DIGITAL DESIGN FOR AN AGEING SOCIETY

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A thesis submitted in partial fulfilment of the requirements of the Manchester Metropolitan University for the degree of Master of Research

Manchester Institute for Research and Innovation in Art and Design (MIRIAD)

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ABSTRACT

An ageing population and the progression of technology is the context for this practice-led research project. Through studying the relationship between older people and technology the research's primary aim is to explore computer interactions aimed at older people. An inquisitive visual design practice was proposed to help stimulate debate and examine the effectiveness of design for health and wellbeing in a digital context.

Many difficulties surrounding older people and their relationship with technology were identified during this research. As well as the obvious physical disabilities such as reduced mobility, dexterity issues and reduced eyesight, other issues less apparent include reduced memory, stereotyping and isolation. A reluctance to adopt new technologies, and in some cases avoid them altogether was identified in this demographic grouping as a significant problem too.

The practice element of the thesis incorporates the design of an iPad app prototype, which uses food as a vehicle to facilitate the research by investigating for example: typography, colour and layout. The design process is informed by findings from a literature review coupled with a heuristic approach to interaction design. Two qualitative focus groups were conducted with a variety of computer users and non-users. Participants discussed their relationships with computers and how they are perceived. They also gave responses after testing the app prototype and completed a questionnaire based on focus group activities.

The results from both sessions concluded that the majority of older people are interested in computers and what they have to offer, but often find it difficult to know where to begin. The importance of patience and consistency when introducing an app to older people was also observed. Some participants were frustrated by inconsistent user interfaces. As a result a set of accessible guidelines is suggested to engage with designers, policy makers and service providers.

NOTICE TO THE READER

This thesis has over 40 images and is best read by using the interactive iPad version developed to fully appreciate the practice part of the research.

iPad Version (Preferred):
http://invis.io/PT1ES7V6E

PDF Version:
www.ashspurr.com/ashspurr_pdf.pdf

Word Version:
www.ashspurr.com/ashspurr_word.doc

GLOSSARY OF TERMS

AFM

See Age Friendly Manchester.

Age Friendly Manchester (AFM)

A partnership between residents, Manchester City Council and NHS that serves with the best interests of older people.

Alzheimer's

Alzheimer's is the most common cause of dementia and is incurable.

Anthropomorphic

Humanlike qualities in something that isn't human.

App

A program designed to run on tablet devices or Smart phones.

Arthritis

The pain and inflammation of joints, which can cause problems with dexterity.

Assistive interface

An interface that aids everyday living for someone with a disability or particular requirement.

Augmented reality

Where real world environments are enhanced through digital technology.

Brand guidelines

A document produced by a business to help define, explain and retain design principles relating to how it behaves visually.

Bumptop

An experimental user interface that uses gravity.

Cascading style sheets (CSS)

A web authoring language that is used to describe how a web page should look to a computer.

Colour vision deficiency

A disability preventing the ability to distinguish the difference between colours.

Corporate Social Responsibility (CSR)

A commitment by a business to be socially responsible towards the environment and abide by sound ethical values.

CSR

See Corporate Social Responsibility.

CSS

See Cascading Style Sheets.

Dementia

A long-term disease that causes memory loss and a decreased ability to think clearly.

Design interaction

Used to describe the development of digital tools that aid people.

Digital inclusion

Having the skills and confidence to access internet services.

Digital channels

A collective phrase meaning any outlet resulting in digital output, whether it is television, internet or film.

Emoticons

A visual language established from texting that uses tiny icons to represent emotions.

Ergonomics

The science and design behind creating a comfortable working environment including furniture and equipment.

Evernote

A diary app that allows voice recording and memo logging.

Floppy disk

A term used to describe an obsolete digital storage method.

Fluid text sizing

A text scale resizer that is part of a graphical interface.

Graphic design

Visual communication through layout, typography, colour and image.

Haptic technology

The use of touch as part of an interface, for example touch screens and vibration.

Hedonomics

The promotion of pleasurable human interaction.

Home automation

The same as *smart home*.

Iconic gesture

A gesture that is only used once in an application.

Intergenerational

A relationship or activity that spans across all ages.

Internet of things

The same as *ubiquitous computing*

Invasive technology

Something that alerts or reminds a user. Examples include a phone ringing, calendar alerts or email reminders.

InVision

An online prototype tool.

JavaScript

A programming language commonly read by web browsers.

Modernism

A philosophical movement in art and design that rejects the past and uses an outlook of the future as inspiration.

Multi-modal
Interaction with a user interface through a variety of input devices. The keyboard and mouse combination is an example.

Older adult
Someone above the age of 50 years old.

Operating system (OS)
Allows hardware and software to communicate and manages all programs. Examples include Microsoft Windows and Apple's OSX.

OS
See *Operating System.*

Participatory design
A design process where all stakeholders including the end user or customer assist in ideas and the active process of design.

Pervasive computing
The same as *ubiquitous computing.*

Point size
A terminology used by designers to describe the size of fonts, otherwise known as font size.

Quality of life
The well-being of an individual including physical, cognitive and emotional states. Not to be confused with standard of living, which concerns income, levels.

Real-time
A technological term for something that is happening at present.

Retrofitting
The process of adding new design features or behaviors to something old.

Reverse mentoring
Used in business to describe the process of younger employees teaching older employees.

Sans-serif font

A font that has no embellishment, or flourishes. An example of a sans-serif font is Helvetica.

Semantics

The study of meaning.

Semanticons

The study of visual metaphors in the context of graphical interface icons.

Sensory experience

Any experience that uses sight, sound, smell, taste or touch.

Serif font

A font that has embellishment, or flourishes. An example of a serif font is Garamond.

Sixth Sense technology

An experimental augmented reality user interface.

Skeuomorphism

The representation of real world objects in a computer interface.

Smart home

Used to collectively refer to digital devices that aid everyday living in the home.

Technophobes

Someone who does not like, trust, or want to use technology.

Tooltip

A pop-up message that is used as part of a graphical interface to help provide hints or tips.

Ubiquitous computing

The concept of computers being involved in everyday life.

Usability

A measure of how easy or difficult something is to learn and use.

Usability heuristics

An informal approach to problem solving in computing through a common sense approach.

User interface

Used to collectively describe the experience of using a computer.

Visual inquiry

Using photos, graphics, video and typography to investigate a problem.

Visual interface design

Concerns anything visual associated with a user interface including layout, animation and typography.

Well-being

The same as *quality of life*.

Wii

A home video game and entertainment system that uses gesture as part of the user interface.

1. INTRODUCTION

1.1 Project Overview

The changes that take place when a person ages are well known. A decline in physical and cognitive abilities can lead to difficulties in everyday life. Attitudes towards ageing are slowly changing in a positive way, as our understanding of related issues increases and we develop methods to treat illness. As new digital technologies are designed for personal use and not just the workplace, how we develop user centred design in the pursuit of health and wellbeing is explored.

There is great potential for technology to be used to enrich an older person's quality of life. Educating and communicating these advantages to older people is where difficulties lie (World Health Organization, 2007). The importance of the *user interface,* defined as the means by which the user and computer system interact (Oxford Dictionary, 2014) is sometimes underestimated. The user interface is often the first point of contact for most people, however this has been under considered for older users.

Due to the broad subject area and the need to be concise within a short thesis, food is used as a vehicle for a practice-led inquiry in designing an iPad *app,* aimed at older people. The topic of food in relation to older people is also expanded on in the context of the research throughout.

The project is approached from a *graphic design* perspective whilst sharing well documented principles established in related fields including computer science, *design interaction* and design philosophy. The multidisciplinary nature of the research highlights the need for a set of aims and objectives in order to structure the research.

1.2 Aims and Objectives

Aims and objectives prove useful when forming a creative approach as well as the basis for the written thesis. The primary aim is to facilitate *intergenerational* communication through interactive design, enhancing user experiences or routines through solutions that are accessible, relevant, and visually appealing. Final objectives specified are to:

- Investigate how interactive design has been used to enrich experiences and improve *well-being*, within the context of supporting older people.
- Understand intergenerational usage and relationships with regards to interactive

technology.

- Identify some of the common problems people encounter as they age in relation to design.
- Explore food and healthy eating as the vehicle for generating interactive experiences through practice-led enquiry.
- Respond through creative design practice with emphasis on intergenerational communication.
- Set-up Age Friendly Manchester (AFM) focus groups to gain feedback and suggest further research, beyond registration.

The methods and processes used in achieving these aims and objectives are outlined in the methodology and practice sections.

1.3 Demarcation of Research

The research encompasses a broad range of subject areas and it is acknowledged that not all the perspectives can be discussed in detail. Technology as a tool for creativity in the research poses some limitations and is discussed in section 4.2.

Literature based on the theme of technology is dependent on the time it is written and can therefore become obsolete quickly. The research takes this into consideration and attempts to consider the wider general context where possible. Specific elements of user interface design are also explored through the creation of icons, colour and typography, for example.

1.4 Structure of the Thesis

The thesis is divided into four core sections; introduction, review, practice and conclusion. The review section is written from the perspective of a graphic designer and takes an enquiring approach to *visual interface design* and the methods adopted in this field. Cross-disciplinary approaches are increasing as knowledge and methods are shared, particularly through the web. The review outlines key arguments from a range of perspectives including interaction, healthcare and computer science, drawing on key texts and data to reflect the complexities of the field and provides a contextual underpinning to the practice-led enquiry.

The methodology considers early ideas and their relevance to the project before discussing specific design decisions in the practice section. The research can be read in a

conventional chronological order or as a designed document that uses principles established from the design methodology (see notice to the reader at the beginning).

1.5 Ethical Considerations

Before the project started, an ethical audit was conducted in adherence to Manchester Metropolitan University's ethical policy and no issues were anticipated. Subsequent checks were carried out at key points during the research. Focus group participants remain anonymous throughout and are only referred to on a first name basis. Participants were informed that they would be recorded on the day and given the opportunity to opt-out. A set of general questionnaires were presented at the end of the focus groups with only first names, dates of birth and 'yes' or 'no' answers being captured (An example questionnaire can be seen in the appendix section 9.3).

2. LITERATURE REVIEW

2.1 Introduction

The literature review analyses older people's needs and identifies some of the problems they encounter on a daily basis. Technology as a tool in helping older people is evaluated and reflected on in the current context. Existing research is used to illustrate various approaches when designing for older people including the use of metaphors, play and intuitiveness to name a few. An understanding of 'visual appeal' and its role when designing for older people is also assessed in detail, setting the tone for the practice.

2.2 Defining an Older Person

The process of defining age classification is not straightforward due to the variance in how people age. For clarity, this research classifies anyone above the age of 50 as an *older adult*. This decision was taken with advice from Manchester City Council's Age Friendly Manchester (AFM) department who set the age factor based on World Health Organization (2007) recommendations.

Age Friendly Manchester (AFM) is a partnership between older people, Manchester City Council and NHS. It serves the community by influencing policy makers, improving council services and creating opportunities for older residents in Manchester. The focus groups and continual advice was was facilitated by Programme Manager Patrick Hanfling.

In the context of this research it is worth considering age classification and how it impacts on the research. Someone aged 50 could have a far greater understanding of technology than that of someone in their 30s whereas it is likely that someone aged 80 may have less of a need, desire or ability to use digital technology. It is proposed that life experience in work and education contributes greatly in learning to use a computer. This is explored in the focus group section 4.14.

2.3 Addressing Older People's Needs

Problems with ageing that have been widely researched both academically and medically are issues concerning: declining eyesight, increased mobility difficulties, hearing loss, dementia, memory loss, dexterity issues, and an overall decline in cognitive abilities (Dowdall et al, 2001 and Zajicek, 2001).

Concerns relating to food consumption are also a major cause of ill health and difficulties. When we grow older the importance of a well balanced diet become more significant.

Failure to maintain a healthy diet in later life can result in illness as a consequence of a poor immune system, falls, and malnutrition for example (South Lanarkshire Council, 2012).

As the body ages our taste buds become less receptive, causing decreased enjoyment of food. We may also lose strength in our mouths, making it more difficult to bite or chew. Some difficulties with food consumption occur even before we eat at all; carrying shopping bags, reaching supermarket shelves, affording healthy meals, reading and understanding nutritional labels and deciding if something is out of date or not, are all practical problems associated with food. Forgetting to eat at all due to *Dementia* and *Alzheimer's* is also a concern. Although it is unlikely one person will have all these issues at once, the problems are practical and highlight some of the basic needs we may take for granted.

Older people's needs are heterogeneous and their requirements combine complex expectations that are not always met. This can be due to poor design, for example: small buttons and text, no explanations or inadequate marketing (Calouste Gulbenkian Foundation, 2010). Products not designed with older people in mind can leave them feeling alienated, uninterested and unable to recognise the relevance of technology in their lives. If these issues were better understood, more opportunities could be generated as well as empower the distribution of knowledge and wisdom to younger people.

Anxiousness, frustration and a fear of using computers are assumed traits amongst some older people and as a society we are often quick to make assumptions about them too. According to Burns et al (2010) the uptake of technology can benefit an older person's quality of life, combat isolation and help to make them feel included. Stereotyping against older people can also result in a lack of empathy towards them as well as discrimination that can lead to isolation, a lack of confidence and self-belief.

2.4 Stereotyping

It is stated that society views young and older people in a stereotypical way, whereby young people are out of control and older people are a burden on society (Ayers, 2013 and AFM, 2012). Stereotyping and self-stereotyping is commonplace, with older people often depicted as '*technophobes*'. Technophobes are defined as someone who does not like, trust, or want to use technology, especially computers (Macmillan English Dictionary, 2014). It could be argued that the familiar tradition of information being passed down to the youngest is being reversed resulting in some of the difficulties faced by older people

becoming technophobes.

If younger people have already become the gatekeepers of technology then this could suggest life experience is less important when it comes to disseminating information and teaching than previously thought? The role reversal of teaching computing can be seen at first hand, with grandchildren transferring their knowledge of computers to older family members. This variance in pedagogy is comparable to the printing press and its impact on self-education. During the focus group sessions, 8 out of 9 said they would happily be taught by someone younger than themselves. This would suggest a mutual willingness to engage, provided younger people are patient in their teaching.

Identifying the barriers associated with technology and how this impacts on business has led some companies like Cisco Systems, Johnson & Johnson and Mars Inc to use *reverse mentoring* as a model for their own company hierarchy (Goodman, 2013). The advantages to this are twofold, firstly, that the younger person learns business techniques and is mentored in a traditional manner (older teaching young), whilst imparting their knowledge of technology and its benefits to their older colleague.

Reverse mentoring is beneficial to a business model, cutting training costs whilst encouraging all ages to mix and form relationships based on common ground. It does however lead to the question of how skepticism and discontent can be avoided when implementing this approach. An older ‘traditionalist’ might be uncomfortable with reverse mentoring, and may even feel threatened by it in the context of a working environment where they are expected to know more than their younger colleagues. Paradoxically, a younger person may become agitated or impatient towards the older colleague’s lack of knowledge on something they see as straightforward. This was proven in the focus groups where participants expressed concern over younger relatives impatient nature when showing them how to use computers.

In a British Council article, Bilsborough (2013) addresses some of the issues in teaching by suggesting that knowledge and learning need to take place in an environment with like-minded individuals. Bilsborough also suggests learning should be led by someone of a similar age that the students can identify with. In an idealistic world this approach makes sense, however, Bilsborough fails to consider in detail some of the physical and cognitive disabilities that could prevent such participatory exercises. Inversely, participants in this research had similar aged mentors but still varied in their ability to use a computer

suggesting that a similar aged teacher is not a necessity. As many older people lack confidence in understanding technology using intergenerational approaches to educate older people is underdeveloped and an opportunity for further research.

2.5 Ageing and Technology

In the World Health Organization's (WHO) Global Age Friendly Cities report (WHO, 2007), the authors claim 'The single biggest universal barrier to communicating with older people is the visual and auditory presentation of information.' With this as a primary consideration and driver behind the rationale for this research it is important to consider how WHO arrived at this statement.

The UK cabinet office declared in 2012 that 10 million people in the UK were aged above 65. The UN (2002, The House of Commons) announced a population shift with more old people than young; this would indicate an improvement in our ability to prolong life through poverty prevention and medical advancements.

Alongside the increase in older people is a parallel advancement of digital technologies. The UK government is committed to communicating with citizens primarily through *digital channels*, with estimated savings in the region of £1.7 billion (Government Digital Strategy, 2012). Opportunities exist to design digital advancements based on the needs of older people, and consider how we communicate with them through digital channels.

Designing a user interface for older people has been tentatively explored from a design led user experience perspective as well as a content driven approach. Bridging the gap between these two approaches has proven less successful. The Amazings (Fig 1) is a good way to unite people through relative content but lacks the consideration for design that is present in the *digital inclusion* website Internet Buttons (Fig 2).

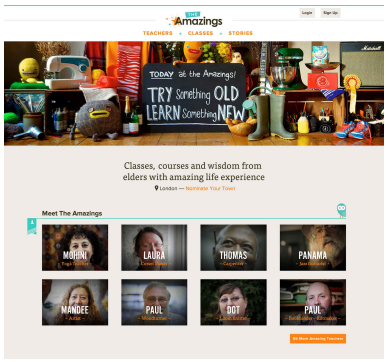


Fig 1: The Amazings homepage.

Fig 2: Internet Buttons homepage.

The Amazings social network platform lets older people share their experiences and knowledge to younger generations. The art and craft themed classes offer mutual benefits by creating a reason for older people to engage with the internet as a community, and offer insightful information to younger users.

From a design perspective, the Amazings website is clean and welcoming but is less approachable. On the homepage it is difficult to understand where you fit in as a user, perhaps a simple gateway offering routes into the website could help to guide a user depending on their needs like Internet Buttons does. Observing the sign-up process could also offer more insight into how we design early computer interactions for older people.

2.6 Designing for an Ageing Population

Encouraging older people to use technology has been researched in a variety of ways. From Age UK and their Digital Champions and Get Online campaigns, Martha Lane Fox and the government inclusion scheme (2009), through to research by students at the Helen Hamlyn Centre for Design (RCA).

The RaMo system (Abbreviation unknown, 2008) (Fig 3) is a self-help interface designed for use in a care home environment. The intention is to link staff with patient; allowing the patient to control their own decisions and preserve independence when making choices about some of their care. A small but important part of their dignity, it is a social maintenance device that can be used by patient and carer.

Fig 3: The RaMo System.

It was considered that a carer or relative would always be available to help show an older person how to begin using the RaMo system. In a way its role was as an extension kit for carers and relatives in recording everyday aspects of an older person's life, including food consumption, medication intake and family visits. The prototype developed for this research differs by encouraging independent use rather than relying on a carer or relative to teach. This is done through an early intervention help section as well as hints throughout and an interface that is sensitive to an older person's needs using *fluid text sizing*, intuitive navigation and carefully considered icons, colour, and tone of voice for example.

During the prototype stage of RaMo, emphasis is placed on capturing data and less so on visual aspects. This results in a visual interface that could easily instil doubt and unease about its effectiveness as a useful tool in everyday life. The food section of the system is lacking in visual stimuli, and appears too basic in the way it allows a user to order meals. If we are to expect older people to engage with new technologies, surely the systems we design for them need to inspire and engage in the same way other successful user interfaces do?

Take for example Nintendo's approach to intuitive gameplay with the *Wii*. The research and development into the handset and games led to a surprising variety of participants including older people in care homes, and even regular organised sessions from Age Concern UK around the country (Fig 4). Re-creating fun and well-known games like tennis, tenpin bowling and golf with gestures helped older people relate to videogames much quicker than a traditional joypad.

Fig 4: Nintendo Wii being used in a care home.

The RaMo system as a personal device in the home does pose important questions based around how technology is accepted and received. Laptops, tablets and mobile phones have been successfully used in both *invasive and* un-invasive ways depending on the user's preferences. This accentuates that not everyone has the same expectations of technology, and the design of new interactive tools must take into account these differences when considering how passive or active it is.

Our relationship with technology has undoubtedly progressed and we have high expectations but everyone has unpredictable tolerance thresholds. How we approach customisation and preferences is becoming key in how we interpret and accept new technologies, this is something that is expanded on later on in the practice section and with the focus groups.

NANA, (Novel Assessment of Nutrition and Ageing) (NANA, 2009) (Fig 5) shares similar features to RaMo and looks at ways of preventing malnutrition through technology. The projects aim is to analyse how digital technology can be used to record nutrition consumption among older adults. It also attempts to overcome limitations imposed by traditional methods of pen and paper whilst capitalising on the storage and communication power of technology.

Fig 5: NANA screens.

The significance of NANA to this research is that it uses technology to interact through food, however its creators approach their research differently. During the design phase the multidisciplinary team consisted of psychologists, nutritionists, and software engineers. In NANA there is a less detailed visual inquiry towards interface design, although they received general feedback on the look and feel from those questioned. The prototype developed for this research is much smaller and concentrates on design as a specialism, with emphasis placed on interaction and how older people perceive technology. This research, therefore adds to what has already been achieved by NANA but from a different perspective.

Eldy (Eldy, 2012) (Fig 6) is a similar interface designed to reduce the technological gap between young and older people. Like RaMo, the design is underdeveloped, reverting to a Windows *OS* graphical interface. In all these assistive interfaces the researchers did consider problems like *point size*, icons, and contrast, but failed to consider how this impacts on visual appeal and a wider context. The benefits of visually appealing design are discussed later in section 2.9.

Fig 6: Eldy interface screen.

Some approaches use digital technology to interact with older people from a product design perspective. The Time Machine radio (Toft, 2008) (Fig 7) encourages older users to interact, by turning back time. Twisting the radio dial lets the user unearth a musical treasure trove of archived music from the decades. Although less complex than most of today's interactions, it highlights the benefits of using established associations with early technology. By *retrofitting* the radio as a tangible metaphorical device for going back in musical time, Toft created an interface that older people can understand and relate to.

Fig 7: Time Machine Radio.

A host of other academic and commercial work aimed at overcoming intergenerational social challenges is being researched including age friendly supermarkets (Kaiser, 2005 and Tesco, 2008), age friendly handsets (Fujitsu, 2012 and Age UK), packaging and manual redesign (Vitamins Design, 2012) (Fig 8) and a variety of websites designed to promote intergenerational communication on the web including The Amazings and Internet Buttons.

Fig 8: Instruction manuals with a friendlier approach.

The German supermarket Kaiser leads the way in designing and implementing age friendly supermarkets. Kaiser's observations of the supermarket experience from an older person's perspective resulted in: better lighting, wider aisles, non slip floors, larger text on labels, easier to use trolleys with drop down chairs, magnifying glasses chained to trolleys, help points and rest zones (Irvine, 2008). The decision to focus a commercial business in this way has been viewed by some as more than just an experiment but is also Kaiser exploring opportunities that arise out of a third of German's being aged over 50 by the end of the decade (Clark, 2009). Since the adaption to Kaiser's stores, Tesco also planned to open a prototype senior friendly supermarket in Gateshead, UK.

The willingness and involvement of large commercial entities is required to progress new ideas on a much larger scale but it shouldn't be used as a way of measuring the success in meeting older people's needs. The success of commercial ventures will be limited by businesses financial limitations, ambition and how willing they are to accept risks. As businesses fulfil their *CSR* (Corporate Social Responsibility) through research and development, government and academic institutions must also share this responsibility in designing services for older people. It remains to be said that in an increasing ageing population, offering these services will be key for businesses to remain competitive and meet customers' needs.

2.7 Accessing Technology

Many people in the workplace already use technology as part of their jobs and will therefore have a more relaxed attitude towards gaining access to email or searching for vital information. Set within the context of a decline in library services and a shift in how we access information online, where does the responsibility lie when providing vital digital services and hardware? Other local services like GP's, galleries or museums could help but it appears that it is largely down to the individuals themselves. As Weiser's (1991) early ideas based around '*ubiquitous computing'* become more progressive, considering where we interact with computers is key.

2.8 Ubiquitous Computing

'Ubiquitous computing' also known as 'pervasive computing' or 'the internet of things' (Wikipedia*, 2014) is the concept of computing becoming involved in every facet of our lives. When designing hardware and software Weiser's vision was to take into account the human's world, forcing technology into the background. Early prototypes from his research share striking similarities with tablet computing today (Fig 9).

* The unreliability of Wikipedia is acknowledged and is used to simply demonstrate the ubiquity of the terms.

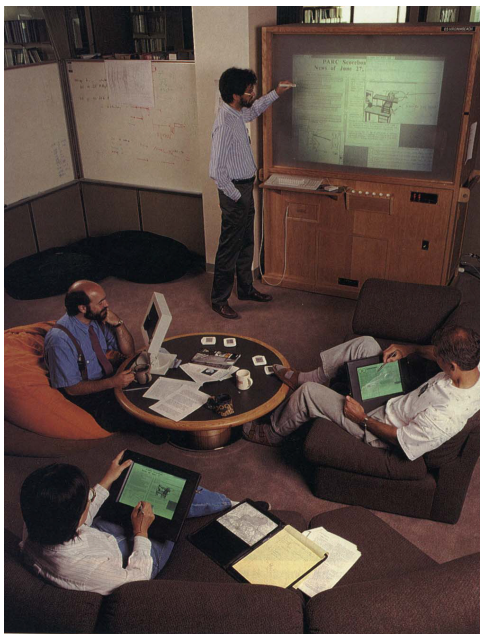


Fig 9: Mark Weiser and his team working on early designs.

The home computing experience descended from the working environment it was so vehemently designed for and has progressed significantly, since the clunky screen, mouse, keyboard and limited choice of software. Computers have become more affordable, fashionable and comfortable. According to some participants in the focus groups this progression has resulted in higher aspirations, an acceptance of technology in the home and an expectation from society as a whole to be computer literate.

The impact of ubiquitous computing and its effects on the '*smart home'* proposition was once the subject of science fiction. Take for example, the British Gas Hive heating control system (British Gas, 2013) (Fig 10) with its sleek app design and consumer facing approach to marketing, Sky's home record feature, light controlling systems, intercoms, locked doors and even automated pet feeding. It is clear to see how computing is becoming ubiquitous. In January 2014, Google purchased Nest Labs for $3.2 billion in what is seen as a direct attempt to enter the home automation market. Nest Labs product offering consists of smart objects including thermostats and smoke alarms but with an emphasis on automation and aesthetics in the home. When considering the value Google have placed in purchasing Nest it makes sense to surmise that *home automation* is of increasing interest for older people.

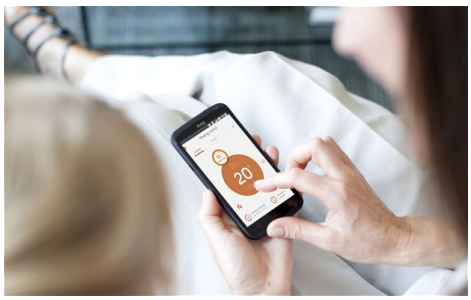


Fig 10: Hive heating control system.

If technology is already ubiquitous, why did some of the people in the focus groups feel like they were getting left behind when using it? An influx of smart devices and updates led some of the focus group participants feeling overwhelmed and confused by what was on offer. If the constant progression of technology was better managed, the advantages it could bring for older people includes independent living and open access to the pursuit of new or old hobbies that enrich ones life. Perhaps part of the solution lies with the way we communicate technologies advantages to older people? An integral contributor in the success of new technology is how it will look and feel in our homes, something we have come to realise as 'visual appeal' in this context.

2.9 Visual Appeal

The evaluation of visual appeal is not an exact science. According to Bell (2007) 'all systems of aesthetics must be based on personal experience – that is to say, they must be subjective' in other words the definition of good design may be different depending on opinion. In design, critical judgement is shared. Good design relies not just on the *sensory experience*, but other factors including how easy something is to use, understand or how convenient it is. Art can be unclear and useless yet still visually appealing.

According to Leonardi et al (2008) 'look & feel concerns perception, so it is important to consider how the interface can meet the sensorial abilities of the user'. As we have seen with Eldy and RaMo (section 2.6), designing for older people is often visually overlooked. During the focus group sessions with older users 4 out of 5 suggested that the visual appeal of a user interface is very important. In considering older people's needs, they too want products and services to look good and certainly don't want ugly equipment that doesn't look out of place in the hospital environment (Calouste Gulbenian Foundation, 2010).

When considering visual appeal Norman (1998) elevates the importance of *usability* and

function, and in his own words neglects the concept of how something looks all together. As a designer, this is a worrying proposition. If this is true then visual design is nothing more than an artifice.

In a more recent article Norman (2003) defended these suggestions by arguing the advances in technology have increased our expectations, placing importance on visual appearance influencing how think, feel and behave. He goes on to describe this as 'affect'. 'Affect' is the subconscious part of our brain that tells us something functions better than something else because of how it looks, sounds or feels. In summary, it is thinking with our hearts as opposed to our heads. Norman goes on to explain the importance of our emotions and how they affect our cognitive ability whilst science often ignores them when judging the success of a user interface. From my own experience as a designer, this view on visual appeal is comforting. It offers a meaningful explanation of design as a facilitator in making a person approach something in a more positive way. It is also a compelling argument against those who dismiss aesthetics as simply decorating something that already exists. Feagin and Maynard's (1997) position is that aesthetics don't just exercise the imagination, but that it also grows the mind and offers variety.

Hedonomics (Hancock et al, 2005) is a way of describing the promotion of pleasurable human technology interaction. The illusiveness in quantifying a successful interactive experience is clearly still in its infancy and demands more research. Making something pleasurable is an interesting, if not rather simplistic approach to design. The Sabi pillbox (Sabi, 2012) (Fig 11) was designed with this approach in mind, but how successful it has been in comparison to other less considered approaches isn't clear. Aligning hedonomics alongside ergonomics certainly points towards a change in what we expect from interactive experiences today compared to what we did, say 20 years ago.

Fig 11: Sabi pillbox is a more fashionable device for organising pill consumption.

When considering visual appeal in the context of typography, Warde's (1930) wine and crystal goblet analogy suggests that using decorative typefaces over a more functional typeface is incorrect and that typography's purpose is rooted in modesty. Warde's view does hold some truth in the context of sustaining legibility and offers an alternative approach in function over form. The use of Helvetica by many graphic designers could be seen as a popular modest solution inherited from Warde's perspective.

Modesty in typography is important, however, reducing it to a supportive role as a necessity in design may not help in creating something functional and visually appealing. The flexibility and choice offered by different fonts adds value for a designer and could create something that Norman describes as 'making something feel better over something else'. Settling for Helvetica or a similar widely used font may be a missed opportunity to use a typeface that is more appealing and suited to the intended audience. Selecting a suitable font and its impact on older people is discussed more in section 4.7.

There is truth in Norman's ideas, however, from a creative perspective Maeda's (2012) approach is more inspiring and creatively fruitful. Maeda creates interactive work through what he describes as a combination of 'old and new' resulting in 'good'. He suggests that the fusion of these two things makes art, technology and design interesting. Although Maeda's measured approach is qualitative, it shares emotional characteristics with Toft's Time Machine Radio discussed earlier and experiments in making technology interesting to older people (Hawthorn, 2007 and Leonardi et al, 2008). Hawthorn discovered that older people needed to gain realistic motivation before interacting. Other researchers (Calouste Gulbenkian Foundation, 2010 and Leonardi et al, 2008) share the same conclusion and observed that older people need to understand 'what's in it for me' before

deciding to interact. During the focus groups this was clear from the user participants but less so from the non-users group, suggesting that further evidence is needed to demonstrate the benefits and relevance of technology to some people.

2.10 Establishing Relevance

In a research project undertaken by Intel (Plowman et al, 2009), the team observed that older people preferred to focus more on the things they considered themselves capable of doing, as opposed to the ones that they can't. Conversely, the Intel team also concluded that older people do like to be challenged as it keeps them sharp.

The notion of 'what's in it for me' is an important observation. When engaging with any kind of interactive experience, it appears that older people require the task to either hold significant relevance to them, or offer a desirable incentive. This would suggest that something too ambient or playful would struggle to maintain interest and also decreases the likelihood of repeated usage. Interestingly, play as a concept in the focus groups wasn't looked upon favourably and none of the users group played computer games. This would suggest that using a game is probably not the most suitable approach when designing for older people.

2.11 Play

Using play could still be a suitable method when teaching new computer skills to older people. Similarities in how children are able to learn new technologies at astonishing pace can be made. Play offers a fun, and engaging way of learning new technologies without becoming laborious or boring, in some instances a user can get lost in all the fun. Although children's relationship with technology draws some similarities to that of adults, it must be said that an older person's ability to learn and retain new information decreases as they age (Burns et al, 2011 and Xie, 2003).

If applied in a fun way, play could be useful in disarming pre-conceived ideas or prejudice towards an activity. For the Collectivity Project, Olafur Eliasson (2005) placed 3 tonnes of Lego bricks in Tirana Square, Albania, allowing citizens to forget the dictatorship they were living under and form their own communities and friendships through construction and play. Bringing the community together and exchanging ideas may not have been possible without play.

Play is also useful when making complex data more approachable. In the search engine 'We Feel Fine' (2011), multi-coloured particles bounce around and can be clicked to reveal users posted emotions being recorded online in *real-time* (Fig 12) through news articles or social media. Although less literal than Eliasson's Collectivity Project the playful nature of the objects makes data more human-like, fun and less about the complexities. As well as the abstraction of data in a user interface, metaphors can be an excellent way of establishing familiar connections with the user too.

Fig 12: A screen from We Feel Fine.

2.12 Metaphors

Apple's iPhone calculator (Apple, 2008) and it's uncanny resemblance to the Braun calculator (Braun, 1989) (Fig 13), and the BBC's radio dial app (BBC, 2011) (Fig 14) with it's design likened to an old fashioned telephone dial are both distinct examples of user interface metaphors. Wikipedia* (2013) demonstrates the ubiquity of interface metaphors suggesting their role is to 'exploit specific knowledge that users already have of other domains'.

* The unreliability of Wikipedia is acknowledged and is used to simply demonstrate the ubiquity of metaphors.

Fig 13: Braun calculator and iPhone comparison.

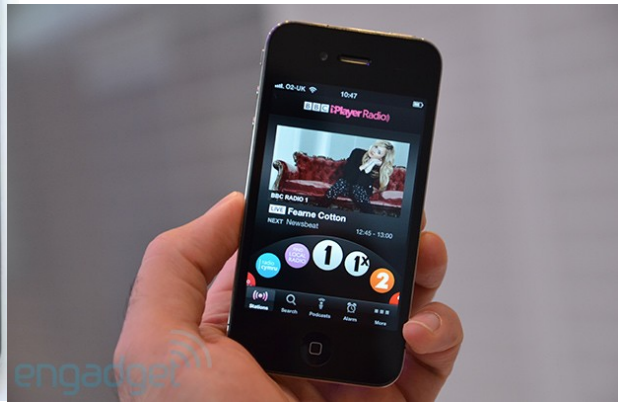


Fig 14: BBC radio dial app.

Metaphors in user interfaces are a reminder of our need to retain a sense of physical space. Whether it has been through *HyperCard* (1987) (Fig 15) and its likeness to a deck of physical index cards; *Microsoft Bob* (1995) (Fig 16) and it's unconventional attempt at placing the interface in a living room or the commonly used desktop interface we use today (Xerox Alto, 1973).

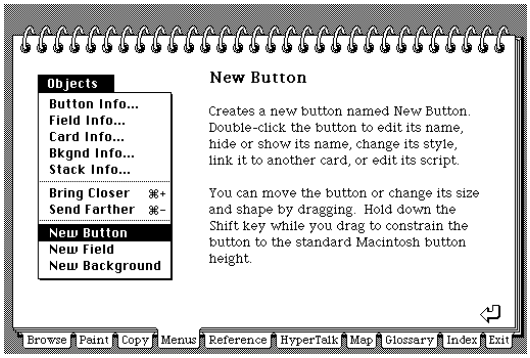


Fig 15: A screen from HyperCard.

Fig 16: A screen from Microsoft Bob.

The desktop interface has played a pivotal role in establishing computing norms and breaking down some of the barriers for new users. Before the desktop most people remained alienated from using computers because knowledge of coding was needed to execute software through text command only. The explosion in visual data and feedback made computers clearer and easier to understand. The sense of physical space paved the way for a more trusted familiarity and comfortable relationship in what the computer was executing.

Moggridge claims that 'the design has outgrown the metaphors' (2008), this statement is an interesting proposition when considering older users and how they relate to technology

from the start. Gentner and Nielson (1996) argue that metaphors constrain and mislead users limiting a designer's ability to invent new interface concepts. If using metaphors is not the best solution when creating accessible interfaces for older people then what is?

A more positive proposal suggests that we use conceptual models that are coherent and adopt rules, or structures that we are familiar with in the real world (Norman, 1998). Agarwala (2006) pushes intuitiveness to the limit by using gravity as the conceptual model in the interface *Bumptop*, as does Mistry (2009) with the development of his *sixth sense technology* that uses real world objects to interact with.

The interface Bumptop (Fig 17) uses gravity in a metaphorically expressive way, creating an intuitive interface based on the rules of physics. The higher a user stacks files in a pile, the more likely it is they will collapse. Throwing a file into a pile instead of hanging it on the wall makes the user re-asses data's place among a hierarchy. It isn't a practical approach to storing large amounts of data but it demonstrates our ability to behave and interpret it differently depending on the cognitive models we are offered.

Fig 17: A screen from Bumptop.

Interestingly, Bumptop uses the defunct *floppy disk* as an icon to signify storage as opposed to more modern data storage methods. Perhaps this cherished, yet realistic icon is a subtle way of representing data that is easier to manage and understand. This may be instead of the far superior cloud storage or solid-state hard drive that is becoming commonplace, yet more difficult to comprehend.

Mistry's Sixth Sense interface (Fig 18) adopts a different approach to Bumptop, using an *augmented reality* gestural system where the user manipulates (or augments) real life objects to enhance their experience. Framing a scene using a finger gesture triggers the device to take a photograph (Fig 19), gesturing a circle on the wrist projects a time, and scanning tinned food in a shop reveals additional content details based on the user's diet. All of this is carried out using a camera and data projector device around the neck. The participatory approach of Sixth Sense creates a rich interactive experience but requires learning and confidence. Renowned authority on augmented reality Hiroshi Ishii (2006) describes this as 'where the sea meets the land' using the analogy of an iceberg to demonstrate the meeting of digital and real-world experiences.

Fig 18: Sixth Sense in action.


Fig 19: Taking a photo using Sixth Sense.

With these rapid advancements in interactive technologies resulting in a *multi-modal* approach to designing user interfaces and an often-fragmented approach to what people already know. How could designing for older people and new users be considered among all the complexities?

2.13 Simplicity Vs Complexity

Simplicity and complexity are important factors when making key decisions concerning user interfaces. Renown technology author and New York Times columnist David Pogue (2006) argues complexity, and the speed of our interfaces leads to frustration and mistakes. The progression of user interfaces has increased accessibility resulting in more users, and thus less tech savvy users. Alongside this, Pogue refers to 'the software update paradox' where software developers are compelled to add new features to sell and promote with less time for design and testing. As technology becomes more complex it is clear to see why new and older users would find software difficult to learn, this was echoed amongst the focus group participants.

Maeda compliments Pogue's view claiming 'technology has made our lives more full, yet at the same time we've become uncomfortably "full"'. Maeda attempts to solve these problems through his ten laws of simplicity using thoughtful reduction and urges designers

to constantly ask themselves ‘how simple can you make it?’ and ‘How complex does it have to be?’ Interestingly Maeda also touches on the inherent satisfaction users gain from owning the power to will complexity from simplicity, as simple as flipping a switch on or off. Pogue expresses a similar view, claiming our instinct is to own the latest technology with added features.

As well as Pogue and Maeda’s observations, adding more features can also create practical problems. Adding too many features will make the prototype sluggish, difficult to comprehend and explain. Not enough features and the ability to customise could make the app patronising, too basic and not offer enough flexibility to the user’s needs. This is addressed through a *heuristic* approach (see section 2.14), participant feedback and observations in the focus groups.

Weiser suggests that when we learn something new very well, we cease to be aware of it; this is easily demonstrated in many home appliances from using a TV remote to switching a kettle on. When applying this thought to computing it is easy to see how experienced users could take their knowledge of computers for granted when designing for users who don’t have that level of confidence or experience. The way smart home systems communicate and ‘fit in’ the home environment is still in its infancy. Key to the synergy of an interactive experience in the domestic environment is that of intuitiveness and its role in user interfaces.

2.14 Intuitiveness

Advances in hardware and software capabilities have led to new approaches in the way computers communicate with users. Touch technology, predictive texting and one click payments allow for easier learning, faster productivity, and a feeling that we can predict or anticipate the way an interface behaves, something we have come to understand as ‘intuitiveness’.

According to Raskin (1994), intuitiveness is an almost supernatural ability, whereby a user can understand ‘without any apparent effort or previous exposure to the idea’. Additionally to this Raskin observes learning as a separate process resulting with intuitiveness. In other words intuitiveness is based on our life experiences more than natural progression (which is something we all experience). Maeda (2006) suggests the best interactive experiences are down to a designer’s ability to ‘marry form and function.’ With Raskin speculating notions of the supernatural, it is clear to see why only analysing the success of our user interfaces through statistics is questioned (Zajiceck, 2006).

Based on previous problems with anticipating intuitiveness Nielsen (1995) developed a heuristic approach to problem solving through trial and error. A ‘heuristic’ approach to evaluating user interfaces is a useful way of avoiding pitfalls when designing an interactive experience and is adopted for this research. Using a heuristic strategy when designing prototypes means quicker implementation at the start, allowing well-known problems to be overcome through a common sense attitude. Conversely, heuristics can also lead to a biased approach based on stereotyping and widely cast assumptions, and therefore more research would be needed later on in the development process.

Intuitiveness is also widely explored in computer science from Douglas Englebart and the first mouse design (1968), to Apple’s finger gestures used on iPhones (2007). West (2013) likens modern intuitiveness as a descriptor for something working well, or as predicted, but only in retrospect. Intuitiveness as a concept implies there is less of a demand for cognitive ability than of something that must be learned, if this is true then it could be beneficial to older users, and dementia patients who often have low cognitive abilities.

Intuitiveness lends itself well when considering the use of metaphors as part of a user interface. Recently the use of visual and conceptual metaphors has led to a difference of opinion as to whether the metaphor should be considered an essential part of an interface designer’s lexicon. The Windows 8 interface (2013) and the literal use of visual symbols in representing music and games (Fig 20) is known as ‘*skeuomorphism*’ meaning the representation of real world objects in a computer interface. Apple’s calendar interface with faux leather texture and ripped paper is also an example (Fig 21) of skeuomorphism’s effectiveness in establishing an environmental picture for the user, this is explored later on in section 4.4.

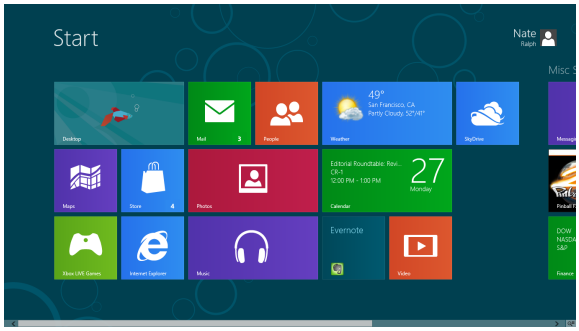


Fig 20: Windows icons in use.

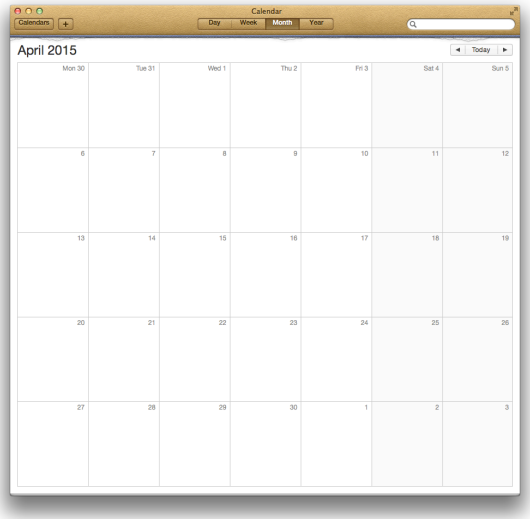


Fig 21: Apple using skeuomorphism in their calendar.

2.15 Design Principles

A set of principles or design standards were discussed and asked for amongst the focus group participants. Currently principles concerning design for accessibility on the web are disseminated and maintained by the Web Accessibility Initiative (WAI) whose core activity is providing resources to people with disabilities but also older people. Although the work WAI do is extremely in depth and widely regarded by policy makers and large businesses, it's appeal as a resource for visual designers or older people is less obvious. If the homepage is packed full of acronyms and technical jargon (Fig 22), how do designers know what is a good standard to uphold?

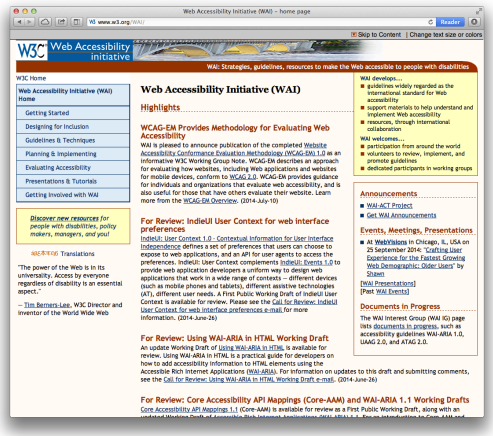


Fig 22: WAI's homepage.

Brand guidelines normally designed for businesses could serve as a template in connecting with user interface designers and digital service providers in a more visual way. Communicating with designers of user interfaces and digital services in this way

could help make them feel more responsible and empathise with the people they are designing for. It is proposed that some of the methods and guides established during the practice-led research could offer a starting framework if the research progressed beyond registration.

2.16 Review Conclusion

How design facilitates older people to use new technologies is an emerging and growing field of research. Justification for more research includes a positive impact on health, well-being and lifelong learning. From the review, it is also apparent that changes in attitude towards older people are taking place, but not so much in the design of user interfaces. In the UK these changes are led by government, whose approach is comparable to tech business entrepreneurism.

Business interest is slowly gaining some momentum from small start-ups and larger corporations like Tesco, Cisco Systems and others. Yet more work and resources are needed to progress from an experimental prototype approach to something that has a lasting impact and creates awareness and realistic incentives for older people to engage and benefit.

Through analysing creative endeavours associated with interface design and older people it is evident that interface design must work harder to meet older people's needs. Some of the common problems older people have are physical, therefore, it is no surprise that many of the design solutions documented and researched consist of product solutions as the main outcome as opposed to visual design considerations.

A key area of debate from the review was visual appeal and its impact on a user's mood and attitude when approaching new technologies. Using metaphors as part of a user interface was analysed and described with an open-ended discussion that results in an area of research that has the potential for further research. In conclusion, the research provides a framework of ideas based around the opportunities that new technologies have and could continue to create for an ageing population.

3. METHODOLOGY

3.1 Introduction

This section illustrates, through practice-led research some of the points discussed in the literature review. Firstly by explaining how the designer is situated in relation to the research, leading onto how design decisions were made, followed by design and prototype construction in the practice section.

The main aim of the research is to facilitate intergenerational communication through interactive design, enhancing user experiences or routines through solutions that are accessible, relevant and visually appealing. Approaching this problem in the first instance requires some consideration as to the designer's role in the practice-led research.

3.2 Designer as Author

The relationship between a practitioner's vanity and designs primary aim to achieve clarity and functionality can be problematic. In this research, the role as design practitioner is not merely a facilitator to design, but a key player in the design itself. If Norman encourages emotion in design, removing the designer from the process would be untenable. Advocates of this approach include Stefan Sagmeister, Marion Banjtes and Paula Scher who are among many graphic designers who are able to influence work in a personal way using their emotions and personal taste.

It could be argued that design should be invisible, void of an author's ego, rational and functional. Something that closely resembles *modernism* perhaps? In some cases this is true. For example an aircraft safety card probably should not contain the chaotic yet distinctive illustrations of Ralph Steadman (Fig 23), or road signs that are designed with a personal approach in mind could be confusing. Although designing in a solely functional way may be possible, it would serve for an extremely mundane user experience. A balanced pragmatic approach is proposed in light of this where form and function exist in equal measure.

Fig 23: The illustrative style of Ralph Steadman.

Historically graphic designers like Norm Cox, Susan Kare and Karen Elliot were pioneers in developing the visual language used in *graphical user interface*s. Tognazzinis (2003), argues that graphic designers are limited to just the surface of how an interface looks, conversely to this it is also worth considering that the surface of a user interface is all most users will ever experience. Wood (2012) believes that graphic designers have lost their influence initiative when it comes to graphical interface design. Interaction Design Foundation (de Souza, 2013) argues differently, suggesting designers are active participants in the communication that takes place through interfaces' and a designer's vision through graphics, icons, and layout controls how a user interprets the software.

When considering the designer's role in the design process it makes sense to consider the role of users too. *Participatory design* incorporates all stakeholders throughout the design process with the core aim of designing for the user or customer's needs. Participatory design is a common approach when concerning user interfaces, and helps identify basic requirements and user behaviours. Examples include: asking users what they expect from an application early in the design, letting users help design, or role-playing a scenario. Participatory design is used in the focus groups through feedback and discussion. It is proposed that this method of enquiry be implemented more if the research progressed beyond the period of registration.

In the design profession trust is a key component between design practitioner and client; with design research it is different. The client is removed, or in a sense the researcher plays both roles. In doing this I have tried to keep a balanced approach which will hopefully prove fruitful rather than neutral. A design centred approach allows for pragmatic decision-making where compromise can be reached in a logical way.

The need for creative solutions that motivate older people to use new technologies was discussed in section 2.10. Explored predominantly from a product designer's point of view, the problems communicating with older people through technologies are surprisingly under explored from a visual perspective. The emphasis is often placed on content and data capture, and design is often a missed opportunity resulting in user interfaces that are compromised by un-considered design. This research differs by using visual inquiry and questions how we create interactive experiences for older people.

Through approaching the design of a user interface I have continued to reflect on my role as the author throughout the project. Where this is the case, I will attempt to rationalise my thoughts and the outcome, in the hope that it will help other practitioners to contextualise their own roles within their research.

3.3 Process

Preparatory research was undertaken where interactivity was approached with the context of older people and can be evidenced in the literature review. The context of the research was discussed with supervisors, research students, designers and professionals. The research also engages with AFM at Manchester City Council, who were instrumental in organising two focus groups.

During the review an understanding of intergenerational design in its current existence was formed and helped identify how the research could contribute to wider society. Throughout this process, reference was collected in the form of web links, images, PDF's and quotes; this was documented in a private self-publishing application called *Evernote*. This method of documenting research became a useful way of depositing quick finds that could be revisited at a later stage, and also shared with others.

The core of the research at this early stage involved mind mapping, post-it notes and sketchbook ideas (Fig 24). This fast and flexible approach to formulating ideas led to identifying themes that were categorised for analysis. Subject areas established through the practice were aligned alongside The World Health Organization's guide to Age Friendly Cities (2007). Re-visualizing an existing diagram (Fig 25) helped to contextualise ideas alongside the key document and pinpoint those with the most potential.

Fig 24: Early ideas.

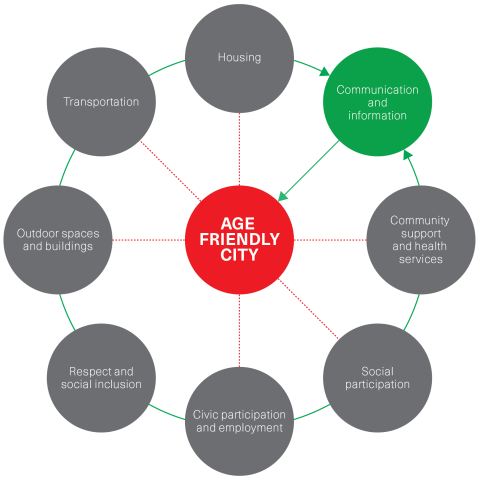


Fig 25: An adapted diagram from World Health Organization.

Early stages of the research identified decision making as a key discipline that needed to be well kept in a personal sense. A list of themes with underlying potential projects was identified and it became clear that the creative brief needed more details. This highlighted the importance in establishing a brief that is focused, yet flexible enough to allow creative problem solving to take place.

Establishing a PDF presentation format as a way of documenting decisions proved useful. This method is common among the graphic design profession and enabled the nurturing of new ideas and self-reflection. Assembling a presentation as the research progressed required succinct explanations that could be understood by supervisors and academics. Although not a conventional method for user experience designers, this personal approach granted creative freedom and forgoes the need to establish details too early on in the creative process. Documenting work in this way presented some difficulties in visually representing some of the ideas resulting in their termination as part of the filtering process.

The filtering process resulted in grouped themes including: transport & navigation,

education, food, home management, technology, healthcare, and the arts. Food was later chosen because of opportunities identified early on in section 2.3. As the population of older people and the demand for healthcare from this segment of society increases, stimulating a good diet is one way of keeping people healthy and out of hospital. Additionally, food as a concept can encapsulate ample creative approaches whilst stimulating a more focused approach to the research. Manchester's AFM also agree that using food to explore technology in a creative way is a worthwhile endeavour.

The use of food throughout the research serves mainly as a theme or vehicle for the project. The nature of practice-led research requires content that can be manipulated, visualised and placed in context. This model of approach could be applied to any field of research concerning the design of an interface and is useful when attempting to establish a visual language.

3.4 Developing Ideas

Early visual experiments laid host to serendipity, proving useful when generating new ideas. Nutritional labelling (Fig 26) was used as a starting point to the practice. The aim of this exercise was to stimulate a visual inquiry, as well as considering food labelling in an interactive context. Alongside this creative exercise, was the study of documents written with nutrition for the elderly in mind. This informed approach helped establish what was important to the research.

Fig 26: Early ideas based around nutritional labelling.

Expressing thoughts visually early on subjected the ideas to tests. The approach was that if an idea could not be visualised then it wasn't feasible for the research, and as such

became less important. Early concepts included food comparison interfaces, novelty apps and ambient installations. Themes that were explored included using humour to relax a user and gain their attention, modularity and how it could be used to familiarise a user with technology, and experiences associated with imitating *anthropomorphic* qualities and nature.

Nature as a concept derived from the consideration of metaphors and a user's conceptual model of a computer process (Norman, 1998). Early ideas based around this were abstract, for example one idea was based on an interactive water current where users could literally wash away unhealthy foods. An application where healthy food items stick together to form a shopping list whilst unhealthy items float away was also considered (Fig 27). By thinking in an abstract way with less reliance on computing norms it allowed for creative freedom.

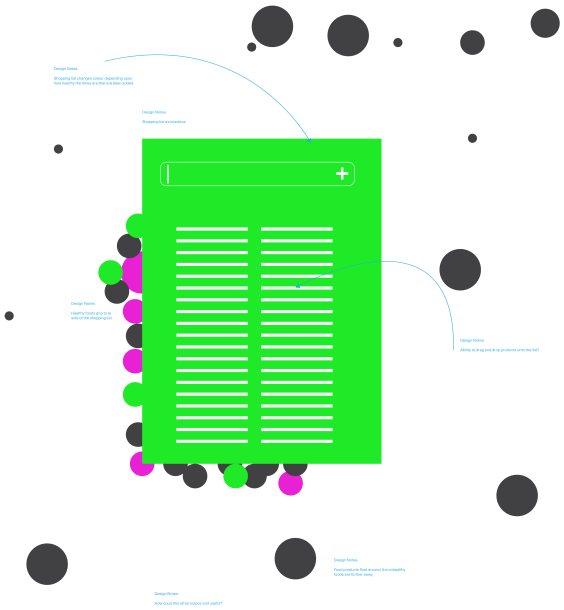


Fig 27: Looking at how shopping lists can be made more interesting.

Exploring some of these ideas formed two approaches. Firstly an abstract approach inspired by nature, and more akin to an art installation, where play was the dominant driver in establishing interest. Secondly a more conventional approach that was more informed by design and established computing norms. The latter was proposed because of its closer affinity to design objectives and less reliance on technical build.

4. PRACTICE

4.1 Introduction

The practice section documents a creative approach that uses graphic design principles. The design of the iPad app prototype is explained in a reflective manner with supporting imagery throughout. Various sections including typography, colour and layout are explored with the aim of analysing specific details that contribute to the user-centered experience. Two focus groups that took place are documented and evaluated.

4.2 Technical Considerations

Before establishing a suitable digital platform for the research it is important to acknowledge some of the considerations and assumptions. This research acknowledges that the iPad, at £319.00 (September, 2014) is considered an expensive piece of equipment for the majority of older people to acquire. Equally the capabilities of large organisations like the NHS and other government authorities to bulk purchase devices could reduce the cost, and increase the likelihood of tablet devices becoming an effective way of facilitating well-being in older people's lives. Additionally, a philanthropic approach may form where hardware developers like Apple and Microsoft could increase the availability of equipment whilst generating more interest around their products.

Over 20 million people have used an iPad in the UK (Dredge, 2013), increasing the chance of an older person receiving help or assistance from a friend or relative. In research, *haptic (touch) technology* was proven to be easier to use for older people than the keyboard and mouse (Caprani et al, 2012 and Umemuro, 2004). The success of haptics over point and click is due to the natural synergy of touch and immediate feedback without any interference. Using haptic technology allows for a more 'hands on' approach when interacting with computers. Consolidating the mouse, keyboard, monitor and tower into one tablet helps simplify its operation and the learning steps involved.

The physical attributes of the iPad's hardware were also considered. It is lightweight when held and has a large screen that accommodates bigger buttons, compensating for people with physical disabilities like *arthritis*. The research acknowledges that the app would need to be downloaded and installed before it is used; this process isn't explored but could be addressed in further research. It is also worth considering that anything designed for the

iPad is transferable to other devices, the iPad is just the basis for the research in its early stages.

For the prototype app itself an online mockup tool called *InVision* was utilised (Fig 28) to form hyperlink relationships between JPEGS and animated GIFS (or screens). InVision allows the prototype to be used in full-screen mode just like a user would with an app. Common tablet gestures can also be applied to the screens so the user can tap, pinch and swipe creating the illusion of a fully operating app. A video of the prototype in operation can be viewed online here at http://www.ashspurr.com/demo.mov

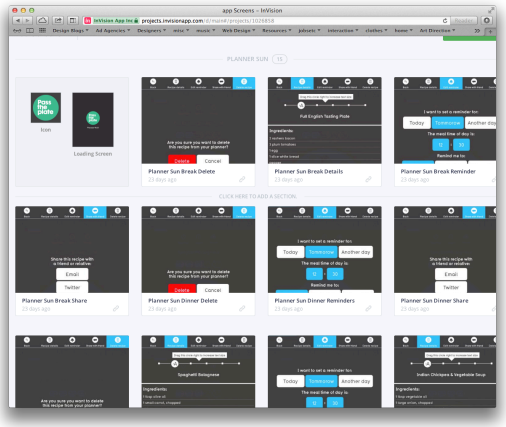


Fig 28: A screen from InVision prototyping tool.

4.3 The Prototype

The prototype uses a navigational metaphor of a dinner plate or bowl. The plate becomes a container for meals that can be tapped for more recipe information. The passing (or swiping) of the plate becomes the primary method for browsing between recipes. The responsive operation of this happening allows the user to form their own basic cognitive model about a space (or environment) similar to a dining table without having to visually depict this through supporting images or textures.

The swiping left and right gesture is designed to be learnt fast, and is an '*iconic gesture*' that is only used once in the application. Leonardi et al, 2008 describes how an 'iconic gesture' could help to increase usability among older users, and detract from the reliance on visual cues because the gesture itself reflects the action carried out. In summary swiping over the plate from the left pushes the plate to the left to reveal the next plate on the right (Fig 29). A demonstration video of the app in operation can also be viewed at http://www.ashspurr.com/demo.mov

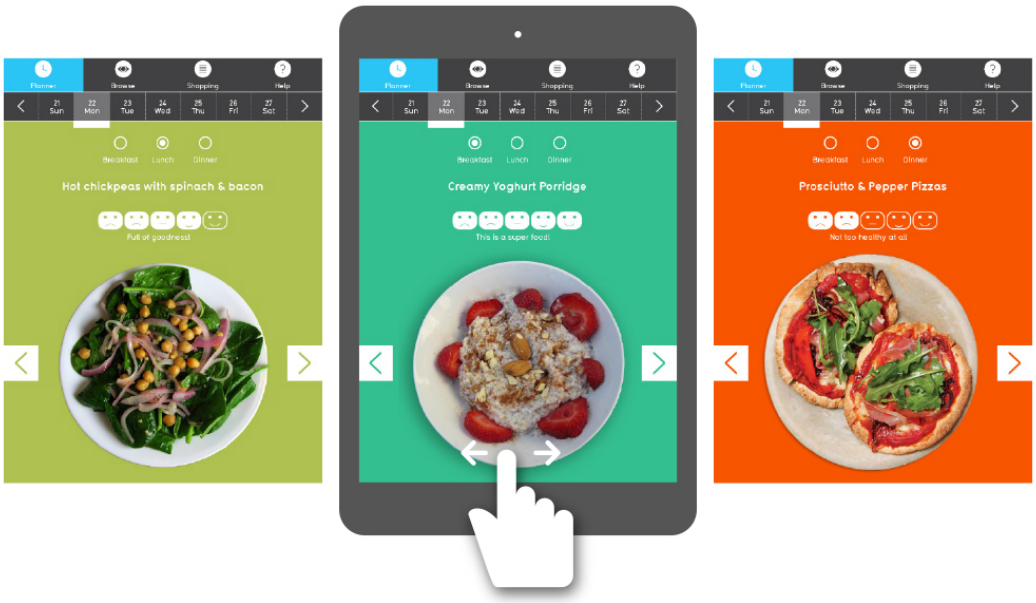


Fig 29: Demonstrating how the iconic gesture works.

4.4 Skeuomorphism

The prototype abandons an absolute visual representation of real world objects (also known as skeuomorphism) but retains the literal image of a dinner plate and food. This is to make the app easier to understand for the user, as well as be more visually appealing and engaging.

The design of the dinner plate itself was explored; replacing it in favour of an information table approach; however this looked and felt cold, technical and less approachable (Fig 30). The prominence of the plate caused some issues with layout due to its unusual shape and not being able to flow text around it. Revising the orientation of the application from landscape to portrait helped resolve some of the layout problems encountered and also allowed more space for text above and below.

Reconsidering the role of the plates use offered the opportunity to consider what they contained. Whether it be information graphics relating to the recipe, an illustration of the food, an icon representing a recipes healthiness or typography. Imagery was eventually used because it helped maintain an element of trust and familiarity whilst been more likely to trigger a desire to try new foods and interact with the plates. Using an image also offered a contrasting visual appeal to what was becoming a *vector* based solution overall. Later in the design process it was decided to include a feature that allows recipes to be

viewed as a list (Fig 31) as well as the default plate view; so recipes can be looked at in summary rather than individually. The disadvantage of a list is that it forces the user to interpret and understand more information at once and could be overwhelming for new users.

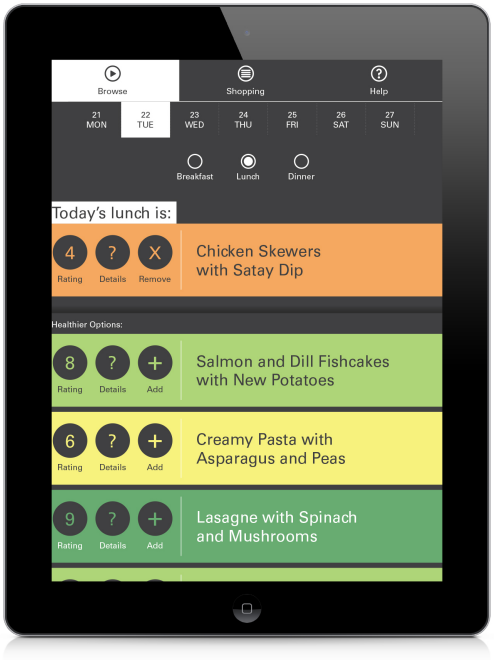


Fig 30: Changing to a list preview when developing.

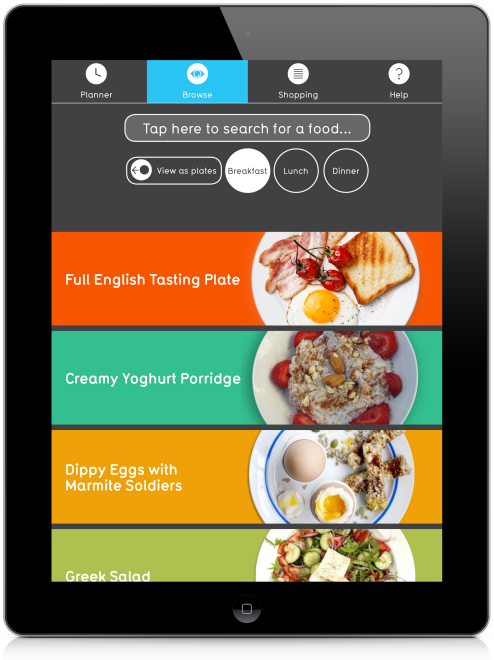


Fig 31: The list view as an additional feature.

4.5 Layout and Navigation

The primary navigation of large buttons along the top is designed for easy tapping (Fig 32). Apple's recommendation is a minimum of 44 pixels squared (Apple, 2014). Used here is 195x80 pixels and so well above recommendations and more suited to older users who may have dexterity problems. The 'Sun' to 'Sat' buttons are also easily navigated through and meal times can be swiped between using the iconic gesture as previously explained. The location of the buttons is determined by predicted popularity, with the most frequently used to the left because in the Western world we read from left to right. Some layout principles taken from the review were to avoid confusion, establish a hierarchy, determine clarity between elements, use large action areas to tap, and adopt icons in addition to label descriptors.

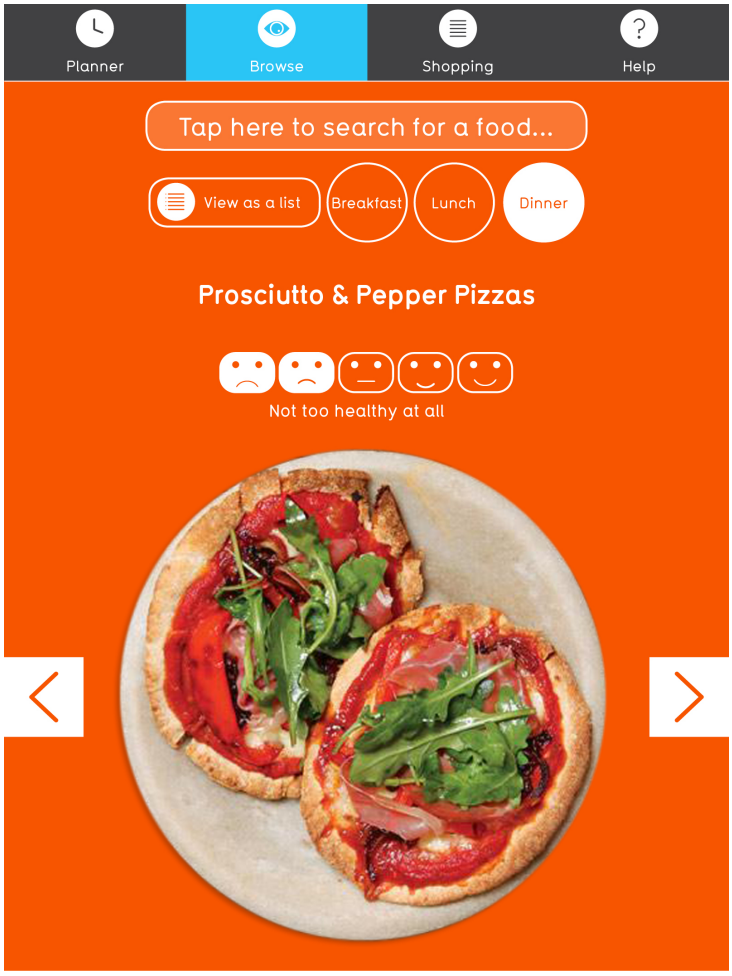


Fig 32: Prototype screen demonstrates large button size.

4.6 Icons

Starting life as wayfinding systems, weather icons, and Olympic pictograms etc, it is safe to say icons as part of the user interface have formed a whole new visual language for designers to experiment with. Illustrating concepts like Wi-Fi, Bluetooth, settings, copy and paste has challenged designers and recipients to form complex understandings that are built over time through repeated usage and a collective understanding.

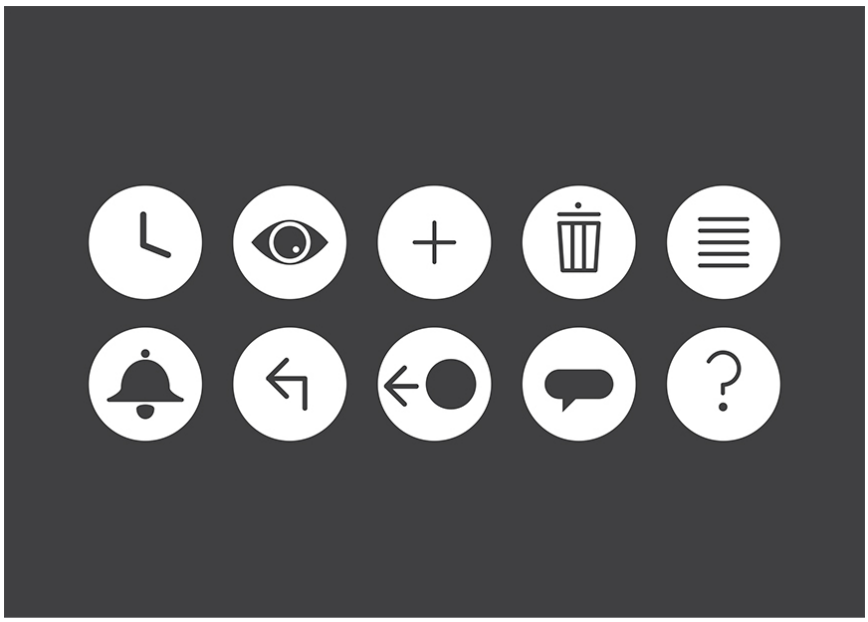


Fig 33: Interface icons designed for the prototype.

The challenge when designing interface icons (Fig 33) was to re-consider them from the perspective of a new user. Looking at the early work of Apple icon designer Susan Kare (Fig 34) and Xerox Star operating system designer Norm Cox (Fig 35) helped establish a context for designing an icon set that is faithful to its intended use. *Semantics* (the study of meaning) was briefly studied in relation to icons (*semanticons*) leading to questioning the use of icons and labels in interface design. American pragmatist C.S Peirce (1958-66) describes the approach in using icons as ‘patterns of expectations that emerge as regularities’.

Fig 34: Apple icons by Susan Kare.

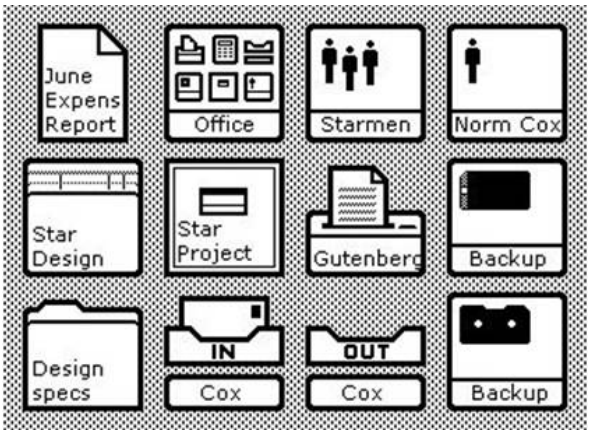


Fig 35: Xerox Star icons by Norm Cox.

It is suggested that using icons alone is less effective for older people and that text should be used with icons (Qian, 2012). Research comparing image recognition to words, demonstrated found pictures to be far superior in memory recognition than words,

(Gehring et al, 1976) therefore supporting Qian's theory. Meanwhile Qian also suggests icons address a sense of balance and order through a grid system giving a well-ordered composition. The usefulness of icons can be illustrated by comparing the visual appeal of classified advert websites gumtree.com (Fig 36) and craiglist.com (Fig 37). Both websites facilitate online advertising, with Craiglist using a minimal non-icon approach deriving from faithfulness to *CSS* and *JavaScript* standards. A self confessed case of programming leading design decisions.

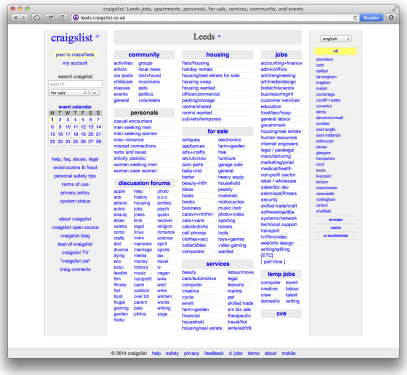


Fig 36: Craiglist homepage.

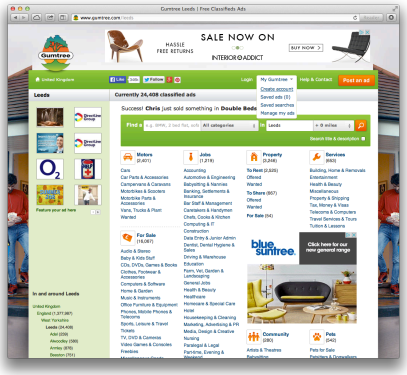


Fig 37: Gumtree homepage.

Gumtree however, uses banners, colour, texture, and icons to help establish a grid that appears easier on the eye, and as a result could be deemed more visually appealing. The icons are fairly conventional, but act as signposts classifying key categories whilst making the website less daunting and text heavy. For the prototype, adopting a similar approach helped create a sense of hierarchy, order and usability.

Chi et al (2001) consider the importance of interface icons through five factors: styling, messaging, meaningfulness, locatability, and metaphor. The investigation asked 40 designers to rate what they thought was the most important. Results found meaningfulness and locatablity was of more importance, perhaps demonstrating the significance of context when icons are used. The icons in the app prototype fit ordered into the grid, and retain a sense of uniformed familiarity throughout fulfilling the patterns of expectations previously discussed earlier. The bold, and flat graphic styling of the icons is for clarity and simplicity in delivering the icons meaning. How the icons would look to people with visual impairments was considered by preventing the fill of negative visual space at small sizes (Fig 38).

Fig 38: Demonstrating an icon working at different sizes.

The icon's role as a signifier acts as a supporter to the labelling. Not relying on established graphical interface language or historical context was key to considering the messaging, unlike Bumptop as discussed in section 2.12, which opted for representing data through the now defunct floppy disk as an icon. The signifier was kept as simple as possible to avoid confusion. Attaching a sense of meaningfulness to each icon tied in with using metaphors where possible, this was the case when considering the 'planner' and 'browse' buttons. A degree of abstraction was applied when needed. For example the 'back' icon was signified through a left pointing arrow, as opposed to trying to do this metaphorically with a pointing finger.

4.7 Typography

The human vision system declines with age. The pupils shrink, allowing less light through resulting in poorer vision than a younger adult. The ability to focus also decreases as the lens loses elasticity culminating in low vision. Compensation for these problems is needed, and is addressed when deciding on suitable typography.

Evidence suggests that older people benefit more when reading on an iPad. Bornkessel-Schlesewsky et al (2013) found through eye tracking measurements that fixation durations were less, and texts could be read faster. Succeeding the tests the team also conducted a survey among participants, unsurprisingly finding that they overwhelmingly chose ink and paper as the preferred method of reading despite the disadvantages! The team concluded that the improvement in reading might be due to the enhanced contrast of the tablet, as opposed to e-readers and paper.

It is widely accepted that contrast is very important (Nini, 2006 and NIA, 2008), so it makes sense to pay attention to this in selecting a suitable font. Secondary to this is how flexible the font is when applying to layout, and thirdly how it looks and feels in the context

of the app. Before making the judgement based on this criteria it is worth considering some other fonts, and the way they are used.

Fig 39: APHont is designed for older people.

Whether a *serif font* contributes more towards legibility than a *sans serif* is a debate to be discussed elsewhere. A prominent online article written on the subject (Poole, 2008) has over 200 comments and still concludes with no scientific evidence to suggest that one is better than the other when analysing readability. The American Printing House for the Blind released their own sans serif font called APHont (APH, 2004) (Fig 39) claiming features include more even spacing between letters, higher crossbars, wider and heavier letters, and larger punctuation marks (Fig 40). APHont features unusually long descenders on the ‘q’ and ‘j’, this would prove problematic when using line spacing later in the app and also appears to disrupt the flow of text.

Other font families considered include Helvetica, Univers, Din, Futura, Bodoni and Gotham. Lineto’s Typ1451 (Fig 41) was used in the app for its modern look and feel, bold characters, over pronounced dots over the ‘I’ and ‘j’ and large counters.

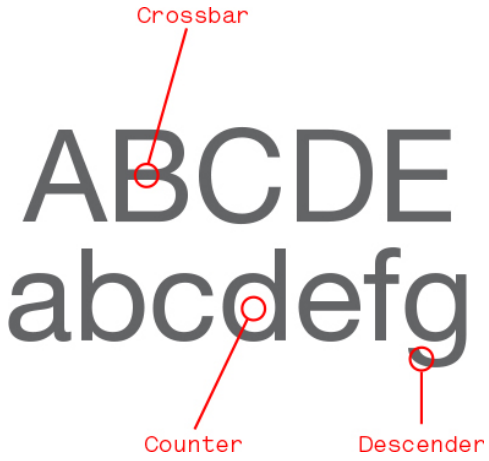


Fig 40: Showing basic font anatomy.

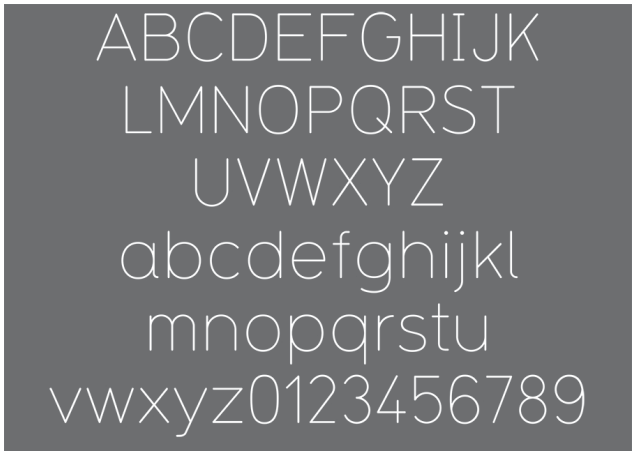


Fig 41: Type 1451.

The use of uppercase is generally reserved for headings and to signify shouting and is avoided in the app prototype. The National Institute on Ageing (NIA, 2008) also advise restricting the use of uppercase unless used as headers because they are more difficult to read, and older readers will be more familiar with sentence case.

The common problem of poor vision is addressed by using a size slider (Fig 42). The slider allows the direct manipulation of point size when reading. The benefits of using the slider include using and learning the drag gesture in an intuitive way, and the ability to tailor the text size to their needs in real-time removing one of the main barriers concerning accessibility.

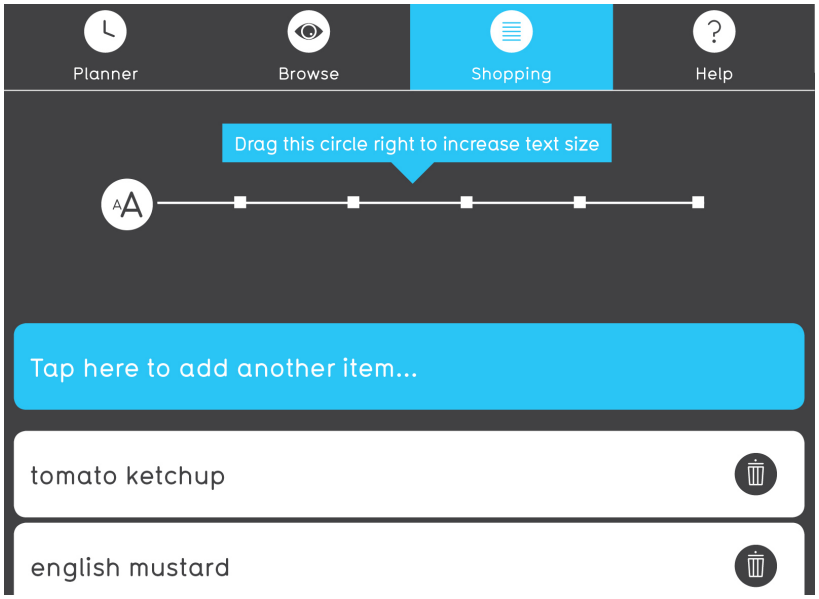


Fig 42: Demonstrating the text size slider.

4.8 Colour

Using colour as part of a user interface offers clues about how the navigation functions. At www.bbc.co.uk (Fig 43) colour is used to emphasise different sections, for example yellow for sport and burgundy for news. Colour is also used more subtly to tint active text links when a user rolls over them with the pointer, establish headings, and emphasise key information or clickable buttons. The consistency of colour application across the BBC helps maintain their brand and offers a sense of comfort and familiarity with the audience.

Fig 43: Showing how the BBC use colour to signify sections of their site.

The ability to identify and differentiate between colours decreases with age (Wijk, 2001 and Wuerger, 2000). Establishing a sense of contrast is more difficult, leading to problems detecting letterforms or objects against a similarly coloured background. Interestingly, our subjective experience of colour does not change as we age (Wuerger, 2000). This was taken into account when selecting colours that are meaningful, for example red for bad and green for healthy. *Colour vision deficiency* effects 8% of men and 1% of women (NHS, 2014) leading to question how much of a role colour should play in successfully aiding accessibility?

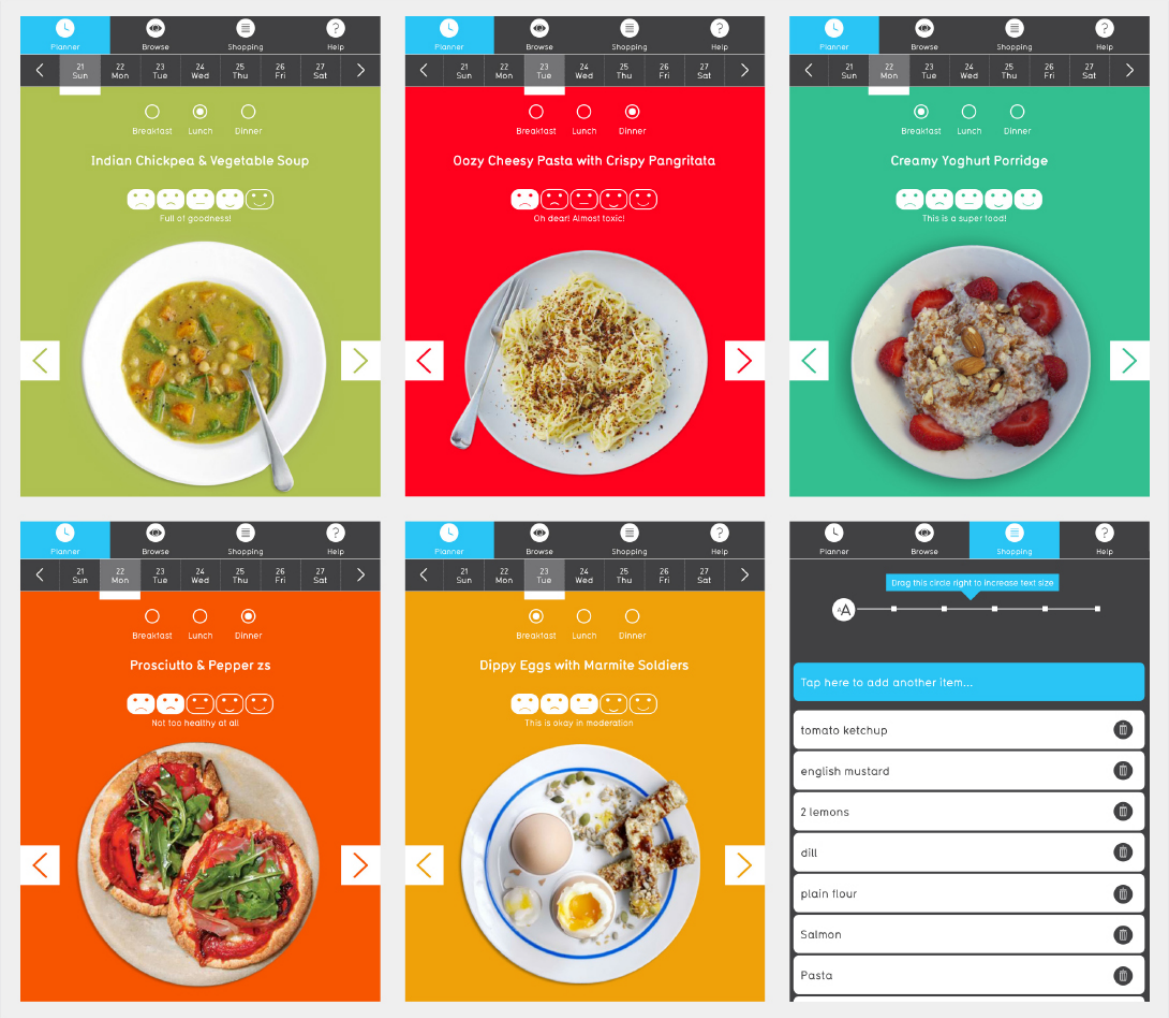


Fig 44: Demonstrating how colour is used in the prototype.

This research proposes that colour is used in a supportive manner and isn't heavily relied upon. The prototype background colours (Fig 44) are used alongside the ratings system to indicate the healthiness of recipes, for example dark green being healthy and red unhealthy. Five grades of colours were chosen with tonal contrast against a white foreground. A dark grey was used for general slides where there is no need to display the grading of recipes. Cyan is used as a supporting highlight colour to help emphasise helpful information and active button states. The use of a textured background was attempted but later removed to streamline the interface and make it visually less cluttered and easier for the user to digest. When a plate is tapped the user is taken to an overlaid screen interface with a subtle transparency effect creating differentiation between the previous and new screen, whilst retaining a sense of location with the plate interface still slightly visible behind.

4.9 Ratings System

The Consumer Council (2007) claims that there is a common inability to understand food labelling and considers it as one of the main difficulties when deciding on what is needed at the supermarket. The traffic light system (Fig 45) used on food packaging is criticised by some as being ‘too judgemental’, ‘over-simplistic’ and ‘open to mis-interpretation’ (Food Drink Europe, no date) Inversely the Food Standards Agency (Giles, 2009) and The Consumer Council (2007) consider the ‘at a glance’ approach of colour coding as useful. A survey conducted by Netmums (2007) found that 87% of parents also support the use of colour coding. During our focus group sessions 7 out of 9 found the ratings system really useful and said that they found it easy to understand.

Fig 45: Traffic light system used on food.

When considering the ratings system, two methods were explored and applied. Firstly a traffic light system that worked with the colour coding already established and secondly the use of the emoticons to convey a sense of personality and human appeal. Pros and cons to the emoticons in context led to questioning whether they were patronising or too childlike, whereas the traffic light system could be perceived as too boring, sterile and therefore be ignored. Emoticons were eventually used for the prototype and received positive feedback in the focus group discussed later in section 4.15.

4.10 Customisation

Customising the way an app or software behaves is often left until the user is more familiar with its basic operational features. According to Berkolter et al (2013) ‘customisation optimises the pleasure and efficiency of a users life experience’, but what happens when we go too far? Bergman (2004) predicts user interfaces will customize

themselves much more depending on a users behaviour, for example email software anticipating when we send emails and who to, or music software suggesting and playing new artists to match a mood or time of day, or online shopping ordering itself. Although useful, Maeda rightfully questions how comfortable we will be with this, and also what are our tolerance levels when the computer makes a mistake?

Customisation could be useful when devising a user interface for older people. Could an interface that adopts a graphical style from a particular era appeal to older generations from that period? Probably, but this would certainly impact on usability, and how could we judge what was right back then will be right for now? Using a graphical style from a bygone era could be problematic when trying to forcibly retrofit every time, and could also make things more complicated than they need to be when teaching too.

In the prototype, customisation was only considered when needed, for example viewing a recipe in list or plate mode, etc. It was anticipated that the scope for customisation would be established over time in further testing the prototype and observing user behaviour and requirements.

4.11 Tone of Voice

The ‘tone of voice’ is not about what is said but more about the way it is relayed to the reader. Guidelines from The National Institute of Ageing (NIA) (2008) suggest being direct, limiting key points, offering a manageable number of steps, using imagery to illustrate information, repeating main points multiple times and avoiding unnecessary jargon. The language used and complexity of words can contribute to making a user interface feel more human.

Consider error messages and how the computer relays a message that something isn’t right. Using Apple iTunes an error message reads:

“We could not complete your iTunes store request. An unknown error occurred (11111)”

Coupled with a red icon and exclamation mark this message is unhelpful, frustrating and alarming in the way it communicates. According to Microsoft (2014) a poorly written error message breaks a users flow and results in low product satisfaction. Burns et al (2010) argues that an older user is likely to blame themselves if something is wrong, which makes them vulnerable if the context is based around decisions, for example paying for something online, or monitoring medicine intake. Nielsen (2001) advises that a message

be explicit, human readable, precise, polite and constructive.

The tone of voice used for the prototype avoids technical jargon and uses plain English. The food-grading emoticons chart uses phrases like ‘this is a super food!’ and ‘not too healthy at all’ helping to add a richer sense of humanness to the interface. Some parts of the interface use an empathetic approach by asking a question and posing answers within the button. Instead of reading ‘new users’ the button reads ‘new here? Tap here’. This approach appears more human-like and offers instructional hints as to what a user should do. When first launched, the app is explained through six points and can be re-visited at any time by tapping the ‘help’ button. Looping animations also allow a user to follow visual instructions at their own pace without feeling they are being left behind.

4.12 Reminders

People with dementia can face the prospect of forgetting to eat; one feature of the app prototype approaches this through reminders, which could be set by the user or a carer. When adding a recipe to the planner a user is prompted to set a reminder. Options include ‘cook food’, ‘go shopping’, ‘take medicine’, ‘turn gas off’ and ‘turn oven off’ (Fig 46). Incorporating this feature required a balanced approach when considering the complexity and quantity of the reminders that could be set. The criteria for the inclusion of reminders was decided that they had to either relate to food, health or well-being.

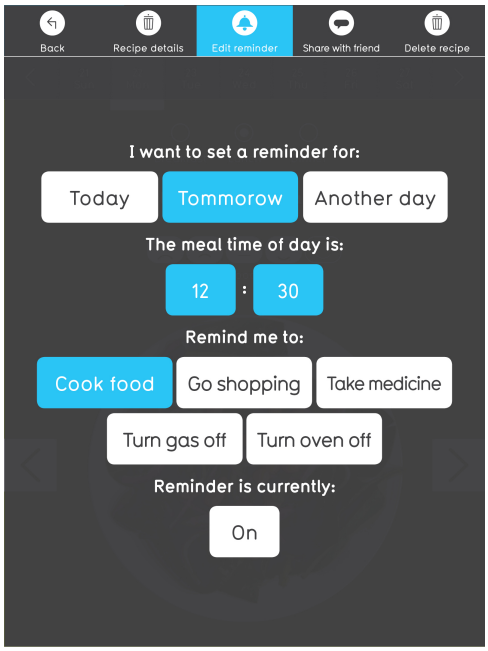


Fig 46: Setting a reminder on the prototype.

4.13 Planning the Focus Groups

To gain feedback on the prototype and form a deeper understanding of the role technology plays for older people two focus groups were initiated. Age Friendly Manchester helped find and select willing participants through local authorities and community centres. Each session featured participants ranging between 52 and 88 years old. One group at the Residents Association in New Moston, Manchester (NEPHRA) (Fig 47) consisted of participants who considered themselves as being ‘really unsure’ when using computers and didn’t use them at all. The second focus group took place at Greenheys Adult Learning Centre in Moss Side and was formed from participants who were all confident computer users.

Fig 47: NEPHRA was one of the focus group locations.

The sessions focused on generating qualitative answers with participants reflecting on their experiences with technology and the prototype developed as part of the practice. Examples of open questions included ‘why do you use computers?’ and ‘what stops you from using a computer?’ Participants were asked to fill in a questionnaire, which helped quantify some answers and offer comparisons for later analysis.

4.14 Focus Groups

The non-users group at NEPHRA began by asking participants why they haven’t used computers before. Answers ranged from ‘feeling overwhelmed’, ‘not been interested’ and also ‘not understanding the way they work’. Some participants spoke about the frustration when trying to use computers and the impatient nature of younger relatives when showing them how to use them.

One participant became ‘upset’ and felt ‘destroyed’ and ‘unconfident’ after a younger

relative tried to teach her. She describes her current feelings towards computing as being ‘lost’. When asked about their feelings towards being taught by someone younger all participants said they wouldn’t mind as long as they were patient.

Another participant has a family living in America but wasn’t aware of video communication and the role computers could play in helping her to connect with family in a more dynamic way. When asked if any family members had tried to teach her computers she said ‘no’, however she did express an interest when video communication was later discussed in the session.

A retired computer engineer explained he did have some computing knowledge but at a very basic data input/operational level. He said that he felt frustrated at 'not being able to get where he needed to go' and that he felt 'locked out'. Interestingly he responded well to the navigational aspects of the app despite his frustrations.

The second focus group was at Greenheys Adult Learning Centre and consisted of older people who only used desktop computers. All participants were younger than the participants from the non-users focus group. Some users were clearly advocates of the learning centre and were proud of the knowledge gained from the courses they had taken.

Participants were motivated to take more computer courses and proceed to ‘the next level’. When asked what motivates them to do this, a range of answers was offered with the group suggesting it was to ‘keep up to date’ and that it also gave them a ‘sense of accomplishment’. One participant admitted he felt encouraged to learn through an incentive scheme that allowed him to buy a second hand computer for £25.

An early discussion centred on the use of computers and naturally led onto participants use of the web. Activities ranged from buying small things online right up to looking for the latest deals when buying a new car. One participant spoke about his interest in booking travel online and felt that it was less hassle than visiting the travel agent. Another participant was also excited by the internet and said he felt ‘empowered’ when he discovered new things (he even recounted new facts discovered that day in the focus group!).

A persistent nature, motivation to learn and the support of the learning centre were all contributing factors towards the participant’s success in learning to use computers.

Perhaps in analysing the differences between the two focus groups we should start by looking at what motivates the participants? One of the non-users was ‘uninterested’ in technology and coincidentally was the oldest of all the participants surveyed across the two sessions. Similar aged participants however expressed more interest so perhaps there is less to be surmised than one would think. The rest of the non-users were interested in what technology had to offer but 3 out of 4 said they didn’t know how to get computers to do what they wanted. This frustration does suggest a desire to achieve something is present amongst some non-users but they don’t know how to.

The non-users placed more responsibility on younger relatives to help than the other group resulting in a collective frustration towards computers and younger relatives. One non-user did however confess to ‘being a little lazy’ and simply let’s her younger relatives sort out any necessities if she needs to find out anything online. Whether an inattentive attitude towards technology is commonplace remains to be seen, and is an area for more research.

In the non-users group only 1 out of 5 admitted they felt under pressure when using computers, however, when discussed in the session it was clear that an early sense of computing as a necessity played a role in motivating them to learn. Amongst the users group some participants felt that the constant reference to the internet on television made them think that learning computing was a necessity. Overall it would appear the early stages of learning coupled with some media provocation to use computers is key to forming incentive and relevance for older users before they even open a book or subscribe to a course.

None of the non-users had ever tried to enrol on a course. Participants in the other group had learned to use computers by enrolling with some also reading books alongside. In the non-users group only 1 in 4 said they would prefer to be shown how to use a computer, whereas the other 3 would prefer to read from a manual. Perhaps a lack of enthusiasm towards being shown stems from their early experiences in being taught computers by impatient relatives?

The use of instruction manuals as a method of learning computers was supported but some participants expressed concern over the relevance they would have because of software upgrades and change occurring so quickly. This echoes some of the inherent problems highlighted by David Pogue (2006) and discussed earlier in section 2.13. The

needs of older people to have a printed manual and the progression of software upgrades clearly demonstrates pulls in different directions and needs addressing in a practical sense. The same conversation with the non-users also highlighted misunderstandings and complications arising from different user interfaces. One participant claimed that she felt confused by different user interfaces and operating systems; she asked why there couldn't be standardisation when designing interfaces for older people.

When considering the accessibility of computers and new technologies none of the participants cited cost as a problem. This could be due to the excellent support of both community groups and the schemes they both operate, which effectively deploy computing resources wherever they are needed. This may not be the case for all; however, it is evidence that cost is becoming less of an issue for older people as government funding is used more effectively.

4.15 Prototype Feedback

Nobody in the non-users group had ever used an iPad before. When first using the app users had difficulties using touch. Problems centred on the way the prototype behaved and responded to sensitivity, leaving users feeling like the app was responding too fast or unpredictably. Unfortunately, this couldn't be rectified so early on in the prototype development due to software limitations out of the project's control. It does however highlight the importance of accommodating how older people interact and use touch when interacting and offers scope for further research.

When using the prototype 6 Out of 9 rated its visual appeal as either good or great with the rest having mixed responses. One user commented on how she liked the food photography and that it made her hungry, supporting its intended purpose to motivate a user to try new foods. When asked about the icons, 7 out of 9 said they were either good or great. Some users said the icons made the app more approachable and fun and not patronising at all. One user was particularly distressed about not being able to read the information in the default iPad title dock, something that isn't a necessity but nonetheless demonstrates that standard text sizes still don't accommodate older users with poorer vision. None of the participants reported struggling to read any of the in app text demonstrating a successful font choice and size.

The navigation of the app was discussed with mixed responses. Some found the plate swiping easy once they understood how it functioned whilst others preferred the list view, suggesting the decision to include both was correct. This could be improved by allowing

the user to set a default view from the start as an advanced feature.

The iconic gesture helped the users group feel more in control than the traditional mouse and keyboard and led them to consider the iPad as a superior tool for older users over the desktop computer. Non-users echoed their support for the iPad over the desktop machine too claiming they felt ‘less locked out’. It was also observed that using an iPad is a more intimate experience compared to the desktop, and as a result may be more difficult or easier to teach.

When observing users interacting with the prototype over the two sessions, the need for a standardised visual language became apparent. Non-users tried to tap already highlighted tabs demonstrating that highlighting, as a navigational standard isn’t necessarily as intuitive as it could be. Contrary to this, experienced users understood highlighting as part of a visual language and even became frustrated when parts of the app didn’t conform to something they were familiar with. One user couldn’t tap on the meals instead of swiping between them, but did however appreciate the similarities the app shared with Microsoft Windows tab navigation.

Some of the non-users confessed to skipping instructions in a bid to simply ‘get on with it’, perhaps demonstrating some over enthusiasm! Participants either forgot or failed to read the help section, resulting in them not knowing how to view recipes. Perhaps an additional tooltip next to the plate would have helped guide and remind? If a video was shown before using the prototype it could have avoided users missing out on important information allowing them to see how things are supposed to behave. Inversely the users group responded well to the introductory help section and said that they didn’t feel overwhelmed by the information being presented. When asked about the amount of features and options in the prototype one user said that if there are too many she simply ignores them. Another user added that he sees it a challenge to learn new features. This would indicate that additional features or options are acceptable if need, are well located and explained.

4.16 Evaluation

A good understanding of the relationship between older people and technology was made by looking at government approaches towards an ageing society, assessing academic writings and considering how older people as a group are perceived. Exploring research done by others helped prepare for an informed approach when conducting the practice-led research.

Identifying shortfalls in existing research highlighted scope for further investigation by showing a lack of evaluation concerning visual appeal and its impact on user perception. The design of an iPad app prototype facilitated discussion based on visually designing technology, aimed at older people and enabled a practice-led approach to a problem that was less considered in a visual way.

Prior to pursuing the selected idea, an extensive decision making process took place that perhaps could have been strengthened by a more precise project criteria earlier. Difficulty committing to a creative approach early on was attributed to not forming a detailed plan of action, and also personally highlighted the need to have a well-written creative brief as soon as possible. Despite these difficulties positioning the research, addressing the role of design researcher was explored in a detailed way and could help inform design researchers about how they place themselves as authors/designers.

Although the research was governed by design, the technical aspects of the practice posed some challenges. A willingness to experiment and explore new tools successfully led to developing a working prototype that could be interacted with in the focus groups. A commitment to learning new tools in tandem with the research itself proved personally useful in learning new software with an end goal in mind.

Applying a theme to the prototype wasn’t wholly embraced to begin with until further understanding of the project was gained and it became clear that using food as a framework for content was needed. Food as a theme successfully led to ideas and also a shared understanding with participants later in the focus groups allowing conversations to stay focused on design.

The way the prototype was constructed and tested in the focus groups demonstrated some limitations. A few participants were observed struggling to calculate the sensitivity and behavior of touch technology. This was due to prototype limitations, and it is suggested that further practice from the perspective of a computer scientist focusing on a haptic experience could be beneficial. There was no database as part of the prototype, which limited being able to offer immersive user journeys through the app where recipes could be added and deleted in a predictable manner. If the app was further developed; a trial period could be initiated where the participants take home the prototype and self document their time using it. This could help form an understanding of what creates an

engaging experience and encourages repeated usage.

The planning of the focus groups went very well and generated valuable feedback, which helped identify improvements as well as solidifying theories and design solutions. Participants responded well and also agreed that they had learnt something new during the sessions. If more focus groups were planned it would have been useful to encourage a more proactive engagement through participatory design, which could have generated new ideas.

More opportunities to develop an understanding of user-centered design were identified and the co-ordination of further participatory design was suggested as a possible next stage if the prototype was to progress beyond registration. A detailed focus on typography, visual appeal and its effectiveness, or the use of play in teaching are among many identified areas that could be explored further.

5. CONCLUSION

5.1 Conclusion

The design of the app prototype helped to put into practice some of the opportunities and assumptions identified during the literature review. Testing the impact of graphical devices including image, typography, fonts and colour helped form a deeper understanding of visual designs' role in effecting user behavior. Most of the focus group participants acknowledged the importance of visual appeal, re-enforcing the need for aesthetically pleasing design in the context of user interfaces. Further inquiry into visual appeal was suggested despite the acknowledged difficulties in measuring its success.

Through the literature review, the research looked at how older people use, or avoid technology and the difficulties they might encounter when learning to use computers. Issues relating to sight, sound, taste and mobility were identified as well as memory problems and the effects stereotyping has on an older persons confidence. Older people's needs and expectations were also focused on and explored more in the design of the iPad app prototype and focus group sessions.

Existing research demonstrated a gradual change in attitude towards designing for older people in academic and commercial circles. Focus is being made on how users want to use technology and applied in supermarkets, the home, and online for example. The engagement with older people, through technology has the interest of some businesses and shows encouraging signs. The participation of new businesses needs to flourish, helped along by government schemes. Designers and teachers could also help much more by creating more stable surroundings in helping older people to learn through a stigma free environment.

Through the methodology, a detailed insight into the possible role of designer as author in practice-led research was set out and adopted. An inquisitive and informed approach was supported by Age Friendly Manchester who engaged in discussion, and feedback on many occasions leading up to, and including the focus groups. Tackling visual design problems from the perspective of a graphic designer led to clear solutions that helped demonstrate the usefulness of visual inquiry and its role in research.

Through the research, it was recommended that: observing the process of signing up to websites or services could help the design process and increase understanding. Observing older people downloading an app could highlight pitfalls and instigate solutions and a more thorough understanding of how much customisation is acceptable in an app could be achieved through more focus groups.

Participants in the focus groups confirmed that older people are interested in technology, but feel frustrated at not being able to understand it. The progression of ubiquitous computing has played some role in making computers more relevant than ever before. Users and non-users in the focus groups acknowledged the presence and relevance of technology in their lives, and most of the participants felt a comfortable amount of pressure to keep up with it, so positive conclusions can be made here.

How computers are taught to older people is a highlighted area that needs addressing. Teaching obsolete software was uncovered as a problem in the focus groups, and creates difficulties when attempting to apply what has been learned. A patient attitude from teachers and the need for design standards was concluded to be of key importance for learners and teachers alike. Further research based on assessing the teaching of older people should be implemented. Observations based on how older people want to learn could also define a new pedagogical approach.

If the focus group demonstrated that older people want to understand technology, then this thesis should be a call to action in asking more questions about how we do this. Through activating debates across various design topics including icons, typography and layout, more focused analysis could be done beyond registration. As older people's desire to learn increases and practitioners have a clearer understanding of how best to communicate through technology, we can harness its potential to enhance well-being now more than ever. Designers should seize on the opportunity to standardise what works well for today's older users, and set the path for future users.

6. REFERENCES

Agarawala, A. (2006) *Enriching the Desktop Metaphor with Physics, Piles and the Pen.* Master's thesis, University of Toronto.

Aph.org. (no date) *APH: APHont: A Font for Low Vision*. [Online] [Accessed on 21st Jan 2014] http://www.aph.org/products/aphont//

Apple. (2014) *iOS Human Interface Guidelines: Bar Button Icons.* [Online] [Accessed on 21st July 2014] https://developer.apple.com/library/ios/documentation/UserExperience/Conceptual/MobileHIG/BarIcons.html

Astell, A. (2013) *NANA Novel assessment of nutrition and ageing*. The University of Sheffield [Online] [Accessed on 17th Jan 2014] http://www.newdynamics.group.shef.ac.uk/nana.html

Ayers, S. (2013) *Can online innovations enhance social care?.* Oxford: Nominet [Online] [Accessed on 19th January 2014] http://www.nominettrust.org.uk/sites/default/files/Enhancing%20social%20care_PP_0113.pdf

Bell, C. (1997) 'The Aesthetic.' *In* Feagin, S., Maynard, P. (ed/s.) *Aesthetics.* Oxford: Oxford University Press, pp.16

Bergman, L., Lau, T. (2004) *Workshop on behaviour-based user interface customization*. *Proceedings of the 9th international conference on Intelligent user interfaces*. January 13-16, 2004. Funchal, Madeira, Portugal.

Berkolter, D., Kluge, A., Luther, W., Weyers, B. (2013) *Customization of user interfaces to reduce errors and enhance user acceptance*. Applied Ergonomics. Human Factors in Technology and Society. pp 346-353.

Bilsborough, K. (2013) *Technophobia*. London: British Council. [Online] [Accessed on 19th Jan 2013] http://www.britishcouncil.org/learnenglish-central-articles-technophobia.pdf

Bornkessel-Schlesewsky, I., Fussel, S., Hosemann, J., Kretzschmar, F., Pleimling, D., Schlesewsky, M. (2013) Subjective impressions do not mirror online reading effort: Concurrent EEG-eyetracking evidence from the reading of books and digital media. *PLoS ONE 8*(2).

Burns, W., Martin, S., Mulvenna, MD., Stephens, S., Wallace, J. (2010) *ICT Interface Design for Ageing People and People with Dementia. In:* Jain L, Wu X. *Supporting People with Dementia Using Pervasive Health Technologies.* Springer; London: 2010. pp. 165–88.

Cabinet Office. (2012) *Government Digital Strategy.* [Online] [Accessed on 8th September 2013] http://publications.cabinetoffice.gov.uk/digital/strategy/

Calouste Gulbenkian Foundation. (2010) *Older People, technology and community – the potential of technology to help older people renew or develop social contacts and to actively engage in their communities.* [Online] [Accessed on 21st January 2014] http://www.gulbenkian.org.uk/pdffiles/Older-people-technology-and-community.pdf

Caprani, N., Gurrin, C., O'Connor, N.E. (2012) 'Touch Screens for the Older User'. *In* Auat Cheein, F. (ed.) *Assistive Technologies*. pp. 95-118.

Chi, C., Huang, S., Shieh, K. (2001) Factors affecting the design of computer icons. *International Journal of Industrial Ergonomics.* No. 29. pp 211-218.

Ciid.dkn. (2012) *Copenhagen Institute of Interaction Design » The RaMo System*. [Online] [Accessed on 10th Sep 2013] http://ciid.dk/education/portfolio/py/courses/graphical-user-interface/projects/the-ramo-system/

Clark, A. (2009) *German Supermarkets Become Senior Friendly*. [Online] [Accessed on 3rd Nov 2013] http://www.cbsnews.com/2100-500395_162-2738695.html

The Consumer Council (2007) *Silver Service? - Are supermarkets meeting the needs of older consumers?* The Consumer Council.

de Souza, C. (2013) *Semiotics*. The Interaction Design Foundation. Aarhus, Denmark [Online] [Accessed on 22nd January 2014] http://www.interaction-design.org/encyclopedia/semiotics_and_human-computer_interaction.html

Dowdall, A., Perry, M. (2001) *The Millennium Home: Domestic Technology to Support Independent-living Older People*. Nottingham.

Dredge, S. (2013) *Apple's iPad still on top as tablets used by a third of Brits in 2013*. [Online] [Accessed on 21st July 2014]. http://www.theguardian.com/technology/2013/oct/02/tablet-uk-usage-emarketer-stats

Eldy. (2012) *Eldy Best Practises*. Vicenza, Italy: Eldy. [Online] [Accessed on 10th September 2013] http://www.eldy.eu/wp-content/uploads/2010/05/Eldy_english-infos_light.pdf

Eliasson, O. (2005) *The Collectivity Project*. Interactive sculpture.

Food Drink Europe. (no date) *GDAs: Guideline Daily Amounts.* [Online] [Accessed on 27th January 2014] http://www.fooddrinkeurope.eu/uploads/publications_documents/GDAs_-_Guideline_Daily_Amounts.pdf

Gehring, R.E., Kimble, G.A., Toglia, M.P. (1976) Recognition memory for words and pictures at short and long retention intervals. *Memory & Cognition*. Vol 4. pp 256-260.

Gentner, D., Nielsen, J. (1996) The Anti-Mac Interface. *Communications of the ACM 39,* No. 8.

Giles, E. (2009) *Older people and food: a synthesis of evidence.* Food Standards Agency.

Goodman, C, K. (2013) *Reverse Mentoring: Students teach executives about social media, tech and more.* 10th January. Miami Herald. [Online] [Accessed on 21st July 2014] http://www.miamiherald.com/2013/10/01/3664061/reverse-mentoring-students-teach.html

Hancock, P. Murphy, L. Pepe, A. (2005) 'Hedonomics: The Power of Positive and Pleasurable Ergonomics.' *Ergonomics in Design,*13 (1) pp. 8 - 14.

Hanfling, P. (2012) *Creating Connections, Breaking Down Barriers.* Manchester: Manchester City Council. [Online] [Accessed on 21st January 2014] http://www.manchester.gov.uk/downloads/download/4249/creating_connections_breaking_down_barriers

Harris, J., Kamvar, S.D. (2011) *We Feel Fine and Searching the Emotional Web*. [Online] [Accessed on 21st July 2014] http://wefeelfine.org/wefeelfine.pdf

Hawthorn, D. (2007) Interface design and engagement with older people. *Behaviour & Information Technology,* Vol 26 Issue 4. pp 333-341.

Internet Buttons. (2014) [Online] [Accessed on 3rd Nov 2013] http://www.internetbuttons.org

Irvine, C. (2008) *Supermarket for older people planned for Newcastle*. [Online] [Accessed 20th September 2014] http://www.telegraph.co.uk/news/uknews/2642925/Supermarket-for-older-people-planned-for-Newcastle.html

Ishii,H. (2006) *Tangible User Interfaces.* MIT Media Laboratory.

ISG'08. (2008) *Proceedings of* the 6th International Conference of the International Society for Gerontechnology. Pisa, Italy, June, 2008. Leonardi C., Mennecozzi C., Not C., Pianesi F., Zancanaro M.

Maeda, J. (2012) *How art, technology and design inform creative leaders.* [Online video] [Accessed on 31st August 2014] http://www.ted.com/talks/john_maeda_how_art_technology_and_design_inform_creative_leaders.html

Maeda, J. 2006. *The laws of simplicity*. Cambridge, Mass: MIT Press. Pg. 39.

Macmillan Dictionary. (2014) *Technophobe - definition of technophob*e [Online] [Accessed on 21st July 2014] http://www.macmillandictionary.com/dictionary/british/technophobe

Mellows-Facer, A. (2010) *Key issues for the new Parliament 2010: House of Commons Library research.* [Online] [Accessed on 21st January 2014] http://www.parliament.uk/documents/commons/lib/research/key_issues/Full-doc.pdf

Microsoft. (2014) *Error Messages (Windows).* [Online] [Accessed: 31st August 2014] http://msdn.microsoft.com/en-us/library/windows/desktop/dn742471(v=vs.85).aspx

Mistry, P. (2009) *Pranav Mistry: The thrilling potential of SixthSense technology* [Online video]. [Accessed on 31st August 2014] http://www.ted.com/talks/pranav_mistry_the_thrilling_potential_of_sixthsense_technology.html

Moggridge, B. (2007) *Designing Interactions.* London: The MIT Press.

National Institute on Aging. (2008) *Making Your Printed Health Materials Senior Friendly.* National Institute on Aging. [Online] [Accessed on 20th January 2014] http://www.nia.nih.gov/health/publication/making-your-printed-health-materials-senior-friendly

Netmums.com. (2007) *Food labelling Survey - Netmums*. [Online] [Accessed on 21st Jan 2014] http://www.netmums.com/family-food/healthy-eating/food-activists/the-great-netmums-food-labelling-survey-the-result#results

Nielsen, J. (2005) *10 Usability Heuristics for User Interface Design*. [Online] [Accessed on 21st July 2014] http://www.nngroup.com/articles/ten-usability-heuristics/

Nini, P. (2006) *Typography and the Aging Eye: Typeface Legibility for Older Viewers with Vision Problems.* AIGA. [Online] [Accessed on 21st January 2014] http://www.aiga.org/typography-and-the-aging-eye/

Norman, D. (2003) *Prologue: Three Teapots*. (e-book) jnd.org. [Online] [Accessed on 10th Sep 2013] http://www.jnd.org/dn.mss/CH00_Prolog.pdf

Norman, D. A. (1998). *The design of everyday things*. London: The MIT Press.

oxforddictionaries.com. (2014) *Definition of user interface in English.* [Online] [Accessed on 31st August 2014] http://www.macmillandictionary.com/dictionary/british/technophobe

Peirce, C. S. (1958-1966). *Collected Papers*. Cambridge, USA: Belknap Press of Harvard University.

Plowman, T., Prendergast D., Roberts, S. (2009) 'From people to prototypes and products: Ethnographic Liquidity and the Intel Global Ageing Experience Study' *Intel Technology Journal,* Vol 13.

Pogue, D. (2006) *Simplicity Sells* [Online video] [Accessed on 20th January 2014] http://www.ted.com/talks/david_pogue_says_simplicity_sells.html

Poole, A. (2008) *Which Are More Legible: Serif or Sans Serif Typefaces?.* [Online] [Accessed on 21st Jan 2014] http://alexpoole.info/blog/which-are-more-legible-serif-or-sans-serif-typefaces/

Qian, W. (2012) *Interface Design of Handheld Mobile Devices for the Older Users.* IACSIT Press, Singapore.

Raskin, J (1994). Intuitiveness Equals Familiar. Communications of the ACM. 37:9, September 1994, pg. 17.

South Lanarkshire Council. (2012) *Eating well and getting older: Nutrition in later life*. South Lanarkshire Council.

The Amazings. (2014) [Online] [Accessed on 3rd Nov 2013] http://www.theamazings.com

Toft, T. (2008) *Time Machine Radio.* [Online image] [Accessed on 31st August 2014] http://www.designbuzz.com/a-radio-that-thinks-its-a-time-machine/

Tognazzinis, B. (2003) *It's Time We Got Respect.* AskTog. [Online] [Accessed on 20th January 2014] http://www.asktog.com/columns/057ItsTimeWeGotRespect.html

Umemuro, H (2004) *Lowering elderly Japanese users' resistance towards computers by using touchscreen technology,* 3 (3-4), pp 276-288

Warde, B. (1930) *The Crystal Goblet.* Typo-L. [Online] [Accessed on 20th January 2014] http://gmunch.home.pipeline.com/typo-L/misc/ward.htm

Weiser, M. (1991) The Computer for the 21st Century. *Scientific American, pp 94 – 104.*

Wijk, H. (2001) *Colour perception in old age: colour discrimination, colour naming, colour preferences and colour/shape recognition.* Goteborg University: Goteborg.

En.wikipedia.org. (2011) *Interface metaphor - Wikipedia, the free encyclopedia*. [Online] [Accessed on 9th Sep 2013] http://en.wikipedia.org/wiki/Interface_metaphor

En.wikipedia.org. (2011) *Ubiquitous Computing - Wikipedia, the free encyclopedia*. [Online] [Accessed on 21st July 2014] http://en.wikipedia.org/wiki/Ubiquitous_computing

Wood, D. (2012) *Interaction Design: Where's the graphic designer in the graphical user interface?.* Phd. St Helens College, College of Arts.

The World Health Organization. (2007) *Global age-friendly cities: a guide.* Geneva: World Health Organization. P 63.

West, T. (2013) *Don't Be Afraid To Teach Interactions* [Online] [Accessed on 20th September 2014] http://blog.timoni.org/post/45842270204/dont-be-afraid-to-teach-interactions

Wuerger S. (2013) Colour constancy across the life span: evidence for compensatory mechanisms*. PLoS ONE*.

Xie, B. (2003) Older Adults, Computers and the Internet: Future Directions, *Gerontech journal,* Vol 2 Issue 4. pp 289-205.

EC/NSF. (2001) *Proceedings of the 2001 EC/NSF Workshop on Universal Accessibility of Ubiquitous Computing: Providing For the Elderly*. Alcácer do Sal, Portugal, May 22–25, 2001*.* Zajicek, M.

Zajicek, M. (2006) ‘Aspects of HCI research for older people’. *In:* Stephanidis C. *Universal Access in the Information Society 5.* pp. 276–286

7. BIBLIOGRAPHY

Agarawala, A. (2006) *Enriching the Desktop Metaphor with Physics, Piles and the Pen.* Master's thesis, University of Toronto.

Aph.org. (no date) *APH: APHont: A Font for Low Vision*. [Online] [Accessed on 21st Jan 2014] http://www.aph.org/products/aphont//

Apple. (2014) *iOS Human Interface Guidelines: Bar Button Icons.* [Online] [Accessed on 21st July 2014] https://developer.apple.com/library/ios/documentation/UserExperience/Conceptual/MobileHIG/BarIcons.html

Astell, A. (2013) *NANA Novel assessment of nutrition and ageing*. The University of Sheffield [Online] [Accessed on 17th Jan 2014] http://www.newdynamics.group.shef.ac.uk/nana.html

Ayers, S. (2013) *Can online innovations enhance social care?.* Oxford: Nominet [Online] [Accessed on 19th January 2014] http://www.nominettrust.org.uk/sites/default/files/Enhancing%20social%20care_PP_0113.pdf

Bell, C. (1997) 'The Aesthetic.' *In* Feagin, S., Maynard, P. (ed/s.) *Aesthetics.* Oxford: Oxford University Press, pp.15-22

Bergman, L., Lau, T. (2004) *Workshop on behavior-based user interface customization*. *Proceedings of the 9th international conference on Intelligent user interfaces*. January 13-16, 2004. Funchal, Madeira, Portugal.

Berkolter, D., Kluge, A., Luther, W., Weyers, B. (2013) *Customization of user interfaces to reduce errors and enhance user acceptance*. Applied Ergonomics. Human Factors in Technology and Society. pp 346-353.

Bilsborough, K. (2013) *Technophobia*. London: British Council. [Online] [Accessed on 19th Jan 2013] http://www.britishcouncil.org/learnenglish-central-articles-technophobia.pdf

Bornkessel-Schlesewsky, I., Fussel, S., Hosemann, J., Kretzschmar, F., Pleimling, D., Schlesewsky, M. (2013) Subjective impressions do not mirror online reading effort: Concurrent EEG-eyetracking evidence from the reading of books and digital media. *PLoS ONE 8*(2).

Brimelow, A. (2007) *Public want food 'traffic lights'*. [Online] [Accessed on 21st Jan 2014] http://news.bbc.co.uk/1/hi/health/6397187.stm

Burns, W., Martin, S., Mulvenna, MD., Stephens, S., Wallace, J. (2010) *ICT Interface Design for Ageing People and People with Dementia. In:* Jain L, Wu X. *Supporting People with Dementia Using Pervasive Health Technologies.* Springer; London: 2010. pp. 165–88.

Cabinet Office. (2012) *Government Digital Strategy.* [Online] [Accessed on 8th September 2013] http://publications.cabinetoffice.gov.uk/digital/strategy/

Calouste Gulbenkian Foundation. (2010) *Older People, technology and community – the potential of technology to help older people renew or develop social contacts and to actively engage in their communities.* [Online] [Accessed on 21st January 2014] http://www.gulbenkian.org.uk/pdffiles/Older-people-technology-and-community.pdf

Caprani, N., Gurrin, C., O'Connor, N.E. (2012) 'Touch Screens for the Older User'. *In* Auat Cheein, F. (ed.) *Assistive Technologies*. pp. 95-118.

Chi, C., Huang, S., Shieh, K. (2001) Factors affecting the design of computer icons. *International Journal of Industrial Ergonomics.* No. 29. pp 211-218.

Ciid.dkn. (2012) *Copenhagen Institute of Interaction Design » The RaMo System*. [Online] [Accessed on 10th Sep 2013] http://ciid.dk/education/portfolio/py/courses/graphical-user-interface/projects/the-ramo-system/

Clark, A. (2009) *German Supermarkets Become Senior Friendly*. [Online] [Accessed on 3rd Nov 2013] http://www.cbsnews.com/2100-500395_162-2738695.html

de Souza, C. (2013) *Semiotics*. The Interaction Design Foundation. Aarhus, Denmark [Online] [Accessed on 22nd January 2014] http://www.interaction-design.org/encyclopedia/semiotics_and_human-computer_interaction.html

Dowdall, A., Perry, M. (2001) *The Millennium Home: Domestic Technology to Support Independent-living Older People*. Nottingham.

Dredge, S. (2013) *Apple's iPad still on top as tablets used by a third of Brits in 2013*. [Online] [Accessed on 21st July 2014]. http://www.theguardian.com/technology/2013/oct/02/tablet-uk-usage-emarketer-stats

Eldy. (2012) *Eldy Best Practises*. Vicenza, Italy: Eldy. [Online] [Accessed on 10th September 2013] http://www.eldy.eu/wp-content/uploads/2010/05/Eldy_english-infos_light.pdf

Eliasson, O. (2005) *The Collectivity Project*. Interactive sculpture.

Feagin, S,. Maynard, P. (1997) *Aesthetics*. Oxford: Oxford University Press. Pp3.

Food Drink Europe. (no date) *GDAs: Guideline Daily Amounts.* [Online] [Accessed on 27th January 2014] http://www.fooddrinkeurope.eu/uploads/publications_documents/GDAs_-_Guideline_Daily_Amounts.pdf

Gehring, R.E., Kimble, G.A., Toglia, M.P. (1976) Recognition memory for words and pictures at short and long retention intervals. *Memory & Cognition*. Vol 4. pp 256-260.

Gentner, D., Nielsen, J. (1996) The Anti-Mac Interface. *Communications of the ACM 39,* No. 8.

Goodman, C, K. (2013) *Reverse Mentoring: Students teach executives about social media, tech and more.* 10th January. Miami Herald. [Online] [Accessed on 21st July 2014] http://www.miamiherald.com/2013/10/01/3664061/reverse-mentoring-students-teach.html

Hancock, P. Murphy, L. Pepe, A. (2005) 'Hedonomics: The Power of Positive and Pleasurable Ergonomics.' *Ergonomics in Design,*13 (1) pp. 8 - 14.

Grey, C., Malins, J. (2004) *Visualizing Research.* Aldershot, England. Ashgate.

Hanfling, P. (2012) *Creating Connections, Breaking Down Barriers.* Manchester: Manchester City Council. [Online] [Accessed on 21st January 2014] http://www.manchester.gov.uk/downloads/download/4249/creating_connections_breaking_down_barriers

Harris, J., Kamvar, S.D. (2011) *We Feel Fine and Searching the Emotional Web*. [Online] [Accessed on 21st July 2014] http://wefeelfine.org/wefeelfine.pdf

Hawthorn, D. (2007) Interface design and engagement with older people. *Behaviour & Information Technology,* Vol 26 Issue 4. pp 333-341.

Helvetica. (2007) Hustwit, G. [DVD] United States: Swiss Dots.

Hiroyuki, U. (2004) Lowering elderly Japanese users' resistance towards computers by using touchscreen technology. *Universal Access in the Information Society*, Vol 3 Issue 3, pp. 276-288.

Internet Buttons. (2014) [Online] [Accessed on 3rd Nov 2013] http://www.internetbuttons.org

Irvine, C. (2008) *Supermarket for older people planned for Newcastle*. [Online] [Accessed 20th September 2014] http://www.telegraph.co.uk/news/uknews/2642925/Supermarket-for-older-people-planned-for-Newcastle.html

Ishii,H. (2006) *Tangible User Interfaces.* MIT Media Laboratory.

ISG'08. (2008) *Proceedings of* the 6th International Conference of the International Society for Gerontechnology. Pisa, Italy, June, 2008. Leonardi C., Mennecozzi C., Not C., Pianesi F., Zancanaro M.

Maeda, J. (2012) *How art, technology and design inform creative leaders.* [Online video] [Accessed on 31st August 2014] http://www.ted.com/talks/john_maeda_how_art_technology_and_design_inform_creative_leaders.html

Maeda, J. (2006) *The laws of simplicity*. Cambridge, Mass: MIT Press.

Macmillan Dictionary. (2014) *Technophobe - definition of technophob*e [Online] [Accessed on 21st July 2014] http://www.macmillandictionary.com/dictionary/british/technophobe

Mellows-Facer, A. (2010) *Key issues for the new Parliament 2010: House of Commons Library research.* [Online] [Accessed on 21st January 2014] http://www.parliament.uk/documents/commons/lib/research/key_issues/Full-doc.pdf

Microsoft. (2014) *Error Messages (Windows).* [Online] [Accessed: 31st August 2014] http://msdn.microsoft.com/en-us/library/windows/desktop/dn742471(v=vs.85).aspx

Mistry, P. (2009) *Pranav Mistry: The thrilling potential of SixthSense technology* [Online video]. [Accessed on 31st August 2014] http://www.ted.com/talks/pranav_mistry_the_thrilling_potential_of_sixthsense_technology.html

Moggridge, B. (2007) *Designing Interactions.* London: The MIT Press.

Nhs.uk. (2014) *Colour vision deficiency - NHS Choices*. [Online] [Accessed on 21st Jan 2014] http://www.nhs.uk/conditions/Colour-vision-deficiency/Pages/Introduction.aspx

National Institute on Aging. (2008) *Making Your Printed Health Materials Senior Friendly.* National Institute on Aging. [Online] [Accessed on 20th January 2014] http://www.nia.nih.gov/health/publication/making-your-printed-health-materials-senior-friendly

Netmums.com. (2007) *Food labelling Survey - Netmums*. [Online] [Accessed on 21st Jan 2014] http://www.netmums.com/family-food/healthy-eating/food-activists/the-great-netmums-food-labelling-survey-the-result#results

Nielsen, J. (2005) *10 Usability Heuristics for User Interface Design*. [Online] [Accessed on 21st July 2014] http://www.nngroup.com/articles/ten-usability-heuristics/

Nielsen, J. (2001) *Error Message Guidelines*. Nielsen Norman Group. [Online] [Accessed on 20th January 2014] http://www.nngroup.com/articles/error-message-guidelines/

Nini, P. (2006) *Typography and the Aging Eye: Typeface Legibility for Older Viewers with Vision Problems.* AIGA. [Online] [Accessed on 21st January 2014] http://www.aiga.org/typography-and-the-aging-eye/

Norman, D. (2003) *Prologue: Three Teapots*. (e-book) jnd.org. [Online] [Accessed on 10th Sep 2013] http://www.jnd.org/dn.mss/CH00_Prolog.pdf

Norman, D. A. (1998) *The design of everyday things*. London: The MIT Press.

Peirce, C. S. (1958-1966) *Collected Papers*. Cambridge, USA: Belknap Press of Harvard University.

Plowman, T., Prendergast D., Roberts, S. (2009) 'From people to prototypes and products: Ethnographic Liquidity and the Intel Global Ageing Experience Study' *Intel Technology Journal,* Vol 13.

Pogue, D. (2006) *Simplicity Sells* [Online video] [Accessed on 20th January 2014] http://www.ted.com/talks/david_pogue_says_simplicity_sells.html

Poole, A. (2008) *Which Are More Legible: Serif or Sans Serif Typefaces?.* [Online] [Accessed on 21st Jan 2014] http://alexpoole.info/blog/which-are-more-legible-serif-or-sans-serif-typefaces/

Qian, W. (2012) *Interface Design of Handheld Mobile Devices for the Older Users.* IACSIT Press, Singapore.

Raskin, J. (1994) *Intuitiveness Equals Familiar*. Communications of the ACM.

Sims, P. (2008) *Tesco reveals Britain's first 'pensioner-friendly' supermarket - with magnifying glasses and seats on trolleys*. dailymail.co.uk [Online] [Accessed on 3rd November 2013] http://www.dailymail.co.uk/news/article-1050195/Tesco-reveals-Britains-pensioner-friendly-supermarket--magnifying-glasses-seats-trolleys.html

South Lanarkshire Council. (2012) *Eating well and getting older: Nutrition in later life*. South Lanarkshire Council.

The Amazings. (2014) [Online] [Accessed on 3rd Nov 2013] http://www.theamazings.com

The Consumer Council (2007) *Silver Service? - Are supermarkets meeting the needs of older consumers?* The Consumer Council.

Tognazzinis, B. (2003) *It's Time We Got Respect.* AskTog. [Online] [Accessed on 20th January 2014] http://www.asktog.com/columns/057ItsTimeWeGotRespect.html

Umemuro, H (2004) *Lowering elderly Japanese users' resistance towards computers by using touchscreen technology,* 3 (3-4), pp 276-288.

Vandi, C. (2008) *Beyond the Metaphor: A Semiotic Approach to Human-Computer Interaction in GUIs*, Bologna, Italy.

Warde, B. (1930) *The Crystal Goblet.* Typo-L. [Online] [Accessed on 20th January 2014] http://gmunch.home.pipeline.com/typo-L/misc/ward.htm

Weiser, M. (1991) The Computer for the 21st Century. *Scientific American, pp 94 – 104.*

West, T. (2013) *Don't Be Afraid To Teach Interactions* [Online] [Accessed on 20th September 2014] http://blog.timoni.org/post/45842270204/dont-be-afraid-to-teach-interactions

Wijk, H. (2001) *Colour perception in old age: colour discrimination, colour naming, colour preferences and colour/shape recognition.* Goteborg University: Goteborg.

En.wikipedia.org. (2011) *Interface metaphor - Wikipedia, the free encyclopedia*. [Online] [Accessed on 9th Sep 2013] http://en.wikipedia.org/wiki/Interface_metaphor

En.wikipedia.org. (2011) *Ubiquitous Computing - Wikipedia, the free encyclopedia*. [Online] [Accessed on 21st July 2014] http://en.wikipedia.org/wiki/Ubiquitous_computing

Wood, D. (2012) *Interaction Design: Where's the graphic designer in the graphical user interface?.* Phd. St Helens College, College of Arts.

World Health Organization. (2007) *Global age-friendly cities: a guide.* [Online] [Accessed on 21st January 2014] http://www.who.int/ageing/publications/Global_age_friendly_cities_Guide_English.pdf

Wuerger S. (2013) Colour constancy across the life span: evidence for compensatory mechanisms*. PLoS ONE*.

Xie, B. (2003) Older Adults, Computers and the Internet: Future Directions, *Gerontech journal,* Vol 2 Issue 4. pp 289-205.

Zajicek, M. (2006) 'Aspects of HCI research for older people'. *In:* Stephanidis C. *Universal Access in the Information Society 5.* pp. 276–286.

EC/NSF. (2001) *Proceedings of the 2001 EC/NSF Workshop on Universal Accessibility of Ubiquitous Computing: Providing For the Elderly*. Alcácer do Sal, Portugal, May 22–25, 2001*.* Zajicek, M.

8. IMAGE SOURCES

Fig 1:

The Amazings. (no date) *Amazings.com screenshot.* [Online image] [Accessed on 18th December 2013] http://www.theamazings.com

Fig 2:

Internet Buttons. (no date) *Internetbuttons.com screenshot.* [Online image] [Accessed on 31st August 2014] http://www.theamazings.com

Fig 3:

Coco, N., Kyte, E., Pintus, A. (2008) *The GUI in context.* [Online image] [Accessed on 23rd January 2014] http://ciid.dk/education/portfolio/py/courses/graphical-user-interface/projects/the-ramo-system/

Fig 4:

Age UK. (no date) *Older people playing Nintendo Wii.* [Online image] [Accessed on 18th July 2014] http://www.ageuk.org.uk/dudley/staying-active/activities-by-area/

Fig 5:

Sortoffilms. (2013) *NANA: Novel Assessment of Nutrition and Ageing.* [Online video [Accessed on 19th July 2014] http://vimeo.com/63569987

Fig 6:

Eldy. (no date) *Eldy user interface screenshot.* [Online image] [Accessed on 31st August 2014] http://eldy.net

Fig 7:

Toft, T. (no date) *Time Machine Radio.* [Online image] [Accessed on 31st August 2014] http://www.designbuzz.com/a-radio-that-thinks-its-a-time-machine/

Fig 8:

Vitamins. (no date) *Instruction manual aimed at older people and new users.* [Online image] [Accessed on 19th July 2014] http://3.bp.blogspot.com/-Im6E6_xDfkk/T1QvqHo6k4I/AAAAAAAAAME/0dZIDjOpkPo/s1600/sansung-508x281.jpg

Fig 9:

Weiser, M. (1991) *Weiser and his team with prototypes.* The Computer for the 21st Century. *Scientific American, pp 95.*

Fig 10:

British Gas. (2013) *Hive heating system screen in use.* [Online image] [Accessed on 2nd March 2014] http://www.v3.co.uk/v3-uk/analysis/2342207/british-gas-touts-benefits-of-aws-to-power-hive-remote-heating-service

Fig 11:

Sabi. (no date) *Sabi Pillbox.* [Online image] [Accessed on 31st August 2014] https://www.selbstwohnen.de/media/image/design-tabletten-clip-von-sabi-in-der-hand-31653bab5d19b207.jpg

Fig 12:

Harris, J., Kamvar, S.D. (2011) *Screenshot taken from wefeelfine.org.* [Online image] [Accessed on 10th August 2014] http://wefeelfine.org

Fig 13:

Cultofmac. (2012) *Comparison of Braun calculator and iPhone calculator.* [Online image] [Accessed on 10th August 2014] http://www.cultofmac.com/188753/the-braun-products-that-inspired-apples-iconic-designs-gallery/

Fig 14:

engadget. (2013) *A screen of the iPlayer radio on iPhone.* [Online image] [Accessed on 31st August 2014] http://www.engadget.com/2013/05/28/bbc-iplayer-radio-downloads-2014/

Fig 15:

Apple Inc. (1998) *A screen of HyperCard.* [Online image] [Accessed on 31st August 2014] http://appleinsider.com/articles/14/07/20/editorial-google-microsoft-claiming-apples-crown-albeit-from-1994

Fig 16:

Microsoft (1995) *A screen of Microsoft Bob.* [Online image] [Accessed on 31st August 2014] http://toastytech.com/guis/bob.html

Fig 17:

Agarawla, A. (2006) A screen of Bumptop [Online image] [Accessed on 31st August 2014] http://i.gzn.jp/img/2006/06/22/bumptop/bumptop01.png

Fig 18:

Mistry, P. (2009) *Sixth Sense projection on the hand.* [Online image] [Accessed on 23rd

January 2014] http://www.pixelpress.org/afterphotography/wp-content/uploads/2009/03/sixth-sense-phone.png

Fig 19:
Mistry, P. (2009) *Sixth Sense technology being used by Mistry.* [Online image] [Accessed on 19th July 2014] http://doobious.org/wp-content/uploads/2011/02/sixth-sense-pranav-mistry.jpg

Fig 20:
Microsoft. (2012) *A screen of Windows 8.* [Online image] [Accessed on 23rd January 2014] http://images.pcworld.com/images/article/2012/03/live20tiles-11331051.png

Fig 22:
Web Accessibility Initiative. (2014) *A screen of www.w3.org/WAI.* [Online image] [Accessed on 19th July 2014] http://*www.w3.org/WAI*

Fig 23:
Steadman, R. (no date) *A painting by Ralph Steadman.* [Online image] [Accessed on 31st August 2014] http://www.fastcompany.com/person/ralph-steadman

Fig 36:
Kare, S. (1983) *A selection of Apple icons designed by Susan Kare.* [Online image] [Accessed on 31st August 2014] http://www.kare.com/portfolio/03_apple_macicons.html

Fig 37:
Cox, N. (1981) *A selection of Xerox star icons designed by Norm Cox.* [Online image] [Accessed on 31st August 2014] http://www.digibarn.com/collections/software/xerox-star/xerox-world-according-to-norm_files/Star-icons_Final.jpg

Fig 38:
Craiglist (2014) *Screenshots from Craiglist.* [Online image] [Accessed on 1st September 2014] http://leeds.craigslist.co.uk

Fig 39:
Gumtree (2014) *Screenshots from Gumtree.* [Online image] [Accessed on 1st September 2014] http://www.gumtree.com/leeds

Fig 45:
BBC. (2014) *Screenshots from the BBC website.* [Online image] [Accessed on 12th March 2014] http://www.bbc.co.uk

Fig 45:

foodmanufacture.co.uk. (2014) *Nutritional label traffic light system.* [Online image] [Accessed on 12th March 2014] http://www.foodmanufacture.co.uk/Packaging/Europe-investigating-UK-food-labelling

9. APPENDIX

9.1 Screens from the app

Fig 48: Screens from the app (1 of 3).

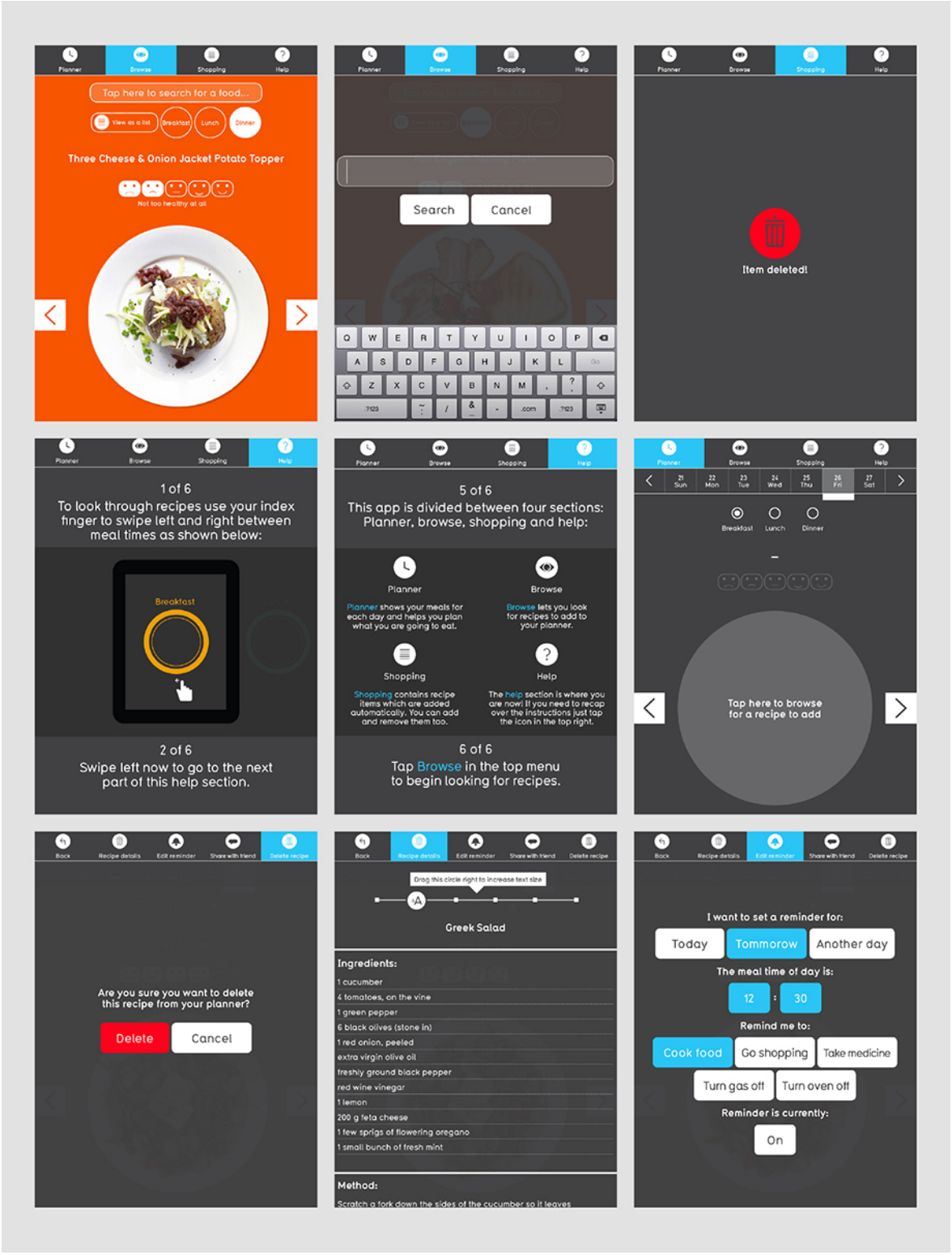


Fig 49: Screens from the app (2 of 3).

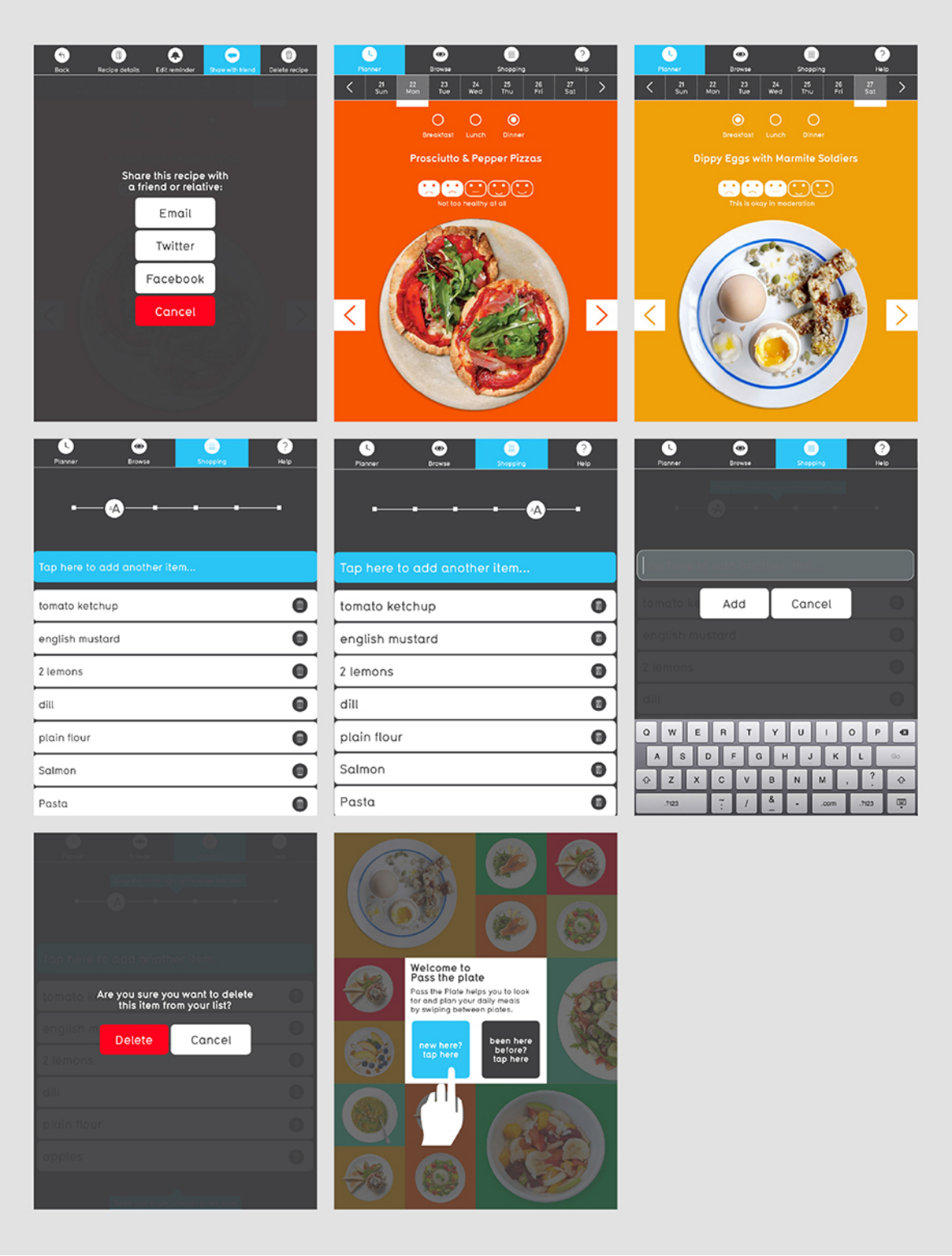


Fig 50: Screens from the app (3 of 3).

9.2 Focus Group Plan Sheets

Digital Design for an Ageing Society
Focus Group 2 — 5 participants who never or rarely use computers aged above 55

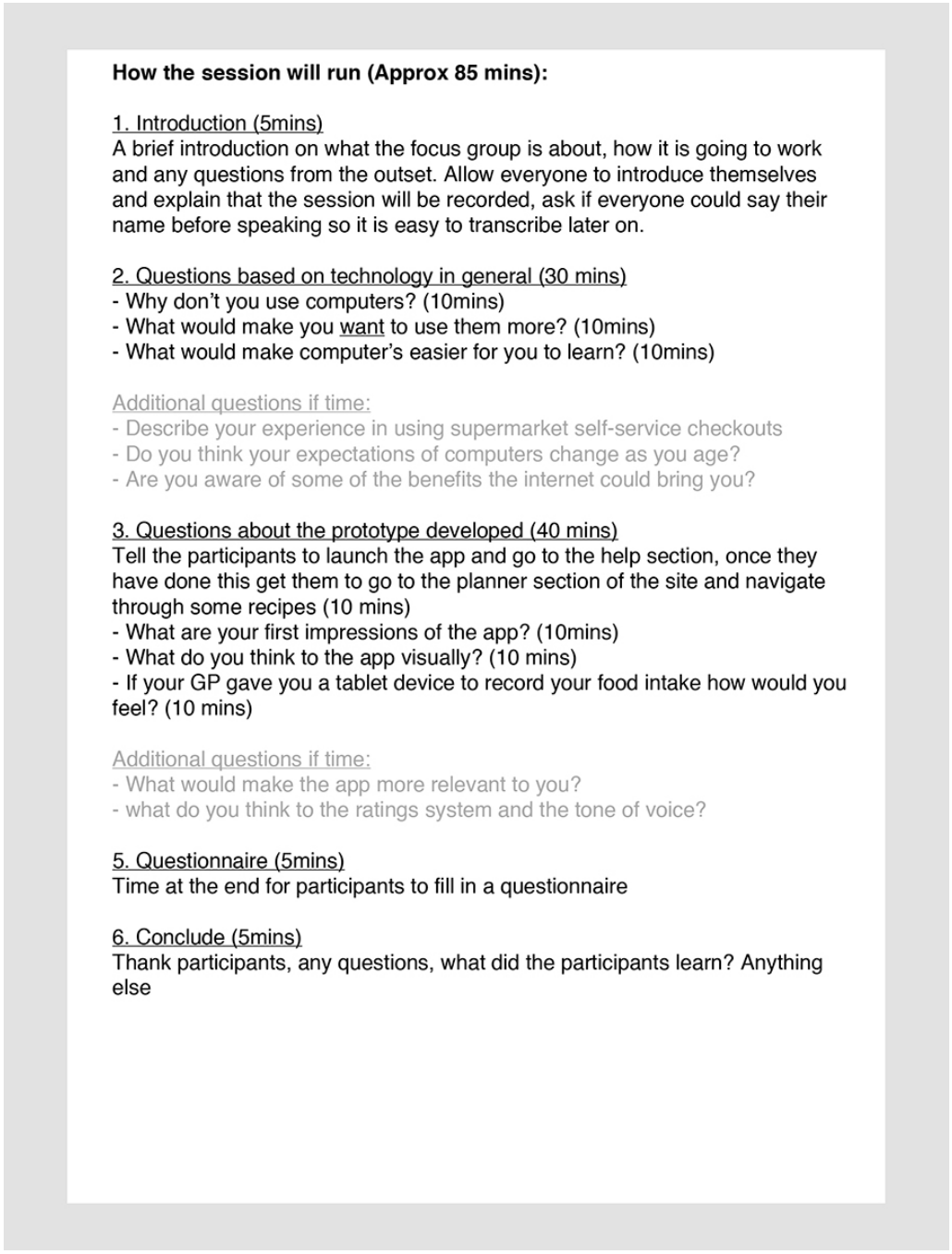
Taking place on: 23rd July at 14:00 (arriving at 13:30 to set up iPad's)
Venue: NEPHRA HQ, 27 Parkfield Road North, New Moston, Manchester M40 3TB
Organised by: Bren Fawcett
Focus group co-ordination: Patrick Hanfling
Taking notes: Ash Spurr

Introduction:
The project is about designing a computer experience that appeals to older people and new users. I want to find out attitudes towards computing and what prevents some people from wanting to or being able to use it. Through the focus group I would like to find out if non-computer users understand what is on offer to them and why they don't use computers. I would like to learn about any personal journeys or attempts at using computers and what difficulties occurred.

The focus group questions will be split in two, based around technology and computing in general followed by a discussion based on a prototype meal planner aimed at older people.

How the data collected will be used:
The focus group will be recorded and the group co-ordinator will only use first names when asking questions. In any write-up of the research names will be excluded to retain anonymity. The focus group recordings will not be shared with anyone and will only be used in the context of analysing preference concerning computing experience among older people. The same applies to the questionnaire where only first names will be taken and later made anonymous.

Fig 51: Plan sheet from the non-users focus group, side 1.



How the session will run (Approx 85 mins):

1. Introduction (5mins)
A brief introduction on what the focus group is about, how it is going to work and any questions from the outset. Allow everyone to introduce themselves and explain that the session will be recorded, ask if everyone could say their name before speaking so it is easy to transcribe later on.

2. Questions based on technology in general (30 mins)
- Why don't you use computers? (10mins)
- What would make you want to use them more? (10mins)
- What would make computer's easier for you to learn? (10mins)

Additional questions if time:
- Describe your experience in using supermarket self-service checkouts
- Do you think your expectations of computers change as you age?
- Are you aware of some of the benefits the internet could bring you?

3. Questions about the prototype developed (40 mins)
Tell the participants to launch the app and go to the help section, once they have done this get them to go to the planner section of the site and navigate through some recipes (10 mins)
- What are your first impressions of the app? (10mins)
- What do you think to the app visually? (10 mins)
- If your GP gave you a tablet device to record your food intake how would you feel? (10 mins)

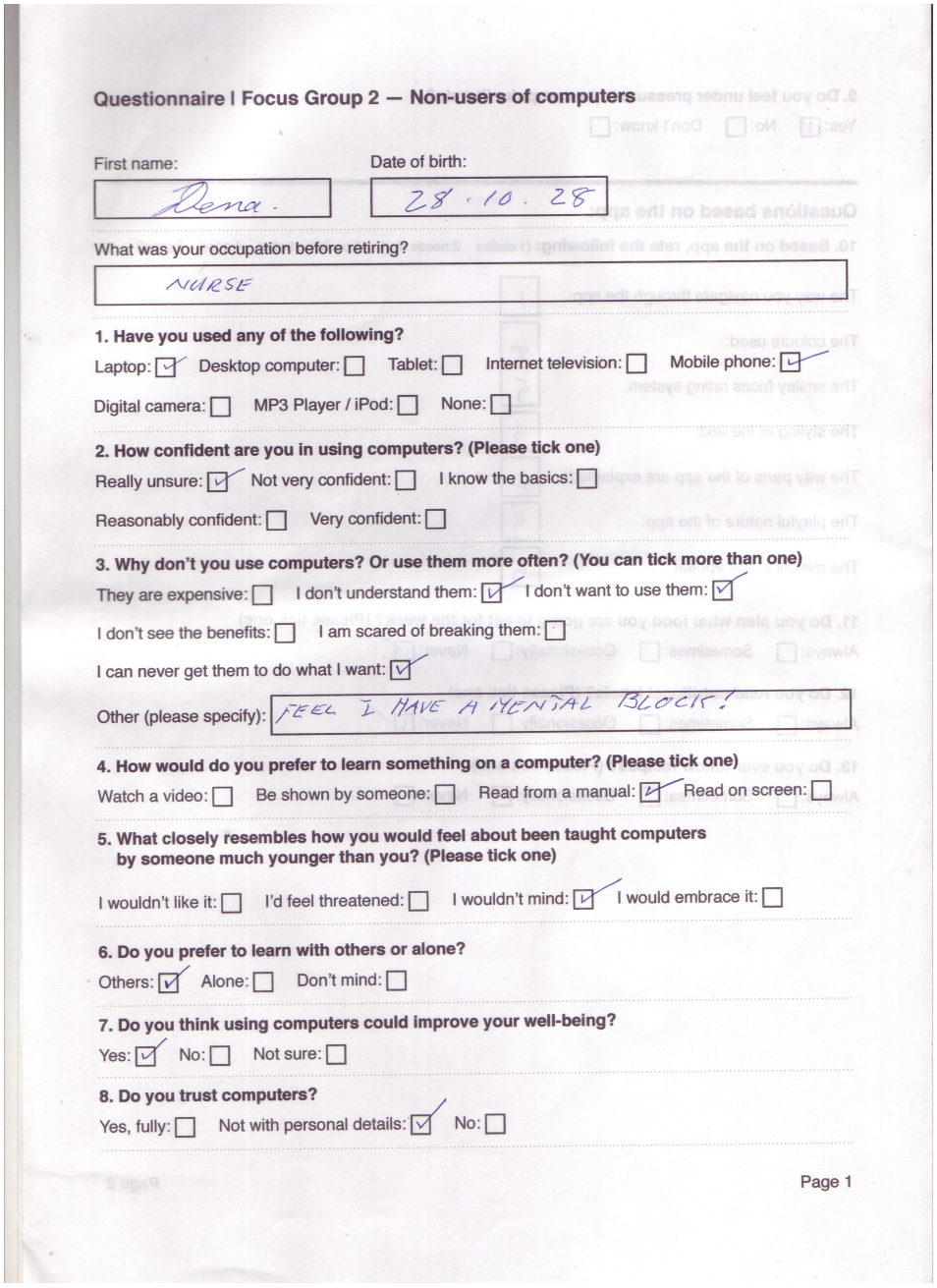
Additional questions if time:
- What would make the app more relevant to you?
- what do you think to the ratings system and the tone of voice?

5. Questionnaire (5mins)
Time at the end for participants to fill in a questionnaire

6. Conclude (5mins)
Thank participants, any questions, what did the participants learn? Anything else

Fig 52: Plan sheet from the non-users focus group, side 2.

9.3 Questionnaire Examples



Questionnaire | Focus Group 2 — Non-users of computers

First name: Dena. Date of birth: 28.10.28

What was your occupation before retiring? NURSE

1. Have you used any of the following?

Laptop: ☑ Desktop computer: ☐ Tablet: ☐ Internet television: ☐ Mobile phone: ☑

Digital camera: ☐ MP3 Player / iPod: ☐ None: ☐

2. How confident are you in using computers? (Please tick one)

Really unsure: ☑ Not very confident: ☐ I know the basics: ☐

Reasonably confident: ☐ Very confident: ☐

3. Why don't you use computers? Or use them more often? (You can tick more than one)

They are expensive: ☐ I don't understand them: ☑ I don't want to use them: ☑

I don't see the benefits: ☐ I am scared of breaking them: ☐

I can never get them to do what I want: ☑

Other (please specify): FEEL I HAVE A MENTAL BLOCK!

4. How would do you prefer to learn something on a computer? (Please tick one)

Watch a video: ☐ Be shown by someone: ☐ Read from a manual: ☑ Read on screen: ☐

5. What closely resembles how you would feel about been taught computers by someone much younger than you? (Please tick one)

I wouldn't like it: ☐ I'd feel threatened: ☐ I wouldn't mind: ☑ I would embrace it: ☐

6. Do you prefer to learn with others or alone?

Others: ☑ Alone: ☐ Don't mind: ☐

7. Do you think using computers could improve your well-being?

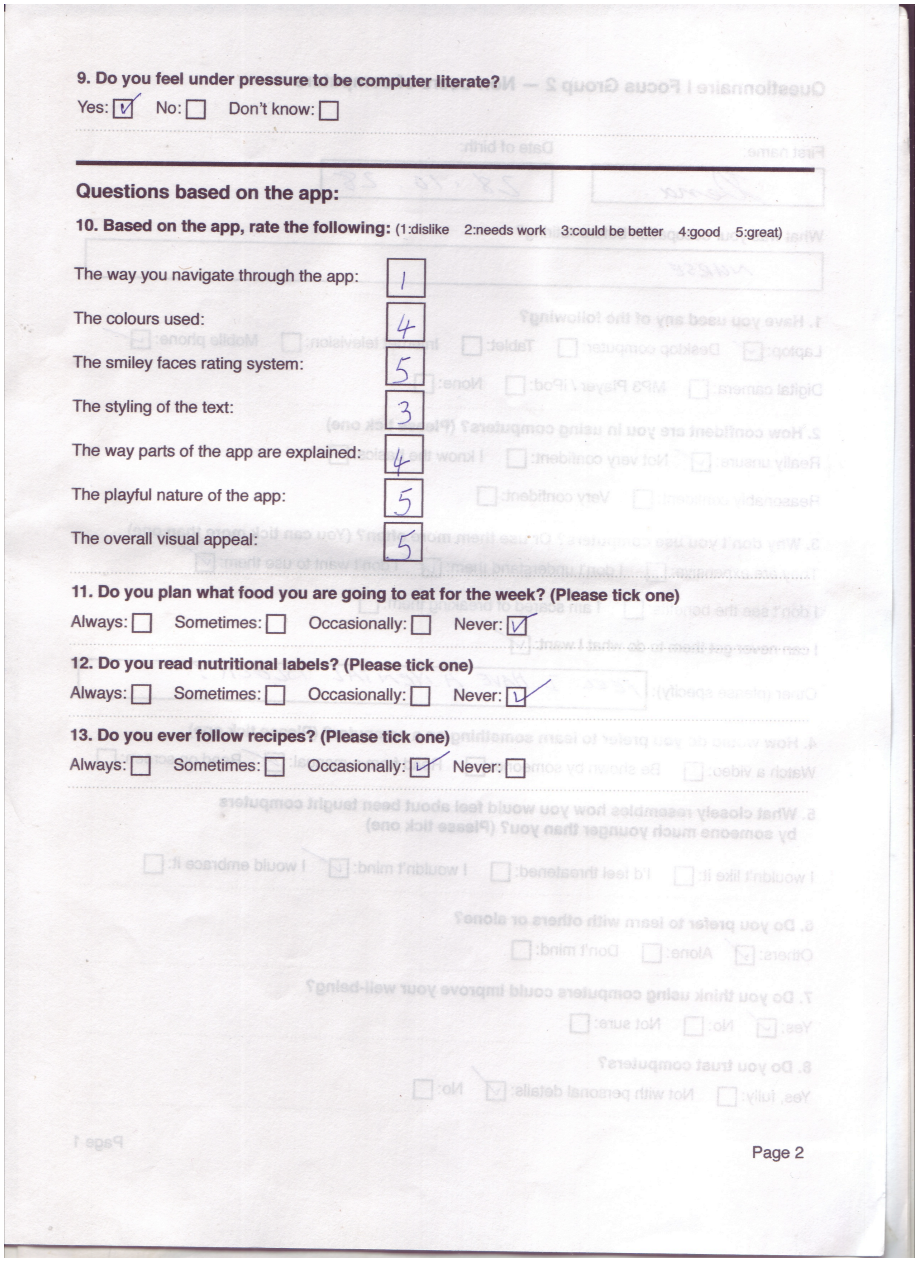
Yes: ☑ No: ☐ Not sure: ☐

8. Do you trust computers?

Yes, fully: ☐ Not with personal details: ☑ No: ☐

Page 1

Fig 53: An example questionnaire from the users focus group, side 1.



9. Do you feel under pressure to be computer literate?

Yes: ☑ No: ☐ Don't know: ☐

Questions based on the app:

10. Based on the app, rate the following: (1:dislike 2:needs work 3:could be better 4:good 5:great)

The way you navigate through the app:	1
The colours used:	4
The smiley faces rating system:	5
The styling of the text:	3
The way parts of the app are explained:	4
The playful nature of the app:	5
The overall visual appeal:	5

11. Do you plan what food you are going to eat for the week? (Please tick one)

Always: ☐ Sometimes: ☐ Occasionally: ☐ Never: ☑

12. Do you read nutritional labels? (Please tick one)

Always: ☐ Sometimes: ☐ Occasionally: ☐ Never: ☑

13. Do you ever follow recipes? (Please tick one)

Always: ☐ Sometimes: ☐ Occasionally: ☑ Never: ☐

Page 2

Fig 54: An example questionnaire from the users focus group, side 2.

9.4 Presenting Research to CHEAD

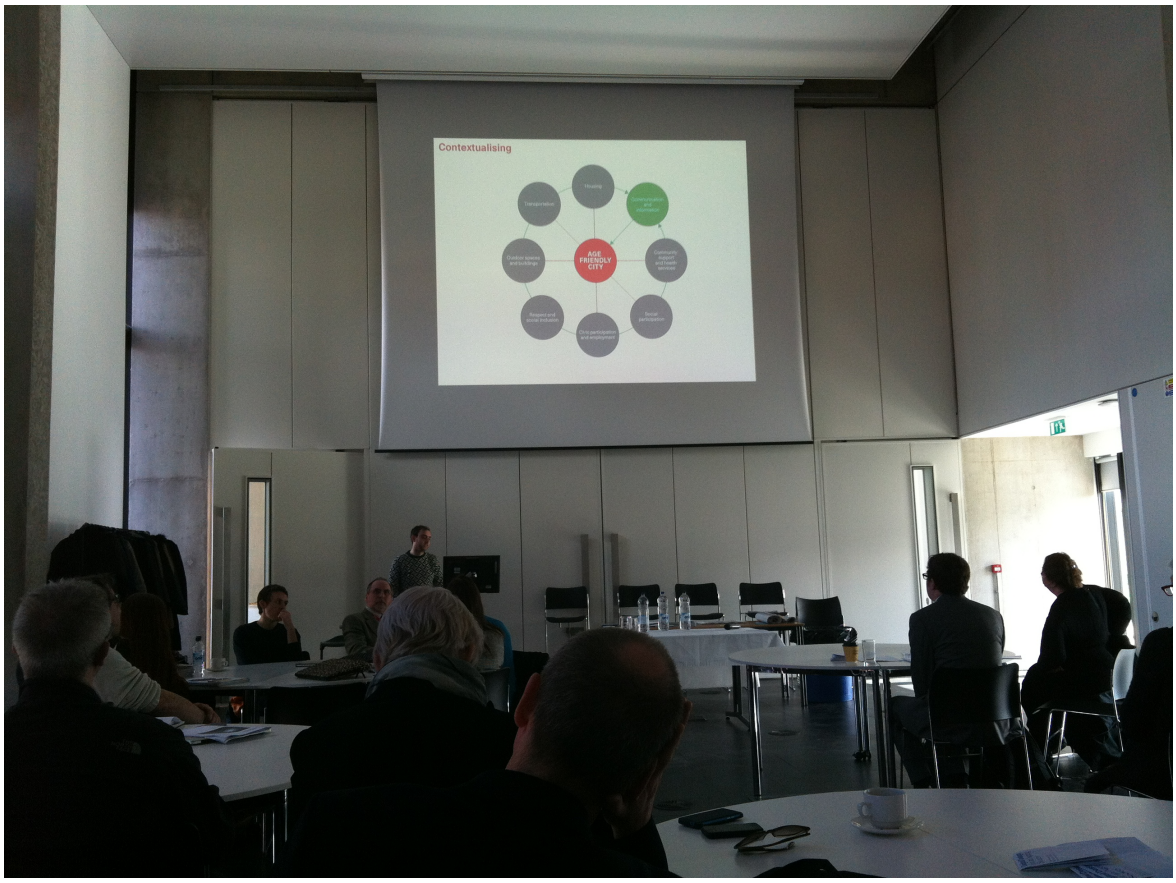


Fig 55: Some of the research was presented to The Council for Higher Education in Art & Design on 21st March 2014 (Photo: Joe McCullagh)

Fig 56: A research outline was printed and given out at the CHEAD Conference.

9.5 Peer Presentation Slides

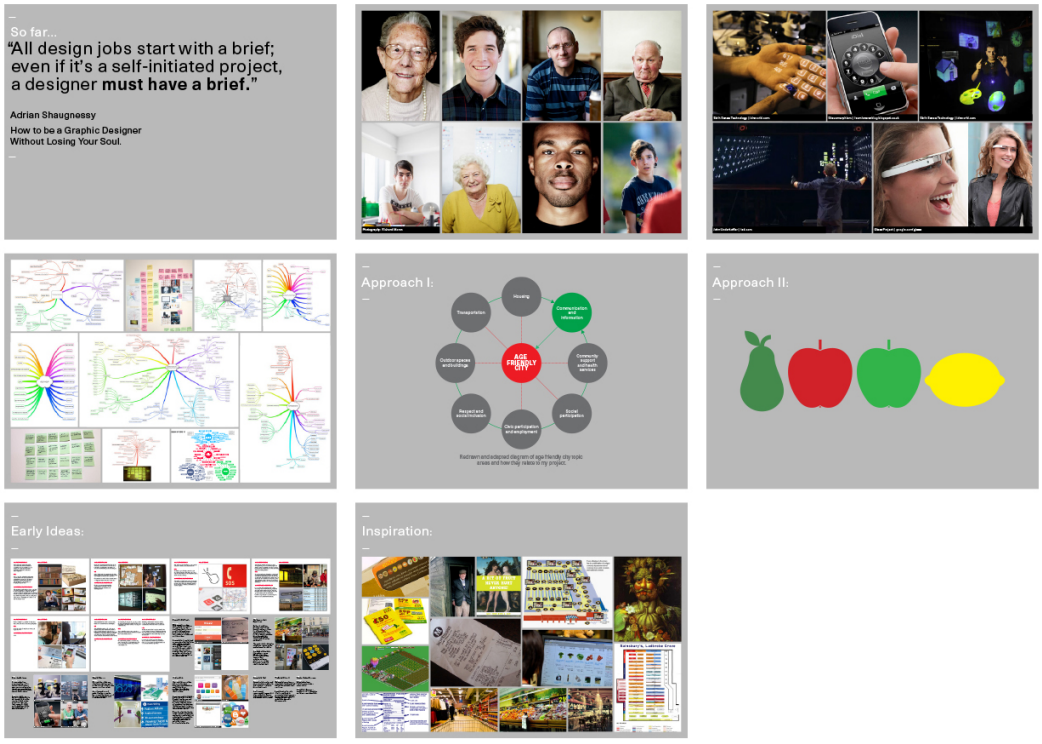


Fig 57: Some work in progress slides presented to peers 13th March 2013