

The route of the walk was chosen by the participant and went around a historical part of Kilkenny. There are many lanes in the city, and some are wide enough to accommodate vehicles and people walking. There are usually no footpaths.

Prior to entering the grounds of St Canices Cathedral, Kilkenny there are old limestone slabs that can be uneven or slippery, as commented by the Participant. As we entered the grounds of the old Church and tower the Participant shared with a tone of regret, how when he was able to he had never climbed the tower. He felt now, with his condition and the steps/ladder access into the tower it is something he will never do.

As we left the grounds we walked towards another lane that leads down to a street. This lane has quite a steep descent. In recent years, the local Authority has assembled handrails to support walkers going up, and down this beautiful old lane. The Participant shared a story of a day before the rails were fitted. He had just returned home after a stay in Hospital. He was going down the steps slowly and holding onto the wall. A lady, whom the Participant shared was older than him began to climb up the steps of the lane. This made the Participant anxious because he was nervous to let go or move away from the wall that was supporting him on his decline. However he was also mindful of the lady ascending the steps, he apologised to her as she walked around him. This also left him with a sense of guilt that he wasn't more agile.

3.2.15.4 Dressing

Task: This task had two aspects to it. The participant shared the story of preparing to leave the house and putting on her jacket and shoes. This involved the task and associated habits or preferences to where items of clothing were regularly placed e.g. At the start of the day, taking off slippers to put on shoes.

Location: participants home

Human factors: The participant shared with the researcher her reduced dexterity in one of her shoulders. This can be problematic to putting on items of clothing if she has a 'flare up'. She also uses support items such as a stool to 'raise her legs up a little' while she is sitting on a chair removing her shoes. The stool creates a closer reach for the participant to remove or put on her shoes a little easier.

Shared Usability? The activity of dressing and undressing was commented by some participants as problematic as we age. The design challenge for this daily activity is to explore the possibility of a 'Shared Usability' response to dressing independently as we age.

Figure 27 Selected images from Dressing Task observation.

Researcher observations:

The task of dressing had been highlighted by some of the Participants as problematic. This task was once again agreed between the Participant and Researcher to observe two tasks of dressing - putting on and removal of shoes, and the putting on and removal of a coat.

The Participant normally leaves slippers or shoes in one particular spot in the sitting room. As the Participant sat down to put her shoes on the researcher commented how they looked comfy. The Participant replied *"As you get older you invest in that sort of shoe."*

Normally around 9am as the participant finishes breakfast she will place her empty cup (from tea) in the sink and reaches for her shoes. Once the participant is seated she removes her slippers and put on her shoes. She then places slippers back in the place her shoes had been previously.

The participant then goes to the hall to get her jacket, stopping to glance outside to see the weather of the day. When getting on jackets or coats, the participant shared generally they are fine. However she has had trouble with movement and agility in one of her arms and shoulders. This can be problematic if there is a flare up. Generally then she needs to adjust and consider to place the affected arm in first and manage the better arm in afterwards. At the time of the task, the Participant was having a 'good day' this reminds her *"makes me aware how well I am, it's not always like this."*

3.2.15.5 Bathing & Toileting

Task: This task involved the participant sharing the experience of using the shower.

Location: Participants home.

Human Factors: The bathroom was discussed during the earlier life logging sessions. The fear of falling, and reduced mobility were recorded as reasons to replace the bath for a shower unit.

Shared Usability? The participant attends a day centre to dine and socialise a few times a week. This centre also provides the service of assisted baths. The participant shared how she enjoys this, and feels reassured with a professional there to help her.





Figure 28 Selected images from Bathing and Toileting Task observation.

Researcher observations:

During the life-loggings sessions, the Bathroom was discussed and the main item had been the removal of baths, or the more common use of fitting a shower in the Bathroom. However some further comment had been about the fittings or support devices and handles placed in Bathrooms. The task undertaken by the Participant was to share access to shower in her home; it was a walk in wet room type area, with a gated wraparound open section fitted with a chair and shower curtain. The Participant was happy with the electric shower -operating the dials and taps were not problematic to note at the moment.

Participant did confide however that is happy to avail of assisted bath service provided by the day centre she attends. She enjoys relaxing time in the bath and reassurance of support by the staff member being present.

An observation of the bathroom fittings in this and some of the other bathrooms visited by the researcher were the multi functions and uses within the bathroom. The bathroom had been used to store additional utility items such as mops or washing dusters. In one home, the bathroom downstairs had also had an additional area to keep drinks chilled.

3.2.15.6 Cooking

Task: There were two cooking tasks performed – One with a participant preparing a toasted sandwich and tea. The second task involved two participants working together to prepare a meal of stew and dumplings.

Location: Nursing Home, Co. Kilkenny

Human Factors: Both participants engaged in these tasks with an Associated Stakeholder (Occupational Therapist) present. This was part of an assessment to evaluate their independence before returning home. Observations considered were the age related reduced cognitive ability that can impair precise actions required when using saucepans on a cooking stove. Both participants used mobility devices (walking sticks, stools). Some domestic kitchens can be small and poorly lit which can hinder space and access to prepare food independently

Shared Usability? The possibilities of Shared Usability were most pronounced within the task analysis that was undertaken by the two Older Adults. It appeared they were relaxed in each other's company despite not knowing each other well. In addition they appeared comfortable to ask for the Occupational Therapists input to the task if they were unsure of what was required

Figure 29 Selected images from Cooking Task observation.

Researcher observations:

A total of two Kitchen tasks were performed. This was an opportunity arranged initially between an Associated Stakeholder (Occupational Therapist) and the researcher. Two patients in the Nursing Home were due for discharge and part of the procedure is an 'assessment' of the patient's ability to be cook a meal independently. The location for the tasks was within the Nursing Home in Co. Kilkenny. The two participants agreed to participate with me as observer in the kitchen.

The first Task was conducted by one Older Adult. The Occupational Therapist and the researcher were in attendance also. This task was to make a toasted sandwich and a cup of tea. The participant was widowed and had led a very active younger life. Preparing for the tea involved the Participant having to gauge approximate measure of water for a cup of tea from the tap filling water to the kettle. As the participant had entered the Kitchen he had placed his walking stick at the chair, he then walked to conduct the task, however should he require support from his walking stick it was now in a distance place and not immediately available for him if needed for support. When the participant went to the fridge to gather all the items he would need he seemed to try and take as many items to avoid a second trip. The Occupational Therapist had provided a trolley close by for the items. The participant engaged with and used a number of kitchen tools and devices. It was observed that some were challenging-an example was a cheese grater, this model was flat with one handle. The Participant was rubbing cheese in a number of directions while holding the grater. However there seemed to be confusion - which end was the correct end to use and grate the cheese.

The second task involved two participants working together to create a meal. The meal was stew and dumplings. One Participant was responsible to cook the casserole, the other to make the dumpling dough. The ingredients were ready and in the kitchen when the Participants arrived, again the location was the Nursing home in Co Kilkenny.

The Participant in charge of the making of the stew appeared to have some cognitive and physical challenge but shared his pleasure at cooking food. When he began transferring meat to the pan, initially using the spoon with his right hand and holding the bowl with his left, after a while he placed the bowl on the surface and then used his left hand to take some meat pieces, and seemed to develop a technique of using right hand and spoon to move the meat up the side of the bowl and then lifting and removing the meat with his left hand to the pan.

Sometimes when the Participant was transferring meat to pan from the bowl, it caused the pan to slip a little on the hob as his right hand had meat and spoon in it and left hand was holding the bowl. So when he used his right hand to stir in the meat in the pan there was nothing to stabilise and keep it securely on the hob – no hands!

A final interesting observation was the use of mobility aids and how much additional floor space can be required in order to provide adequate mobility to complete tasks. The Occupational Therapist also indicated a need for more adequate and appropriate lighting in an average domestic kitchen to assist with the ability to do tasks.

3.2.15.7 Access

Task: This task was to observe access into and out of the car. The researcher also discussed with the participant the routine activities prior to leaving the house to go on a journey in the car. Likewise the discussion covered the 'return' activity: access from the car back into her home.

Location: Participants home

Human Factors: The participant's front door to her home had recently been replaced. She shared how she did not like the new door as it was solid wood with no window. This made her small hallway very dark, and particularly she did not feel comfortable at night if there was a knock on the door.

Shared Usability? The concept of 'Shared Usability' was observed in this task observation when the participant was asked about taking a car journey. What she would do if she became lost or disoriented? She replied she would not depend or read maps, but would prefer to ring a family member and seek support or guidance from them.

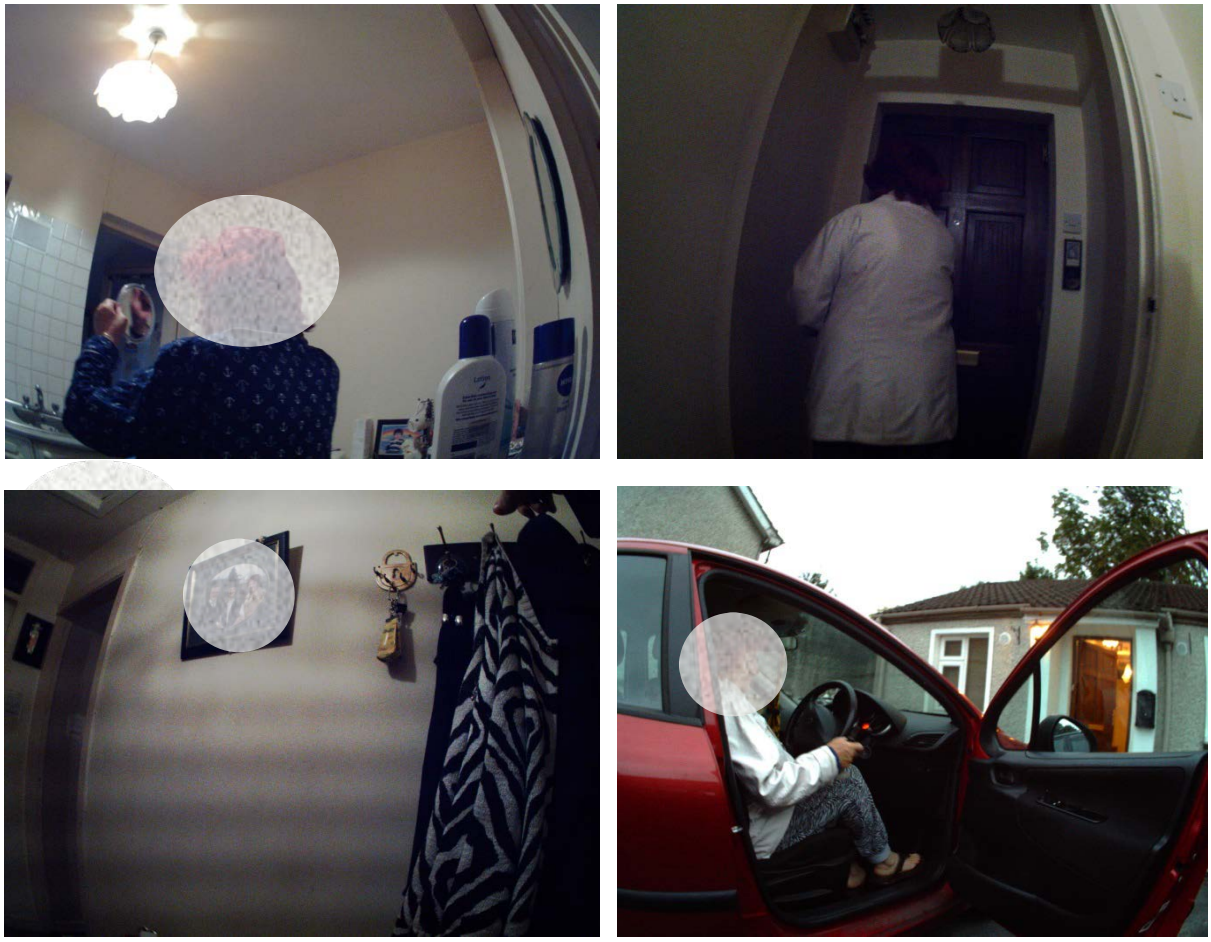


Figure 30 Selected images from Access Task observation.

Researcher observations:

This task recorded the preparation and ritual prior to getting into a car, and also the return practice.

The participant can be seen grooming and putting on her jacket. At one point places a mirror behind her head, in addition to the mirror in front to ensure her hair is ok, and then settled with hairspray. Accessing the car is straightforward the participant has remote unlock on her car and accessed into and out of the car both as a driver and a passenger. When it came to accessing the passenger side, she commented how it was an unusual side of the car to be getting into as she lives alone and is the driver and owner of her car.

An interesting behaviour noted was at the end of the task as Participant entered hall to remove her coat she placed her car keys on the coat hook, beside the key holder hook on the wall. She then placed her coat on top of the coat hook with the keys. The researcher asked her about this and she explained she does it as a security and safety practice. She will often later in the night then take the keys off the hook and place in her coat pocket. She likes to always know she has a quick exit if required in the night. I asked her when did she begin this ritual and she explained when she began living alone.

3.2.15.8 Physical Functions/Limitations

Task: The participant was asked to demonstrate ability and movement around the home. Specifically the participant was asked to conduct typical end of day behaviour – going to the bedroom and removing her personal alarm. Furthermore she was asked to conduct typical 'waking' behaviour as she places her personal alarm back on her wrist when she is getting up for the day.

Location: Participants home

Human Factors: The participant has a number of health limitations and uses a walking stick to assist mobility. An observation by the researcher during this task was the close proximity of the assisted handle to aid the participant getting out of the bed, however it could be potentially a hindrance that may injure hand or wrist if knocked into accidentally. Especially as the participant reaches through to take items from the locker or to turn the lamp on/off

Shared Usability? During the task, the participant twice acknowledged a soft toy placed on her sofa. The participant lives alone, and has no immediate family in Ireland. She shared with the researcher her affection of this soft toy.

Figure 31 Selected images from Physical Functions/Limitations Task observation.

This Participants task was to demonstrate ability and movement around the home. The researcher and participant agreed a scenario of wearing and removing her personal alarm, the typical action for the participant at the end of one day and at the beginning of the following day.

The participant wears the alarm on her wrist daily, removing at night only to place on her bedside table. During the night should there be a need to call for assistance; there is a wall mounted unit beside her bed to raise the alarm.

To begin the task the participant gets up from the sofa as she normally does in preparation for bed. It is observed that the participant touches affectionately a toy that is beside her on the sofa. As the participant retires to her room, it is noticed that the assistive rail fitted beside her bed could also be a barrier to accessing her personal items on the table too. During the night if there is an emergency need in the darkened bedroom, the participant's hands may not manoeuvre through the rail, and could possibly bang the rail, and risk injury. The participant clearly uses the rail as support getting in and out of the bed. The participant's walking stick is placed in a habitual place in her room.

The participant positioned herself to bed, and shortly after rose as she would normally in the morning. Once she has placed personal alarm on her wrist she reclaims the walking stick from its regular spot and returns into the sitting room. Once near the sofa the participant again acknowledges the soft toy sitting on the sofa, and positions herself back comfortably on to the sofa. Further observations here are the position or placing of items as the participant gets back to the sofa, the table is in reach for items such as glasses, a drink, remote controls, and also the photos and images of happy times to allow for reflective moments too.

Part Two Review

The second part of this chapter describes the activity and methods used by the researcher when gathering data. The ethnographic approach to observing and understanding Older Adult participants in natural settings provided a deep source of insight and data in eight areas of daily life.

The outcomes of fieldwork assisted in identifying and understanding potential product areas that could support a 'tangible' understanding of 'Shared Usability'

The final part of this Chapter – *Analysis* describes the methods used to define three design areas before refining to a final design area

3.3 PART THREE – ANALYSIS

3.3.1 Methods

Qualitative Analysis is a *"process of examining and interpreting data in order to elicit meaning, gain understanding and develop empirical knowledge."* – (Corbin, J., & Strauss, A., 2008. p.1)

At this point of the research validation of fieldwork findings was required. Furthermore it had to be analysed with consideration to the research Hypothesis (2.2.7):

'It is possible to empower Older Adults through 'Shared Usability' by mutually agreed intervention with other stakeholders when using Products or services.'

Within the research conducted participants had shared narrative in each of the eight areas.

Using a thematic coding approach (- Robson, C; 2011 Ed.) the data collected was collated and placed into themes as per the eight areas of enquiry. After which each theme were assigned labels. The labels were created and directed by the participant's responses and narrative during the life logging and task observation sessions.

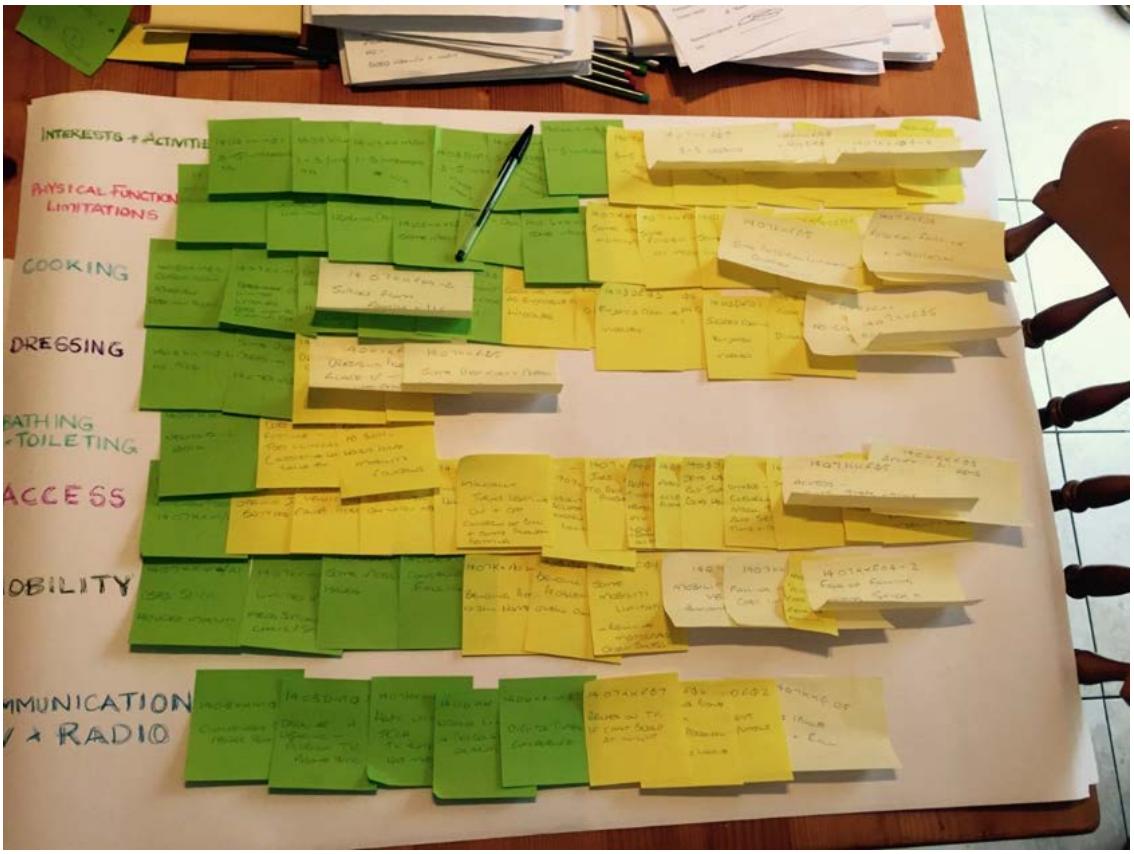


Figure 32 Analysing Fieldwork data.

As a means to analyse the gathered data, it needed to be transferred visually and actively in order to be sorted into quantitative results. The gender of participants was defined and is identified on Figure 32 as:

- Male: Green
- Female: Yellow

Furthermore, each area of enquiry or theme now transferred quantified results from the fieldwork enquiry into the various labels that would support product and research outcomes.

Theme: Mobility

Labels:

- Self-acknowledgement of ageing and limitations
- Mobility and balance in vehicles
- Assistive mobility device
- Aware/fear of falling

Theme: Communication TV & radio

Labels:

- Challenged by Technology
- Require Support device/product (assist security, comfort, heating)
- Personal alarm preferences

Theme: Interest & Hobbies

Labels:

- Activities –Social clubs 1-3 weekly
- Activities – Social Clubs 3-5 weekly
- Mass/Spiritual

Theme: Dressing

Labels:

- Problematic

Theme: Bathing & Toileting

Labels:

- Nervous getting in/out of bath
- Removed Bath
- Dislike of fittings (assistive handles etc.)
- Physical difficulties operating shower

Theme: Cooking

Labels:

- Cooks regularly
- Does not cook regularly
- Limited cooking
- Enjoy cooking

Theme: Access

Labels:

- Kitchen tools
- Packaging
- Vehicles
- Central heating timer
- Furniture
- Buildings

Theme: Physical Functions/Limitations

Labels:

- Health decline
- Medication daily

3.3.2 Triangulation

The data gathered was processed and analysed using triangulation. This was considered a method that would produce *"believable, credible and trustworthy work".* (Collins. H., 2010. p.170) Triangulation of this research involved the analysis of the comprehensive body of information gathered during the beginning and second stages. Richardson & St. Pierre refer to triangulation when *"a researcher deploys different methods- interviews, census data, documents and the like to 'validate' findings."* (Denzin. N.K., & Lincoln. Y.S., 2005. P.963)

Design direction that supports the concept of 'Shared Usability' evolved as an outcome of triangulating the various methods of data collection and the analysis of the themes and labels identified (see Figure 33).

Figure 33 Triangulation of the research data.

The validation of the research findings required direction to begin synthesising towards 'product or service' outcomes. In order to assist the decision making process, a 'Pugh matrix'[17] was devised that applied criteria specific to outcome needs of the research. The image in figure 34 shows the ratings applied and the top three outcomes. This defined the highest rating in the 'F' column which highlighted the area of 'Access' as the most appropriate area for progression to conceptualisation.

Criteria	Baseline	Weight	A	B	C	D	E	F	G	H
Shared Usability? (Standards, market/Company constraints)	0	4	+1	+1	+2	+1	+1	+1	0	+1
Problem area as indicated by Fieldwork participants (Customer/ergonomics/environment/aesthetics)	0	5	+2	+1	+1	+1	+1	+2	0	+1
Product Potential (existing? competitors/quality/reliability)	0	3	+1	0	+1	+1	+1	+1	0	0
Time factor to Project deadline (time scale/action)	0	3	0	-1	0	0	-1	+1	0	0
Total:			17	6	16	12	9	20	0	9

Guide:
A: physical/Functional supports
B: Interests & Hobbies
C: Cooking
D: Bathing & Toileting
E: Mobility
F: Access/Accessibility
G: Dressing
H: Communication, TV & Radio

Note:
As per Pugh Matrix,

Each alternative aspect of fieldwork enquiry(listed A to H)
'Criteria' refers to the requirement of understanding and Potential Product Design Specification in the time scale for this project.
'Baseline' shows a 'neutral' figure
'Weight' refers to the priority rating as defined by fieldwork, it then becomes the multiple that each criteria is measured.

Figure 34 Pugh selection matrix as used by the researcher.

[17] This would assist evaluating the direction of design and conceptualisation. The eight areas were listed alphabetically and placed along the horizontal plane. The criteria applied to the overall research and identified as critical to product conceptualisation were placed vertically. Baseline was set as a '0' to apply a start point. The criteria were given a weighting factor in order of importance in relation to the concept outcome. Each of the eight areas had a rating then applied based on research findings to their importance.

Chapter Conclusion

This chapter outlines and describes three elements of design research conducted throughout this project. The Introduction stage commenced with informal contextual observations and Literature reviewing. Ethical factors for the research was also considered and implemented at this stage.

The Introduction and Second stages included the three Pilot studies, in addition to the Life-logging and Task observation sessions. Finally the third stage of the research involved quantifying the data from fieldwork enquiry and triangulation of all gathered data as a means to define the research outcomes.

CHAPTER FOUR – Research Outcomes

Chapter Overview

This chapter will present the outcomes of fieldwork and integrate them as part of the design process to express the potential of 'Shared Usability' to design. It will firstly discuss the concept of 'Shared Usability', reflecting on the third chapter and how this impacted on the fieldwork enquiry. In addition it will review the definition of 'Shared Usability' (2.2.8) as an activity which includes the consideration of more than one user to the design process. The following chapter will document the journey of design, from the initial sketches following the Pugh matrix discussed in Chapter four, to the final product design outcome.

As a conclusion and reflection to the whole research process it will present a graphic outlining the story of this research.

4.1 Design Conceptual Development – Access

The definition of 'Shared Usability' offered guidance in the conceptualisation. The fieldwork findings were triangulated and determined 'Access[18]' as the theme to pursue product concept development. Issues with access are directly linked with human physical decline as we age.

As Pirkl states;

"as we live on longer than our predecessors, more of us will acquire one or more functional limitations that will interfere with our activities of daily living" (1994, p. 67).

In this research, participants were all independent living individuals. They acknowledged that a factor of ageing was the reduction of abilities and that "Access" was a key area for development.

Therefore this became a strategy of conceptualisation for this research.

[18] Access has been defined as *"The right or opportunity to use or benefit from something."* Oxford Dictionary (2015). Access definition. Furthermore, Accessibility is acknowledged as a right defined in the United Nations Convention on the rights of persons with disabilities –*"To enable persons with disabilities to live independently and participate fully in all aspects of life, States Parties shall take appropriate measures to ensure to persons with disabilities access, on an equal basis with others, to the physical environment, to transportation, to information and communications, including information and communications technologies and systems, and to other facilities and services open or provided to the public, both in urban and in rural areas." United Nations (2006). Convention on the Rights of Persons with Disabilities. New York, USA, United Nations.*

The participants had discussed the following areas of access as challenging during the fieldwork:

- Domestic Packaging
- Buildings
- Vehicles

To commence the design process the researcher began to enquire further into these three areas, visualising the problems encountered by creating product and lifestyle boards.

4.3 Product & Lifestyle boards

The product & lifestyle boards offered an opportunity to assist with visualising product experience using fieldwork observations. Together with fieldwork observations, generic images were included to understand the breadth of the problems Older Adults encounter. Pirkl discusses the availability of *"geriatric gadgets"*(Pirkl, 1994) and specialised products for Older Adults. He shares how, despite the benefits and advantages of many *"ingenious aids"* he points to items such as jars and bottles and the requirement of additional *"layers of technology between the user and the required accommodation."* The researcher found this insight beneficial to considering existing products and improving the usability for the user.

Figure 35 Product & Lifestyle Board- Domestic Packaging.

Figure 36 Product & Lifestyle Board - Vehicle Accessibility.

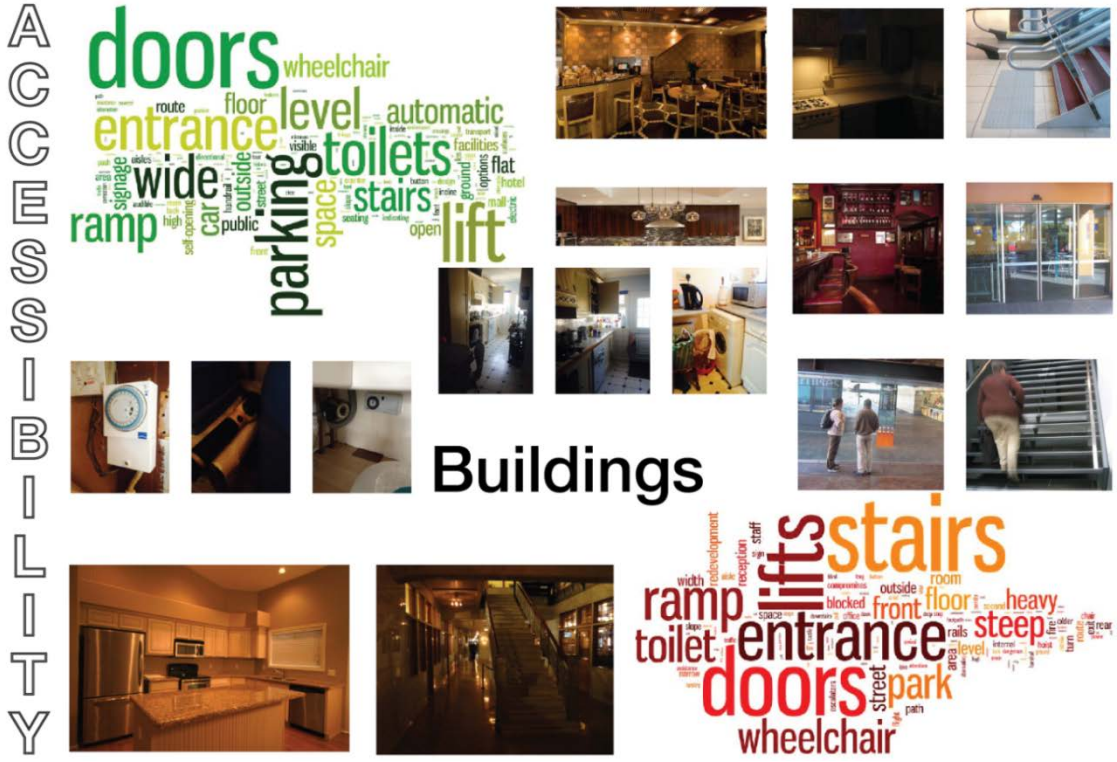


Figure 37 Product & Lifestyle Board - Buildings.

The product & Lifestyle boards assisted the researcher in visually communicating and instilling the needs requirements for the product areas.

4.4 Sketch conceptualisation

The next stage of development was practice based, interactive and 'studio' based. This process was reflective and design method oriented. This phase included ideation and iterative sessions with early sketches and models based on the three identified areas of Access.

4.5 Domestic Packaging

This area explored and considered the access to packaging. The participants during fieldwork had commented particularly on jars, and opening tight lids. There were various methods shared by the participants in overcoming the tight lids or large jars. A section of these are detailed below:

- Using additional products designed to assist opening – sometimes unsuccessfully.
- Using a knife to lever and release the vacuum created during processing.
- Holding the jar under a running water tap.
- Wrapping a cloth around the jar to create a 'tension' to support opening.
- Ask somebody else to open the jar.

The following images illustrate some of the conceptualisation and iteration process in testing and ideation to understand product need. The area of jars and access considered not just the lid, the materials or structure but also the glass and how perhaps this could mould support areas as part of the glass jar.

Figure 38 Images showing sketch and sketch model testing.

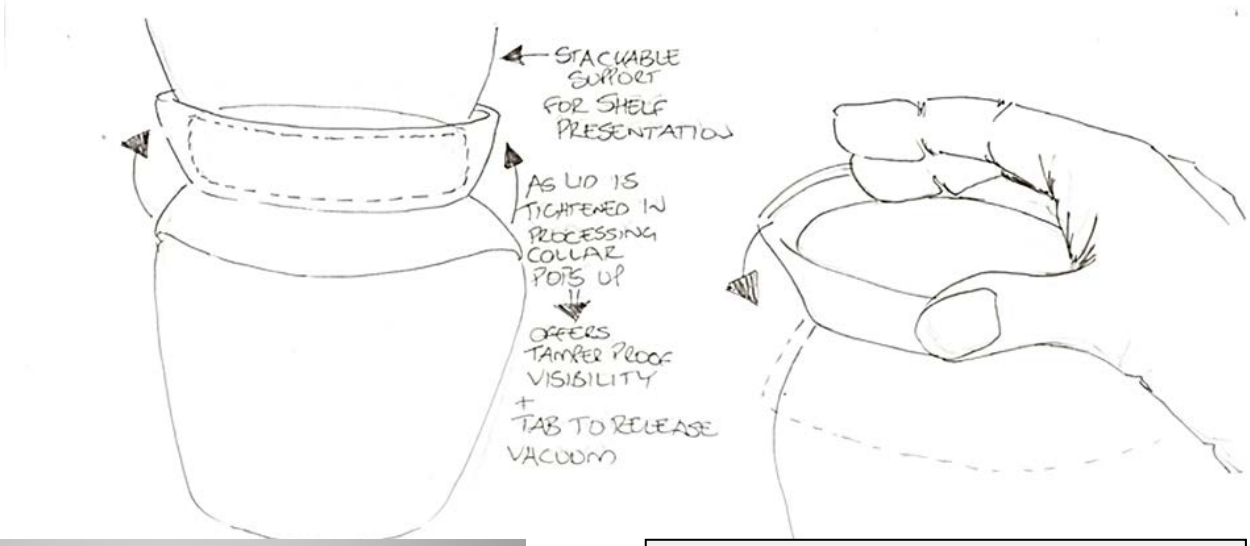


Fig 39 displays the concept of a 'collar' lid. This creates a flexible polymer collar that is fitted on the jar as part of the filling process by the manufacturer. Once the lid is placed down to create the vacuum and tighten the lid, it pushes the collar in under the lid and this action causes the collar to 'pop' up around the lid. When the jar is purchased, the user slips the collar back down around the lid which in turn breaks the vacuum and allows for easier jar opening.

Figure 39 Selected images during conceptual enquiry - Domestic Packaging.

4.6 Buildings

This direction provided broad potential for conceptualisation and product development. Within access to buildings there were a number of challenges and concerns raised by the participants in fieldwork such as:

- Central Heating.
- Steps into or out to garden areas.
- Security.
- Doors.
- Light change impacting on orientation as one goes from daylight to building interior – and vice versa.
- Steps to access shopping or leisure areas.
- Kitchen space accommodation, particularly oven positioning and access.

The researcher explored the potential of each of these areas and considered an amalgamation of some of these areas into a managed solution that could be supported by 'Shared Usability'.

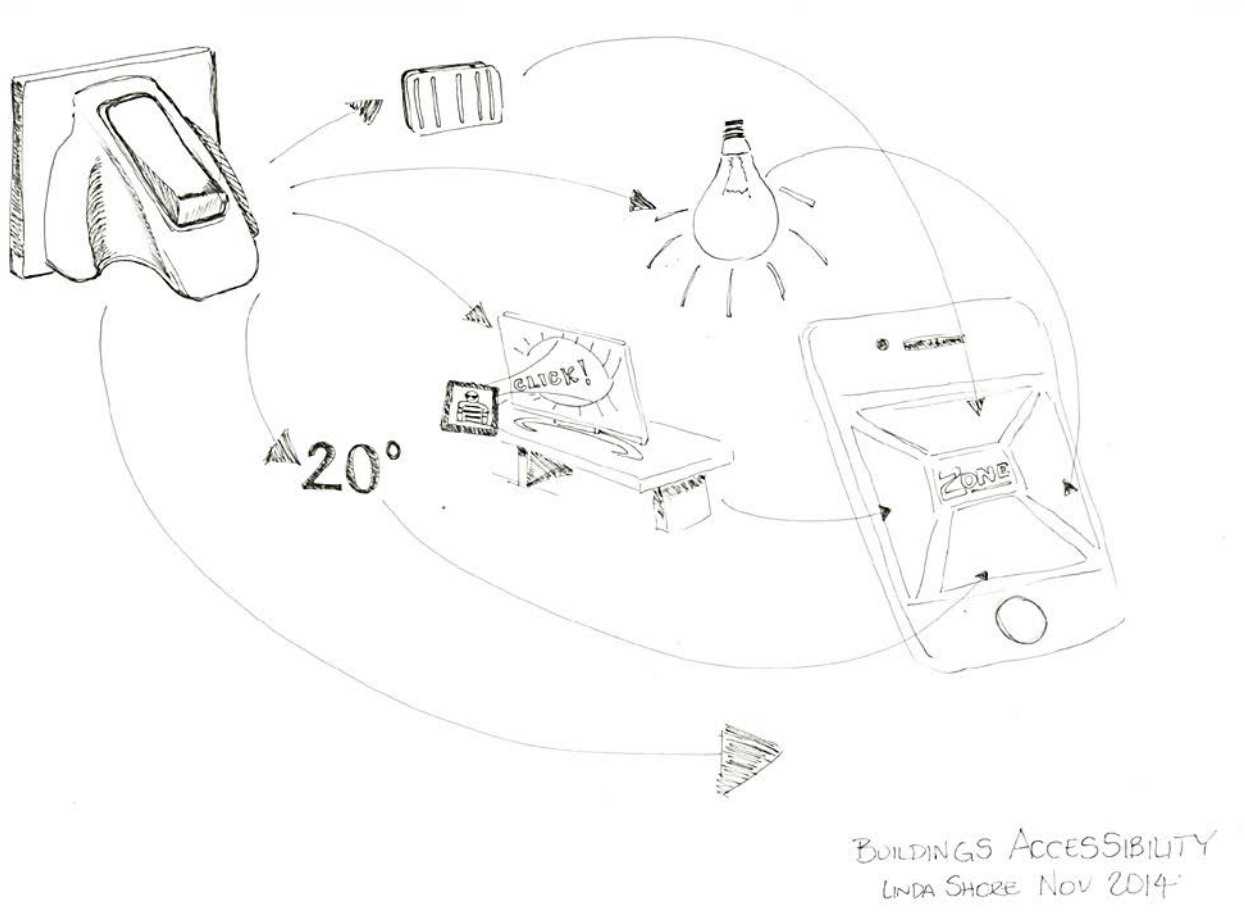
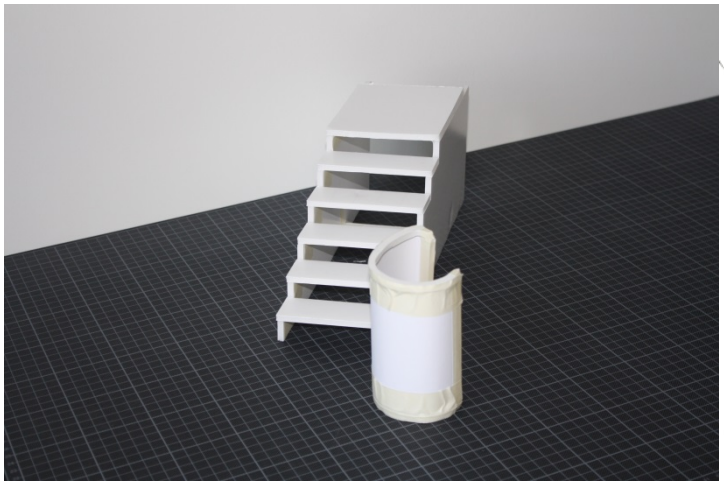
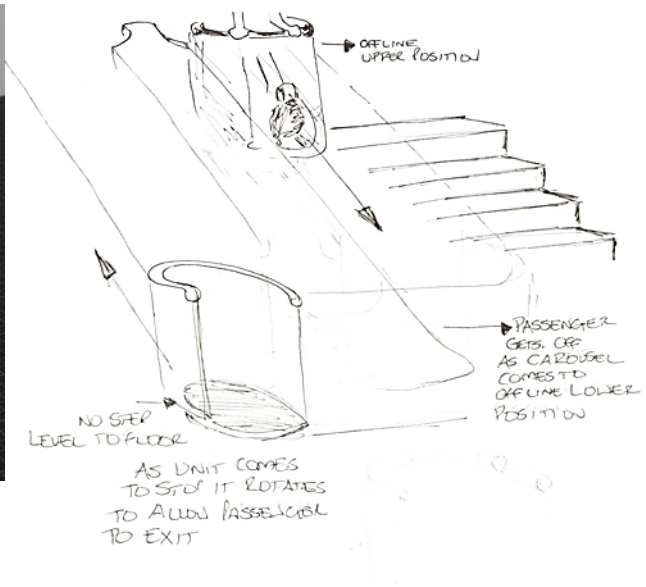
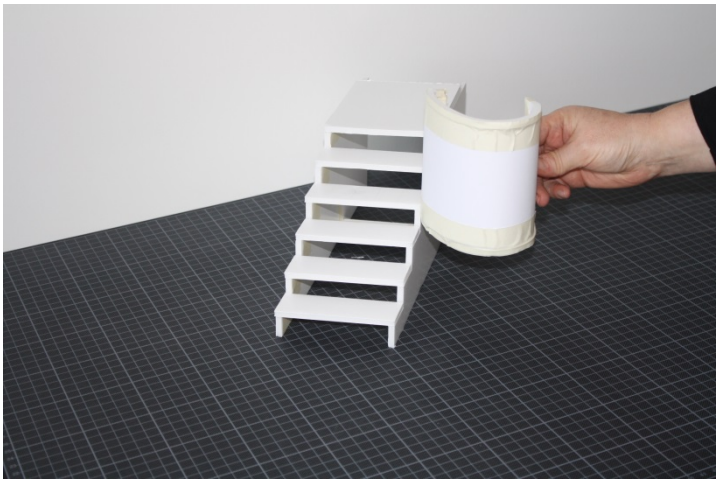


Figure 40 Sketch exploring a shared system to support Shared Usability - Buildings.







This concept considered the idea of access by stairs into public buildings. Accessibility for all to buildings is defined in ISO 21542(2011) as *"the approach, entry to and use of a building, egress during normal conditions and removal from the vicinity of the building ... and, most importantly, evacuation during a fire incident to a 'place of safety' which is remote from the building."*(ISO, 2011)

In addition, some participants discussed their reluctance to access buildings that presented the challenge of steps. This led to a concept that, in addition to stairwells that are shorter than one that would require an elevator. The concept displays a carousel that is fitted close to the stairs and at floor level. It is accessed easy by users and provides room to place shopping bags.

Figure 41 Exploring Access to different floor level - Buildings.

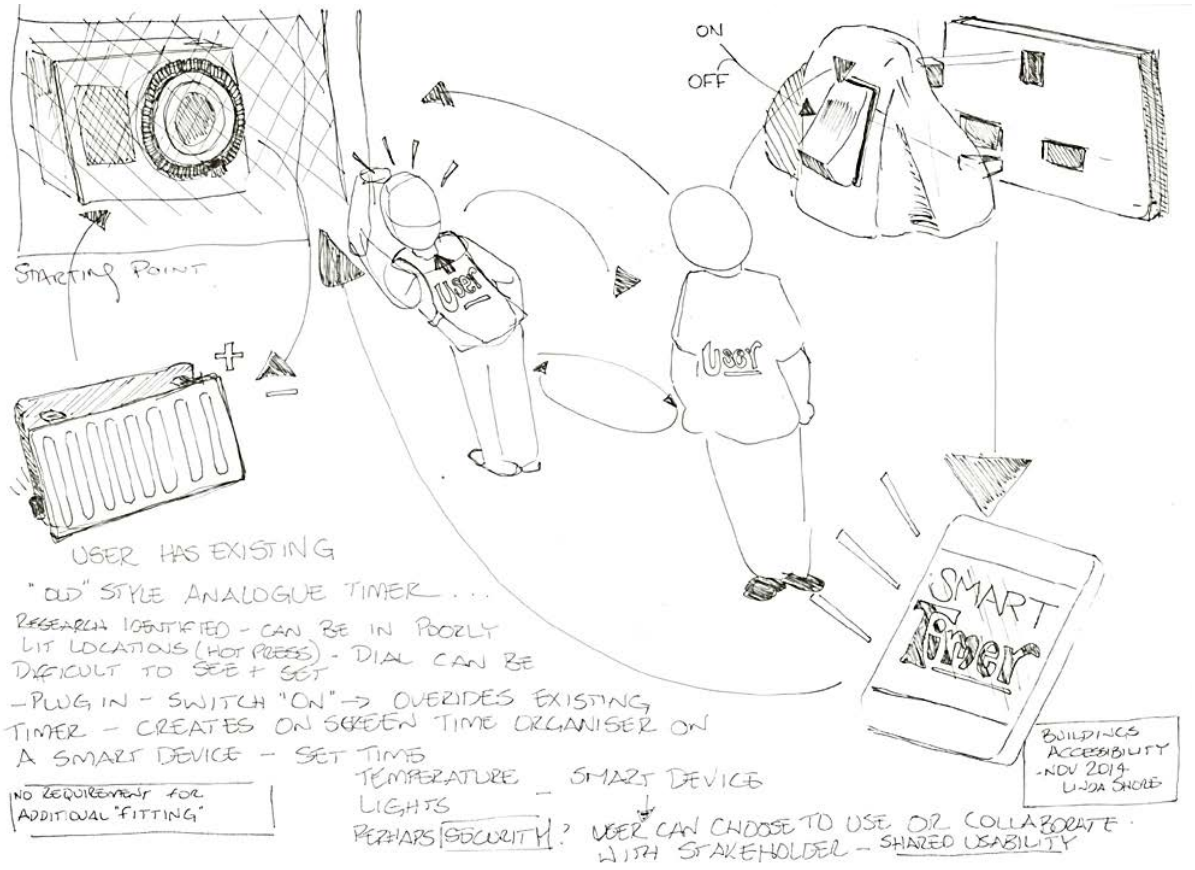


Figure 42 Mechanical Timer - replacement concept - Buildings

The mechanical timer in this concept replaces a traditional timer and managed through wireless connectivity. This accommodates product potential to support 'Shared Usability' as a product and usability feature. It allows for the system sketched above to be managed by the user in their home location or from a different geographical location. It also promotes Shared Usability further by allowing the User to agree with an Associated Stakeholder how they access the system and what access points – security, lights heating etc. that can be managed.

4.7 Vehicles

The direction of vehicle accessibility was identified during fieldwork as a main challenge for Older Adults for a selection of reasons:

- Physical health prevents them from driving
- Accessing buses or trains with the fear of the gap or the challenge of steps
- Sitting comfortably in a car, particularly the rear seat
- Opening car doors, and sitting into lower model cars
- Once seated in a car, the reach to close the car door unassisted can be challenging

The development of Advanced Driver Assistance Systems[19] (ADAS) supports varying levels of autonomy to driving. Shared Usability is supported because it positions the potential of the car manufacturer as an Associated Stakeholder. The importance of electronic aids to driving together with comfort and safety of the driver are some of the Human factor considerations. In addition to this is the development of a car that potentially self-drives on a route determined by the driver needs.

Figure 43 Sketch considering Driver Autonomy.

[19] *The purpose of Advanced Driver Assistance Systems (ADAS) is that driver error will be reduced or even eliminated, and efficiency in traffic and transport is enhanced. The benefits of ADAS implementations are potentially considerable because of a significant decrease in human suffering, economical cost and pollution.* Brookhuis, K. A., et al. (2001). "Behavioural impacts of advanced driver assistance systems–an overview." European Journal of Transport and Infrastructure Research 1(3): 245-253.

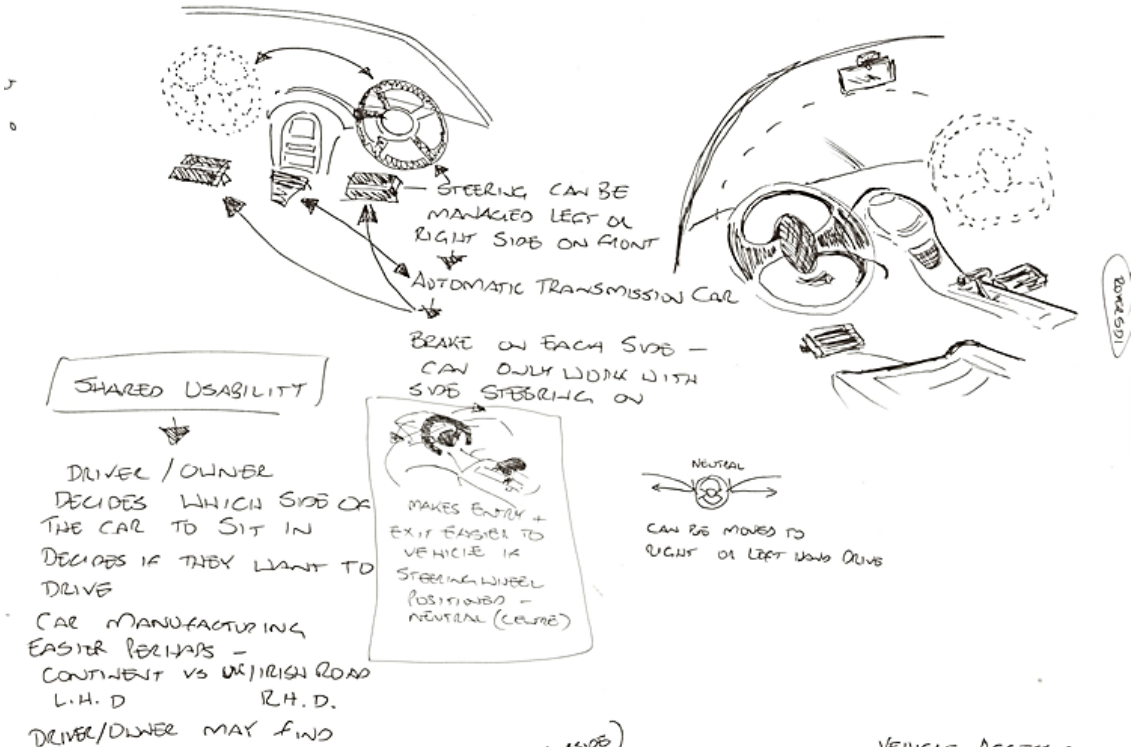


Figure 44 Driver selection Autonomy concept sketch.

This concept considers the fully autonomous option to driving. It offers the option to the driver – what side of the car they sit and also what levels of drive management they wish to have. The driver inputs the route choice, and can engage the car where they drive for perhaps a portion of the route, perhaps a country or rural location and engage Advanced Driver Assistance System to navigate and drive through more challenging areas/road conditions.

As a further benefit, the concept of a managed 'moveable steering wheel' offers a manufacturing benefit because it removes the need to consider left hand or right hand drive vehicle. The technology that could support this concept would be 'drive by wire technology' which uses *"electronic controls to activate the brakes, control the steering, and operate other systems."* (Laukkonen, J, 2015)

4.8 Analysis of design

After a period of time sketching and iterating in the three areas, the researcher met with an Associated Stakeholder, and with Older Adult participants. Access had been the defined area of design to pursue product/service design conceptualisation. With this in mind sketches were produced during one informal session with the Associated Stakeholder – Occupational Therapist, and two further informal sessions with Older Adult participants. The images displayed collectively as **figure 45** are a selection of sketches produced and discussed during these sessions.

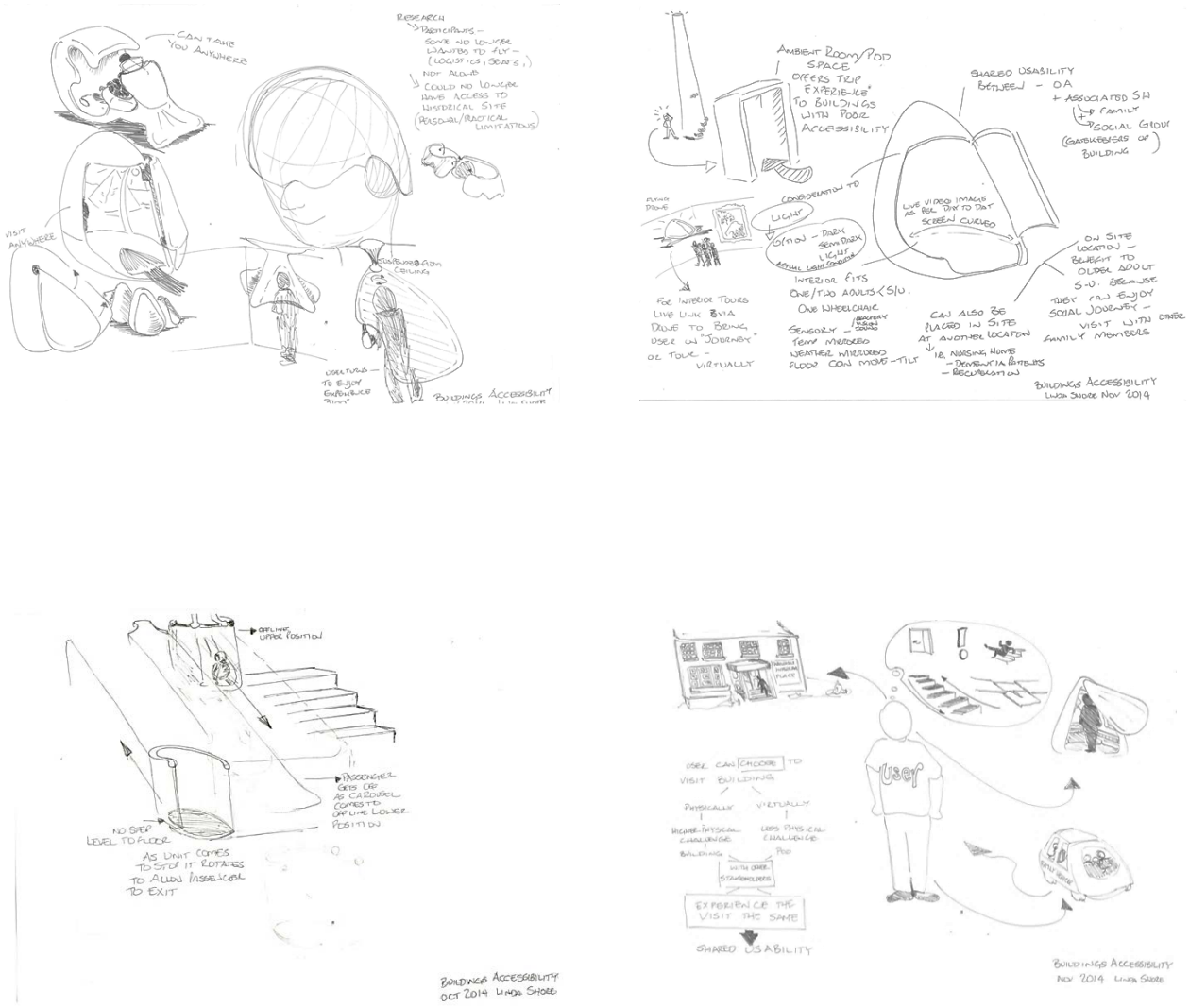


Figure 45 Selected images of sketches produced at design analysis meetings between researcher and Older Adults and Associated Stakeholder

There was one concept area that provided great enthusiasm amongst both the Older Adults and Associated Stakeholder – The central heating timer. This had been detailed as problematic during life-logging sessions. Various Older Adults expressed dissatisfaction with the location, the usability and the need to introduce supporting products (i.e. a torch) as a means to ensure setting it correctly or turning it on and off.

In addition during the session with the Occupational Therapist she commented how a plug can often also be problematic for Older Adults, particularly those in early stage dementia. She advised that the plug can often by pulled out by the lead as opposed to the handling and withdrawal of the plug itself. This poses a risk of electric shock and is a hazard that she feels should be addressed in the process of design. Ideas were discussed such as colour coding or creating a handle to the plug socket to aid the user firstly identify which appliance was which(i.e. red – television ; green – vacuum cleaner etc) as a follow up to this thinking the researcher created some early stage sketches to assist conceptual development and research outcome.

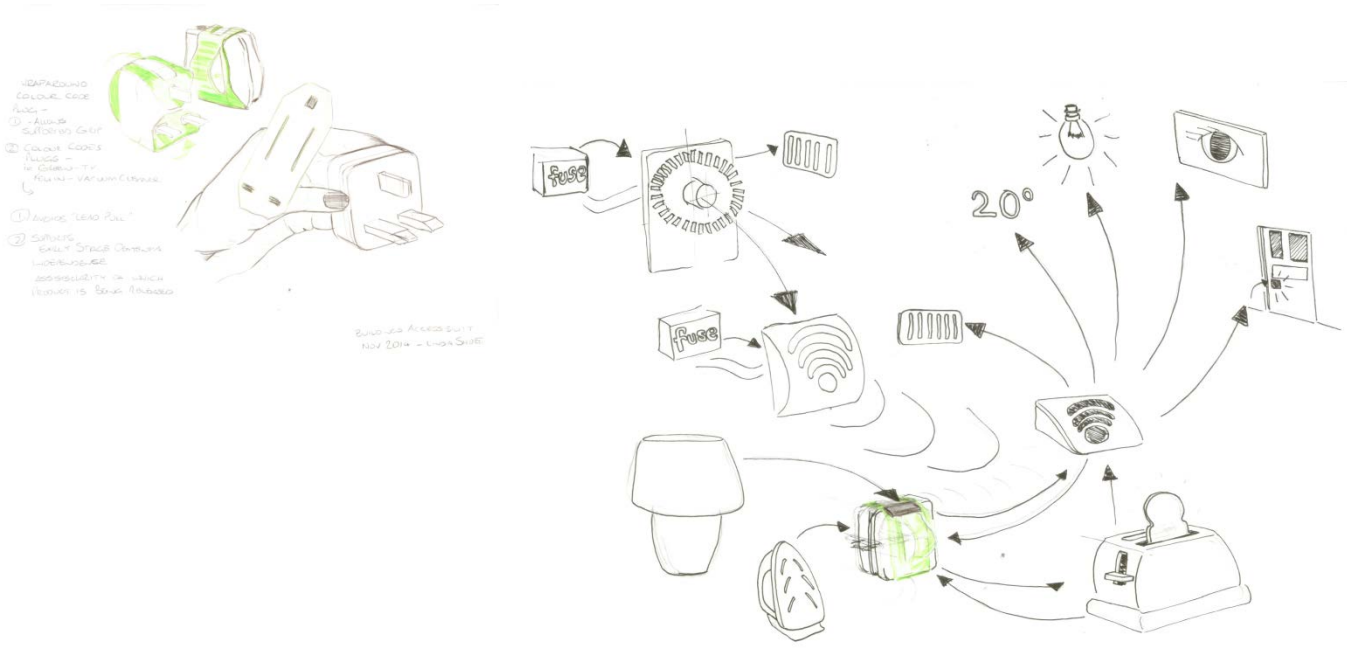


Figure 46 Post analysis sketches development of 'smartshare'

The concept outcome developed as a result of the analysis sessions was one that considers the existing mechanical type timer and replacing it with a new product with no functional buttons or switches. This product would allow the central heating system be accessed through a wireless modem and provide services to set automatically the heating to come on, switch off and

accommodate further services with development. It removed the manual application of the user having to input and change the pins to assume the right times for on and off heat.

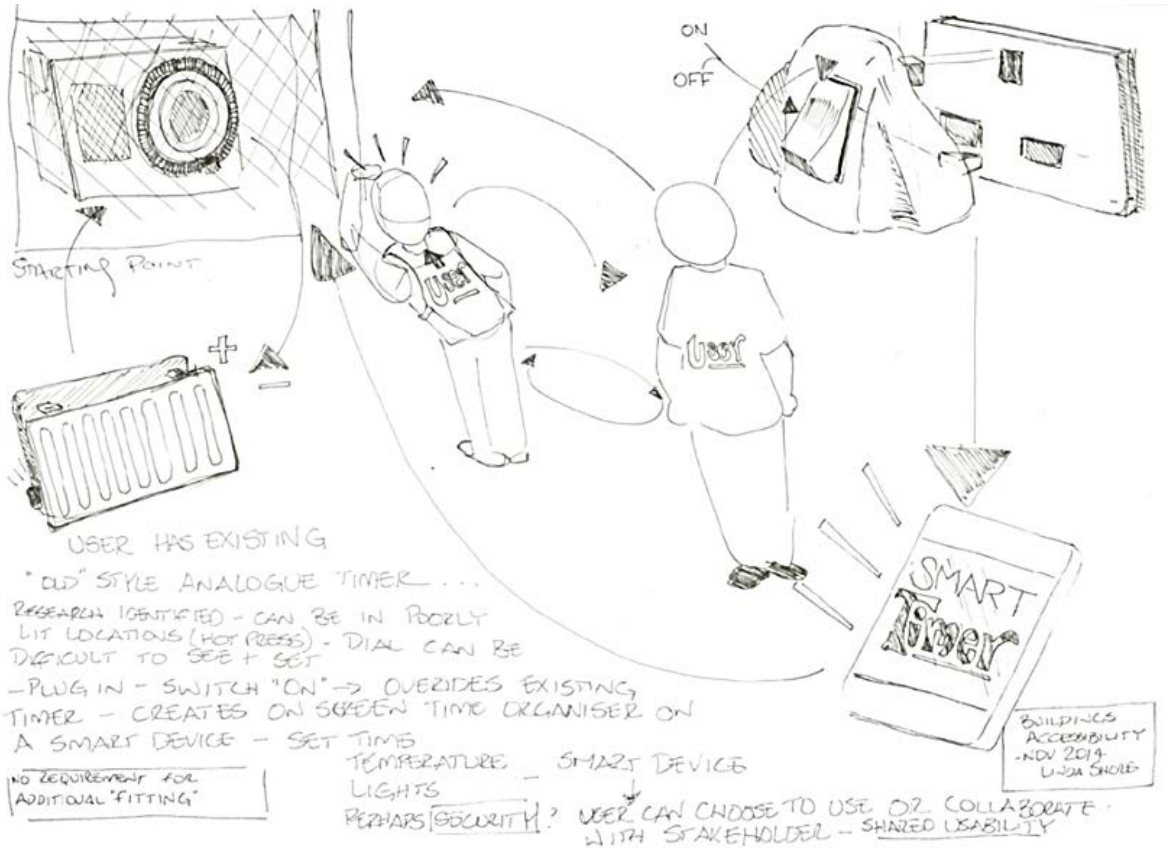


Figure 47 SMART TIMER domestic heat management system concept.

As a result of meeting the Associated Stakeholder and Older Adult feedback, the researcher created storyboards and expanded this concept to consider the following:

- **Direction One:** Replacing the existing timer in the home with a new product and service application (Storyboard Figure 48)
- **Direction Two:** Re-cover and enhance with added features to the existing timer. (Storyboard Figure 49)
- **Direction Three:** A removable or mobile timer that could be placed in a more convenient location in the home to manage the central heating. (Storyboard Figure 50)

Each of the concepts had a common base feature to provide the ability to input heating preferences for the home using wireless network[20] connectivity.

To reinforce the need for such devices the Centre for Ageing Research and Development in Ireland produced a report in 2011 relating to the impact of the cold weather on Older Adults. There were a total of 722 Older Adult participants in this research(Goodman et al., 2011) Some of the statistics revealed:

- 24% of sampled population described their home as too cold
- 62% worried about the price of heating their home
- 51% responded how they went without necessities such as food or clothing in order to pay for heating over the Winter period

The benefit of transparent costings would support an efficient management system to heating within the home.

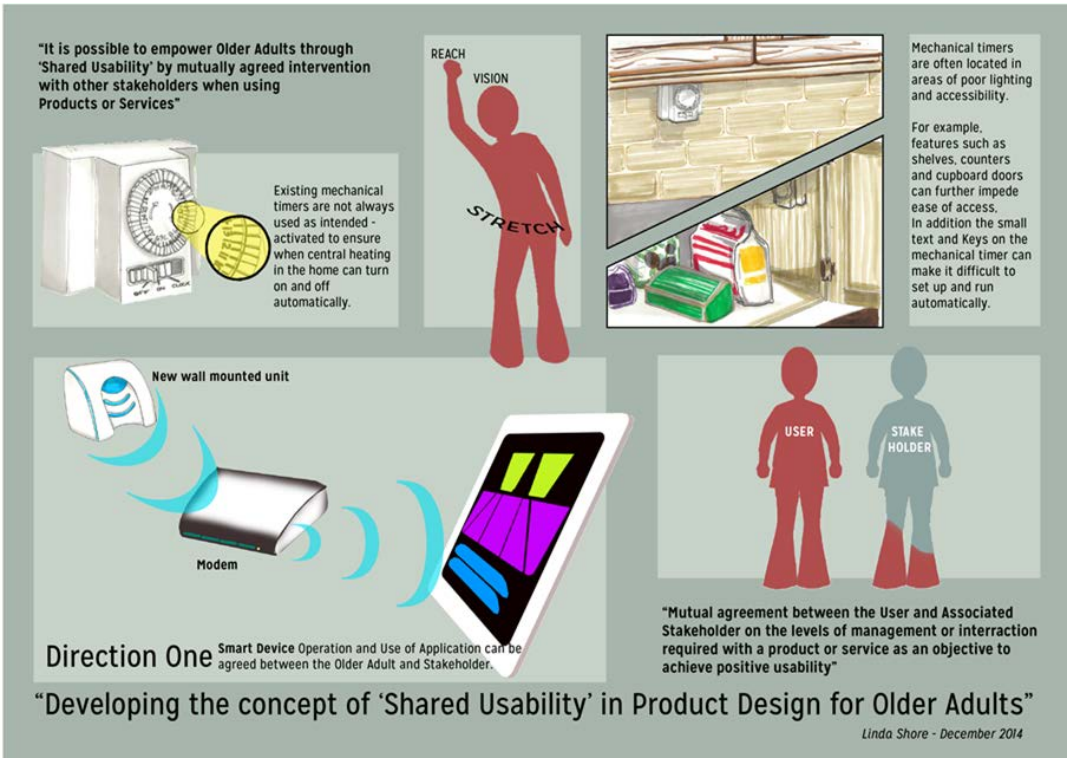


Figure 48 Storyboard Direction one - Replacing the existing timer in the home with a new product and service application.

[20] A wireless network is *"a local-area network (LAN) uses radio waves to connect devices such as laptops to the Internet and to your business network and its applications."* CISCO. 2015. *What is a wireless network? : The basics* [Online]. Cisco.com. Available: http://www.cisco.com/cisco/web/solutions/small_business/resource_center/articles/work_from_anywhere/what_is_a_wireless_network/index.html.

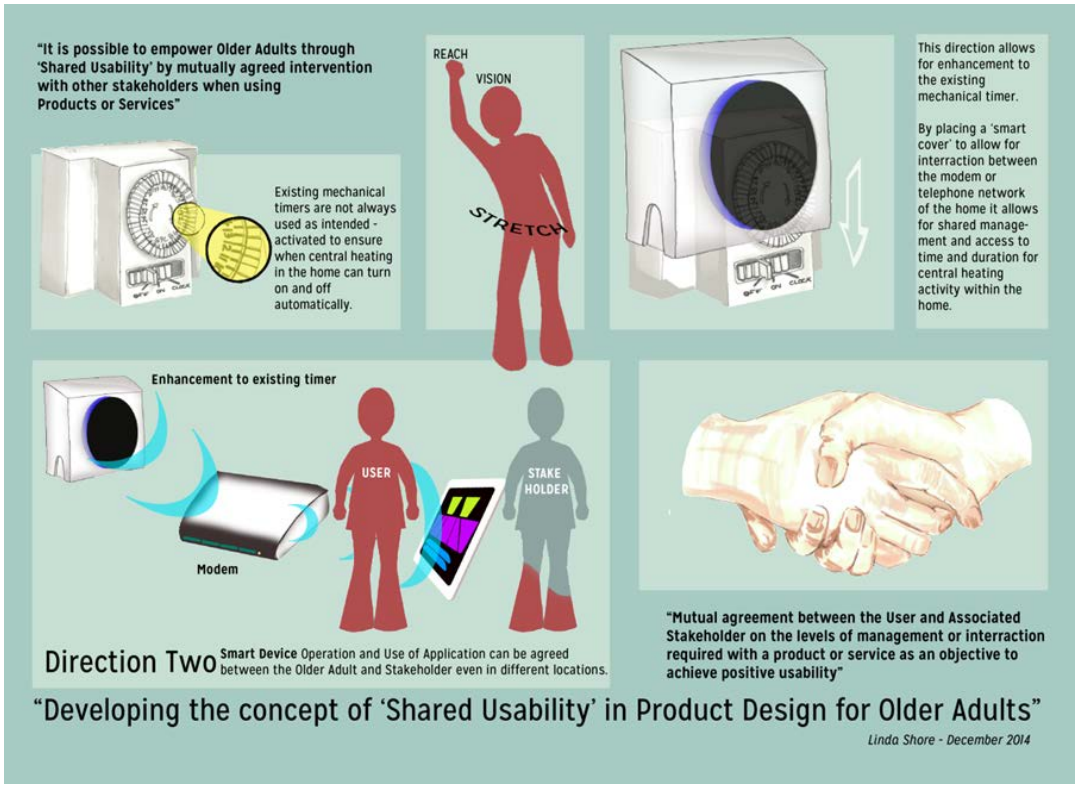


Figure 49 Storyboard Direction Two - Re-cover and enhance with added features to the existing timer.

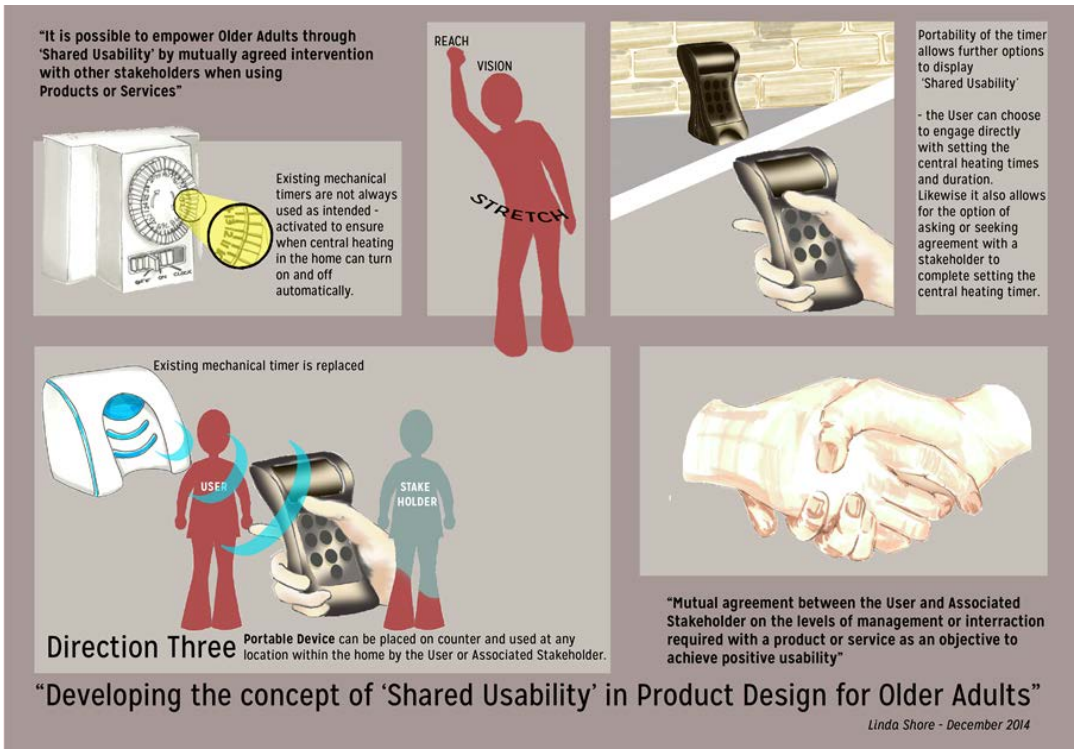


Figure 50 Storyboard Direction Three Removable or mobile timer that could be placed in a more convenient location in the home to manage the central heating

The development of the product concept needed to resolve the problems identified with fuel access and heating management within the home. It also required that 'Shared Usability' would be a defined factor of use and usability between the Older Adult user and Associated Stakeholders. The following part of this chapter will discuss the product and system outcome of research.

4.9 Product Design outcome

During the fieldwork, a number of the participants had discussed problems regarding their home heating systems, some of them sharing how they often do not 'set' or automatically time their central heating using the timer-*particularly* mechanical timers.

A number of reasons were offered:

- Some participants preferred to know the cost implication, and preferred to turn it on and off manually as required
- 'Pins' that you raise or lower to set the time were too awkward to manage with fingers
- The location of the timer was poorly lit
- The small print of the numbers are difficult to see and accurately set the time
- Some participants felt it was more challenging to set the timer
- The location of the timer is usually under a press or cupboards and often located in the 'hot press'.

The product outcome for this research, is one that involves the User (Older Adult) plus Associated Stakeholders (these can be family members, service providers, other companies)

It is a retrofit device that is operated on a smart device, tablet or computer. It can be accessed by the user (Older Adult) or managed levels agreed between the Older Adult and Associated stakeholders.

There is a second product need identified with the fuel supply and provision to the home, again the concept here is managed through a wireless network and agreed between the Older Adult and perhaps the utility company or service provider.

The third area is the system of the 'App' supporting the product use and management. This can have further services or features added to as they get developed. This potentially could provide a home with services such as lighting, security, access in addition to the heating and fuel management concepts as an overall home service management system.

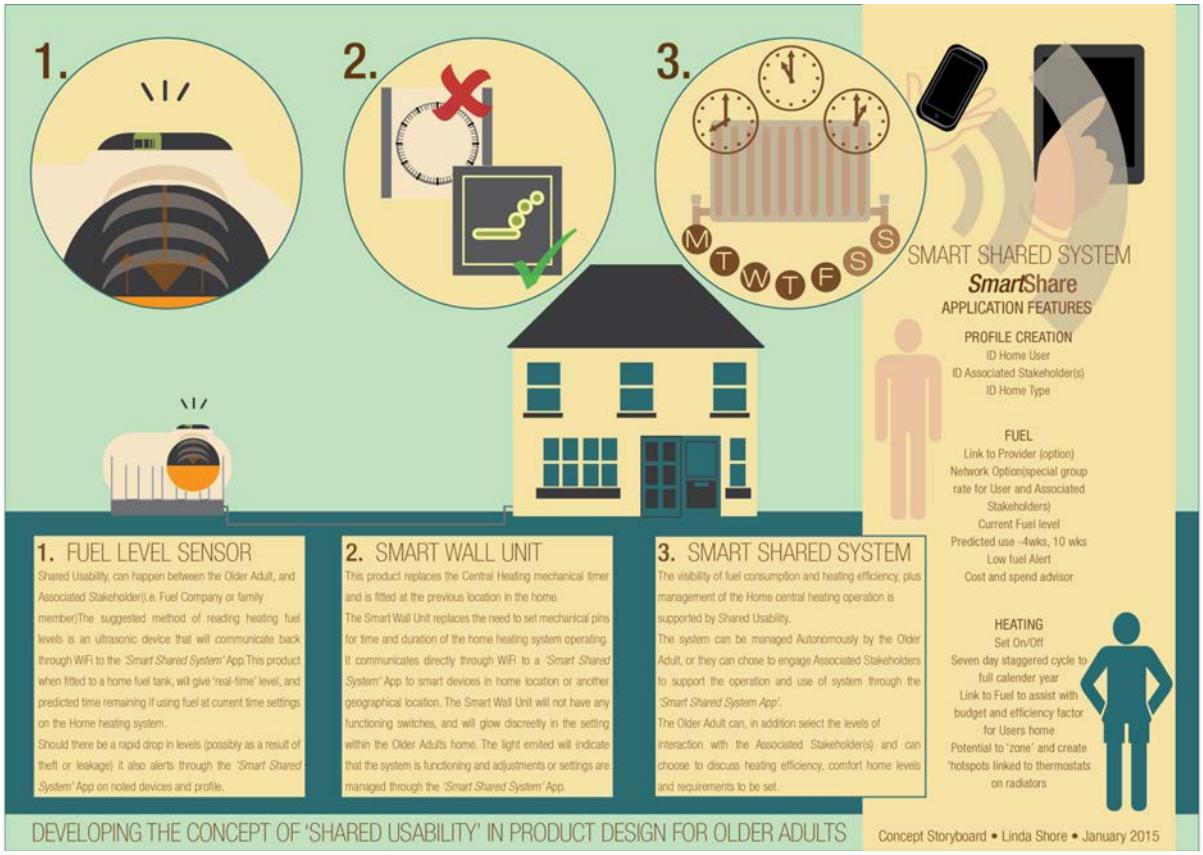


Figure 51 Smart*Share* system Product Concepts.

The concept outcome of this research is called 'Smart*Share*' it offers two initial products and an 'App'

1. Fuel level Sensor
2. Smart Wall Unit
3. Smart Shared system App.

1 FUEL LEVEL SENSOR:

The fuel level sensor is a product that can be potentially incorporated to an existing fuel tank or a product feature of a new fuel tank design, which is owned and managed by a fuel company or service utility provider –for example Oil, Gas or biomass. This concept is of benefit to the Older Adult and supports Shared Usability. The company will have access to the fuel level gauge which can be transmitted wirelessly back to the company and offer the following information:

- Use or spend by the Older Adult to date.
- Identify if there is a top up or new order of fuel required as agreed budget and data information between the Older Adult and fuel provider.
- It would offer an oil company for example to ability to provide a more uniform service to the older adult by Offering a 12 month contract type that would set a budget spend and allowance to 'standardise' payments as opposed to a large spend during one season of the year.
- It would offer ability to communicate between the Older Adult and the Utility Company regarding current settings and requirements or through another nominated Associated Stakeholder.
- Costings and spend advisor.
- Network option to provide discounted rates from the fuel company to the Older Adult if the Associated Stakeholder also becomes a fuel network member.

2 SMART WALL UNIT:

This product concept replaces an existing mechanical timer, or can be fitted in a new build home. The new product would have a simple lowlight feature as an acknowledgement of functionality to the older Adult. It would be scaled to the existing space requirement of a typical mechanical timer which is usually the size of a light switch. It would not involve new wiring or fitting other than replacing the old timer for the new unit. It would communicate through a fitted transmitter to the wireless network modem in the home. This would provide access for the Older Adult or associated Stakeholder to manage the home heating from the Smart*Share* App. The older Adult can manage the home heating in their home or from another geographical location. This offers Shared Usability management as it offers the potential for the Older Adult to self-manage or agree other

levels of management to an Associated Stakeholder. Some of the features of the Smart wall unit are:

- Automatic management of home heating
- Controlled temperature management
- Ability to create zones within the home to assist fuel or heating efficiency
- Seasonal alerts to indicate weather change that could impact on the current heating setting.

3 SMART*SHARE* SYSTEM APP

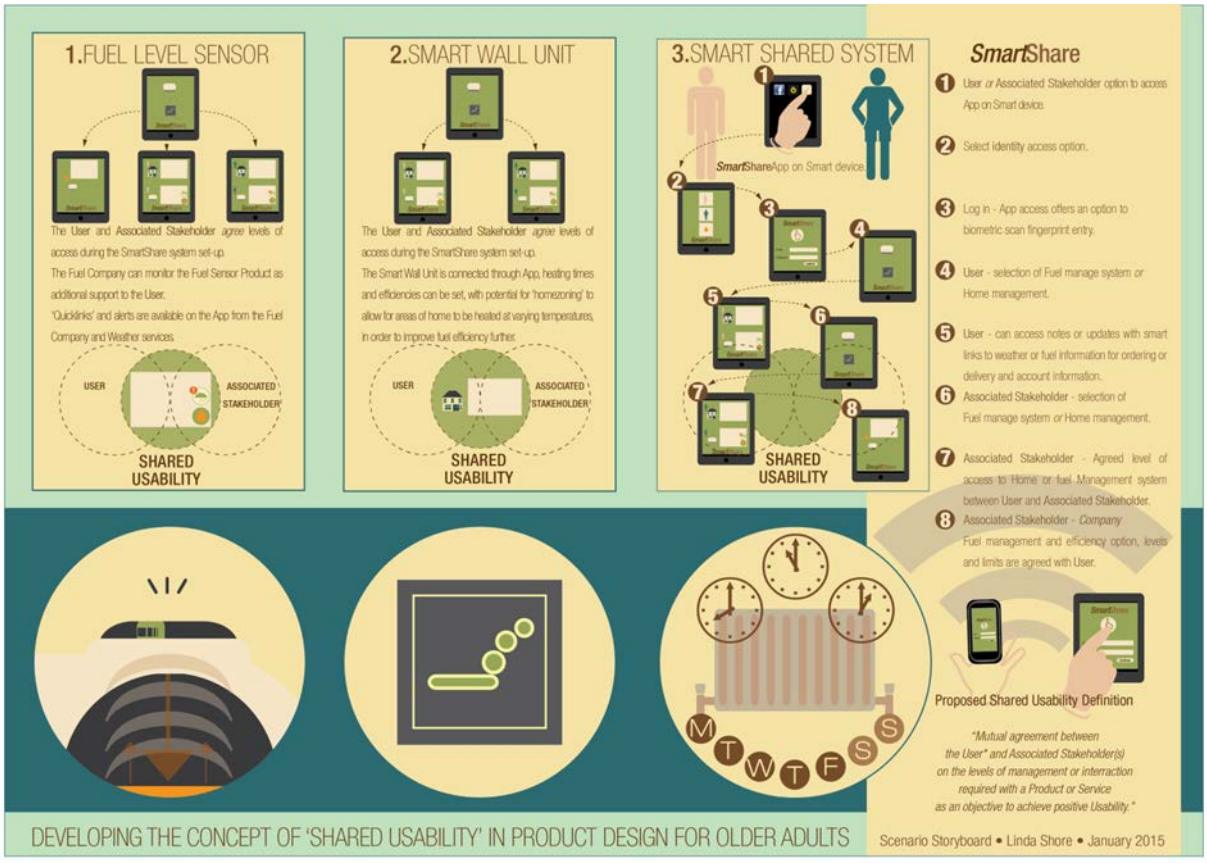


Figure 52 Smart*Share* system Application features.

The App feature offers a system of support to manage the heating and fuel efficiency within the home. The Older Adult can initially create their profile, individually or with the support of associated Stakeholders.

Once the App has been set up, it can offer the following identity access:

- Fuel level sensor can be managed by the Older Adult, or utility company or another nominated Associated Stakeholder
- Smart Wall Unit managed by the Older Adult or Associated Stakeholder, not accessible by the utility company.

In order to initially access the App it will have an embedded security feature options to either log in manually using an email and password or to biometrically scan ID. Biometric scanning systems are:

> *"automated methods for the identification of individuals based on their physiological (e.g. fingerprint, face, hand, retina, iris) or behavioural (e.g. voice, handwriting, keystroke style) characteristics."* (Ferrara, 2009)

The access recognition for this App would be fingerprint based. The consideration would be one of convenience to access the SmartShare system efficiently and securely. The infographic displayed as figure 53 highlights the stakeholder map in relation to the Older Adult User being supported through 'Shared Usability' when using the Fuel level sensor or Smart wall unit.

SmartShare

Stakeholder map displaying agreed interventions between Older Adult and Associated Stakeholder when using Fuel level sensor and Smart wall unit

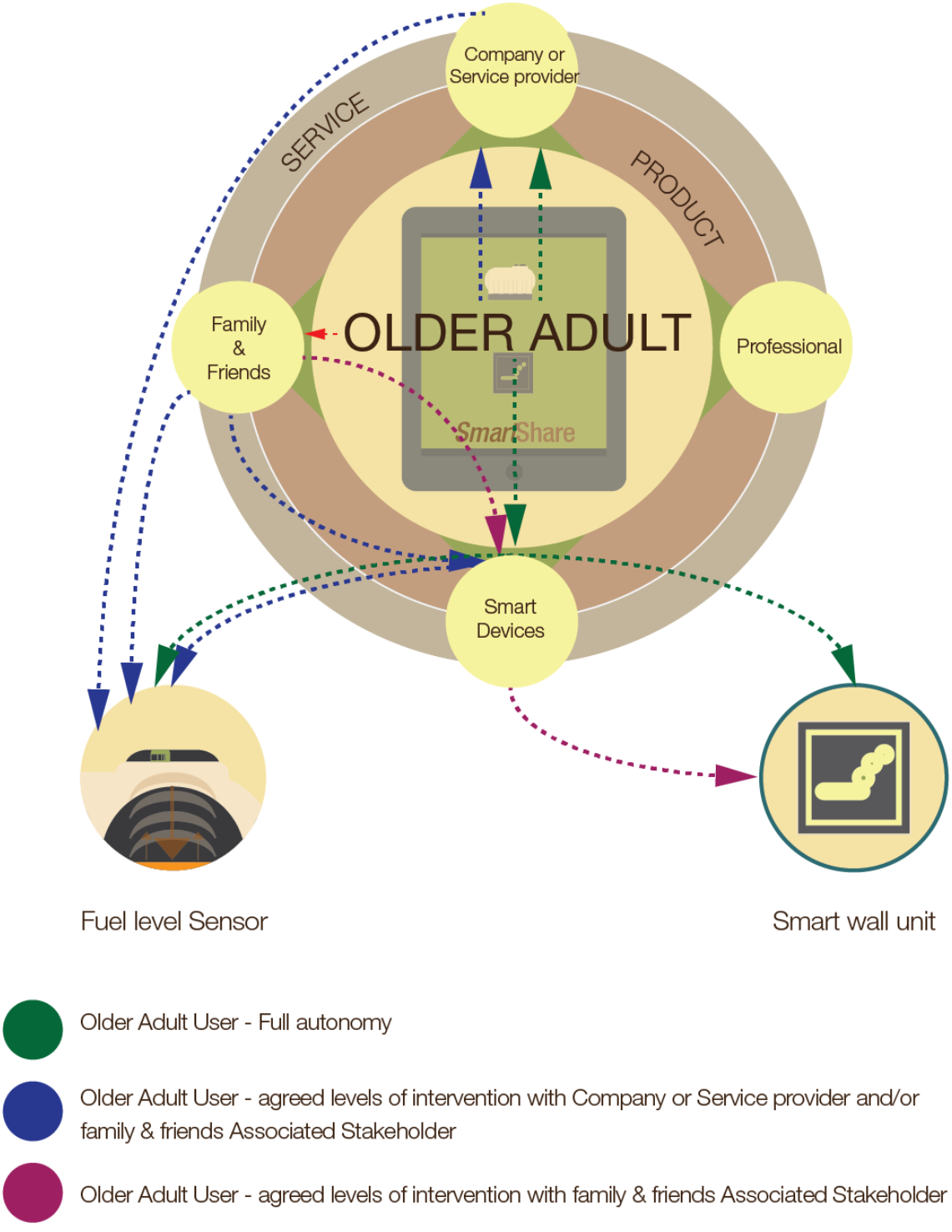


Figure 53 Stakeholder map -*Smart*share system

Chapter Conclusion

This chapter has documented the journey of design, incorporating the concept of 'Shared Usability'. It has reflected throughout the chapter on the importance of the fieldwork with the participants to the design process. Conceptualisation was supported further by knowledge gained from the Literature review in the earlier stages of research.

The design outcome of this research – The Smart*Share* system could now be developed further to gauge market viability of the products and App.

As a record of the work conducted and completed during this research, Fig. 54 highlights the 'story' and overview of this research. It begins with the assessment of what was required in order to develop the hypothesis, and fieldwork strategy. The Life-logging sessions and task observations culminated to a stage of triangulating the gathered data and knowledge as a means to deliver new knowledge outcomes that conclude with product, fieldwork and Shared Usability outcomes.

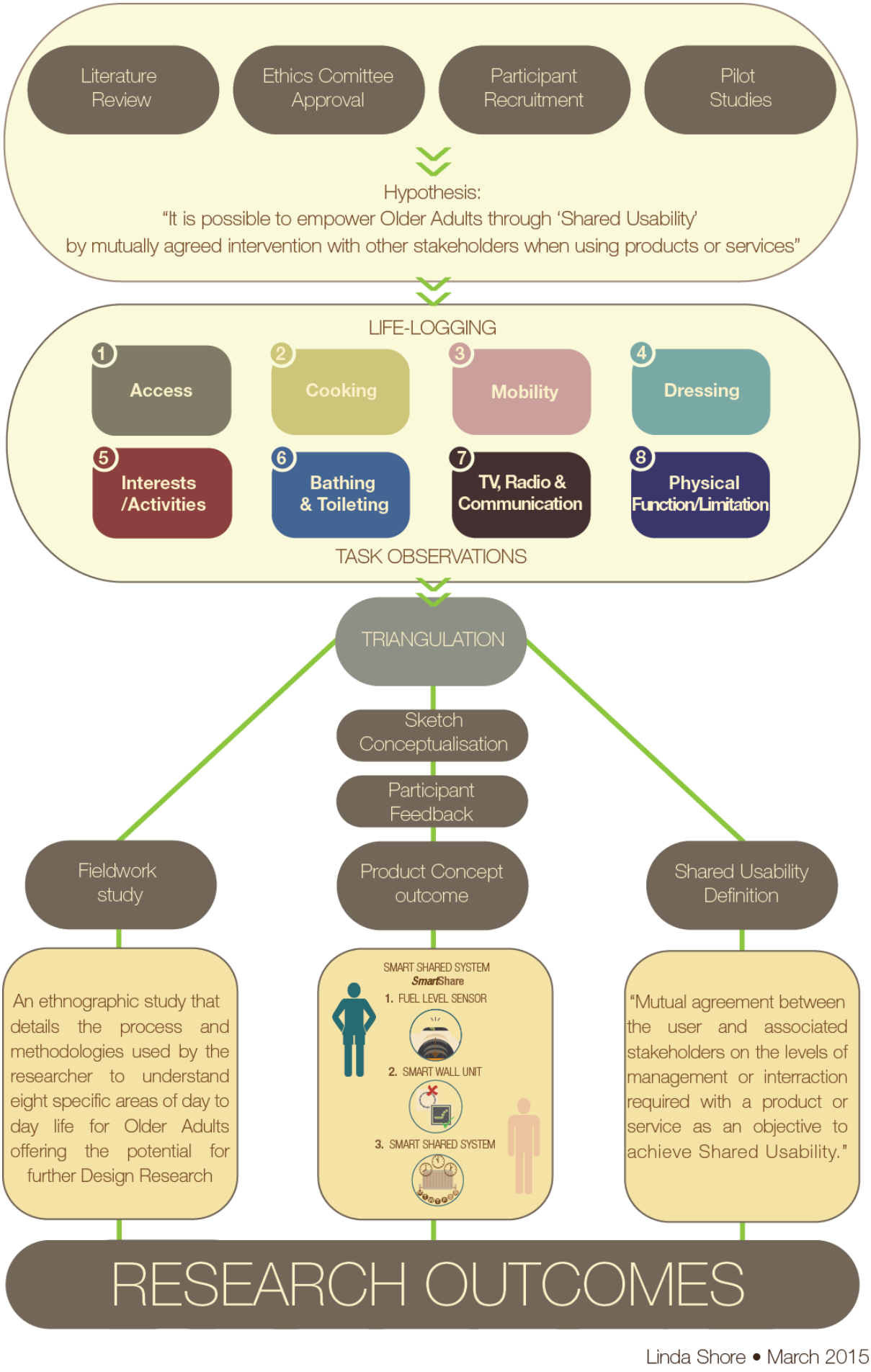


Figure 54 Infographic displaying research Journey from Initial enquiry to outcomes.

CHAPTER FIVE – Thesis Conclusion

This thesis concludes with three new knowledge outcomes. These outcomes will offer potential for further research and product development. The conceptual product outcome supports the application of 'Shared Usability' to the design process. This is achieved through iteration and collaboration of the following:

- User Centred Design
- Principles of Universal Design
- Design for all approach

User Centred Design considers the needs of a user when applied to the process of design. It requires defining unmet needs as identified by the user. The designer's responsibility is to deliver a product or service that is intended to fulfil these needs. However the limitations of User Centred Design can be restrictive when 'Shared Usability' is applied because of the requirement to consider the network of Associated Stakeholders to support the autonomy of the user – the Older Adult.

The principles of Universal Design were beneficial to the consideration of more than one user as a means to a design outcome; it supports also the consideration of human abilities and function when considering product or service system development. This was beneficial particularly to the impact of limiting function and mobility associated with ageing. However where this faltered was the need to expand and associate stakeholders as supporters to the autonomy and independence of the Older Adult using products or services. (2.1.7)

> *"Design for all relies on the involvement of potential users, where this means not only the end users, but all those involved in the design, development, production and marketing processes."* (Krauss 2011, p. 13.2).

The following images (figures 55, 56 & 57) display iteration and development to the relationship of the Design philosophies discussed throughout the earlier Chapters, and implemented during the conceptual phases as a means to promote the value of Shared Usability design.

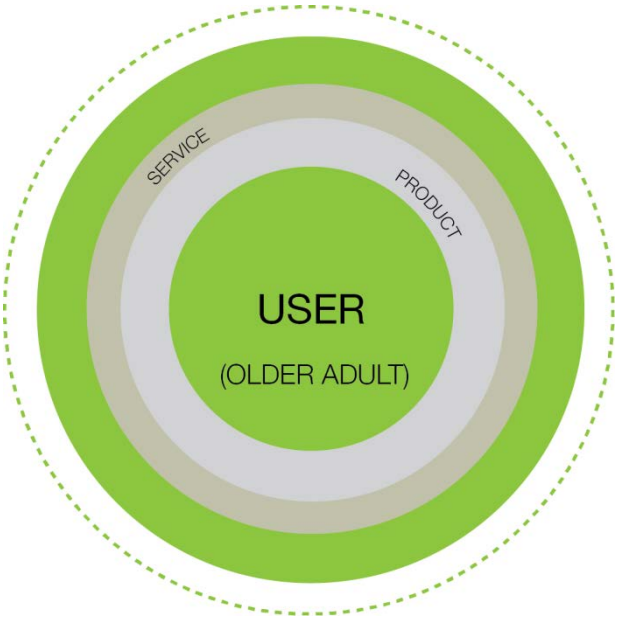


Figure 55 User Centred Design defining unmet needs of a user

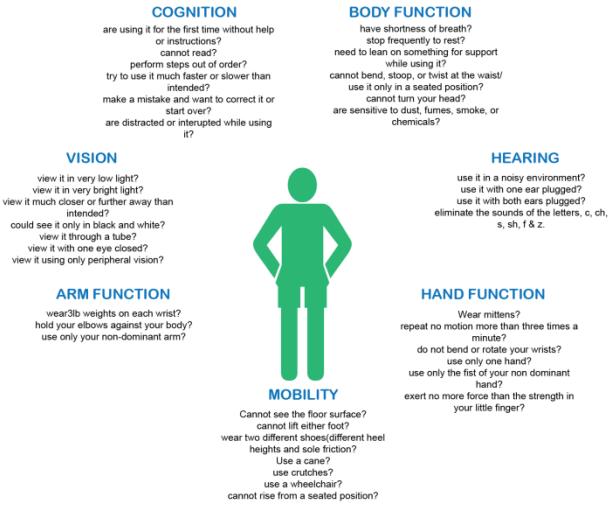


Figure 56 Spectrum of Human Abilities as per Universal Design file

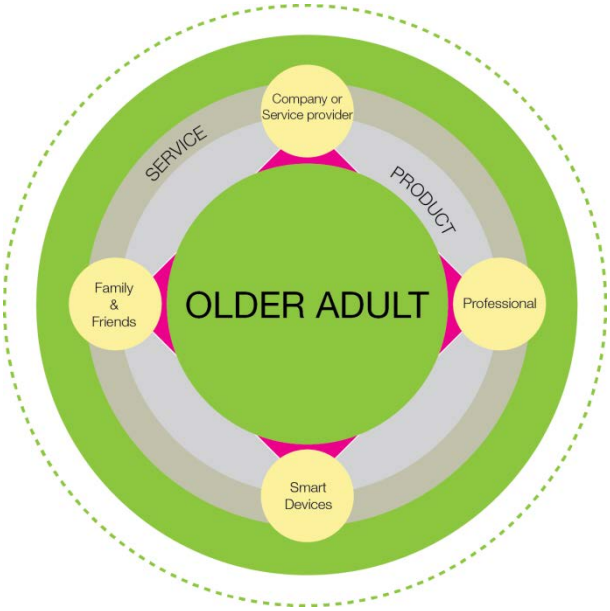


Figure 57 Shared Usability Design

The development of the concept of Shared Usability is evident by the body of research undertaken, in addition it has supported the main three new knowledge outcomes.

The three new knowledge outcomes are as follows:

1. A definition of Shared Usability
2. Product Concepts
3. Fieldwork detailed enquiry into Older Adults

5.1Definition of Shared Usability

White defined Shared Usability as a concept for independence (White, P.J., 2012). The purpose of this research was to enquire further into Shared Usability and to offer design examples from this enquiry. This was achieved by conducting field studies with Older Adult participants and other stakeholder's.

The research conducted, highlighted the potential benefits of Shared Usability in the design of products and services for Older Adults. This research also clearly highlighted the benefits of the engagement of User with Associated Stakeholders in product or services use. The User (Chapter Two, 2.1.4) and Associated Stakeholder network (Chapter Two, 2.2.6) have also been defined in this research offering understanding of the potential relationships that can support Shared Usability.

The definition of Shared Usability created from this research is as follows:

> ***Mutual agreement between the User and Associated Stakeholders on the level of management or interaction required with a product or service as an objective to achieve positive usability.*** (2.2.8)

5.2 Product Concepts

The eight areas of enquiry pursued during fieldwork were comprehensively explored as a means to identify unmet needs in products and services for Older Adults. This offered the researcher many areas to pursue design conceptual development. The fieldwork data gathered was triangulated determining the area of 'Access' as the most appropriate area to progress product development conceptualise within. The conceptual stage involved further feedback sessions informally between the researcher, Older Adults and Associated Stakeholders as a means to determine concept and product outcome.

The concept of the Smart*Share* system was presented as an outcome to conceptualisation. Smart*Share* is a mobile application that encourages Shared Usability and support the user in fuel and heating management within the home. This concept offers the opportunity for further user testing, enquiry and development as a means to explore market viability.

5.3 Fieldwork Study

People are not only living longer, but often living longer and independent with some functional limitation (2.1.2). The growing ageing population directs a need for designers to engage with research specific to Older Adults. The intention of design research must be to improve and endorse the choice and autonomy we all deserve as we age when using products or services.

Fieldwork was conducted as a means to define unmet needs within eight areas, the fieldwork methods that were selected by the researcher ensured a comprehensive record of Older Adult behaviour and experience. The fieldwork methods of observation, interview and task analysis within the day to day life for Older Adults revealed in-depth insight.

The Pilot studies that were conducted offered new knowledge and insight into Associated Stakeholder involvement in Older Adult day to day activity.

This thesis also offers direction to assist with further research in eight areas:

1. Mobility
2. TV, Radio & Communication
3. Interests/Activities
4. Dressing
5. Bathing/Toileting
6. Cooking
7. Access
8. Physical Function/Limitations

5.5 Future Research

This research revealed that Shared Usability was previously an undefined existing activity that Older Adults and Associated Stakeholders engaged in. The research undertaken offers a definition of Shared Usability; which supports the requirements capture to consider more than one user engaging in the use of products or services. This research focussed on the Older Adult as the 'User' however the promotion of Shared Usability could offer enabling and empowerment to all users, irrespective of physical or cognitive limitations.

Future research could explore areas such as Older Adults and dementia, being supported by Associated Stakeholders as a means to prolong independence. Another example that considers Shared Usability and 'Users' other than Older Adults could be the area of play and recreation for children that would allow the child explore and be curious, whilst also being supported by the Associated stakeholders in their lives – Parents, Guardians, Educators etc. This could be an area that collectively could support the area of healthy eating and obesity or outdoor activities as examples.

The fieldwork undertaken explored eight areas of day to day life for Older Adults (Mobility, Communication, TV & radio, Interests & Hobbies, Dressing, Bathing & Toileting, Cooking, Access and Physical Functions/Limitations).

It concluded with a product concept outcome in the area of 'Access'. There is potential to explore in greater detail each of the remaining seven areas with an objective to create new Product or Service designs that benefits Older Adults. Within the concept of *SmartShare*, future development could include product prototyping and usability testing to validate the concept and understand market viability. .

Finally the knowledge gained from this research offers an understanding of ageing and independence in Ireland. It documented Older Adults day to day experience which in turn can be referenced for future research.

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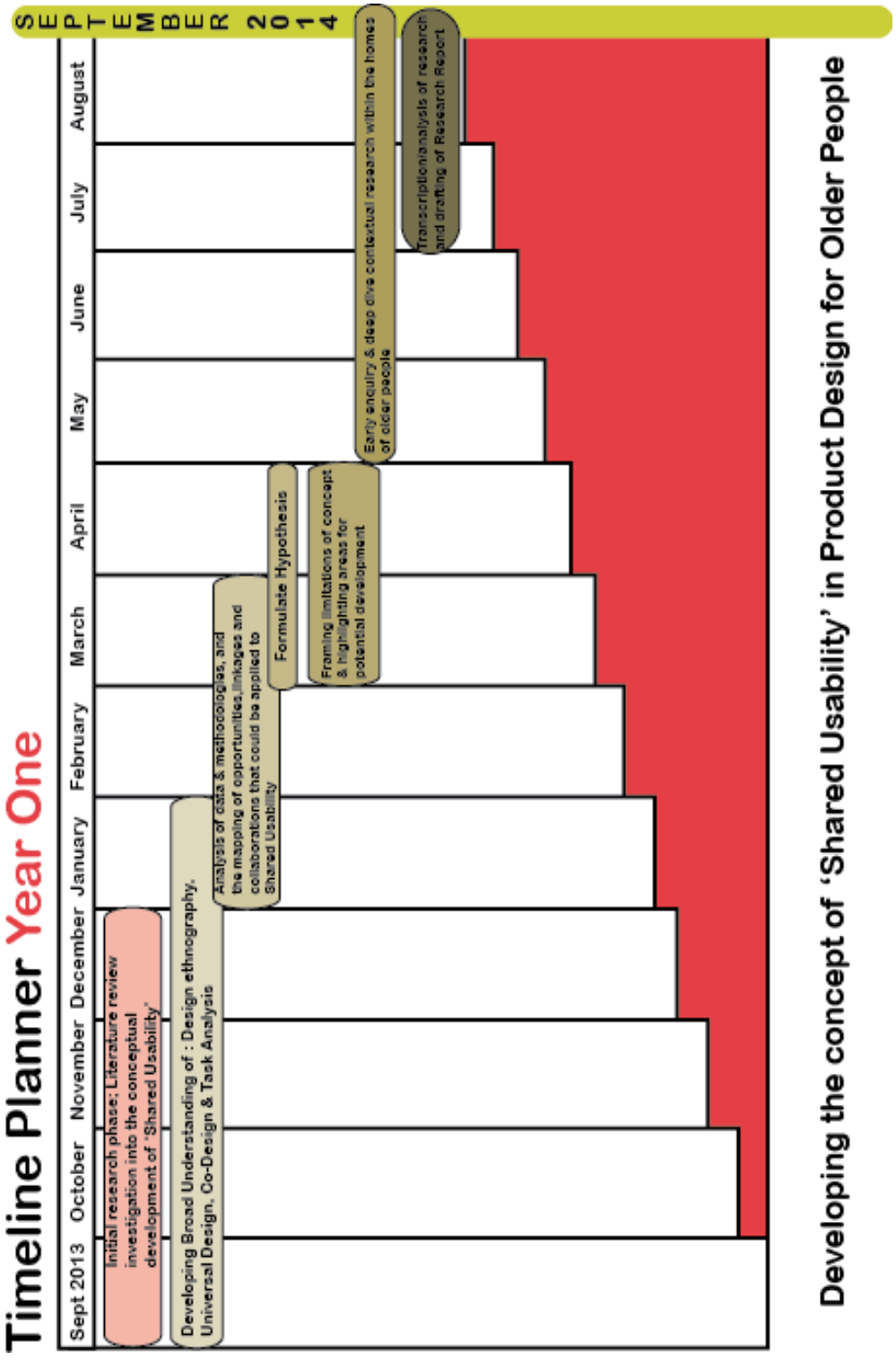
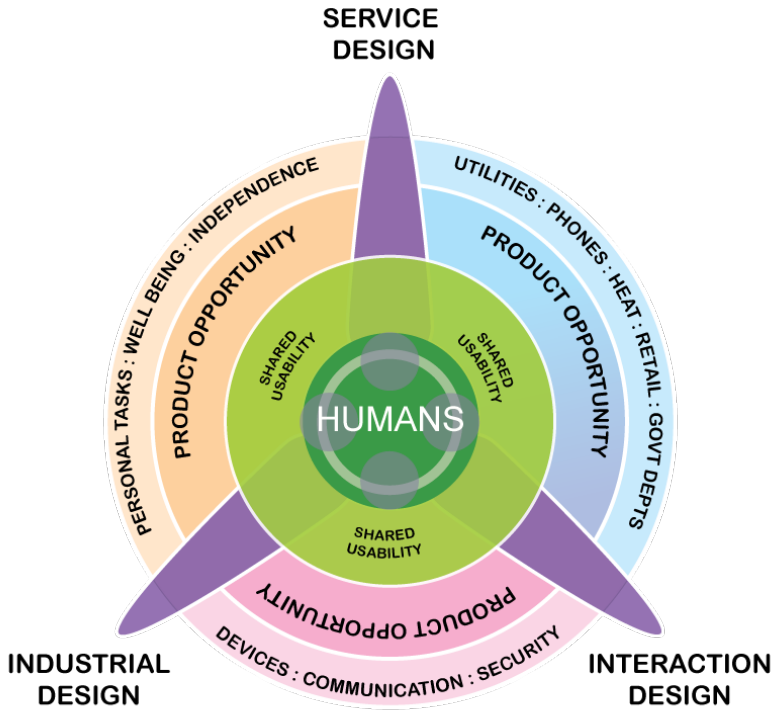
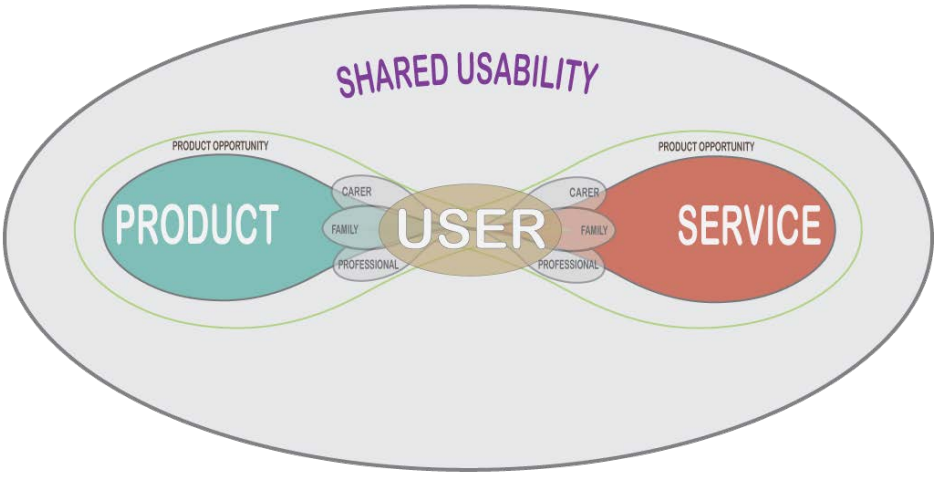
APPENDICES A: PROJECT PLANNING AND RESEARCH STRATEGY/DEVELOPMENT

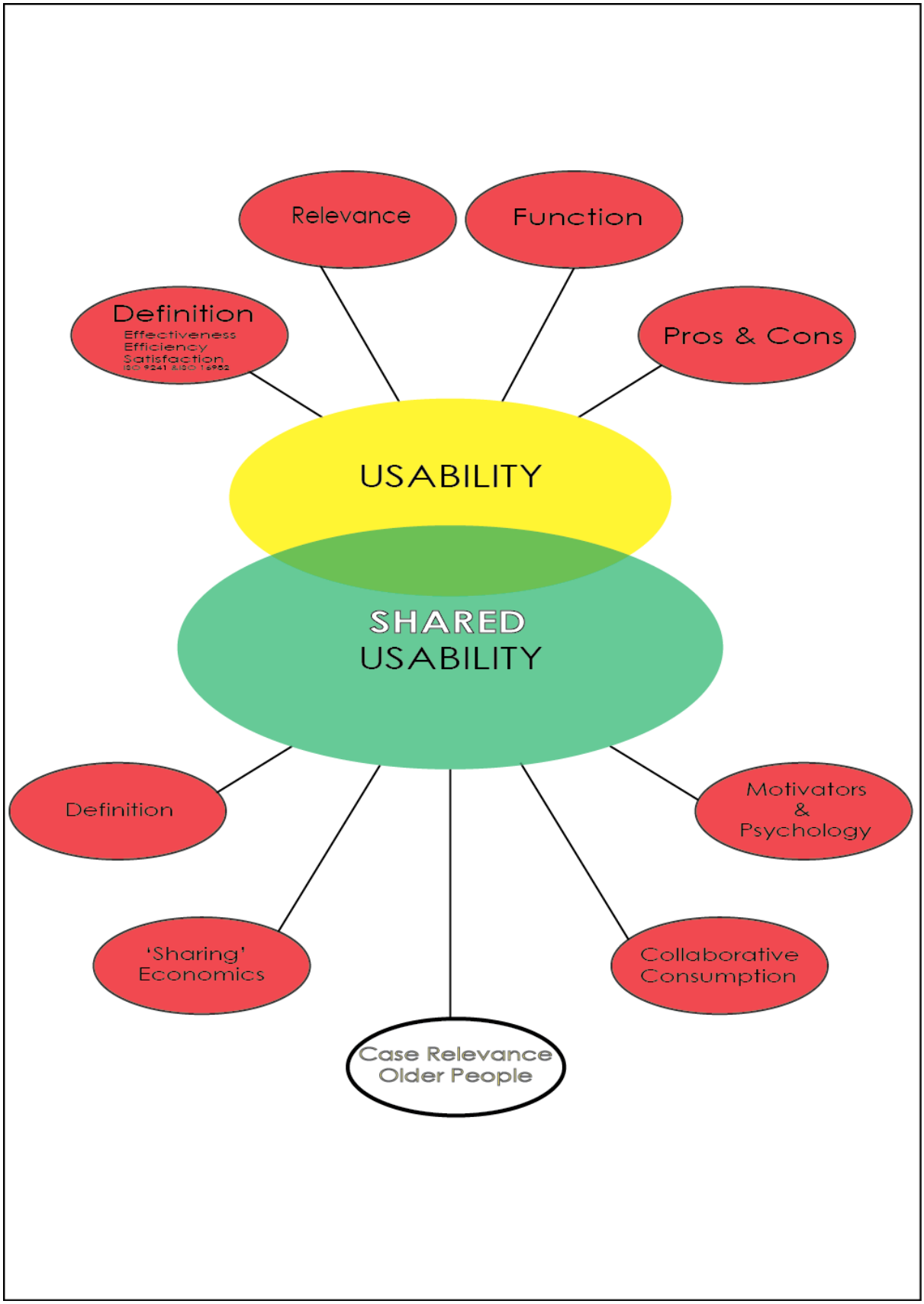
A 1: YEAR ONE RESEARCH PLANNER



A 2: EARLY STAGE SHARED USABILITY ENQUIRY





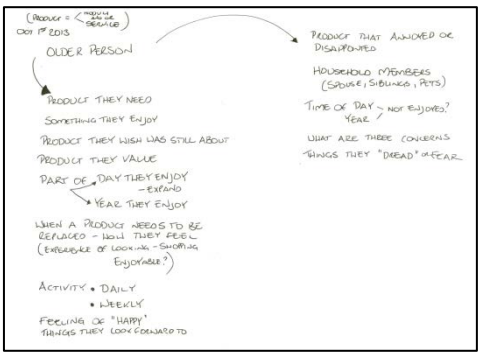

Relevance
Function
Definition
Effectiveness
Efficiency
Satisfaction
ISO 9241 AISO 16982
Pros & Cons
USABILITY
SHARED
USABILITY
Definition
Motivators
&
Psychology
'Sharing'
Economics
Collaborative
Consumption
Case Relevance
Older People

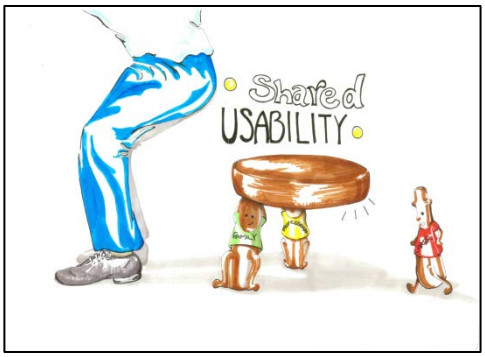
USER

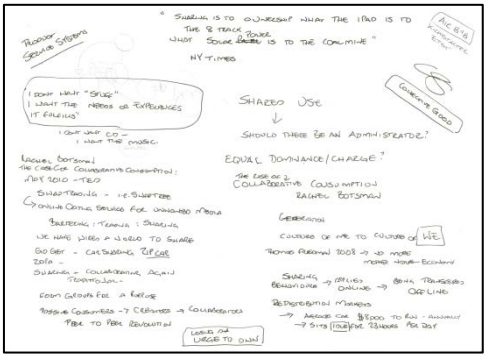
PROBLEM IDENTIFYER

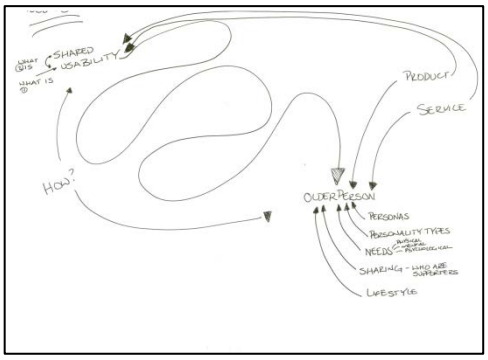
PROBLEM DEFINER

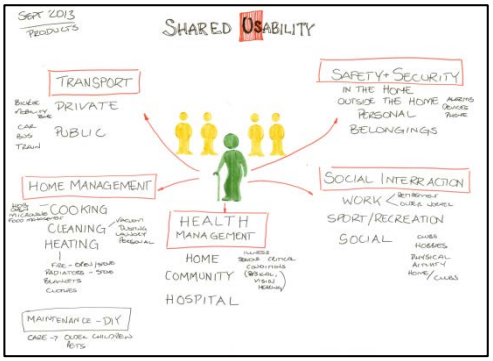
DESIGNER

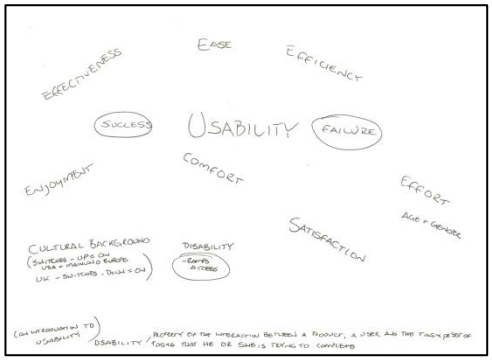

OLDER PERSON
PRODUCT THEY NEED
SOMETHING THEY ENJOY
PRODUCT THEY WISH WAS STILL ABOUT
PRODUCT THEY VALUE
PART OF DAY THEY ENJOY
YEAR THEY ENJOY
ACTIVITY • DAILY
• WEEKLY
PRODUCT THAT ANNOYED OR DISAPPOINTED
HOUSEHOLD MEMBERS (SPOUSE, SIBLINGS, PETS)
TIME OF DAY / YEAR NOT ENJOYED?
WHAT ARE THEIR CONCERNS
THINGS THEY "DREAD" OR FEAR

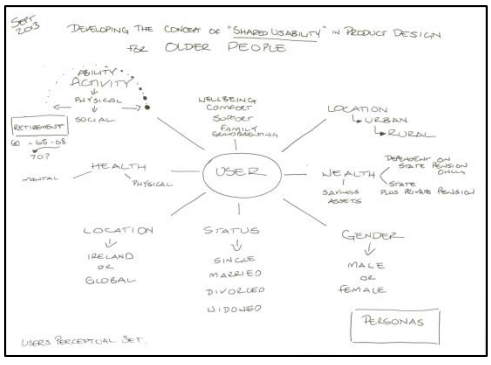

Shared
USABILITY

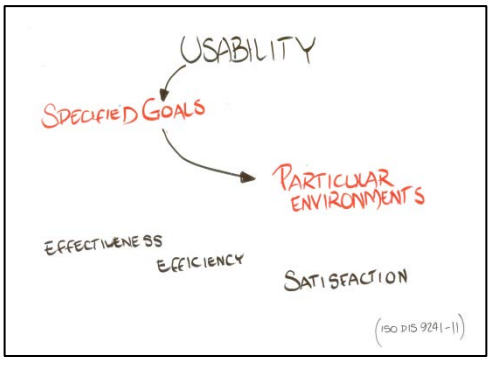

SHARED USE
SHOULD THERE BE AN ADMINISTRATOR?
EQUAL DOMINANCE/CHARGE?


SHARED USABILITY
PRODUCT
SERVICE
HOW?
OLDER PERSON
PERSONAS
PERSONALITY TYPES
NEEDS
SHARING - WHO ARE SUBSTITUTES
LIFESTYLE

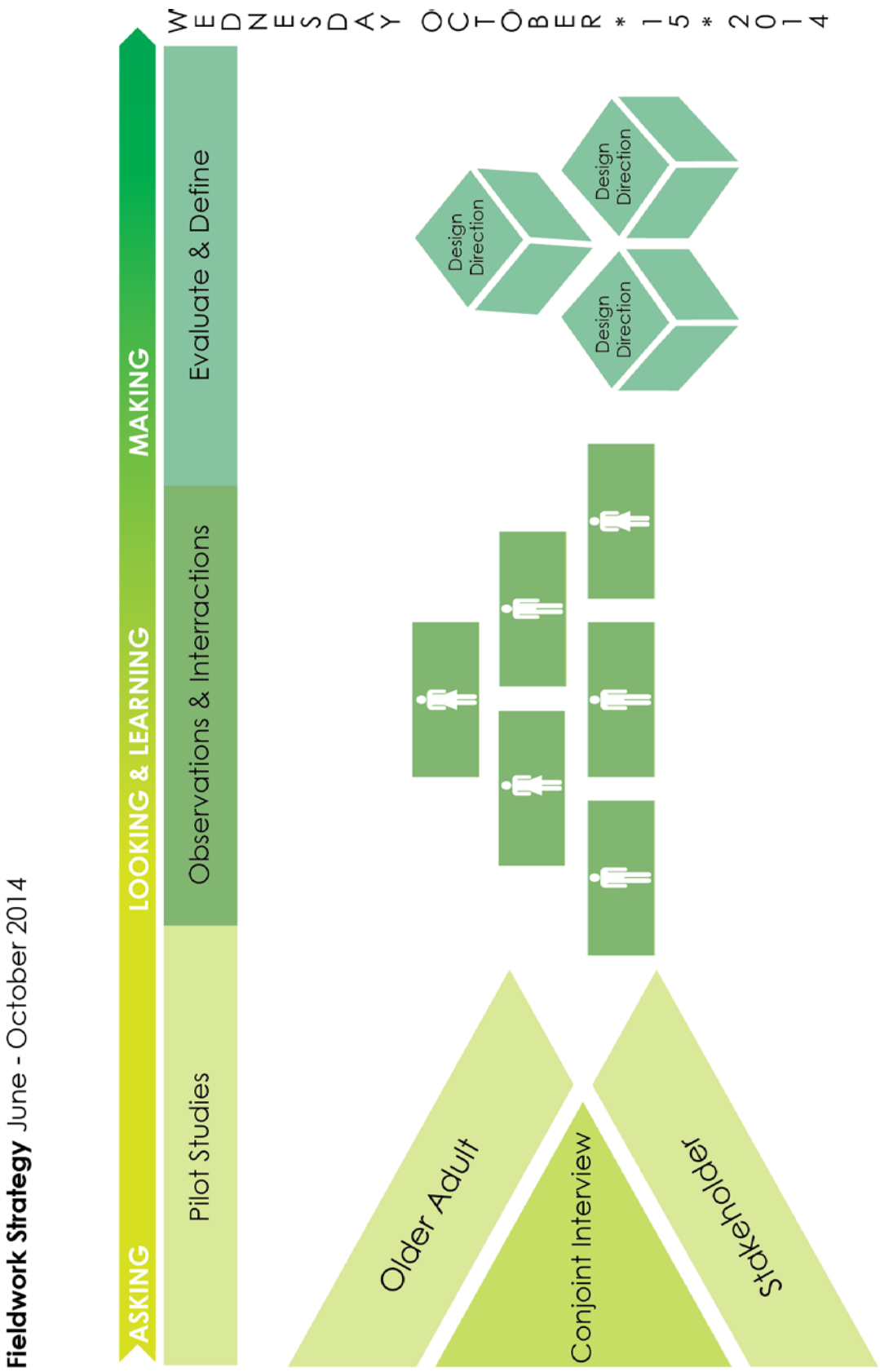

SEPT 2013
PRODUCTS
SHARED USABILITY
TRANSPORT
PRIVATE
PUBLIC
SAFETY + SECURITY
IN THE HOME
OUTSIDE THE HOME
PERSONAL
BELONGINGS
HOME MANAGEMENT
COOKING
CLEANING
HEATING
SOCIAL INTERACTION
WORK
SPORT/RECREATION
SOCIAL
HEALTH MANAGEMENT
HOME
COMMUNITY
HOSPITAL
MAINTENANCE - DIY


EASE
EFFECTIVENESS
EFFICIENCY
SUCCESS
USABILITY
FAILURE
ENJOYMENT
COMFORT
EFFORT
SATISFACTION
CULTURAL BACKGROUND
DISABILITY

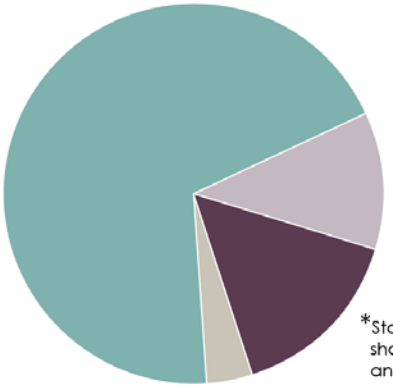

SEPT 2013
DEVELOPING THE CONCEPT OF "SHARED USABILITY" IN PRODUCT DESIGN FOR OLDER PEOPLE
USER
ABILITY
ACTIVITY
PHYSICAL
SOCIAL
RETIREMENT
HEALTH
MENTAL
PHYSICAL
WELLBEING
COMFORT
SUPPORT
LOCATION
URBAN
RURAL
WEALTH
SAVINGS
ASSETS
STATE PENSION
LOCATION
IRELAND
OR
GLOBAL
STATUS
SINGLE
MARRIED
DIVORCED
WIDOWED
GENDER
MALE
OR
FEMALE
PERSONAS
USERS PERCEPTUAL SET


USABILITY
SPECIFIED GOALS
PARTICULAR ENVIRONMENTS
EFFECTIVENESS
EFFICIENCY
SATISFACTION
(ISO DIS 9241-11)

A 3: FIELDWORK STRATEGY GRAPHIC



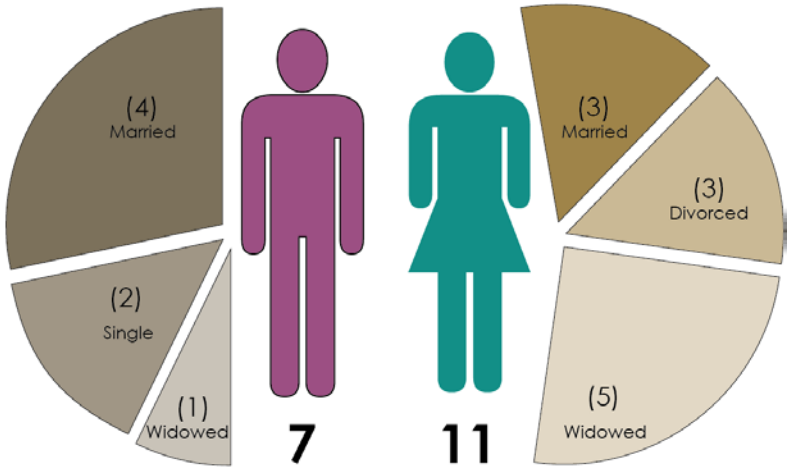
Participant Breakdown -September 2014

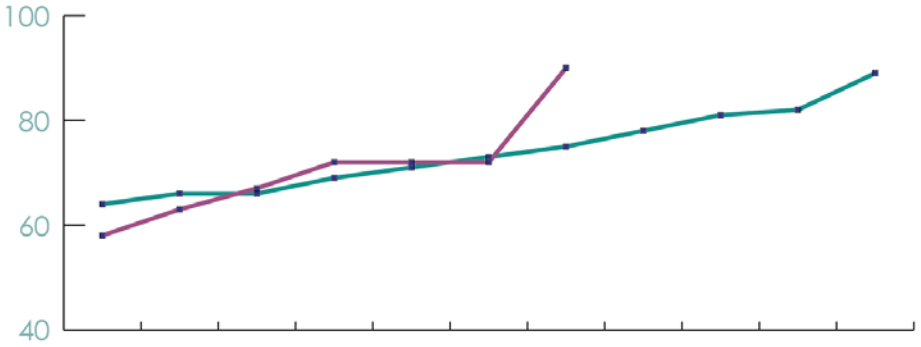


Overall **26**

Older Adults	**18**
Stakeholders*	**3**
Decline	**4**
Could not proceed	**1**

*Stakeholders were relevant to definition of shared usability and particiapted Independently and as part of pilot Studies

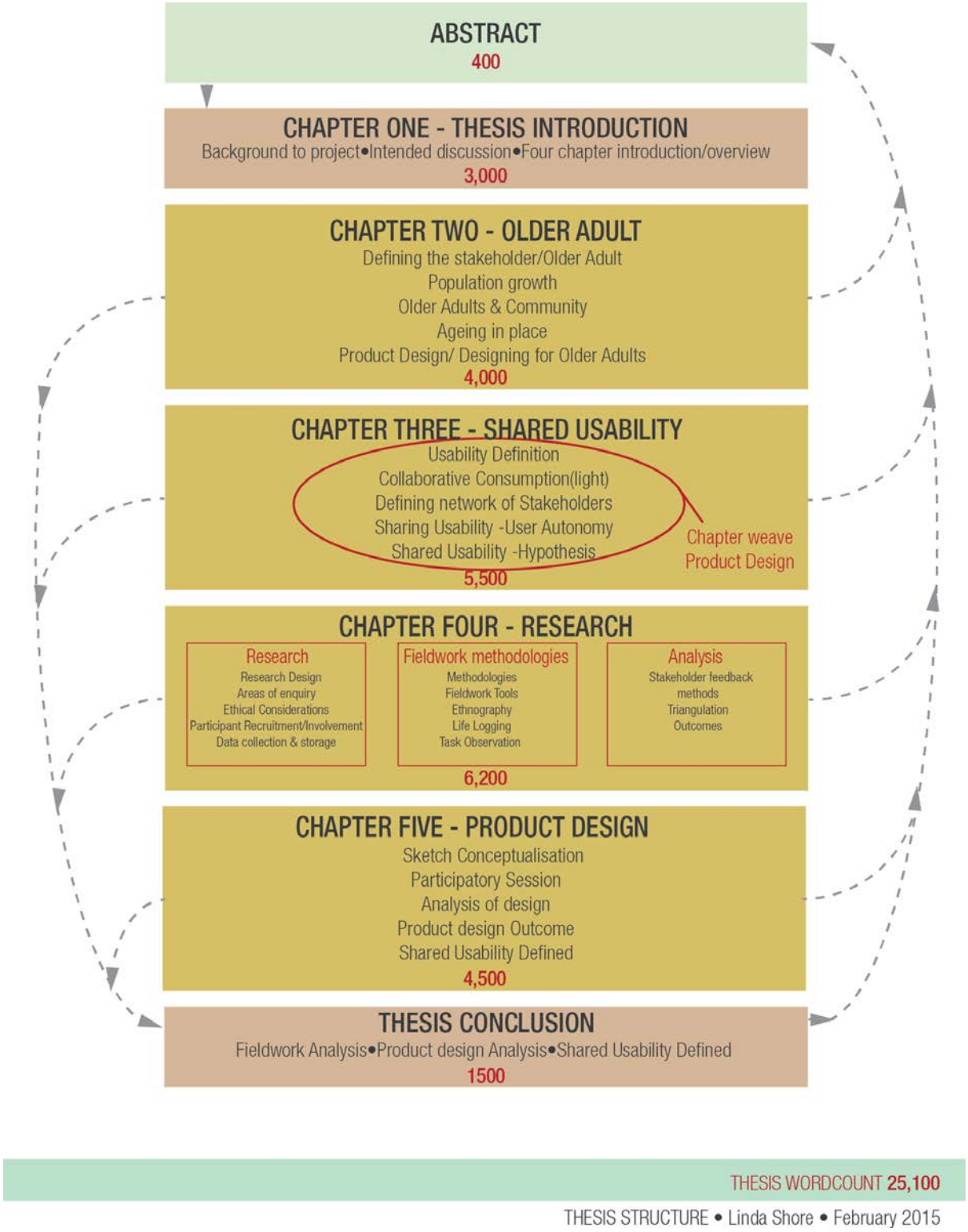




Age profile of participants and broken into Gender type, variance from 58 to 90

- Participants were from rural and urban areas in two locations -Dublin and Kilkenny. They live in Bungalows and two storey dwellings.
- Two participants homes were not included as they participated in tasks based in St Columba's Nursing home, Thomastown, Co Kilkenny.
- The majority of participants lived in Urban areas of Dublin and Kilkenny (14) and 2 lived in rural areas of Kilkenny.
- Three were residents of St Canices Centre for Independent living, and the remaining 15 were living independently in the community.

A 5: THESIS STRUCTURE PLAN



APPENDICES B: ETHICS COMMITTEE APPLICATION AND DOCUMENTS

B 1: ETHICS COMMITTEE APPLICATION

Institiúid Teicneolaíochta Cheatharlach
INSTITUTE of TECHNOLOGY CARLOW
At the Heart of South Leinster

Application to the IT Carlow Research Ethics Committee for
Ethical Approval of a Research Project involving Human Participants
(Individual Participation or donation of human derived material)

Please append any relevant interview schedules, consent forms, detailed research proposals etc. that are available.

Name of student submitting research proposal: **Linda Shore**

Thesis advisor(s): **Dr. PJ White & Mr. Hilary Dempsey**

Medical Consultant: **N/A**

Project Title: **Developing the concept of 'Shared Usability' in Product Design for Older People**

Describe the basic purposes of the research proposed.

For Design Research purposes it is not adequate to rely solely on assumptions of day to day experience and usability problems associated with User Centred Design.

Field research involving interviews, Participant observation and feedback of experience, & focus groups of the older adult (older adult aged 60+ as defined by United Nations.) are critical to delivering viable and realistic design outcomes (product or service system) to this project.

"unlike scientific research, design research is not concerned with what exists but with what ought to be." – Research methods for product design – Alex Milton & Paul Rodgers

Design research is typically observational focussed and has a need to be participant or user led in order to deliver a viable design outcome. It is through the discovery or learning from a user or participants experience and story that I, as a Design researcher can identify and deliver a viable design solution on conclusion of research.

Outline the design and methodology of the project.

This project is design research based. For the observational study to begin it is intended to initially issue an information sheet with Opt-in and Opt-out information with further detail on confidentiality, storage and use of data gathered.
It is intended to focus on two geographical locations, Dublin and Kilkenny. The intended participants will be based broadly on two cohorts – Individuals living in communities independently (Dublin and Kilkenny), and individuals living in an Independent Living centre, located in Kilkenny.
There is an intention that to understand and ensure research outcomes are optimised that the numbers of interviews conducted will be in the region of twenty.
The participant group profile will have a diverse mix including: gender, civil status, employment status, dwelling types, and include a mix in age groups from 60 years old upwards.
Participants living amongst communities independently will be invited through family, friends, and other trusted sources. Regarding the Independent living centre, I have made initial contact and met with the manager, Ms. Frances Gilligan, and she has offered me an opportunity to engage with the residents and also the day centre members at a meeting that will be in the activities room of the day centre area. This will be for me an opportunity to build rapport, engage with the group and ask for assistance through their participation of my research.
Once a participant has agreed to engage with the process in their home.

The interviews are likely to engage initially in 'housekeeping' explain to the participant again - their opt in/opt out choices. The participant will be asked a series of necessary to research questions – Age, gender, civil status, Employment status, home dwelling type, activities they like to engage in weekly and finally any challenges or experiences they had recently that they did not enjoy.

The researcher will offer one to three scenario based stories that will encourage the participant to engage and share maybe a trigger of a personal story or experience based on what the participant has heard and what share they recall to offer. It is intended that this will be a series of open enquiry and thought provocation for the participant to share.

Examples of scenario to encourage participant story telling include:

- The room you are in feels too warm (can also feel too cold); you are sitting in a very comfortable chair what do you do?
- You are at home; the weather is not too nice. It is 7pm and you have read the newspaper and there is nothing of interest on the TV. How do you refresh or find some engaging activity?

- You have received a utility bill, it seems strange and out of pattern with your usage (it could be high or low?) would you feel happy to contact the service provider or discuss with a family member?

These scenarios are just examples and what is hoped is that the participant would engage in a share that is recorded by audio, and notes as well as use of sketches to explain or photographs.

As a follow up once the participants have engaged with the scenario and story share as individuals it would be anticipated to have some form of feedback session that will share discussion from me as the design researcher to the group of participants some ideas regarding design need. At this session participants would be asked for input and feedback based on ideas.

The data gathered at initial meeting/interview stage will be useful in understanding the various experiences daily that older adults have. By learning of these experiences it offers an opportunity at this stage of research to consider, product or service gaps that do not offer positive support or experience to the older adult.

It also allows the opportunity to further identify and define shared usability and its presence, or not, in the daily lives of older adults.

It is by product or service problems or difficulties that the design process can move to concept development and consideration stage. At this stage it is again critical that I, as researcher reflect on the collective information gathered. I will need to share my understanding further and this will happen at a later stage in research when there is likely to be a requirement to revisit the participants and engage in focus group type sessions involving groups of approximately six people to spend time collectively discussing concepts or prototypes and the older adults impressions of viability or potential. This will be beneficial to directing towards final design outcomes and product or service, with a potential to benefit older adults.

Describe the research procedures as they affect the research subject and any other parties involved.

The proposed procedures for research and fieldwork will be structured to ensure fully informed consent and awareness of the participant.

This will involve observation and informal interviews/conversation based enquiry in order to record true and non-directed answers.

This will take the form of suggested scenarios and seeking response based on experience or story from the participant.

What in your opinion are the ethical considerations involved in this proposal?

Because this research will involve access to participants home, ethical considerations such as respect and courtesy to the participant and their home.
There will be an offer of participation and likewise an awareness of opt out or discontinuation offered by means of information sheet provided to each potential participant.
The actual organising of interviews will at all times be at the discretion of the relevant gatekeeper(s) and also the participant.
The relevant gatekeeper(s) will be kept informed of my attendance on the grounds and to individual dwellings. There will be ongoing consultation between gatekeeper(s) and myself as researcher regarding my activities pre and post individual interviews.
There will be an offer, and awareness stated to the participant of the option for them to have a third party such as a family member or friend in the vicinity of their private dwelling during the interview process.

Concern and interest will be focussed on the Participant, using my experience and observation, should I note prior to the conclusion of an interview, a discomfort or unease with the participant I will suspend and withdraw from the interview, being mindful at all times to the care and comfort of the participant. Likewise, should the participant express a wish to discontinue or stop the interview I will respect and ensure they are well and do not require assistance prior to my leaving their home.

The other area of ethical consideration to offer the participant is one of trust that their information recorded by means of audio, visual or any other format will be stored in a secure confidential manner

- Lockable drawer unit in the Designcore office in IT Carlow.
- This is within the Dargan Building, a secure Research Building on the campus of IT Carlow with coded access to only approved Key holders.

Once it is deemed, or after a time (up to 36 months) to have no further usefulness will be disposed of securely and appropriately.

- Any electronic audio or visual data will be deleted/overwritten using an appropriate software product.
- Paper documents that bear any information to participants or interviews will be securely shredded in IT Carlow

Who are the investigators (including assistants) who will conduct the research and what are their qualifications and experience?

Linda Shore is the only investigator conducting field research. Linda is a Product Design Researcher. She has previous experience working and building relationships with clients in Design, Financial Services, and is an active volunteer with St Vincent de Paul.

Are arrangements for the provision of clinical facilities to handle emergencies necessary? If so, briefly describe the arrangements made.

There are no requirements for the provision of clinical facilities.

Specify whether subjects will include students or others in a dependent relationship.

There are no requirements to include students or others in a dependent relationship currently.

Specify whether the research will include children or those with mental illness, disability or handicap. If so, please explain the necessity of using these subjects.

This field work will focus only on Older Adults(as defined United Nations, adults aged 60+)

Will payment be made to any research subject?

There will be no provision or offer of payment of monies to any research subject for participating in research.

Comment on any cultural, social or gender-based characteristics of the subject which have affected the design of the project or which may affect its conduct.

The characteristics of this subject rely heavily on the input of real people, in this instance the older adult, if there is no real participation this research will become null to say it has truly investigated the concept of shared usability and the older adults. Older adult participants are critical to this research.

Give details of the measures, which will be adopted to maintain the confidentiality of the research subject.

Each individual participant will be coded to protect their real name and relevant categorical reference to gender, age, and task/day to day storytelling share.

For the researcher, and only for data build, names will be known but not shared.

Any recording of images will remain focussed on the issue of usability and product they relate to. The images will show no personal or facial features that potentially could identify the participant. In addition the participants private living environment will be protected from identification through the images by obscuring and removing if necessary aspects of those images.

Will the information gained be anonymised? If not, please justify.

Yes, it is stated on the information sheet to be issued to each potential participant that their identity and place of residence will not be revealed or made public at any time.

Any potentially identifying features, facial or otherwise will not be revealed as part of any photography or images recorded.

In addition, and to minimise any potential for identity reveal of the participant, any living environment surroundings that could potentially identify participant will be obscured imagery not relevant to recording action or activity, but to be published, these features can also be obscured.

Will the intended group of research subjects, to your knowledge, be involved in other research? If so, please justify.

To my knowledge this is the only research fieldwork the participants will be involved.

Date on which the project will begin: March 2014

Please state location(s) where the project will be carried out.
Kilkenny – St Canices Centre for Independent living –Residential Units Private individual Homes located in Kilkenny and Dublin

Signed: _____ **Date**: _____

Project supervisor or Principal Investigator

Signed: _____ Date _____

(Supervisor of student)

COMMENT FROM HEAD OF DEPARTMENT/GROUP/INSTITUTE/CENTRE

Signed: _____ **Date _____**

(Head of Department/Group/Institute/Centre)

B2: ETHICS COMMITTEE APPROVAL

Institiúid Teicneolaíochta Cheatharlach
INSTITUTE of TECHNOLOGY CARLOW
At the Heart of South Leinster

ETHICS IN RESEARCH COMMITTEE EVALUATION REPORT

School/Campus/Centre:	Business & Humanities
Department:	Humanities
Research Proposer:	Linda Shore
Ethical Application Number:	94
Project Title:	Developing the concept of "shared usability" in Product Design for older people
Thesis Adviser:	Dr P J Whyte, Mr Hilary Dempsey
Medical Consultant:	None
Evaluation Date:	12th March 2014

1.	Procedures have been followed according to those laid down by Academic Council	Yes ☑	No	☐
2.	Approval granted	Yes ☑	No	☐
3.	Referred for resubmission	Yes ☐	No	☑

Reason for resubmission

Signed: Ivan Sheeran **Date:** 1/4/14

Mr Ivan Sheeran, Chairperson
Ethics in Research Committee

B 3: INFORMATION AND CONSENT FORM

"Developing the concept of 'Shared Usability' in Product Design for the Older Adult"

Linda Shore
Designcore
Department of Humanities
Institute of Technology, Carlow.
linda.shore@itcarlow.ie

Introduction

I am a Post Graduate Product Design Student (Masters by research) in Institute of Technology, Carlow. This project began September 2013 and will conclude September 2015.

The title of this project –"Developing the concept of 'shared usability' in Product Design for older people' has three areas of interest.

- The older adult
- The products/services they engage with daily
- The support that older adults may or may not require using, engaging or interacting with a product or service.

Fieldwork

In order to understand and learn day to day product experience I need to complete studies of older adults (older adult as defined by UN is an adult aged 60+).

These studies will be in the form of informal interview, there are no right or wrong answers. Conducting interviews/observation studies I will gain insight to product or service design needs.

In order to understand and identify areas to develop or improve the proposed format of interviews will be informal discussion session, observations of day to day tasks, conversations / interviews and focus groups.

The method of recording information will be by audio recording, notes, sketchbooks, and perhaps photographs with no personal features visible, these images will also minimise the possibility of identifying the participants living environment and will focus purely on the issue of use, or interaction of products or services.

I am seeking adults aged 60+ to assist with my research. This will involve me visiting your home – i.e the living room or a place that is comfortable for the participant. Meetings can be arranged for an appropriate time, as defined by the participant.

The duration of each meeting will always be conducted at a time that suits the participant, and for a *duration that is appropriate to the comfort of the participant.*

Please note that an interview session may carry on for approximately 1 to 1 and half hours, but again will be arranged to suit the needs of the participant.

If there is a need for the researcher to be shown to any other rooms or outside areas of the participants home it will always be with the permission of the participant. The purpose of the location or rooms of meetings will be to see or observe tasks involving using products the participant is familiar with on a day to day basis. It may involve more than one visit.

There is potential that later in the research there will be an opportunity to engage with other participants in groups of six, informally gathered to discuss research to date, and you can choose if you would like to part of this session also.

Should you wish to have a friend or family member in attendance during the interview process then this is welcome.

Confidentiality/Anonymity

At all times you, as the participant will be consulted on how much information will be shared, and at no time will personal details be divulged publicly, other than general reference to gender, age, etc. and task/day to day storytelling share.

Your name and personal information that could identify you will not be revealed in any of the public documentation i.e. diaries, reports that are printed/published.

To support research and project outcomes, it would be helpful to record visuals/photographs – it can be defined that no facial images or features that could identify the participant will be recorded, in addition potentially identifiable areas of the participants living environment will be blurred on images.

The purpose will be to show or identify how sample Older Adults use, engage or manage day to day tasks and products. All data recorded will be securely stored at IT Carlow and destroyed after a period of 36 months.

This research is intended to be informal and focussed on day to day experience for older adults, however if the researcher should be made aware of anything that causes concern, the researcher has a duty to act. Firstly to the participant to see what needs to be done and secondly to inform the relevant person(s). In very exceptional circumstances if there is a sense of immediate concern the researcher may need to breach confidentiality without first talking to the participant.

Benefits of fieldwork participation to this research project

Participants will be of great assistance to building and sharing invaluable experience and information to this research.

The outcomes of this research rely greatly on primary research involving real user experience understanding.

Studio based assumptions not involving user experience study can deliver somewhat artificial outcomes or assumptions of what is best for the user, and therefore may not see real identifiable product and usability problems identified and defined.

The anticipated outcomes of this project overall will be a product or service system new to market, or an improvement of a product or service system, at all times intended to improve and make better day to day experience for older adults. If this project leads to potential commercial product, the fieldwork research information gathered and archived may be used with a view to further development. The archived information will not identify or relate to any individual participant.

Risks

This fieldwork will not involve any challenging or concerned behaviour or actions that could harm or risk the participant.

Permission

I have obtained permission as a Post Graduate researcher of IT Carlow from the Ethics committee in IT Carlow to conduct this research. I am bound by ethical guidelines and integrity as defined in IT Carlow.

Questions

If you have any questions regarding this project work, please feel free to contact me by email – linda.shore@itcarlow.ie or by telephone – 059 9175325

Participation & Withdrawal

This letter is intended to inform participation in academic research. After reading and considering the project, you as the participant have the right to engage and/or withdraw from research/study. The procedure for withdrawal may be given by you, in writing or e-mail to the address above at any time. It will be helpful to use images/photographs that will support research outcomes – no facial images or identifiable features will be recorded.

Declaration

Would you like to participate in this research?

By signing this information sheet, you are indicating that you have read and understand the Participation Information sheet provided, and the importance of your participation. You are also acknowledging that your rights to anonymity/confidentiality and process of right to withdraw have been understood.

If you are happy to proceed, please tick the 'I AGREE' box and complete below.

If you do not wish to participate, you can tick 'NO THANK YOU'.

Your time and engagement is greatly appreciated, thank you.

I AGREE ☐

NO THANK YOU ☐

I'm happy to participate in focus group session ☐

Participant's Name _____

Participant's signature _____

Contact details

Researcher's signature _____

Date _____

B 4: LIFE-LOGGING TEMPLATE

Date:

REF:

Gender:

Age:

Status:

Home Type:

Active:

Interests and Hobbies:
(Social, Spiritual)

Activities
(Indoors, Outdoors, Independent or grouped)

Physical Function/Limitations
(Underlying conditions, aids, medication)

Day to day tasks

Cooking
(Access in and around the kitchen, access to storage and function areas – presses,oven. Use of utensils and appliances)

Dressing
(Footwear, buttons, zips, fasteners. Seasonal)

Bathing and toileting
(Home –Bath or shower? Access in and around bathroom)

Access
(Entering, Exiting Buildings or vehicles, Opening or closing doors, jars, packets,zips, locks, buttons)

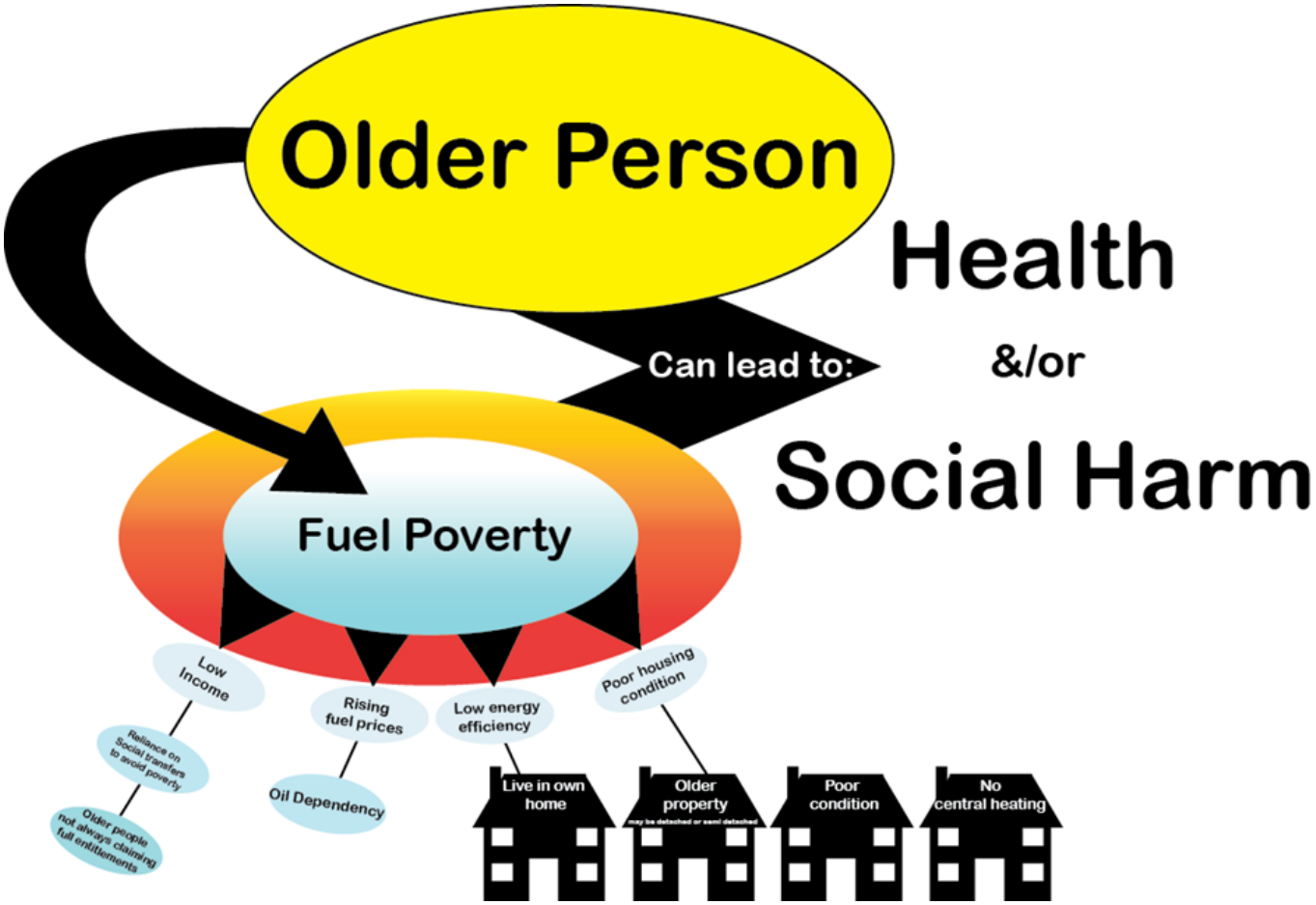
Mobility
(Sitting down, Getting up, Falling)

Communication, TV & Radio
(Enjoyment, use, preference? Computer tablet, phone type?likes dislikes, competencies, fears? – remote control, doorbell, alarms, clock, oven or heating timers?)

APPENDICES C: REFLECTIVE LEARNING

This is a series of notes gathered at various stages of the research that were beneficial reflective pieces to gather thoughts and pursue research outcomes.

C 1: FUEL POVERTY



Reflective graphic interpreted from (Goodman, McAvoy et al. 2011) Fuel poverty, older people and cold weather: An all-island analysis (Authors own)

C 2: BARTHEL INDEX

Barthel Index Sample (http://www.docstoc.com/docs/143986744/Barthel-ADL-Index)

Barthel Index of Activities of Daily Living

Instructions: Choose the scoring point for the statement that most closely corresponds to the patient's current level of ability for each of the following 10 items. Record actual, not potential, functioning. Information can be obtained from the patient's self-report, from a separate party who is familiar with the patient's abilities (such as a relative), or from observation. Refer to the Guidelines section on the following page for detailed information on scoring and interpretation.

The Barthel Index

Bowels
0 = incontinent (or needs to be given enemata)
1 = occasional accident (once/week)
2 = continent
Patient's Score: _____

Bladder
0 = incontinent, or catheterized and unable to manage
1 = occasional accident (max. once per 24 hours)
2 = continent (for over 7 days)
Patient's Score: _____

Grooming
0 = needs help with personal care
1 = independent face/hair/teeth/shaving (implements provided)
Patient's Score: _____

Toilet use
0 = dependent
1 = needs some help, but can do something alone
2 = independent (on and off, dressing, wiping)
Patient's Score: _____

Feeding
0 = unable
1 = needs help cutting, spreading butter, etc.
2 = independent (food provided within reach)
Patient's Score: _____

Transfer
0 = unable – no sitting balance
1 = major help (one or two people, physical), can sit
2 = minor help (verbal or physical)
3 = independent
Patient's Score: _____

Mobility
0 = immobile
1 = wheelchair independent, including corners, etc.
2 = walks with help of one person (verbal or physical)
3 = independent (but may use any aid, e.g., stick)
Patient's Score: _____

Dressing
0 = dependent
1 = needs help, but can do about half unaided
2 = independent (including buttons, zips, laces, etc.)
Patient's Score: _____

Stairs
0 = unable
1 = needs help (verbal, physical, carrying aid)
2 = independent up and down
Patient's Score: _____

Bathing
0 = dependent
1 = independent (or in shower)
Patient's Score: _____

Total Score: _____

(Collin et al., 1988)

Scoring:

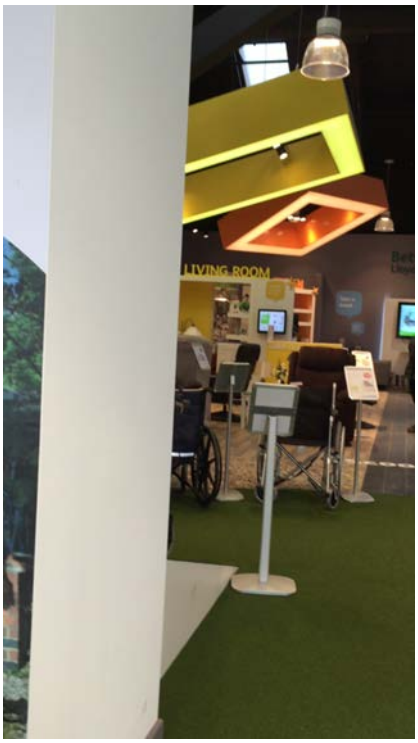
Sum the patient's scores for each item. Total possible scores range from 0 – 20, with lower scores indicating increased disability. If used to measure improvement after rehabilitation, changes of more than two points in the total score reflect a probable genuine change, and change on one item from fully dependent to independent is also likely to be reliable.

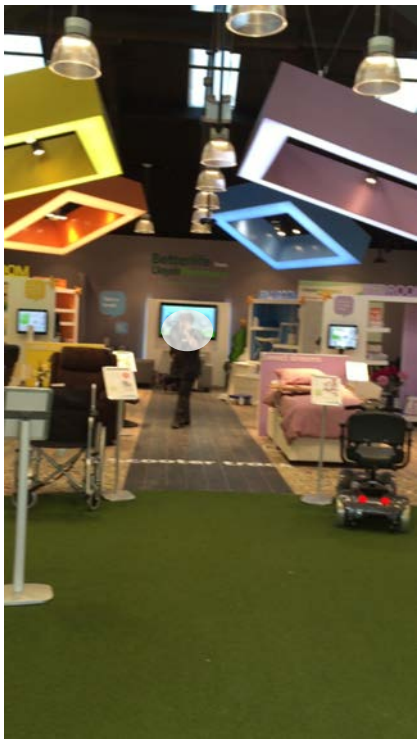
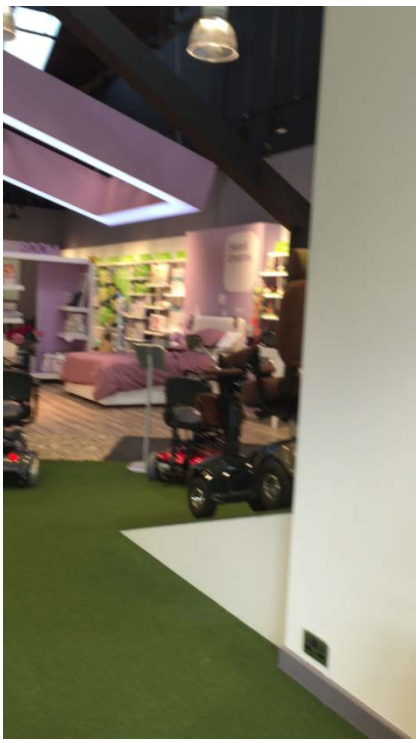
Sources:

- Collin C, Wade DT, Davies S, Horne V. The Barthel ADL Index: a reliability study. *Int Disabil Stud.* 1988;10(2):61-63.
- Mahoney FI, Barthel DW. Functional evaluation: the Barthel Index. *Md State Med J.* 1965;14:61-65.
- Wade DT, Collin C. The Barthel ADL Index: a standard measure of physical disability? *Int Disabil Stud.* 1988;10(2):64-67.

C 3: VALIDATION STUDY TRIP

7.12.2014: Entrance has two large automatic doors to welcome the customer, irrespective of physical abilities or size.

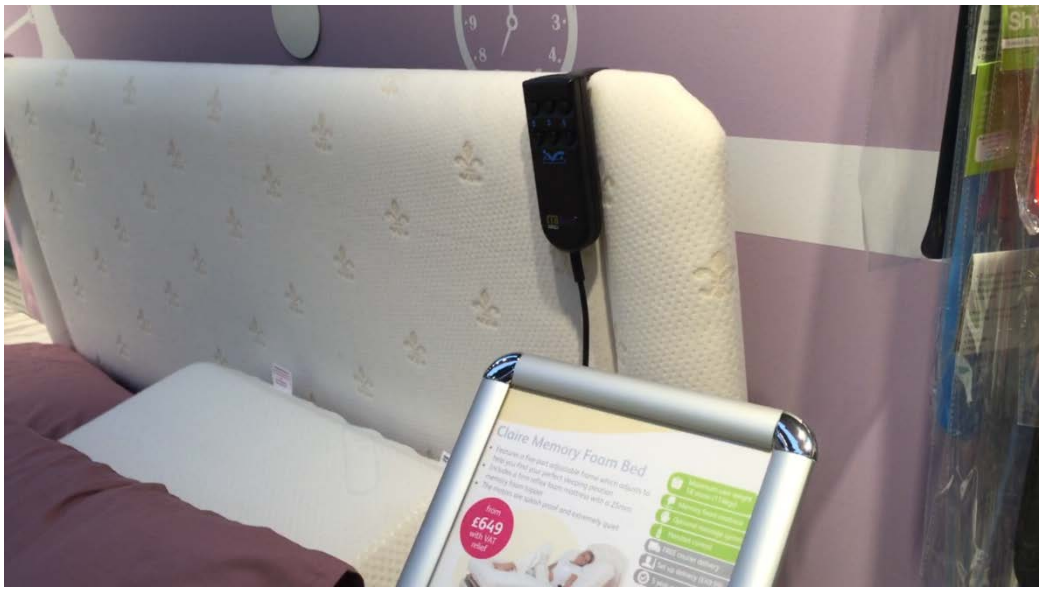


Interior of Shop Entrance area

Bedroom Area:

This area had a number of items in addition to the two display beds, the single bed type shown in the above middle picture did have a different mattress type – quite soft and as I was sitting on it I could feel myself sliding towards the edge of the bed. There are times when a soft mattress is required particularly as we age and our skin condition can deteriorate. This mattress was a sprung type. The double bed also on display had a memory foam type mattress that when I sat on it felt a lot firmer and perhaps more supportive, but again this is down to the preference of the customer and there is a range of mattress options available.



Claire Memory Foam Bed
from
£649
with VAT
relief

Controls for bed comfort range

Bath – support device

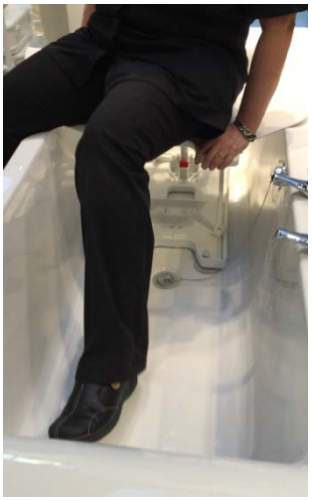
This assisted Bath product allows for the user to have a bath with little or no assistance. It is raised and lowered by the control device, which has a detachable charger plug attached to the lead that can be left on the charging unit at some other location in the home.

Another interesting aspect to the bath on display was the consideration of the bath fittings placement. The taps are almost centred, also the close proximity of the bath plug allows for less stretch and strain to access emptying the bath.

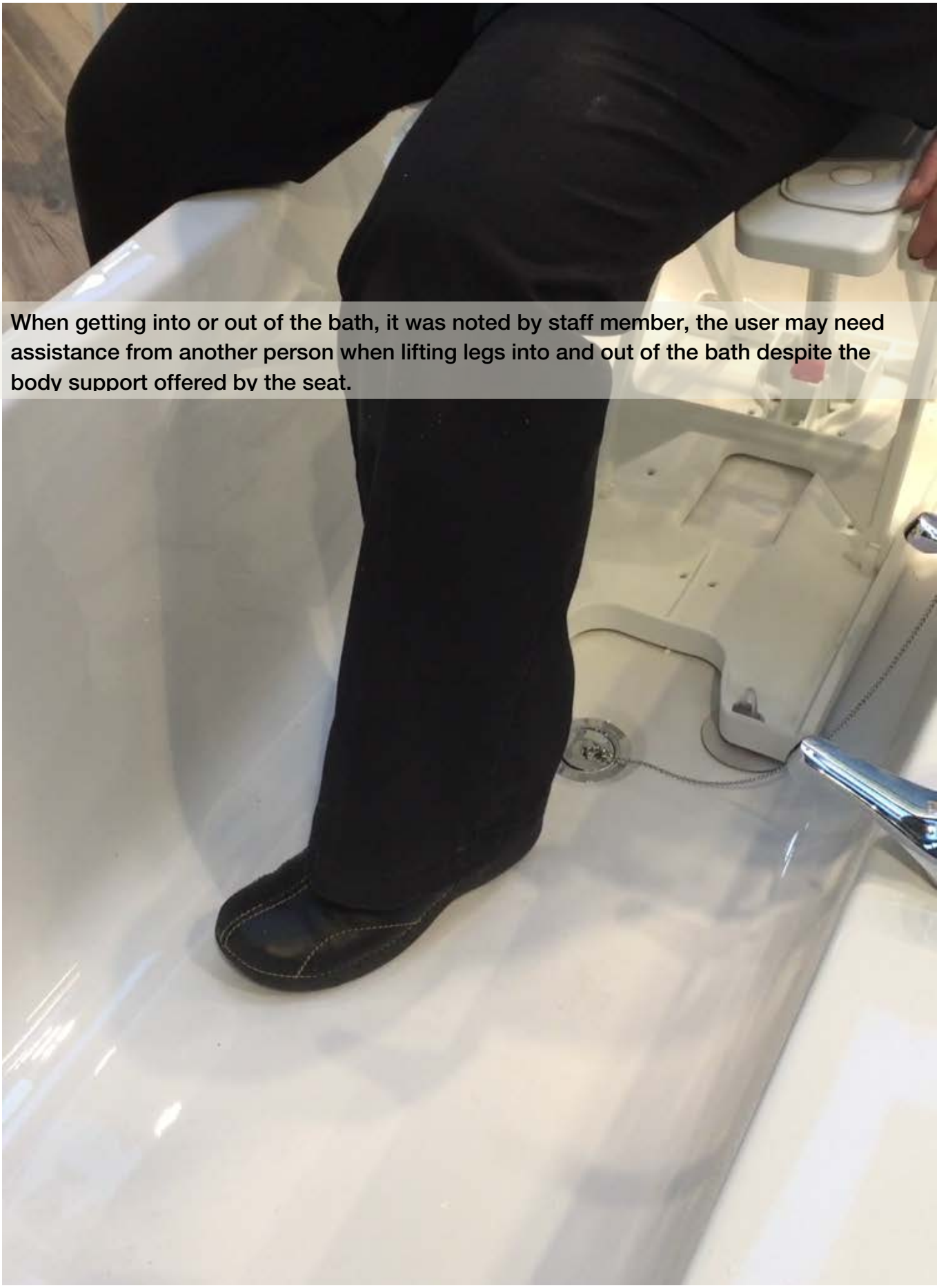




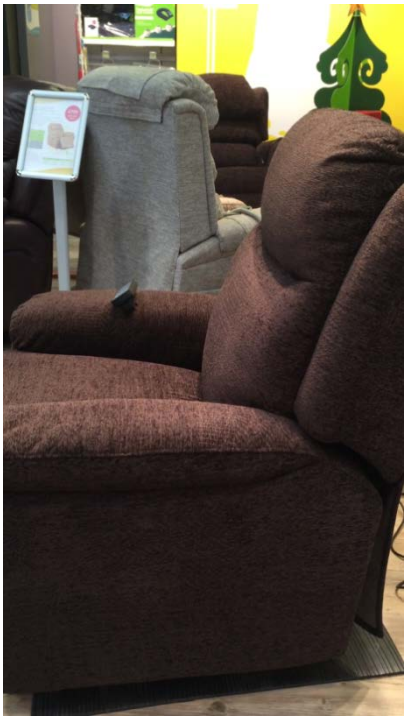


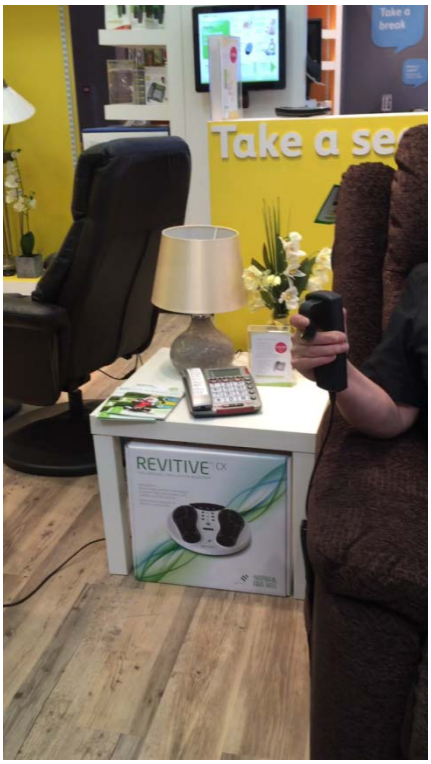






When getting into or out of the bath, it was noted by staff member, the user may need assistance from another person when lifting legs into and out of the bath despite the body support offered by the seat.





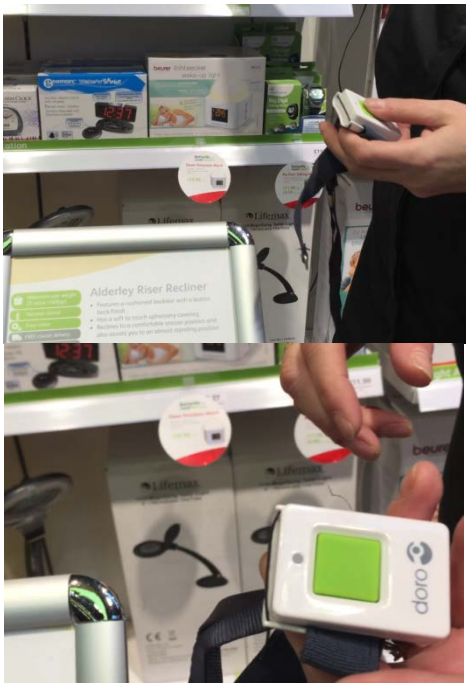
In the picture top right you can see a black non slip type mat that has been placed under the display chairs.

The staff member explained how the Older Adults can just ‘drop’ into a chair when they get close to the seat, however on some floor surfaces this can cause the chair to move back and there is a potential for harm.

The store has these mats for the display models but not currently as a sale item.

Seasonal Affective Disorder (SAD) is a type of depression that can be temporary as a result of seasonal change; there are a number of light therapy products on display in store.

One of the conversation points I had with the staff members was type of customer enquiring and purchasing. They advised it is not just older adults. In addition when discussing this product there was a question of thought around the fact that a lot of homes no longer have a natural fire or flicker from same. This could be interesting for product development if there was an option to perhaps replace a natural flame or use the fireplace that might be existing in the home as a focal point(with SAD light products you do not look directly at them)


Alderley Riser Recliner
doro

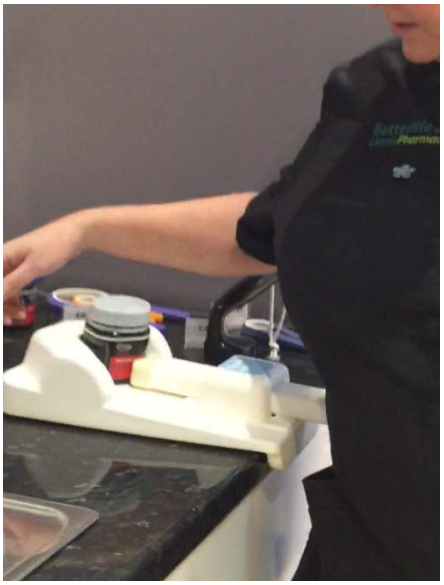

betterlife.co.uk
Illuminated Magnifier

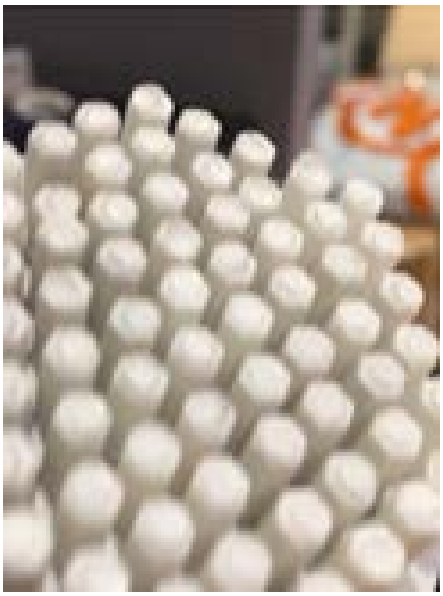

LloydsPharmacy
Seven Day
Spring Loade
Pill Box
With Removable Compartments


Pill Box
£5.99
betterlife.co.uk
Sheet


£2.63
Key Aid
Three Key Turner
BHTA
Holds Three Key
Extends Reach by 30"


betterlife.co.uk
Folding Magnifier with Light





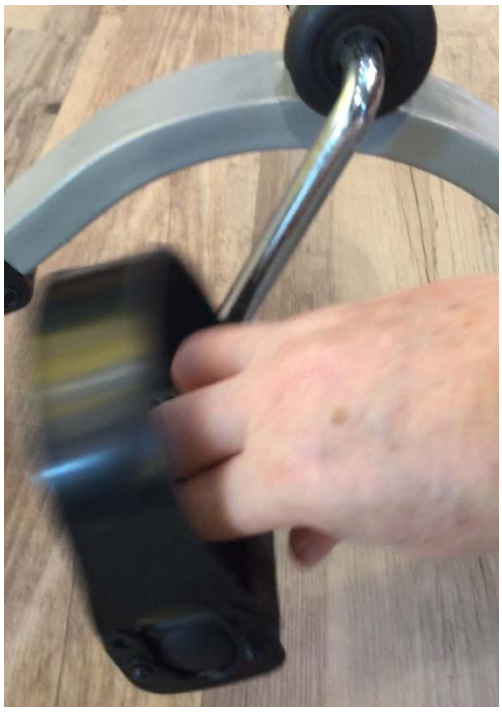
A selection of products available for kitchen and day to day tasks.

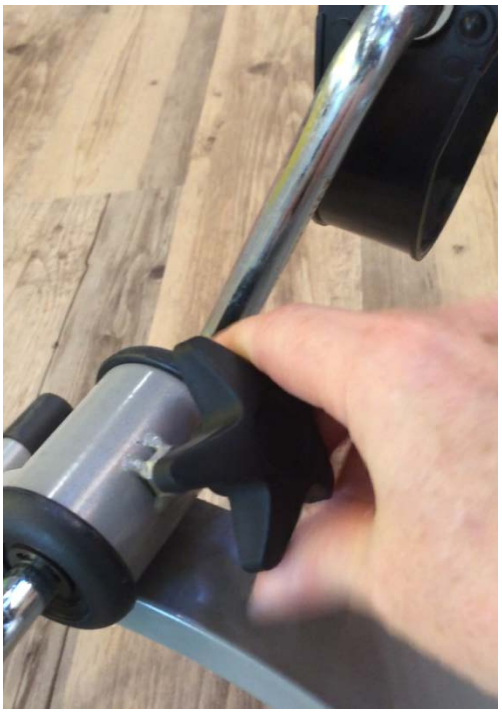
Jar opening as per research has been shown to be a problem area, products on offer in store from simple to more complex counter top devices.

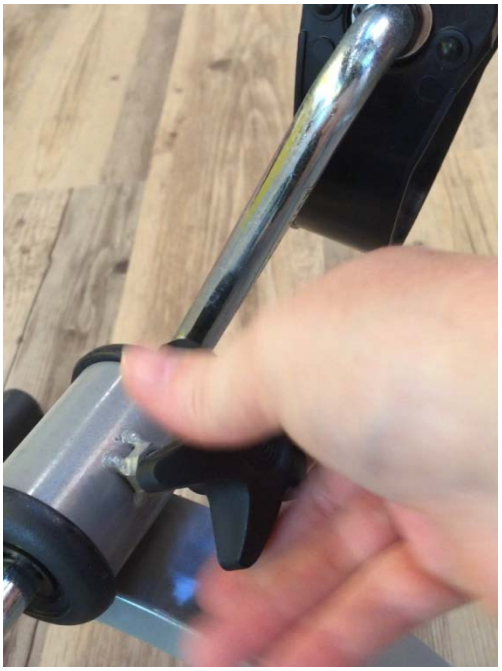
Body cycle machines are available in the store. There are two models, a manual or digital tension management option available.

Observation was that the pedals consistently remained with the strap pointing down. This made it difficult to sit in a chair and just slip your feet into securely position feet with strap across.

Even though the on the floor to exercise legs, it can also be placed on a table to exercise arms. The pedals on this model could be considered better and perhaps the overall form so that it can show as a full body pedal exerciser?



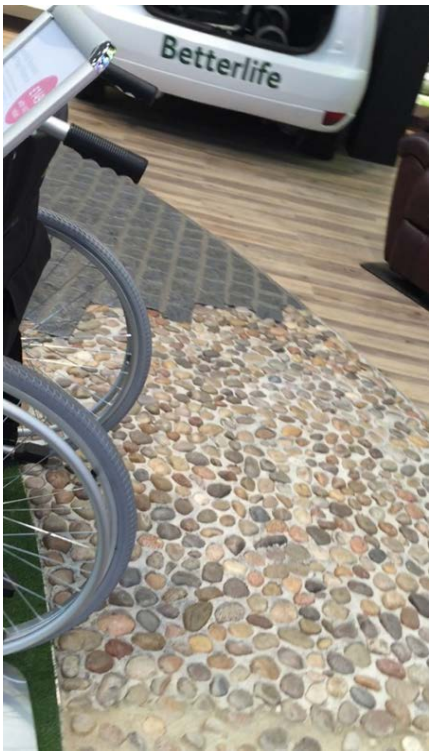


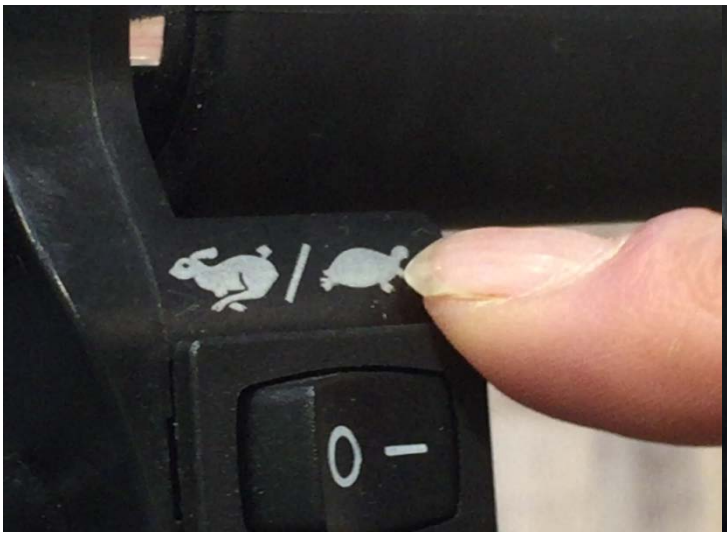


There was a large range of mobility aids and scooters, from sticks to chairs to electric scooters.

As you come into the store your eyes are drawn to the circular scooter track. It has multiple surface types so you can ‘test drive’ a scooter or chair and feel how it goes, in store!

The staff explained how customers when approaching the track as they were exploring the store were a little unsure of the uneven floor surface that was a pathway to the rest of the store. This caused a revision and change of the material to a smoother more stable underfoot flooring for that section (you can just see the change in the left picture mid-section)





Taking one of the scooters for a test drive was an experience. On the handles you have two control handles, left had a brake and the right was to drive. There are two speeds as displayed – hare or tortoise.

A thought regarding the keys and the need that they would be inserted would be if there was a block type insert rather than a small key would this help re dexterity and finger/hand control?

This model was apparently modelled from features used in the automotive industry.

When reversing it does bleep as an audio alert, however from a visual alert it does not note or follow in using white lights as reversing lights.

The right handle accelerates the scooter forward, however for the test drive I relied on the F switch, mainly because once it releases the scooter stops.

The staff stressed to me to avoid pulling on the handle as it is NOT the brake

This model was very ‘custom cruiser’ style scooter.

It had a lot of chrome finish on it, from a styling perspective that’s fine, however from the maintenance of keeping the chrome polished and shiny

The seat felt perhaps a little too roomy, there is a lap belt. Perhaps as I did not have outer layers on it felt bigger also. My feet didn’t seem to be able to reach floor comfortably. I also wonder about the area around where the feet are placed, and accessing on and off the scooter, re the chair from the ground level.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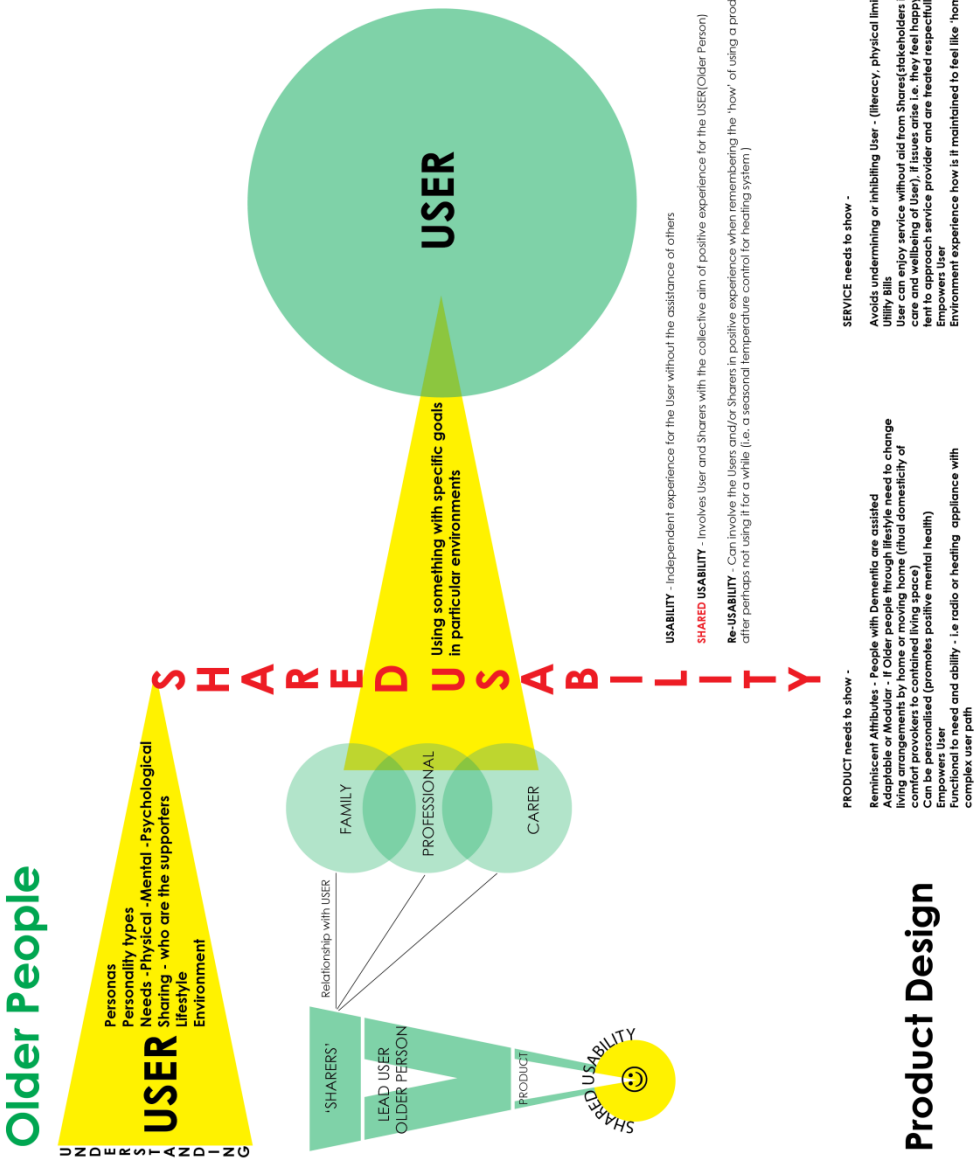
APPENDICES D: PRESENTATIONS

The following pages display imagery and presentations delivered during research development.

D 1: EARLY STAGE RESEARCH PRESENTATION



D 2: RESEARCH PRESENTATION DARGAN CENTRE, IT CARLOW, May 2014

Developing the concept of
'shared usability' in product design for older adults

Linda Shore
May 2014

designcore

SHARED USABILITY

OLDER ADULTS

PRODUCT DESIGN

designcore

USABILITY

Definition of Usability – ISO 9241-11:1998

Usability: *"Extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use".*

designcore

SHARED USABILITY

The concept of 'shared usability' (White, 2012) was observed to show viability to developing, for it offered the older adult a potential to remain empowered and independent even if the need arose to seek support from stakeholders – family members, carers etc.

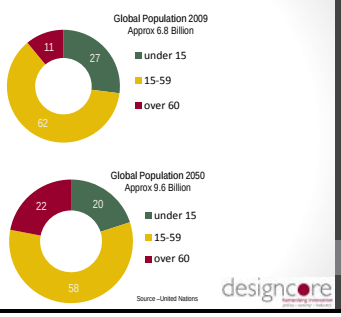
It suggests, for success of the concept it would

"Provide levels of usability assigned to products. This could involve an agreement by both parties as to what levels of usability are controlled and by whom and assigned into a functional input on the product."

designcore

OLDER ADULTS

Who is old? adults that are aged 60 or above (United Nations)



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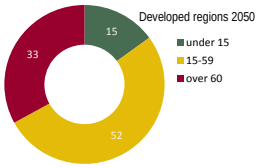
OLDER ADULTS

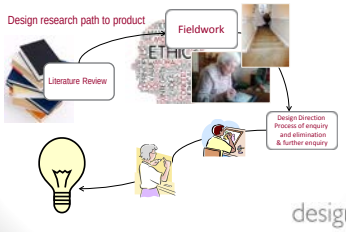


"less than two people of working age (15 to 64) for every older person aged 65 or more in the "EU-27 by 2060"
(European Commission,2012)

designcore

PRODUCT DESIGN

The ageing demographic points clearly to the fact that, in addition to living longer, the products and services used daily by all people need to consider how, and in what way older adults are supported in the desire for aging in place and independence.



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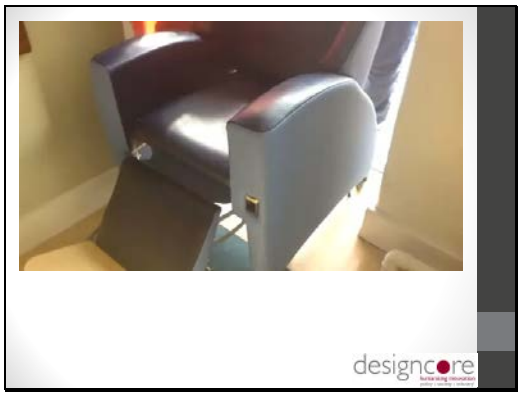
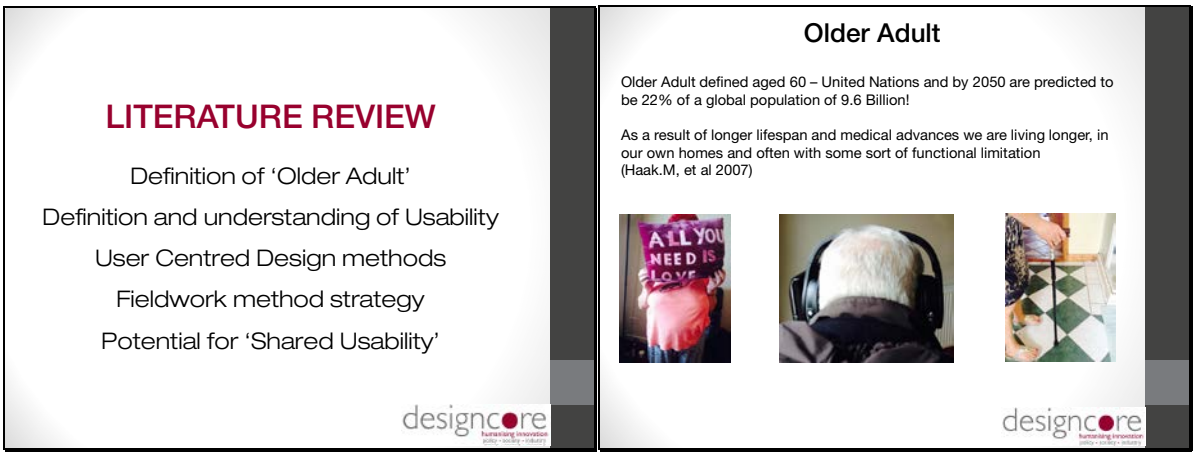


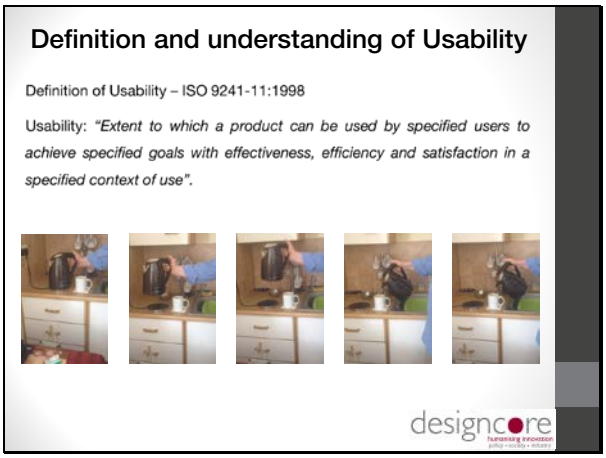
NOTES:

The older adult with various needs, abilities, limitations and aspirations associated with this particular group will be expressed and recorded through a process of engagement and fieldwork with a targeted groups located in Kilkenny and Dublin.
The process of design becomes people or 'user centred' when we, as designers consider and determine *"users knowledge, capabilities and limitations relative to the tasks for which the product or system is being designed"* (ISO/TR 16982:2002(E)
In turn this now poses a need to consider also the potential need for ergonomics and human engineering to the development of product as the design outcome for this research.

D 3: RESEARCH PRESENTATION DARGAN CENTRE, IT CARLOW, NOVEMBER 2014

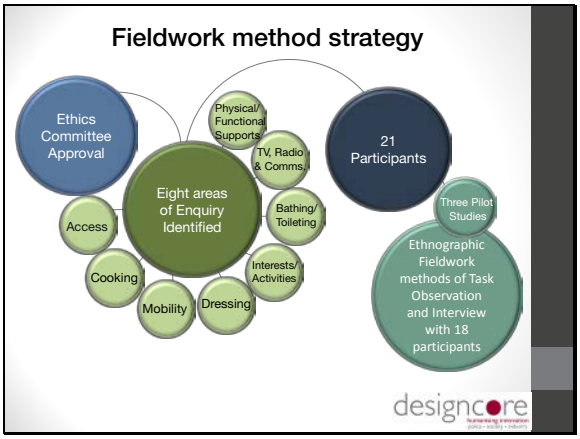


The current global population is approx 6.8Billion, with 11% of that figure attributed to the demographic aged 60 and above. This is expected to increase to a percentage of 22% of a population of almost 10Billion by 2050. 1900 avg life expectancy was 45/50…today 78,…2050 83….and for the first time, there will be fewer children than older adults….
This indicates the need to consider the older adult as someone who despite ageing, is living longer, and often with some aspect of functional limitation.



Standard supports that there is a consideration to the experience a user has when engaging with products, this example of the use of a kettle can be a positive experience for most people independently….

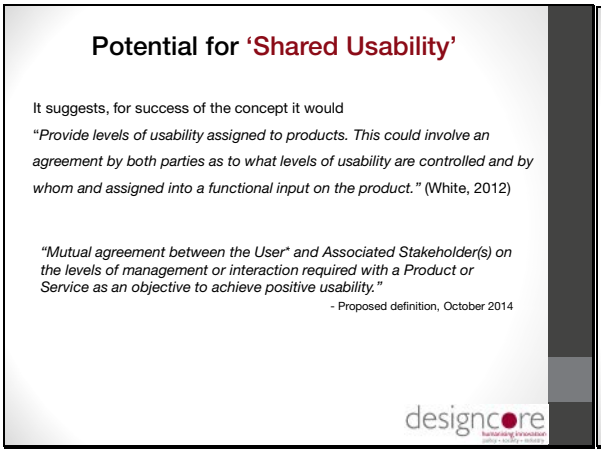
USER CENTRED DESIGN: As a designer with a brief, a necessity to consider is the user or the stakeholder involved in the interaction or the engagement with a product or service. In order to deliver a tangible potentially marketable artefact the involvement of participants or users in research was very much a priority to conclude a stage of enquiry. - Participatory design, Co-Design, Transgenerational Design, Universal Design – network of stakeholders

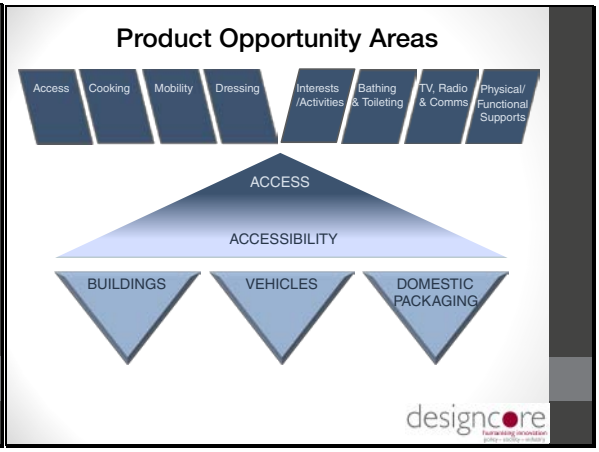


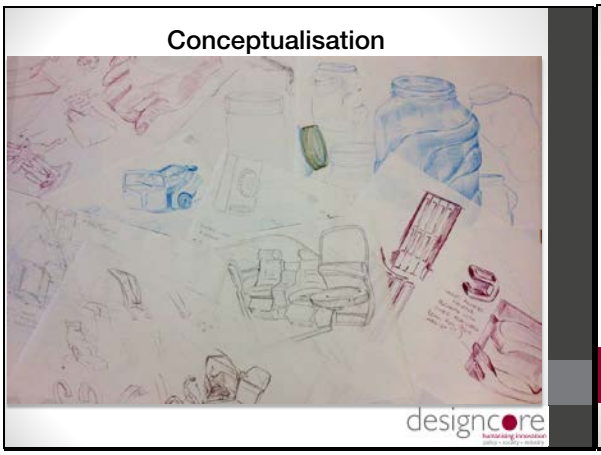
Eight areas of enquiry identified
Ethnographic Fieldwork methods of Interview and observation
Participant Identification, invitation and engagement – Interviews and task Observations - Three Pilot studies – 1 Older Adult, 2 Stakeholder, 3 OA + SH)
Eight areas adapted from
WHO 2001 international classification of functioning disability and health, and from OT

journal article published 1990 "the use of technical aids among community based elderly" as well as learning of 'life span development', Universal design principles/requirements

Fieldwork began Feb and continued throughout until September, engaging with users in understanding day to day life experience for each of them. Participants lived in Dublin and Kilkenny. Each were considered independent – 7(58-90) 4 M 2 S 1 W 11(64-89) 3M 3D 5W







D 4: POSTER PRESENTATION DARGAN CENTRE, IT CARLOW, MAY 2014

DEVELOPING THE CONCEPT OF 'SHARED USABILITY' IN PRODUCT DESIGN FOR OLDER ADULTS

INTRODUCTION

A recent study of domestic product design for older adults identified the concept of **"Shared Usability"** (White, 2013) as having many beneficial aspects for the older user. These benefits include but are not limited to: promoting good health, increasing sociality, encouraging safe use and instilling financial control; all offering empowerment and independence in everyday life.
For future designed products, it is proposed that usability be a **shared stakeholder concern**.
By providing levels of shared control over products, levels of self-sufficiency could be achieved in use regardless of the level of ability of the older adult. With shared usability, even at the lowest level (perhaps with an individual suffering with dementia) operation and use of products can be viewed as manageable or can offer a sense of 'perceived independence'. **If executed correctly it could allow older people maintain independence and age in place with dignity and self-sufficiency.**

Researcher
LINDA SHORE

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OBJECTIVES

As our global Population becomes older, this is a pattern not likely to change in the short to medium term, with predictions that by 2050 almost 2 billion people will be aged 60 years or older(60 years being the defined cut-off age a person is considered 'older adult'-United Nations. 65 is defined as Older Adult-World Health Organisation) If the quality of life for all is to be maintained or improved, the older adult demographic must be considered as one that is central to ensuring its advancement. In additon to living longer, the products and services used daily by all people need to consider how, and in what way older adults are supported in their desire for ageing in place and independence.

RESEARCH METHODOLOGIES

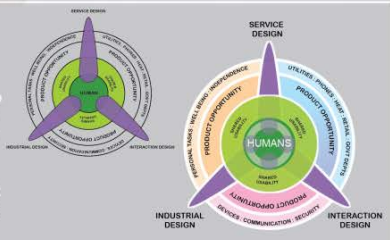
This research is focussed on the development of a concept to assist with the design process, and needs consideration of the user and associated stakeholders. The scope of exploration and enquiry will involve using methodologies of research from aspects of ethnographic fieldwork, to more standardised referencing of quantitative data available through various global and national bodies(United Nations, World Health Organisation, EU departments and agencies, Tilda, etc)

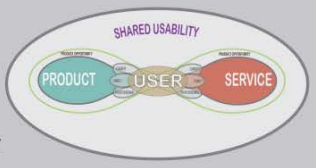
Field research involving interviews, Participant observation and feedback of experience, & focus groups of the older adult are critical to delivering viable and realistic design outcomes (product or service system) to this project.

"unlike scientific research, design research is not concerned with what exists but with what ought to be." – Research methods for product design – Alex Milton & Paul Rodgers

RESEARCH OBSERVATIONS TO DATE

Initial fieldwork and interviews are ongoing and likely to continue for a further number of weeks. this will allow for reflection and strategy to Product or Service design direction. Here are a selection of images that are inspiring direction going forward.
In addition to defining 'Shared Usability, this framework is also evolving through experience and understanding the older adult and how they engage with various stakeholders from Family members, to carers to professionals medical,health or otherwise)





Communication path framework - Shared Usability

REFLECTION

Life, and quality of life are a right to be expected irrespective of age, and the 'age friendly' consideration discussed Chapter one of 'Aging in the Twenty-First Century – A celebration and a challenge' (UNFPA & HelpAge International, 2012) states:

"..living arrangements, including housing and transportation are age-friendly, to ensure older persons can 'age in place' and remain independent for as long as possible"

This consideration is one of great adventure and challenge for the designer, in addition to considering design and development of products or services, the activities or involvement of others in shared usability needs also to be considered.Shared usability is a concept all around us and is irrespective of age or ability when we experience or engage with products or services that create assistance or influence through others to improve or add in a positive way to that experience or engagement.

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D 5: POSTER PRESENTED AT HUMAN FACTORS AND ERGONOMICS SOCIETY CONFERENCE, LISBON, OCTOBER 2014