

The London School of Economics and Political Science

Older adults, e-inclusion and access to ICT-based care

Jacqueline Damant

A thesis submitted to the Department of Social Policy
of the London School of Economics for the degree of
Doctor of Philosophy, London, September, 2014

Declaration

I certify that the thesis I have presented for examination for the MPhil/PhD degree of the London School of Economics and Political Science is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it).

The copyright of this thesis rests with the author. Quotation from it is permitted, provided that full acknowledgement is made. This thesis may not be reproduced without my prior written consent.

I warrant that this authorisation does not, to the best of my belief, infringe the rights of any third party.

Statement of conjoint work

In Chapter 8, I cite the results of the quantitative analyses of the MonAMI trial evaluation from Damant et al. 2013. The quantitative analyses were conducted by Dr Derek King and Sarah Watters, who co-authored the journal article. The results were included as part of the review of evidence on quality of life. Neither of the named researchers contributed to reviewing the overall body of literature or to writing the chapter.

Daniel Lombard assisted with reviewing the literature and with identifying three or four additional references for Chapter 8. He also read an early draft of Chapter 8 and provided some useful comments which helped shape subsequent drafts. However, I identified the main body of literature for the review and performed the analyses of the literature. The results reported in Chapter 8 are from my analyses. Furthermore, I was the sole author of each draft of the chapter. Therefore, I can confirm that I contributed more than 95% of the work in this chapter.

Statement of inclusion of previous work (if applicable)

I can confirm that chapter 5, 6, 7 and 8 was the result of the previous study “E-inclusion and access to the ‘ICT-care sector’ of older people in England” project, funded by the NIHR’s School for Social Care Research. I undertook this project with the Personal Social Services Research Unit of the London School of Economics between March 2012 and April 2014.

I can also confirm that parts of chapter 6, 7 and 8 was the result of the previous study “Mainstreaming on Ambient Intelligence (MonAMI)” projet, funded by the European

Commission's FP6 framework. I undertook this project with the Personal Social Services Research Unit of the London School of Economics between October 2006 and May 2011.

Statement of use of third party for editorial help (if applicable)

I can confirm that my thesis was copy edited for conventions of language, spelling and grammar by Ann Richardson.

Signed

Jacqueline Damant

Abstract

Background: Information communication technology (ICT) such as the Internet, mobile phones, computers and tablets, has become a central part of daily life. However a large number of older people do not use ICT, putting them at risk of exclusion from the digital society.

Aims: To investigate level to which older people are “e-included” (or engage with ICT) across various contexts, the factors which influence their e-inclusion and their access to ICT-based care, and the effects of ICT-use on their quality of life.

Methods: Using a mixed method approach, I collected both secondary and primary data from numerous different sources including national datasets, the *MonAMI* project, the relevant literature, and interviews with older adults and technical experts.

Analysis: Quantitative and qualitative analyses were performed according to the dimensions of the 6C framework for e-inclusion. The effects of ICT use was assessed against the domains of the ASCOT and WHOQOL models of quality of life.

Results: Older people’s e-inclusion and access to ICT-based care were affected by a number of person-centred and environmental factors. There were marked variances in level of e-inclusion with the older population, which was partly attributed to a cohort effect. The evidence showed that access to ICT-based care was affected by local eligibility policies and care practitioner endorsement.

Analyses revealed that ICT use positively affected older people’s quality of life in terms of maintaining independence and social networks, and improving psychological wellbeing. However, ICT-use had negative effects on older people’s sense of privacy. Moreover, ICT-based care services proved to be obtrusive and stigmatising for many older people.

Conclusion: The findings highlighted a paucity in targeted policies which consider older people’s specific digital interests. There is also a need for a better understanding of the effects of ICT-based care on older people’s quality of life.

Abstract word count: 298

Acknowledgements

In one of our first meetings, my supervisor compared writing a PhD to running a marathon. He warned of the long and sustained effort that it entailed, and of the “walls” that I would hit. I never doubted his wisdom, but it would be dishonest to say that I didn’t try to devise ways of lessening the impact of the suffering he described.

A decade on, it feels like I have run several marathons and my head has taken a new shape from the obstacles I have hit. But as I come to the last few miles, I look to the side lines and I see the people willing me on and I am reminded that it is through their encouragement, advice, patience, and honesty that I have got this far.

It goes without saying that I am in awe of the genius of Professors Martin Knapp and Paul Freddolino. Thank you for taking me on and for enduring my endless self-doubt. You not only gave me academic support, you were counsellors, colleagues and friends and I am eternally indebted to you for going beyond the call of duty to help me through some of the bumps in the road.

Several PSSRU colleagues also helped me get to this stage. I want to thank Margaret Perkins for generously donating her time to help me organise the focus group and to recruit participants. Thank you also to Juliette Malley for finding participants for the focus group. And to the participants of the focus group: thank you for the lively discussion and for teaching me a thing or two.

Derek King’s brilliance got me through the mine field that is statistics. Ann Richardson’s talent made my ideas sound intelligent. Cate Henderson, thank you for running with me, literally. Your sound advice, both as a colleague and a friend, has kept me grounded throughout and you always give me food for thought. Drinks on me at the Ritz!

Last, and in no way least, I want to acknowledge the important influence Maggie Ellis has had on my PhD journey: we had our differences, but you are an inspiration.

I also want to acknowledge the kindness and selflessness of the staff, the volunteers and the clients of the Age UK centre in Banbury, Oxfordshire. Bee Myson and Kasia Zielasko, thank you for your warm welcome and for helping me to promote my project to clients of the centre. To the people who agreed to be interviewed: thank you for sharing a little bit of your fascinating lives with me. A special shout out to the IT trainers and the volunteers at the cafe: thank you for the laughs, the tea and the cake!

To my dearest friends SH, YK, MAM, and AC, who saw me through my moods swings and my boring waffling monologues: thank you for never hanging up on me.

I have no words for how I grateful I am to my family for the support and encouragement that they have given to me throughout this process. To Thomas, thank you for "pushing the repeat button" and for helping me keep things into perspective. To my two little cherubs, thank you for forgiving me for not being there as I should have been. Finally, to my mother who is the kindest, most devoted, most self-sacrificing person anyone will ever meet, and who I admire beyond measure: we got here together, hand in hand.

To grandma, this comes from survival. I hope that this makes you smile.

Now, time to get off my chair and to go run a marathon.

Table of Contents

CHAPTER 1 : INTRODUCTION	15
1. THE E-INCLUSION OF OLDER PEOPLE	15
1.1. E-INCLUSION: POLICY CONTEXT	16
2. OLDER PEOPLE AND ICT-BASED CARE	17
2.1. POLICY CONTEXT: ICT-BASED CARE	18
3. RESEARCH QUESTIONS	19
4. WHAT LIES AHEAD	19
CHAPTER 2 : DEFINITIONS AND CONCEPTUAL FRAMEWORK	21
1. INTRODUCTION	21
2. DEFINING PRINCIPAL CONCEPTS	21
2.1. OLD AGE	21
2.2. MAINSTREAM ICT	22
2.3. SOME OTHER ICT TERMS	23
2.4. ICT-BASED CARE TAXONOMY	23
2.5. THE EVOLUTION OF ICT-BASED CARE	25
3. TECHNOLOGY AND SOCIETY: THE SOCIAL FUNCTION OF ICT	26
3.1. ICT AND OLDER PEOPLE	28
3.2. ICT, GENDER AND HEALTH	31
4. CONCEPTUAL FRAMEWORKS	32
4.1. SOCIAL INCLUSION	32
4.2. E-INCLUSION	36
4.3. THE "6C" FRAMEWORK OF E-INCLUSION	39
4.4. QUALITY OF LIFE	45
4.5. THE COMBINED QOL FRAMEWORK	49
5. DISCUSSION	54
CHAPTER 3 : METHODOLOGY AND DATA SOURCES	56
1. INTRODUCTION	56
2. RESEARCH DESIGN	57
2.1. RATIONALE	58
3. SECONDARY DATA	60
3.1. OXFORD INTERNET SURVEYS	60
3.2. OFFICE OF NATIONAL STATISTICS	65
3.3. THE MONAMI PROJECT	68
4. LITERATURE REVIEW	75
4.1. REVIEW METHODOLOGY: EPISTEMOLOGY AND RATIONALE	76
4.2. DATABASE REVIEW	79
4.3. SNOWBALLING SEARCH	81
4.4. HAND-SEARCHING	81
5. INTERVIEWS	82

5.1. QUALITATIVE DATA ANALYSIS: EPISTEMOLOGY AND RATIONALE	82
5.2. SERIES 1	85
5.3. SERIES 2	88
6. DISCUSSION	90

CHAPTER 4 : MEASURING THE LEVEL OF E-INCLUSION OF OLDER PEOPLE **93**

1. INTRODUCTION	93
2. METHODOLOGY	93
3. ANALYSES	94
3.1. A SCALE FOR E-INCLUSION	94
3.2. STATISTICAL ANALYSES: CHARACTERISING OLDER PEOPLE’S E-INCLUSION	101
4. RESULTS	106
4.1. TYPOLOGY OF OLDER PEOPLE’S LEVEL OF E-INCLUSION	108
4.2. CHARACTERISTICS OF OLDER PEOPLE ACCORDING TO LEVEL OF E-INCLUSION	108
4.3. REGRESSION ANALYSES	113
4.4. CHANGES OVER TIME IN THE LEVEL OF E-INCLUSION OF OLDER PEOPLE	118
5. DISCUSSION	122
5.1. TRENDS IN OLDER PEOPLE’S E-INCLUSION	123
5.2. FINDINGS “OFF”-TREND	124
5.3. CHANGES OVER TIME	126
5.4. LIMITATIONS	128
6. CHAPTER 4 FIGURES	130

CHAPTER 5 : PERSON-CENTRED EFFECTS ON E-INCLUSION: REVIEW OF THE LITERATURE **133**

1. INTRODUCTION	133
2. METHODOLOGY	133
3. RESULTS	134
3.1. CONTENT	134
3.2. CAPABILITY	139
3.3. CONFIDENCE	145
3.4. COST	151
4. DISCUSSION	155
5. LIMITATIONS	157

CHAPTER 6 : CONNECTIVITY AND CONTINUITY **160**

1. INTRODUCTION	160
2. METHODOLOGY	160
3. QUATERNARY STAKEHOLDERS: SETTING THE POLICY CONTEXT	163
3.1. E-INCLUSION POLICY	163
3.2. POLICY FOR ICT-BASED CARE	169
4. CONNECTIVITY	171
4.1. OVERVIEW OF OLDER PEOPLE’S CONNECTIVITY TO MAINSTREAM ICT	171
4.2. OVERVIEW OF OLDER PEOPLE’S CONNECTIVITY TO ICT-BASED CARE	175

4.3.	TERTIARY STAKEHOLDERS CONNECTING OLDER PEOPLE TO MAINSTREAM ICT	176
4.4.	TERTIARY STAKEHOLDERS CONNECTING OLDER PEOPLE TO ICT-BASED CARE	181
4.5.	SECONDARY STAKEHOLDERS CONNECTING OLDER PEOPLE TO MAINSTREAM ICT: LOCAL GOVERNMENT	189
4.6.	SECONDARY STAKEHOLDERS CONNECTING OLDER PEOPLE TO ICT-BASED CARE: CARE SERVICES PROVIDERS	193
4.7.	PRIMARY STAKEHOLDERS CONNECTING OLDER PEOPLE TO ICT-BASED CARE: PERSONAL NETWORKS	197
5.	CONTINUITY	199
5.1.	TERTIARY STAKEHOLDERS SUPPORTING OLDER PEOPLE TO USE MAINSTREAM ICT	199
5.2.	TERTIARY STAKEHOLDERS SUPPORTING OLDER PEOPLE TO USE ICT-BASED CARE	201
5.3.	SECONDARY STAKEHOLDERS SUPPORTING OLDER PEOPLE TO USE MAINSTREAM ICT	202
5.4.	SECONDARY STAKEHOLDERS SUPPORTING OLDER PEOPLE TO USE ICT-BASED CARE	205
5.5.	PRIMARY STAKEHOLDERS SUPPORTING OLDER PEOPLE'S USE OF MAINSTREAM ICT AND ICT-BASED CARE	207
6.	DISCUSSION	212
6.1.	CONNECTIVITY	212
6.2.	CONTINUITY	215

CHAPTER 7 : FROM THE GROUND UP: QUALITATIVE ANALYSIS OF INTERVIEW DATA WITH OLDER PEOPLE AND TECHNICAL EXPERTS **219**

1.	INTRODUCTION	219
2.	METHODOLOGY	219
2.1.	SUMMARY OF DATA COLLECTION, RECRUITMENT AND PARTICIPANT CHARACTERISTICS	220
2.2.	DATA ANALYSIS	223
3.	RESULTS: INTERVIEWS WITH OLDER PEOPLE	227
3.1.	CONNECTIVITY	227
3.2.	CONTENT	230
3.3.	CAPABILITY	236
3.4.	CONFIDENCE	238
3.5.	COST	239
3.6.	CONTINUITY	241
3.7.	EMERGING THEMES FROM OLDER INTERVIEWEES	243
4.	RESULTS: INTERVIEWS WITH EXPERTS	245
4.1.	CONNECTIVITY	245
4.2.	CONTENT	249
4.3.	CAPABILITY	254
4.4.	CONFIDENCE	257
4.5.	COST	259
4.6.	CONTINUITY	261
4.7.	EMERGING THEMES FROM EXPERT INTERVIEWEES	264
5.	DISCUSSION	267
5.1.	MAINSTREAM ICT	267
5.2.	ICT-BASED CARE	270
5.3.	OUTSIDE THE 6C FRAMEWORK	271
6.	LIMITATIONS	272

CHAPTER 8 : IMPACT OF THE USE OF MAINSTREAM ICT AND ICT-BASED CARE SERVICES ON QUALITY OF LIFE	274
1. INTRODUCTION	274
2. METHODOLOGY	274
2.1. DATA COLLECTION	274
2.2. ANALYTICAL FRAMEWORK	275
2.3. DATA ANALYSIS	276
3. RESULTS	277
3.1. CONTROL OVER ONE’S LIFE	277
3.2. PERSONAL SAFETY AND SECURITY	281
3.3. SOCIAL INVOLVEMENT AND PARTICIPATION	285
3.4. OCCUPATION	290
3.5. PSYCHOLOGICAL WELLBEING	292
3.6. PHYSICAL CAPABILITY	296
4. DISCUSSION	298
CHAPTER 9 : CONCLUSION	303
1. INTRODUCTION	303
2. TRIANGULATING THE RESULTS	303
2.1. WHAT IS THE LEVEL OF E-INCLUSION OF OLDER PEOPLE?	305
2.2. WHAT IS OLDER PEOPLE’S LEVEL OF ACCESS TO ICT-BASED CARE?	306
2.3. WHAT PERSONAL AND ENVIRONMENTAL FACTORS AFFECT OLDER PEOPLE’S E-INCLUSION AND THEIR ACCESS TO ICT-BASED CARE?	307
2.4. HOW DOES THE USE OF ICT – FOR BOTH MAINSTREAM AND CARE-RELATED PURPOSES – AFFECT OLDER PEOPLE’S QUALITY OF LIFE?	311
2.5. DO CONTEMPORARY MEASURES OF E-INCLUSION REFLECT OLDER PEOPLE’S LEVEL OF PARTICIPATION IN THEIR COMMUNITIES?	312
3. STRENGTHS AND LIMITATIONS	314
3.1. STRENGTHS	314
3.2. LIMITATIONS	318
4. IMPLICATIONS FOR POLICY, PRACTICE AND RESEARCH	324
4.1. POLICY AND PRACTICE: E-INCLUSION	324
3.3. POLICY AND PRACTICE: ICT-BASED CARE	327
3.4. FUTURE RESEARCH	329
REFERENCES	331
APPENDIX A: MONAMI QUESTIONNAIRES	359
1. BASELINE QUESTIONNAIRE: SERVICE USERS	359
2. CONFIGURATION AND PERSONALISATION TEMPLATE	372
3. MIDTERM QUESTIONNAIRES	376

4. POST-TRIAL QUESTIONNAIRES	380
<hr/>	
APPENDIX B: SERIES ONE INTERVIEWS WITH TECHNICAL EXPERTS	386
<hr/>	
1. SERIES ONE INTERVIEWS: EXPERT INTERVIEWEE INFORMATION SHEET	386
<hr/>	
2. SERIES ONE INTERVIEWS: EXPERT INTERVIEWEE CONSENT FORM	388
<hr/>	
3. SERIES ONE INTERVIEWS: TOPIC GUIDE	389
<hr/>	
APPENDIX C: SERIES TWO INTERVIEWS	391
<hr/>	
1. INFORMATION SHEETS	391
<hr/>	
1.1. INFORMATION SHEET: ONE TO ONE INTERVIEWS WITH OLDER ADULTS	391
1.2. INFORMATION SHEET: FOCUS GROUP PARTICIPANTS	393
1.3. INFORMATION SHEET: TECHNICAL EXPERTS	395
<hr/>	
2. SERIES TWO INTERVIEWS: INFORMED CONSENT FORMS (ALL PARTICIPANTS)	396
<hr/>	
3. SERIES TWO INTERVIEWS: TOPIC GUIDES	397
<hr/>	
3.1. TOPIC GUIDE: INDIVIDUAL INTERVIEWS	397
3.2. TOPIC GUIDE: FOCUS GROUP	399
3.3. TOPIC GUIDE: TECHNICAL EXPERTS	401

Table of Tables

Table 2-1 Description of the dimensions and facets of the 5Cs and 6C models.....	39
Table 3-1 Sample questions in 2005 and 2011 OxIS questionnaires	61
Table 3-2 Outcome of address issuing and visits by OII interviewers	64
Table 3-3 Results of visits.....	64
Table 3-4 Yearly average response rates	67
Table 3-5 Description of MonAMI services.....	69
Table 3-6 MonAMI trial interview schedule	72
Table 3-7 Recruitment techniques and targets by site	74
Table 3-8 Boolean terms for search strategy.....	80
Between April 2010 and September 2011, I conducted interviews with 23 experts, including ICT-based care service commissioners, e-inclusion policy experts, academics, and stakeholders from the private and third sectors. Experts were identified through recommendations by PSSRU colleagues, other expert interviewees, and through the review of the relevant grey literature. Table 3-9 lists the number of interviewees by sector and named organisation of this first interview series. Table 3-9 Series 1 interviews by sector, organisation and number of Interviewees.....	85
Table 3-10 Description of participants of Series 2 individual interviews and focus group.....	88
Table 3-11 Series 2 interviews by Sector, organisation and number of Interviewees	89
Table 4-1 E-inclusion typology	96
Table 4-2 List of Internet activity variables from 2005 and 2011 Oxford Internet Survey datasets	98
Table 4-3 Variables from 2011 OxIS used as indicators of the dimensions of the 6C framework	102
Table 4-4 Coding for dependent variable for multifactorial models	104
Table 4-5 Demographic profile, access to ICT of adults aged 65 years and older in 2005 and 2011	106
Table 4-6 Linear regression models 1a to 1f: effects of 6C dimensions on level of e-inclusion	114
Table 4-7 Linear regression Model 2 (level of e-inclusion) and Model 3 (number of devices)	116
Table 5-1 Comparison of confidence levels of Internet activities between older and younger people	150
Table 6-1 Types of household Internet connection.....	177
Table 6-2 Location of Internet access for people aged 65 years and older.....	190
Table 6-3 Source of help to use the internet by ex – and non – users aged 65 years and older	198
Table 6-4 Sources of help to use the internet in the past year by people aged 65 years and older	209
Table 7-1 Series of interviews	219
Table 7-2 Series 1 expert interviews by sector, organisation and number of Interviewees	221
Table 7-3 Characteristics of the MonAMI participants.....	222
Table 7-4 Description of participants of Series 2 individual interviews and focus group.....	222
Table 7-5 Series 2 interviews by Sector, organisation and number of Interviewees	223
Table 7-6 Development of analytic framework	224
Table 7-7 Framework Matrix	226
Table 7-8 Percentage of MonAMI participants who used each type of ICT, by trial site	228
Table 7-9 Number of participants using ICT-based care services at baseline, by trial site.....	229

Table 7-10 Level of interest of MonAMI Participants in acquiring new technologies, by MonAMI trial site	231
Table 7-11 Responses from non-users of different ICT, by MonAMI trial site	232
Table 8-1 Purchases made over the internet 2014.....	279
Table 8-2 Perceptions of helpfulness towards IADL of the MonAMI services.....	280
Table 8-3 Perceptions of helpfulness of MonAMI services to personal safety and security	284
Table 8-4 Perceptions of helpfulness of the MonAMI services to social involvement and participation.....	290
Table 8-5 Perceptions of helpfulness of the MonAMI services on psychological wellbeing	294
Table 8-6 Cross-tabulation of Internet usage and health problem of people aged 65 year and older	296
Table 8-7 Perceived helpfulness of MonAMI services on physical capabilities domain.....	298

Table of Boxes

Box 2-1 Activities used to indicate computer and Internet skill levels.....	43
Box 2-2 ASCOT domains.....	47
Box 2-3 WHOQOL domains	48
Box 2-4 Quality of life domains of the combined QOL framework.....	49
Box 3-1 Modules of the Eurostat model household survey of Internet usage.....	66
Box 4-1 Variables from 2011 OxIS dataset used in combined dependent variable	105
Box 5-1 Activities used to indicate computer and Internet skill levels.....	133
Box 6-1 Stakeholder groups	161
Box 6-2 Managed care models for ICT-based care in England	195
Box 8-1 Description of the combined, ASCOT and WHOQOL domains and facets.....	275

Table of Figures

Figure 2-1 Proportion of adults aged 16 years and older who use different types of ICT.....	22
Figure 2-2 Proportion of internet users engaging in information seeking, e-commerce and e-government in 2005 and 2013.....	27
Figure 2-3 Proportion of internet users engaging in social activities on the internet in 2005 and 2013	28
Figure 2-4 Proportion of internet users engaged in internet functions that offer emotional support by life stage	29
Figure 2-5 Use of email or social networking for communication.....	30
Figure 2-6 Proportion of internet users and ex-users who experienced effectiveness of Internet use by life stage.....	30
Figure 3-1 Review in literature databases	81
Figure 3-2 Timeline of data collection	92
Figure 4-1 Process for deriving variables for e-inclusion scale from 2005 and 2011 OxIS datasets	100
Figure 4-2 Distribution of people age 65 years and older across levels of e-inclusion	108
Figure 4-3 Mean age (years) of people aged 65 years and older according to level of e-inclusion	109

Figure 4-4 Proportion of women and men aged 65 years and older at each level of e-inclusion	109
Figure 4-5 Distribution of user-types of people aged 65 years and older in 2005 and 2011 ...	118
Figure 4-6 New generation users by age group and year	119
Figure 4-7 Advanced users by age group and year	120
Figure 4-8 Moderate users by age group and year	120
Figure 4-9 Basic users by age group and year	121
Figure 4-10 Ex-users users by age and by year	121
Figure 4-11 Non-users by age group and year	122
Figure 4-12 Older people's degree of agreement/disagreement with the statement: "The internet makes life better" at each level of e-inclusion	130
Figure 4-13 Proportion of older people with and without health problem or disability with limited their ability to perform activities of daily living at each level of e-inclusion	130
Figure 4-14 Yearly household income across sample of older adults at each level of e-inclusion	131
Figure 4-15 Level of attained education at each level of e-inclusion	131
Figure 4-16 Level of agreement/disagreement with statement: "I get nervous using technology; I might break something" at each level of e-inclusion	132
Figure 4-17 Number of adults aged 18 years and older living in the household at each level of e-inclusion	132
Figure 5-1 Level of computer skill of individual in the UK (2012)	139
Figure 5-2 Internet skill levels of individuals in the UK (2013)	140
Figure 6-1 Stakeholder configuration of mainstream ICT market	162
Figure 6-2 Stakeholder groups configuration for the ICT-based care market	162
Figure 6-3 Proportion of people in the UK who have never used the internet by age group, 2005 to 2013	172
Figure 6-4 Proportion of Individuals who access the Internet "on the go", 2012 to 2014 (GB)	172
Figure 6-5 Proportion of people who ever used a computer across time, by age-band (UK) ..	173
Figure 6-6 Use of mobile phones and smart phones in 2013 by age (GB)	174
Figure 6-7 Proportion of adults in the UK who own a tablet computer in 2012 and 2013	175
Figure 6-8 Areas in England with highest rates of access to less than 2Mbit/s (2013)	178
Figure 6-9 Tertiary stakeholders in ICT-based care	183
Figure 6-10 Use of online government services to access information between 2009 and 2013 by age group	191

Chapter 1 : Introduction

1. The e-inclusion of older people

Communicating with friends and family, acquiring goods and services, and increasingly, accessing social care services are frequently achieved through the use of information communication technology (ICT) such as the internet, mobile phones, computers and tablet computers (Copeland et al., 2014). As such, ICT has become part of the social fabric and has infiltrated every aspect of daily life in Britain. However, it is estimated that 9.5 million adults in Britain do not have the basic skills needed to use the Internet (Go ON UK, 2014a). Among them are approximately 4.8 million people aged 65 years and older who have never used the Internet (Office for National Statistics, 2014a), which raises concerns about whether older people are able to participate in some important aspects of daily life in what is becoming an ever more digitised society (Mason et al., 2012).

Age-related decline in physical and cognitive functioning leaves many older people facing challenges in managing their activities of daily living (ADLs) (Hawthorn, 2000). In addition, the wide dispersal of the traditional family – and smaller average family size – has meant that many older people experience considerable loneliness and isolation. Chronic loneliness and social isolation are estimated to affect over a million adults aged 65 years and older at any point in time (Age UK, 2014a), and can have serious consequences for both their physical and mental health (Courtin and Knapp, 2015; Department of Health, 2012a).

Such social isolation can also be intensified by the increased use of ICT in everyday life. For instance, there is an increased use of ICT to perform daily activities which were traditionally done in person, such as shopping, banking, and playing games, as well as receiving care services. Thus, those older people unable to use ICT may now find it much more difficult than previous generations to gain access to resources that might reduce their loneliness and social isolation.

It is also the case that ICT could help to minimise some of the physical and social disadvantages of old age. For instance, older people with reduced mobility could, in principle, administer their finances, do their shopping, and contact their local council from the comfort of their own homes by using the growing wealth of online services. Older people on lower incomes can benefit from the cost efficiencies of using online services (Wright and Wadhwa, 2010). Furthermore, there are a raft of assistive technologies designed to compensate for physical and cognitive impairments which could help older people with needs to become more mobile and independent (Age UK, 2010a).

Several studies have described the role of ICT in helping older people to overcome loneliness and social isolation. For instance, the report “*Campaign to End Loneliness: connections in older age*” (Campaign to End Loneliness, 2014) provides anecdotal evidence of the benefits of internet applications, such as email and Skype, in helping older people to maintain or improve contact with friends and family, especially when they live far away. Email and Skype have also been shown to help older people maintain - or enhance - meaningful participation in their communities (Independent Age, 2010; Mason et al., 2012) as well as to feel more “included” in Britain’s digital society (BBC, 2014a).

Despite the reported benefits of using ICT to improving the quality of their lives, 40% of people aged 65 years or over do not use the internet. To provide points of comparison, the relevant figure for 35 to 44 year olds is 3%, and for 45 to 54 years olds it is 7% (Office for National Statistics, 2014a). This suggests that older people face a number of specific barriers impeding their adoption of ICT (Lewis, 2012; Mason et al., 2012). As such, observers have challenged the ethical stance of a society that disregards the needs of a large group of people who likely have the most to gain by being online (Wright and Wadhwa, 2010).

1.1. E-inclusion: policy context

Concerns over how “e-excluded” people function within a digitised society have given rise to EU and UK “e-inclusion policies”, which look to improve the access to – and develop the skills for – ICT.

The European Union’s (EU) *Riga Declaration* (2006) pledged to increase the availability of broadband Internet across all regions of Europe, improve the throughput and accessibility of e-government services, and - above all - to ensure accessibility, affordability and equal participation in the digital economy for all EU citizens (European Commission, 2007a).

In the spirit of the tenets of the *Riga Declaration*, the UK government published the *Digital Britain White Paper* (2009), which outlined its commitment to improve the supply of the high speed broadband infrastructure and e-government services. At the same time, the White Paper laid out a strategy to stimulate the demand for internet services by non-users by appointing a Champion for Digital Inclusion and supporting cross-sector initiatives which promote the benefits of being online and provide digital skills training.

More recently, in the *UK Digital Inclusion Charter* (2014), the government made a commitment to reduce the number of people who were offline by 25% every two years until everyone who

could be e-included *would* be e-included, and it renewed its support for cross-sector e-inclusion initiatives dedicated to awareness about the internet and to develop the skills base.

2. Older people and ICT-based care

At the same time as the digital environment is changing, Britain's population is ageing. Approximately 16.4% of the population in the UK is aged 65 years and older (Office for National Statistics, 2013a). Population projections estimate that by 2050, the population of people aged 65 years and older will increase to 23.0% (European Commission and Economic Policy Committee, 2009). The ageing population has important implications for the health and social care system. While many people are living longer lives in good health, there is also a greater absolute number of older people who have long-term conditions, which places heavy demands on care resources (Cartwright et al., 2013).

There is also a projected shift in the ratio of older people to working-age adults; the ratio is expected to increase from just over 2 older people per working-age adult (2.4) to almost 4 older people to working-age adults (3.8) over this same period. This will not only affect the labour supply of the formal care sector, but it also implies potential decreases in the availability of both paid and unpaid support (European Commission and Economic Policy Committee, 2009). Consequently, policy makers have been strategizing on ways to continue to deliver high quality care services as demand for care increases and there is a decline in resources (Department of Health, 2010a).

ICT has the potential to abate some of the challenges facing the care system, as well as to enable older people to live active, independent lives in their communities. Through the installation of "intelligent" devices throughout the home, telecare services can detect unusual user and environmental circumstances which trigger an alarm and a prompt caregiver response (Damant et al., 2013). Similarly, telehealth services offer the possibility to exchange vital sign data between service users and care professionals that can streamline diagnosis, monitoring and treatment processes for long-term conditions (Cartwright et al., 2013). Furthermore, incorporating mainstream ICT, such as the internet, mobile telephones and tablet computers, into the delivery of care services has the potential to improve the flexibility of those services by enabling users to access care while they are outside the home (Technology Services Association, 2013).

However, using ICT for the delivery of care also raises a number of ethical questions about the reliability of the technical infrastructure, the protection of personal data, and loss of human contact. Furthermore, given the large proportion of older people in the UK who do not have

access to mainstream ICT devices and appropriate internet networks, it is unclear whether ICT-based care is a practically viable solution to the impending pressures on the health and social care system.

2.1. Policy context: ICT-based care

The *Riga Ministerial Declaration* specifically identified active ageing as a key aspect to Europe's inclusive digital society. The signatory Member States agreed to focus on older people's access to ICT systems, which would enable them to live independently in their communities (2006). In addition, the *Declaration* aimed to lower some of the market barriers which appeared to limit the innovation and development of ICT devices and services which could enhance the quality of life of older people and people with disabilities.

In the UK, the *Preventative Technology Grant* (PTG), set out to increase the demand for telecare services and encourage the development of a more integrated care system between local social care, housing, health, and emergency response services (Department of Health, 2005a). The government also recognised the gap in knowledge around the national scalability and effectiveness of ICT-based care, and it funded the *Whole Systems Demonstrator* (WSD) programme (Telecare Services Association, 2013a), the world's largest randomised controlled trial of ICT-based care.

The headline findings of the WSD trial suggested that telehealth services had a significant effect on reducing mortality rates, reducing the number of hospital admissions and diminishing the length of hospital-stays (Steventon et al., 2012). However, results of the economic evaluation showed that telehealth services were not cost-effective (Henderson et al., 2013) and findings from the qualitative research raised questions about older people's acceptability of ICT-based care (Sanders et al., 2012).

The government continues to promote the use of ICT-based care as part of mainstream health and social care services. In 2011, it launched the *Three Million Lives* (3ML) campaign to promote the cross-sector integration of care services and to empower people with long-term conditions to self-manage their care through the use of ICT-based services (NHS England, 2012). Also, the recent *Care Act 2014* has put renewed focus on wellbeing, independent living and prevention. Consequently, local authorities have been encouraged to provide a range of flexible services, including ICT-based care, which respond directly to the needs and goals of service users (Department of Health, 2014).

3. Research questions

Against this background, the purpose of this study is to shed light on the issues affecting older people's e-inclusion and their access to ICT-based care. In a convergent parallel mixed-method design, where I combine both qualitative and quantitative methods using a number of data sources, I address the following principal research questions:

1. *What is older people's level of engagement with mainstream - and care-related - ICT?*
2. *How does older people's engagement with mainstream - and care-related - ICT affect their ability to fully participate in their communities?*

To contribute towards the answer to the principal research questions, I also address the following subsidiary research questions:

- a) What is the level of e-inclusion of the older population?
- b) What is older people's level of access to ICT-based care?
- c) What personal and environmental factors influence older people's access to mainstream ICT and ICT-based care?
- d) How does use of ICT – both for mainstream and care-related purposes – affect older people's quality of life?
- e) Do contemporary indicators of e-inclusion reflect older people's level of participation in their communities?

4. What lies ahead

Chapter 2 defines the central terms and concepts of the thesis. The analyses presented below centre on the six dimensions of the 6C framework of e-inclusion, an analytical framework derived from the "5Cs of digital inclusion" model by Bradbrook and Fisher (2004). The dimensions of the 6C framework identify the factors that potentially influence the adoption – and continued use – of mainstream ICT and ICT-based care. The dimensions of the framework identify the aspects of e-inclusion which are influenced by personal characteristics, including content (perceptions and ease of use), capability (skills), confidence (attitudes and self-efficacy), and cost (affordability). The framework also explores the environmental factors that affect e-inclusion including connectivity (material access) and continuity (support mechanisms). The chapter describes the development of the dimensions of the 6C framework in the context of other contemporary models of e-inclusion. Chapter two also provides a description of the analytical framework used to assess the effects of older people's use of ICT – both for mainstream and ICT-based care contexts – on their quality of life.

Chapter 3 sets out the research design of the study, the data sources, the sampling methods and methods for analyses. There is also a description of the European Commission project, *MonAMI*, which is one of the data sources for the later analyses and the main inspiration for choosing this topic of research.

Chapter 4 presents the quantitative analyses of this study. The chapter includes a description of the creation of a scale of e-inclusion. The scale is used to characterise the older population at each level of ICT-engagement, as well as to describe the changes in older people's level of ICT-engagement over time. The chapter also contains a series of regression analyses designed to explore the effects of the dimensions of the 6C framework on older people's level of e-inclusion.

Chapters 5 reviews the relevant literature around the person-centred factors of the 6C framework (content, capability, confidence, and cost) which potentially influence older people's adoption of ICT across different contexts.

Chapter 6 reviews the evidence on the effects of the environmental factors of 6C framework (connectivity and continuity) on older people's adoption of mainstream ICT and ICT-based care. The analysis is framed using a stakeholder approach, both to identify the market forces, which facilitate and inhibit older people's connectivity, as well as to identify the stakeholders involved in supporting older people's continued use of ICT.

Chapter 7 explores the dimensions of the 6C framework in a qualitative analysis of interview data. Also using a grounded theory approach, the qualitative analysis uncovers themes around older people's e-inclusion which lie outside of the 6C framework.

Chapter 8 describes the evidence from the literature and interview data on the effects of older people's use of mainstream ICT and ICT-based care on their quality of life.

In the concluding **chapter 9**, I summarise the findings and triangulate the results of different methods of analyses. I also reflect on the strengths and limitations of the study as well as present the implications of the findings for policy, practice and future research.

Chapter 2 : Definitions and conceptual framework

1. Introduction

There is surprisingly little consistency in the definitions of key concepts, such as “care” and “quality of life”, within the academic and policy literature. It is therefore necessary to set out the definitions used in this study, to aid understanding. This chapter sets out a number of important definitions.

2. Defining principal concepts

2.1. Old age

Any definition of “older people” is necessarily based on chronological age, but many different cut-off points could be used. Age UK, the UK’s largest charity dedicated to assisting people in later-life, invites people aged 60 years and older to take advantage of their services (Age UK, 2013a). This coincides with the former official UK retirement age of 60 years for women and 65 years for men (Department of Health, 2001).

Old age is, of course, a turning point where many people experience changes in the economic and other activities of their daily lives. Many people live long, healthy lives well beyond the traditional retirement age, but it is also a period of potentially deteriorating health. The *National Service Framework for Older People* (2001), for instance, linked “old age” with a transitioning state of health, where many people in their 60s and 70s move from being fully healthy to experiencing some physical, sensory or cognitive limitations. Accompanying such changes are increasing needs for care, and rising societal costs of providing appropriate services. Many international organisations use a cut off of 65 years and older to delineate “older people”, including the United Nations (2012), the Directorate General for Economic and Financial Affairs of the European Commission (2009), the World Health Organisation (World Health Organisation, 2014), and the Organisations for Economic Co-operation and Development (2014).

To reflect improvements in disease-free longevity, the UK government has recently readjusted retirement and pension legislation - and has subsequently indirectly redefined old age. In October 2011, the government abolished the default retirement age, so that people can work as long as they want (Age UK, 2013b) and employers can no longer discriminate against “older” workers (Department for Work and Pensions, 2014). The *Pensions Act 2011* instituted changes to the state pension age by incrementally increasing the eligible age for collection to 67 for

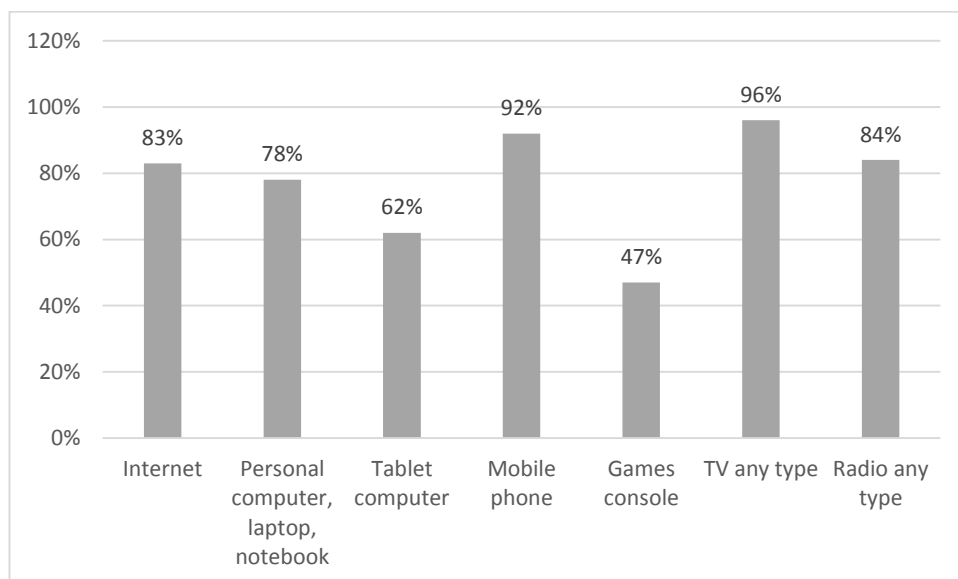
both men and women by 2026 (Age UK, 2013c). The first incremental change will take place in 2016, when the State pension age for women will increase from 60 to 63. In sum, while 65 years and older is arguably an arbitrary cut-off in the light of the changing UK policy stance, it remains a widely accepted benchmark for defining the older population and is the one used in this research.

2.2. Mainstream ICT

The *Innovate UK* organisation (formally known as the Technology Strategy Board) defines Information Communication Technology (ICT) as technology systems and services that gather, store, recover, maintain, manage, transmit, process, interpret, present and project information. ICT is therefore a broad concept that ranges from major systems, such as telecommunications networks and the World Wide Web, to ordinary devices, such as mobile telephones and personal computers, as well as to services, such as digital television and online government services (Technology Strategy Board, 2008).

Mainstream ICT refers to contemporary technologies that are used by a large segment of the population. The OfCom *Consumer Market Report* provides yearly trend data on usage – and ownership – rates of different ICT and I use this report to determine what constitutes mainstream ICT in the UK. Figure 2-1 presents a list of the ICT used or owned by large proportions of the adult population aged 16 years in the UK.

Figure 2-1 Proportion of adults aged 16 years and older who use different types of ICT



Source: OfCom Adults' Media Use and Attitudes Report (2014)

It can be seen that the internet, personal computers, laptops and notebooks, tablet computers, mobile phones and smartphones, games consoles, television and radio are some of the current forms of ICT used by large proportions of the UK population – and these ICT are defined as mainstream. Other mainstream ICT noted in the 2014 OfCom report and are used by a significant, but smaller, proportion of the population include DVDs and Blu-rays, MP3 players, CDs or hi-fi music players and portable media players. This research focuses on only a subsection of mainstream ICT, including the internet, personal computers, tablet computers and mobile phones and smartphones. There are also brief mention of policies on access to digital television.

2.3. Some other ICT terms

There are a few terms used throughout the thesis which relate to an ICT context.

Interface: Refers to the point where aspects of information exchange meet. In the context of this study, the interface related to the ICT device people use to access information. Therefore the interface can be a mobile phone, a computer, or a tablet computer. It can also refer to a peripheral device such as a monitor

Graphic User interface (GUI): This refers to the type of interface users employ to access information on a digital device, using icons and text on a screen.

Bluetooth: This is a wireless technology which allows ICT devices to “communicate” with each other over short distances.

2.4. ICT-based care taxonomy

ICT-based care refers to health and social services which are delivered – or accessed – through an ICT device or network. In the UK, ICT-based care services are typically categorised according to the types of services they deliver – either health or social care services. Broadly speaking, ICT-based care is divided into telecare services, which are deployed by adult social care departments; and telehealth services which are under the remit of the National Health Service (NHS) (Department of Health, 2010a). Other terms to describe ICT-based care services recurring in the literature include “telemedicine”, “smart home technology” and “e-health”.

There is no standard taxonomy of ICT-based care, and definitions vary with different national or regional health and social care governing bodies, as well as in the international literature. The descriptions of the ICT-based care services used in this research are based on information provided by Technology Service Association (TSA), the largest industry body and network for

telecare and telehealth in Europe (Technology Services Association, 2013); these descriptions are also used by the Department of Health (Department of Health, 2011a).

2.4.1. Telecare

Telecare is a 24-hour remote support and assistance provided through the use of ICT. Via personal and environmental sensors placed throughout their home, users of telecare receive continuous, automatic monitoring from a distance. Telecare allows users to continue living in their own homes, with personal emergencies (e.g. a fall) and adverse home events (e.g. a gas leak or bathroom flood) detected in real-time, so that a response team can intervene accordingly (Telecare Services Association, 2013b).

2.4.2. Telehealth

Telehealth is the remote transmission of patient data between patients at home and clinicians to assist in the diagnosis and monitoring of long term conditions. Telehealth systems often consist of electronic sensors or peripheral devices which monitor vital signs such as blood pressure, oxygen saturation, temperature and weight remotely. The readings are automatically transmitted for clinical review via a telephone line or broadband internet connection. Through regular remote monitoring of these vital signs, health professionals can detect abnormal patterns and instigate appropriate interventions before a patient's health status deteriorates to a "critical" level (Telecare Services Association, 2013c), without patients having to attend a clinic (Department of Health, 2011a).

2.4.3. Telemedicine

The term telemedicine is often used in the literature to describe remote monitoring services of health status (Cardozo and Steinberg, 2010; Hill et al., 2010; Wadhwa, 2011), and is closely related to the description of telehealth above.

Telemedicine is also used in the specific context of consultation services between service users and healthcare professionals enabled by video-conferencing technologies (Healthcare UK, 2013; Lopez et al., 2011). To avoid confusion, the term telemedicine is not used here and I use the terms telehealth or tele-consultation services where needed.

2.4.4. Smart-home technology

Smart-home technology refers to a broad range of home automation devices and services which serve to address specific care needs. Cheek et al. (2005) broadly defined smart-homes as ICT technology used to build an automated home environment whereby devices can communicate with each other and with the internet. Smart-home systems have yet to be

deployed on a large scale (Kubitschke and Cullen, 2010), but elements of these systems (e.g. automatic alarm systems and passive environmental control services such as smoke alarms) are similar to the more advanced forms of telecare.

2.4.5. E-health

The terms e-health or e-healthcare are defined as the use of the internet and other ICT to support, deliver and manage health care services (Healthcare UK, 2013; Takahashi et al., 2011; Tse et al., 2008), covering a broad range of services. E-health is also used in the context of care professionals accessing data from electronic patient records via an allied care (e.g. NHS) web portal (Department of Health, 2011b; Healthcare UK, 2013). However, most references to e-health specifically refer to the act of searching the internet for health-related information (Takahashi et al., 2011; Tse et al., 2008; Xie, 2011), or accessing web portals to access health education services (Stellefson et al., 2008).

2.5. The evolution of ICT-based care

Telecare and telehealth are broad categorisations for several types of social care and health services, which are continually evolving. Advances in ICT have made mainstream devices and networks faster, more powerful and more “intelligent”, and have given rise to a new generation of ICT-based care services allowing for more precise, flexible and personalised care (Damant et al., 2013; Department of Health, 2005a). The evolution of ICT-based care is often described in terms of three distinct generations of technical developments, with an increasing sophistication of the functionalities allowing for improvements in real-time communication at the time of an emergency (Lloyd, 2011).

2.5.1. First generation

First generation ICT-based care services primarily refers to community alarm systems, which run on a conventional landline telephone connection. Service users actively trigger an alarm by pushing a button (or pulling a cord) on a device either placed in the home or worn as a pendant or on the wrist. The alarm reaches a call centre which assesses the nature and urgency of the problem and arranges for the appropriate response (Sixsmith and Sixsmith, 2008) according to an established protocol (Kubitschke and Cullen, 2010). Most telecare services deployed in the UK consist of first generation community alarm systems (Sethi et al., 2011).

First generation ICT-based care services are simple, affordable and easy-to-use, but they are limited by the fact that service users need to activate the alarm. There are many scenarios where users are unable to push an alarm button, such as being incapacitated, having a form of

cognitive impairment, or being unaware of an impending problem (e.g. flood in the bathroom) (Sixsmith and Sixsmith, 2008). This has led to the development of more advanced forms of ICT-based care.

2.5.2. Second generation

The inherent limitations of first generation ICT-based care services gave rise to the development of second generation services, which include a passive alarm dimension (Wadhwa, 2011). These include smoke and flood detectors as well as fall monitors, and consist of sensors which are placed throughout a person's home such as pressure mats, enuresis pads, bed and chair occupancy sensors and activity monitors (Technology Services Association, 2013). An alarm is triggered when environmental or personal circumstances are detected outside "normal" parameters. As with first generation systems, a monitoring centre receives the alarm, appraises the nature of the emergency and initiates the necessary response (Kubitschke and Cullen, 2010).

2.5.3. Third generation

Third generation ICT-based care comprise more advanced types of monitoring and alarm services, which collect continuous everyday activity and health data automatically via sensors placed throughout the home. These include devices such as electrical usage sensors, fridge door sensors, and front door detectors, and vital sign monitoring equipment. Data is sent to care professionals and family carers who monitored the data regularly and assess the need to provide help and support when data trends start to deviate away from a "normal" baseline (Kubitschke and Cullen, 2010).

3. Technology and society: the social function of ICT

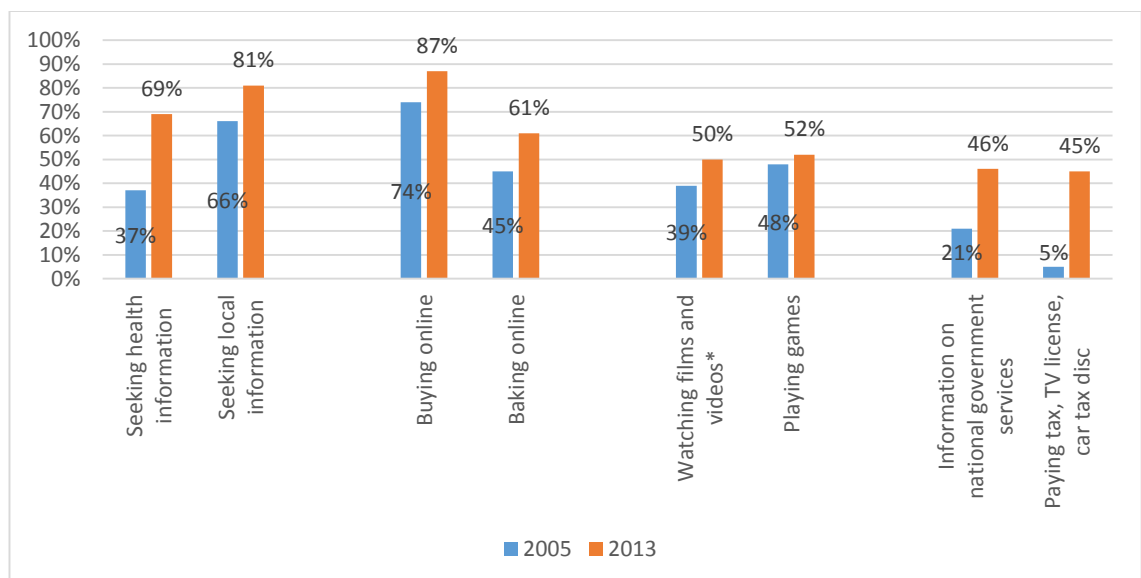
ICT is taking an ever more central role in our everyday lives (Dutton and Blank, 2011) as we turn to ICT to facilitate our daily activities. Figure 2-1 suggests that mainstream ICT has a wide-ranging social function in society. The social function that ICT plays was explored by Dutton and Blank (2011), where the notion of first-generation and next-generation ICT users was introduced. Essentially this typology distinguished the level to which ICT plays a central – or peripheral – role in our daily lives.

It has been clear since the onset of mainstreaming the internet that it was a transformative social force (Slevin, 2000, p. 27) on several levels: informational, commercial, leisure, civic and emotional. Indeed, the Oxford Internet Institute (OII) conducted their first biennial national survey of internet use (the Oxford Internet Survey (OxIS)) as early as 2003. In their most recent

report (Dutton and Blank, 2013), the OII described main uses of the internet in Great Britain and changes in popularity of these uses, illustrating the social role of the internet in daily life. Information-seeking (looking up information on local events, health, sports, travel, and news) has remained a popular internet activity since 2005. Figure 2-2 describes the large increase in proportion of users using the internet to search for information on local events and health. Seeking health-related information was a popular internet activity in 2013 for the sample as a whole, but compared to other activities, it does not appear to be a primary use of the internet. Similar results were found by OfCom in the *Adults' Media Use and Attitudes Report (2014)*: only 37% of respondents used the internet to look up health information, the third least common use of the internet. Surfing search engines and sending emails were the most popular internet activities (91% and 90% of adult respondents respectively).

The use of e-commerce (buying and selling goods and services online) has steadily increased over time, as have many entertainment and leisure functions (watching videos and playing games). The 2013 OII report also demonstrates a large increase in internet use for e-government, particularly for paying fees and fines and for seeking information about national government services (see **Error! Reference source not found.** for changes in usage rates of some activities).

Figure 2-2 Proportion of internet users engaging in information seeking, e-commerce and e-government in 2005 and 2013



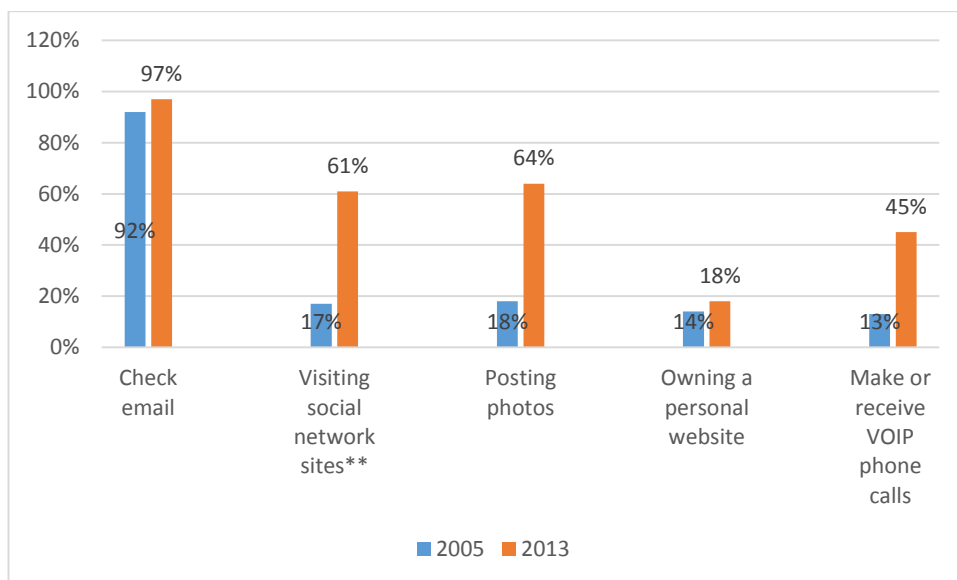
Notes: *Estimate from 2011 rather than 2005; Source: Dutton and Blank. (2013)

A large proportion of the 2013 report discussed the role the internet played in reshaping social networks, how friendships are managed and by extension, how individuals seek emotional

support. Results from the analyses also demonstrated that some support functions of the internet were not only the most popular activities (e.g. email), but also saw the biggest increases (e.g. social network sites, sharing photos) (Figure 2-3).

Dutton and Blank (2013) categorise the use of social networking as a creative or productive internet activity, implying that the usage is a form of self-expression. Creative use of the internet was available prior to popularisation of websites such as Facebook, such as the ability to create one’s own website. However, unlike social networking, there has been little change in ownership of personal websites, suggesting that social network sites are accessible and meet a social need. This also indicates that, over time, the internet itself has changed from a communication tool between people with high levels of ICT expertise to a medium of exchange and self-expression for the general population.

Figure 2-3 Proportion of internet users engaging in social activities on the internet in 2005 and 2013



Note: **Estimated from 2007 rather than 2005; Source: Dutton & Blank (2013)

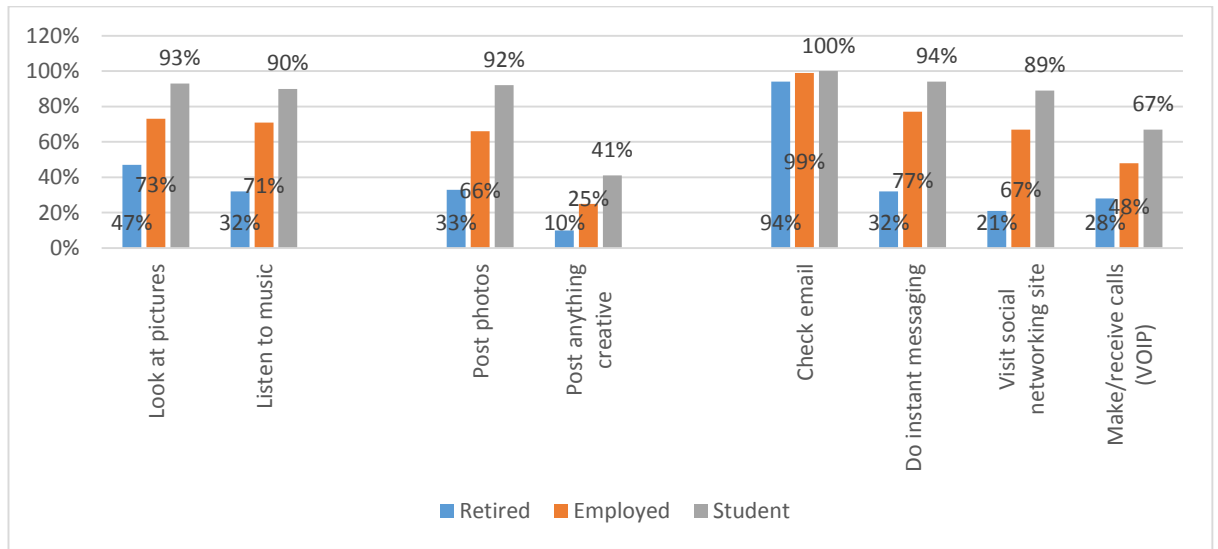
3.1. ICT and older people

The 2013 OII report described internet usage according to life stages: students, employed and retired. For the purposes of this study, it is assumed that most ‘retired’ respondents are older people.

Unsurprisingly, retired respondents had the lowest internet usage of all three life stages: only 43% of retired participants claimed to use the internet, compared to 100% of students and 93% of employed respondents.

Figure 2-4 shows the proportion of users in each life stage who engaged with social functions of the internet which offered emotional support. For most functions, retired users have considerably lower usage rates for most internet activities compared to employed - and student - users. The one exception is checking email, where there is a similar proportion of retired internet users (94%) to employed (99%) and student (100%) users.

Figure 2-4 Proportion of internet users engaged in internet functions that offer emotional support by life stage

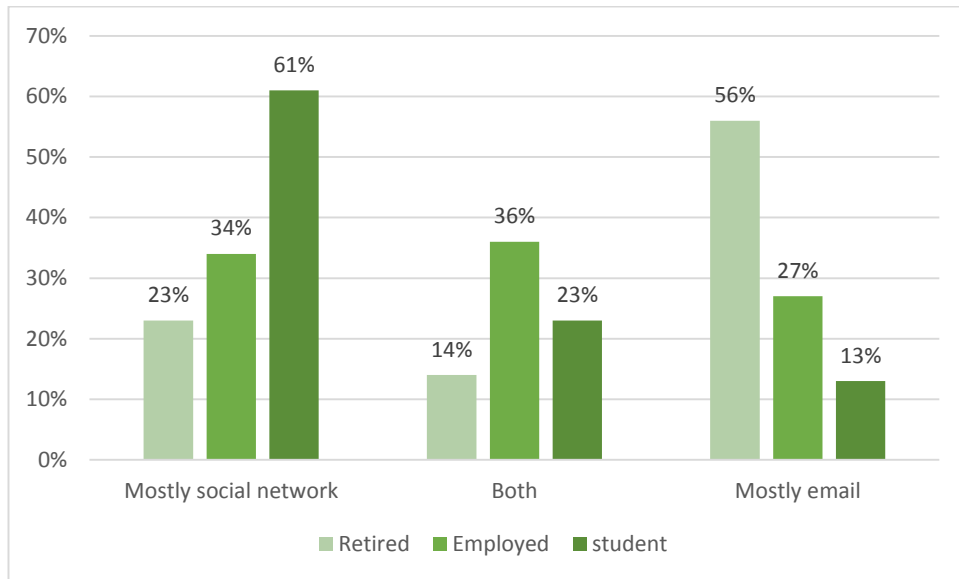


Source: Dutton & Blank (2013)

Using email proved to be the preferred method for communicating for retired users (Figure 2-5), while employed users used a mix of methods, and students showed a strong preference for using social networks. McAndrews and Jeong (2012) confirm older people’s reluctance towards using social networking: they found a negative relationship between age and most Facebook-related functions. Furthermore, older people who did use Facebook were more likely to interact with individuals directly, to look at their own page and to look at family pictures compared to younger people.

These findings allow for a different interpretation of Dutton’s hypothesis of the role of the internet in restructuring social networking customs, especially with the advent of social networking sites, where it appears to be salient amongst younger populations. Older people appear to stick to “known” procedures for communicating online (email), and those which resemble “traditional” methods of communication the most, such as writing a letter. Older people’s relative absence on social networking sites also suggests that the concept of a more public exchange of personal information may be unfamiliar and they may have different preferences for exchanging such information.

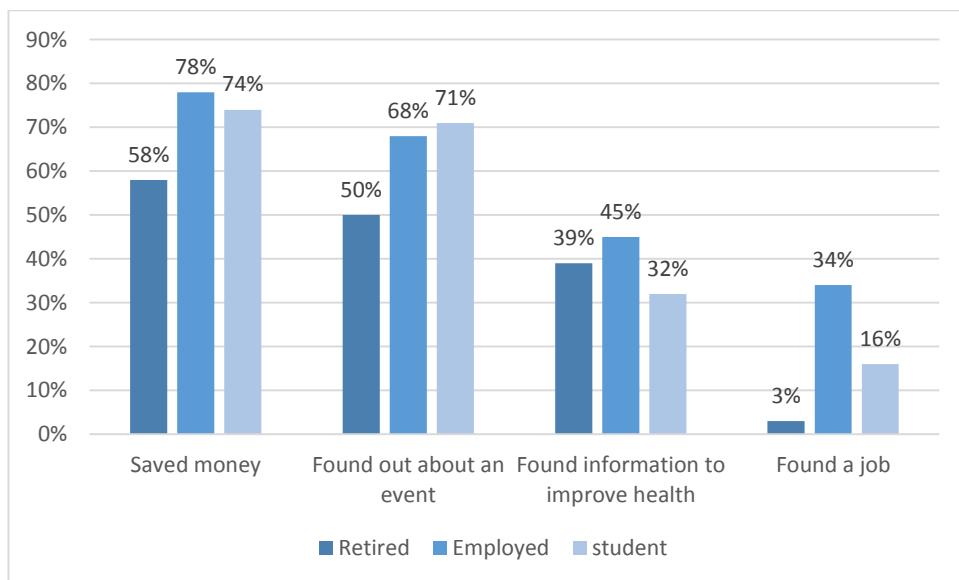
Figure 2-5 Use of email or social networking for communication



Source: Dutton & Blank (2013)

Estimates in Figure 2-6 suggest that compared to their engagement with internet activities which include aspects of social support (see Figure 2-4), retired users/ex-users perceive higher levels of benefit from online activities with include either informational or commercial elements. Retired users/ex-users had the lowest levels of perceived benefits of all life-stages for most activities listed in Figure 2-6. The exception was for finding information for improving health, where a higher proportion of retired people (39%) engaged with the internet for that purpose than the student sample (32%).

Figure 2-6 Proportion of internet users and ex-users who experienced effectiveness of Internet use by life stage



Source: Dutton & Blank (2013)

These results challenge popular assumptions that older people are primarily interested in health applications on the internet. They imply that the internet's role as an intermediary for older people to improve their health does not differ greatly from its role for the general population. Potentially its role is of lesser importance for health than it is for other social functions. These findings are corroborated by other studies. Olson et al (2011) found that the frequency of internet use for health information was similar between younger and older people. Wagner et al (2010)'s review of computer use of older people revealed that the most common uses of the internet by older people were for communication and support. Other uses cited included leisure and entertainment and information-seeking. However within information seeking, searching health-related information was a particularly popular activity. Similarly, Erickson and Johnson (2011) found that using the internet for email and to conduct searches were the activities for which the highest proportion of older respondents reported doing "often". Almost 60% stated they used email often and 43.3% used search engines often. Using the internet for "public information" was the next highest rated activity (35.3% of respondents). As in Dutton and Blank's 2013 report, only a minority of respondents said they used online communities and instant messaging "often".

3.2. ICT, gender and health

Contributors to Balka et al (2009) discussed gender disparities in ICT use, particularly with respect to functions related to health. For instance, Bella (2009) commented on the gender divide in technology, where men dominate the ICT workforce, including design of ICT products and services, which has resulted in ICT reflecting inherently "masculine" values, such as speed, strength and competition. Henwood and Wyatt (2009, p. 22) added the feminist perspective, suggesting that ICT is characteristically male and which consequently assigns gender roles to using technology. Bella (2009) argued that male characteristics were embedded into mainstream technologies, which opposed traditional "feminine" values of intuition, compassion and tenacity. The masculinity of ICT was also cited as the reason why many women could feel alienated from technology, and to feel "anxious" and "uncomfortable" when using ICT.

The feminist discourse was also used to explain gender differences in internet usage. In particular, compared to men, women more often used the internet to access health-related functions, and often for other people. These findings were seen to be reflective of women's traditional roles as nurturers and healers. In contrast, Seale et al (2006) found no differences in the proportion of men and women using the internet in relation to their diseases. Rather, they uncovered differences in the types of health information sought by men and women: men

tended to seek instrumental information around interventions and procedures related to their illness, while women tended to look for emotional and social support.

While there may be slight differences in how men and woman use the internet, evidence demonstrates that the technological gender divide has narrowed over time. In 2000, Slevin (2000, p. 42) stated that women made up almost 40% of internet users across industrialised countries. The OxIS data in 2003 and 2013 also demonstrated that gender differences were diminishing: in 2003, 55% of female and 64% of male respondents used the internet; in 2013, the percentages were 78% and 79%, respectively. There were also only marginal differences in terms of the types of internet activities men and women engage in (Dutton and Blank, 2013).

Dutton and Blank (2013) did uncover gender differences in internet self-efficacy: 70% of women and 77% of men rated their internet ability as excellent or good. However, the difference had decreased since 2011 (when it was 12 percentage points), suggesting that although some women may still have apprehensions towards using inherently “male” technologies, these are diminishing. Alternatively newer ICT, such as touchscreen devices, have adopted more “female” qualities with intuitive interfaces and more flexible “app” selection, allowing users to personalise their devices; features which could arguably be more in tune with “female” values.

4. Conceptual Frameworks

The research questions in this study were addressed through analyses of data following established frameworks of e-inclusion and quality of life.

4.1. Social inclusion

The term social inclusion (or social exclusion) has several connotations. Most commonly, it refers to people existing outside the margins of mainstream society (Levitas, 2005). In general, the term “social exclusion” has evolved to become an alternative expression for poverty and social inequalities. Specific forms of exclusion have been suggested, including political, institutional or cultural exclusion (Burchardt et al., 1999).

Levitas (2005) identified three broad, interrelated schools of thought on social exclusion. The first group consists of the *social integrationist* discourse which focuses on employment. The second group is the *moral underclass* discourse and mainly considers anti-social behaviour and crime. The final group is the *redistributionist* discourse, which originates from British social policy, and is primarily concerned with poverty and inequality.

One recent conceptualisation of social exclusion, lying outside the Levitas typology, was developed by Nussbaum and Sen (Helsper, 2008; 1993). It considers people's capabilities to be included and whether inclusion in society is based on one's ability to make a free choice. Unlike the previous discourse, the latter concept of social exclusion challenges the binary assumption that inclusion is "good" and exclusion is "bad", and considers the notion some people voluntarily choose to live outside of some (or all) of the confines of mainstream society (Helsper, 2008; Nussbaum, 2000).

The conceptual frameworks for e-inclusion and quality of life described below draw on the concepts of social exclusion delineated by Levitas (2005), with a particular emphasis on the redistributionist discourse, as well as Nussbaum and Sen's (1993) concept of social inclusion being driven by one's capabilities to make free choices.

4.1.1. Social inequalities and old age

The transitioning states of health and working life which characterise old age reflect the biological, and socially constructed processes of old age. The biology of ageing is associated with physiological changes in the body where the incidence and prevalence of disease and disability increase. The social constructs of ageing are the result of the values and attitudes about ageing woven into the social fabric (Blackman et al., 2001, pp. 154–155). Both forms of ageing lead to social inequalities, causing many older people to experience different forms of social exclusion and in turn reducing quality of life. Indeed, Dean (2009) and Walker (2009) acknowledged that growing older for many people represents a time of loss: loss of income, social networks and emotional support, health status and wellbeing. These put people of advanced age at greater risk of social exclusion and psychological distress (Walker, 2009). Similarly, Patsios (2006) linked decreased income and deteriorating health status that many older people experience with various forms of social exclusion, including impoverishment (or income poverty), exclusion from public and private services, and exclusion from social relationships.

Impoverishment

For several decades, ageing policies linked poverty and older age with the social inequalities associated with generation, gender, class and ethnicity (Scharf, 2009). Townsend (1981) coined the term "structured dependency" to describe old age as affected by imposed retirement, poverty and restriction in social roles. The combination of statutory retirement (Patsios, 2006) (which has since been reformed) and institutional ageism (Dean, 2009) (which has since been

made illegal) means that many older people are unable to work in order to “earn” their way out of poverty (Patsios, 2006).

Today’s older generation is considerably wealthier than previous generations of older people (Dean, 2009). Pensioners’ incomes grew in real terms by 66% in the 1980s and 1990s, allowing many older people to live more independently compared to preceding generations (Patsios, 2006).

However, a great number of older people have not benefitted from such rises in relative income (Patsios, 2006); approximately 2 million pensioners in the UK currently live below the poverty line (Dean, 2009). Scharf (2009) also observed that the gap between pensioners who were “better-off” and those living in poverty had widened over time. Scharf (2009) further noted that income poverty disproportionately affects older people from Pakistani, Bangladeshi and Black Caribbean communities.

Scharf et al’s (2002) study of older people living in three very deprived areas of England demonstrated that multiple deprivation was more likely amongst older women, the very old, and older people living alone. Walker (2009) and Abbott and Sapsford (2005) also highlighted the effects of gender on economic status and income in older age: women tended to experience deeper levels of exclusion in multiple dimensions compared to older men. The effects were attributed to women being much less likely to have access to occupational and personal incomes compared to men. Women were also more likely to have been in routine, manual occupations and to have worked part-time; and were also more likely to have interrupted their participation in the workforce to assume caring responsibilities (Walker, 2009). In their study of older people in Middlesbrough, Abbott and Sapsford (2005) found that older women in deprived areas were more likely to experience income poverty, were in poorer health, less likely to own a car and to be more fearful of crime, and therefore at greater risk of social exclusion compared to older men in the same areas.

Deteriorating health in old age is also associated with social inequality. Sixty percent of UK “pensioners” (i.e. described in Patsios (2005) as people of pensionable age: women aged 60 year and older and men aged 65 years and older) have a disability or limiting illness, and 30% reported that their disability or illness prevents them from conducting daily activities such as shopping, banking and leisure activities (Patsios, 2006). Dean (2009) noted that the poorest older people were five times more likely to be in poor health than the wealthiest older people. Chandola et al.’s (2007) analysis of The Whitehall II study also demonstrated that older people with lower occupational grades have poorer physical health compared to pensioners with

higher occupational grades, and older women reported worse physical health than older men (of the same occupational grade). Walker (2009) noted that life expectancy at 65 for women in social class I was four years longer than women in social class V, and that this disparity was widening. Patsios (2006) found that poorer and older pensioners were more likely to say that poor health prevented them participating in “common societal” activities. In particular, poorer pensioners with mobility problems felt excluded from social activities as they were unable to afford special transport. Blackburn (2001) also noted that the quality of life of older people with chronic illness is often highly dependent on environmental factors such as accessibility of public services and spaces, and affordability of care and appropriate transport.

Exclusion from public and private services

Patsios (2006) noted that older people are often excluded from using common services such as financial services, transportation services, social services (e.g. meals-on-wheels) and shopping facilities. Dean (2009) and Scharf (2009) also found that poverty often leads older people to use utilities (water, gas and electricity) less.

Being unable to afford services particularly affected older, single and poorer older people. In addition, Dean (2009), Abbott and Sapsford (2005) and Scharf et al (2002) demonstrated that living in deprived areas also affected access to services due to a lack of availability and poor transport links. Scharf et al.'s (2002) study showed that older people in deprived areas felt there was a lack of services: almost a third of respondents felt there were few services targeting older people specifically, and over a third noted few venues for them to meet, and that post offices, health, social care and welfare services and local transport services were missing. Blackman et al (2001) and Dean (2009) linked older people's access to services to disempowerment and ageism: older people's needs are disregarded because they are not “economically active” and are perceived to be at the end of their lives. This prevailing attitude promotes the idea of “the burden of ageing” and stigmatises older people and the services they commonly use. This in turn has an effect on availability of public and commercial services, particularly in disadvantaged areas where services are also affected by low levels of demand and higher levels of crime (Scharf et al., 2002).

Social relationships

Social isolation and loneliness amongst older people are important policy concerns (Age UK, 2013; Campaign to End Loneliness). Social relationships provide older people with essential instrumental and emotional support (Patsios, 2006; Scharf et al., 2002) and lack of access to

these relationships can have detrimental effects on both mental and physical health (Patsios, 2006). Scharf et al (2002) found a significant relationship between loneliness and self-reported quality of life for older people living in deprived areas.

Older people are at greater risk of social isolation and loneliness as their social networks shrink due to death, extended family members moving away or restrictions caused by poor health and wellbeing. This was particularly noted by poorer and single pensioners, who did not have access to enough emotional support and care in time of need, implying that they suffered a form of exclusion from their usual social networks (Patsios, 2006). Patsios (2006) also found that approximately 20% stated lack of affordability as a reason for being unable to participate in their usual social activities. Income poverty as a reason for exclusion from social relationships was reported more by younger than older pensioners.

Retirement was also identified as a source of exclusion. As older people leave the labour market they are often distanced from the social relationships with former work colleagues (Patsios, 2006). Patsios (2006) found that four-fifths of pensioners did not participate in social activities due to confinement, defined as an inability to leave the house, lack of transport, or poor accessibility to public venues. Abbott and Sapsford (2005) reported that fear of crime inhibited older people living in deprived areas from leaving the house and affected their ability to trust their neighbours. Scharf et al.'s (2002) study demonstrated that crime affected the ability of older people in deprived areas to access their social networks. Older women experienced more fear of certain crimes, such as being robbed on the street, than older men. The same study showed that older people of White, Pakistani, and Somali backgrounds had more concerns about personal safety than older people of Black Caribbean and Indian descent.

4.2. E-inclusion

The term "e-inclusion" is used throughout European Commission policy to describe citizens' participation in Europe's digital society. According to the *Riga Ministerial Declaration* (European Commission, 2006), "e-inclusion" refers to both people's use of ICT as well as the inclusiveness of ICT. As such, EC policies promote both the use of ICT by people who are at risk of exclusion, as well as the development of e-inclusive environment. In the UK, the Cabinet Office's *Government Digital Service* (GDS) uses the term "digital inclusion" to denote individuals' participation in Britain's digital economy, in policies such as the *Government Digital Inclusion Strategy* (Cabinet Office, 2014a) and the *UK Digital Inclusion Charter* (Cabinet Office, 2014b).

In this research I follow the terms set by the European Commission, and use the term “e-inclusion” when referring to discussions of ICT engagement and digital inclusion.

The precursor to the current e-inclusion frameworks consisted of discourse around the “digital divide”, which examined the information gap – and subsequent social inequalities – between those who did and did not have access to digital resources (Norris, 2001, chap. 1). This paradigm was later criticised for its one-dimensional perspective on material access to the internet, seen to lead to an overly simplistic, dichotomous portrayal of society (Stellefson et al., 2008). Warschauer (2004, p. 7) further suggested that the polarising notion of the digital divide not only focuses solely on physical access to the internet, but also falsely represents the large variances within population subgroups which are typically on the “wrong side” of the divide.

A new school of thought emerged, where digital divide theory was refined to include social divides, such as skills and usage, also seen to create gaps in access to the “information age” (Stellefson et al., 2008). The “first order divide” referred the traditional dimension of access to – or ownership of – ICT resources, highlighting the barriers created by the availability of technical infrastructure and financial resources. The “second order divide” addressed skills and usage of ICT, including personal and psychological obstacles to ICT access (Berry, 2011a; Stellefson et al., 2008).

Molnar (2003) devised a diffusion of innovation theory of e-inclusion, whereby the types of exclusion were seen typically to follow an “s-curve of adoption”. Early adoption was seen to create “access divide”. In the access divide phase, the cost of ICT is high and there is poor demand as the majority are unsure of the benefits. Therefore, the inequalities of the access divide lie between those who have and those who do not have ICT. In the “primary divide” phase, ICT becomes more affordable and there is a surge in adoption. The inequalities in the primary divide reflect the differences between those who have access and who are users and those who have access and who are non-users. Finally, as ICT-adoption reaches the saturation point in the “secondary divide” phase, there is only minority of people who are non-users. The issues of the secondary divide concentrate on the differences in types of usage and skills (Mancinelli, 2007).

E-inclusion theory emerged from the realisation that numerous non-material factors played a predominant role in the adoption of the internet (Berry, 2011a). Key factors which reinforced poverty and exclusion from society in general, such as low income, poor access to learning opportunities and unemployment, had been shown to have similar exclusionary effects on

access to the digital society. Thus, the study of e-inclusion became an extension of established social inclusion theories, which considered the factors which prevent excluded groups from participating in society and benefiting from its resources. Warschauer (2004, pp. 8, 28, 30) argued that social inclusion extends beyond the boundaries of what it means to be poor or having access to resources. Several factors, which transcend class and poverty, contribute to one's "exclusion", such as age, gender, disability, political leanings or sexual orientation. Warschauer further implied that the same principle applies to one's access to ICT (or e-inclusion). He emphasised the need to be part of the "digitised" society for all aspects of daily life from education, civic participation, personal relationships and cultural production, and without access to ICT people are "shut out of opportunities to practice full citizenship". His thesis was based on the concept that when ICT is properly deployed, it can help improve access to education, health and government, and therefore can be a conduit to social inclusion in the wider sense.

E-inclusion theory departed from the simple "have" or "have not" perspective of a digital divide, to reflect the multiple social, material and environmental factors which influence a person's ability to engage with ICT. (Bradbrook and Fisher, 2004; Helsper, 2008; Mancinelli, 2007). Furthermore, theorists recognised the dynamic nature of ICT engagement, viewing e-inclusion as a continuum, where an individual's level of engagement can change over time in response to advances in technologies or changes in life circumstances (Almuwil et al., 2011; Ferro et al., 2011).

Almuwil et al. (2011) noted that there are several ways to conceptualise and measure e-inclusion. Generally, its conceptualisation revolves around notions of material access to ICT, attitudes and motivation towards ICT, and ICT-related skills. However, similar to social inclusion theories, there are different approaches to framing a person's e-inclusion relative to the digital environment. For instance, van Dijk (2005, p. 22) developed a cumulative model of e-inclusion based on social inclusion theory, in which individuals were seen to gain successive access to digital resources, beginning with motivation access, subsequently acquiring material-, skills-, and usage-access (Almuwil et al., 2011). Verdegem and Verhoest (2008) developed a measurement of e-inclusion based on a model of relative utility, which differentiated different non-user groups according to their access to ICT, (general) skills and attitudes towards ICT. This model was designed as tool to assist in the development of targeted e-inclusion policies and programmes for each non-user profile. Helsper (2008) built on van Dijk's model of access to digital resources and added a dimension reflecting individuals' choice to engage or not engage

with ICT. Her approach was designed to highlight the differences between external and internal barriers to ICT adoption.

Bradbrook and Fisher (2004) developed a multidimensional e-inclusion framework in order to identify the personal and systemic barriers to ICT-engagement, which bear elements of van Dijk’s resource model (2005), however the former view each dimension as having a concomitant influence over e-inclusion, rather than a sequential one. Bradbrook and Fisher (2004) devised the “5Cs of digital inclusion” which include dimensions concerning connectivity (material access), capability (skills), content (perceived relevance and accessibility) and confidence (attitude). The final “C” encapsulated the continuity dimension, reflecting the resources needed to sustain people’s use of ICT.

4.3. The “6C” framework of e-inclusion

The 6C framework, used throughout this research, is based on Bradbrook and Fisher’s broad approach of the “5Cs of digital inclusion” (2004). The “5Cs” model describes e-inclusion as a graduated scale of ICT usage affected by a complex interplay of personal and systemic factors. The five “Cs” – or dimensions – identified as determining factors of e-inclusion consist of connectivity, content, capability, confidence and continuity (see Table 2-1).

The new 6C framework is generally faithful to the “5Cs” approach (2004), but adds a new, sixth, dimension of “cost”. It is derived from a review of both the literature on digital inclusion and alternative models. In addition, there are some refinements of some facets within the dimensions, for instance the connectivity dimension has been amended to reflect technological advancements in ICT devices and internet networks (Dutton and Blank, 2011).

Table 2-1 outlines the key dimensions and facets of the “5Cs” and 6C models; it also indicates the factors influenced by individuals’ personal characteristics (person-centred) and those influenced by the external environment (environmental).

Table 2-1 Description of the dimensions and facets of the 5Cs and 6C models

	E-inclusion dimensions	Facets of the 5Cs model	Facets of the 6C framework
Environmental	Connectivity	How people access the internet (devices) Where people access the internet Cost/affordability	How people access the internet (devices and networks) Network reliability Promotion and marketing

			Proxy use Purchasing equipment/subscription charges
Person- centred	Content	Relevance/usefulness Accessibility Language	Relevance/usefulness Motivation Accessibility
	Capability	ICT Skills ICT literacy Learning styles and needs Self-efficacy	ICT Skills ICT literacy Language Learning styles and needs
	Confidence	Awareness Motivation/interest	Attitudes Self-efficacy
	Cost		Income and purchasing power Consumer behaviour
Environmental	Continuity	ICT-infrastructure Scalability Funding Promotion	Stakeholder groups influence Where people access the Internet Funding for care Distribution and procurement Training and support

Source: Bradbrook and Fisher (2004)

It must be stressed that the dimensions of the 5Cs model – and by extension – the 6C framework are interrelated and therefore some topics overlap, leaving the model subject to differences in interpretation. For instance, language can be viewed as an artefact of design – or content – where ICT manufacturers and designers use particular technical terms to describe different aspects of ICT. However, learning and understanding a contemporary lexicon can be also be viewed in terms of cognitive ability or literacy.

The following sections describe each of the six dimensions of the 6C framework of e-inclusion in more detail and explains the reasoning behind any changes made to the original 5Cs model.

4.3.1. Connectivity

In the original 5Cs model, the connectivity dimension concentrated on how and where individuals accessed the internet (Bradbrook and Fisher, 2004). The hardware and software that people had access to – or owned – were discussed within the context of where they accessed the internet, raising the issue of the affordability of ICT. Bradbrook and Fisher proffered an extensive analysis of the issues surrounding home versus public access to the internet. They highlighted the contributions made by public policy and third sector organisations, such as *UK Online Centres* (UK Online Centres, 2014a), in democratising internet access so that cost and income were no longer barriers to use. Under the 6C framework (in contrast to the 5Cs model), the focus shifts onto how stakeholders facilitate individuals' material access to the internet.

The 6C framework also examines ownership – and use of – ICT hardware, such as mobile phones and tablet computers, in addition to computers. In contrast to the 5Cs model, the 6C framework also considers the type of broadband connection to which individuals have access. Since the 5Cs model was developed over a decade ago, a new generation of ICT devices and internet networks have been introduced to the market which allow for ubiquitous internet access, and consequently have altered the meaning of both how and where people access the internet. The shift in trends in internet access were noted by Dutton and Blank (Dutton and Blank, 2011), who implicitly proposed a revised definition of “connectivity” based on the number and types of devices used to access different internet networks.

Furthermore, developments in internet technologies have introduced new issues concerning equality of access to - and the reliability of – different internet networks. These developments also highlight the role of government policies in balancing commercial interests with social welfare concerns (Mason et al., 2012; OfCom, 2012; Ragoobar et al., 2011).

4.3.2. Content

The content dimension of the 6C framework centres on the two main facets identified in the 5Cs model: perceived relevance – or usefulness – of ICT, and accessibility (Bradbrook and Fisher, 2004). What is common between these two themes is that both consider the design of ICT devices and services. Therefore, the essence of this dimension is how individuals' needs, abilities and interests are met by ICT devices, services and systems. Where the facets diverge is that perceived relevance entails users' subjective appraisal of –and overall satisfaction with –

the design of ICT. Accessibility consists of the objective experience of using and manipulating ICT interfaces.

Bradbrook and Fisher (2004) described the perceived relevance of ICT as the applicability of content to people's lives; without a compelling reason to employ ICT, the technology is not perceived to be relevant or useful. In the 5Cs model, motivation was implied as underpinning perceived relevance and usefulness. Bradbrook and Fisher, however, stressed the explicit influence of motivation as the central facet of the confidence dimension. In the 6C framework, motivation is an explicit facet of perceived relevance and is included in the content dimension.

The second facet of the content dimension consists of the objective components of content, i.e. the *accessibility* of an ICT device or service. The European Commission broadly defines accessibility as the removal of barriers in the environment which might prevent people with disabilities from "using products, services and the public infrastructure" (European Commission, 2014a). In terms of the internet, the EC refers to accessibility as the capacity for all people, regardless of level of ability, to be able to "perceive, understand, navigate and interact with the Web" (European Commission, 2014b). For the purposes of this research, the two definitions proposed by the EC are combined to describe accessibility of all forms to ICT. Therefore accessibility of ICT systems, services and devices, is defined as the ease with which users can physically and cognitively use, manipulate and understand its content.

The original 5Cs model included language as a facet of the content dimension, within the context of English being the *lingua franca* of the internet, which is a barrier for some people in Britain (Bradbrook and Fisher, 2004), and even more so for people across the world.

Unfamiliarity with a particular language or vocabulary can also be linked to literacy, defined by UNESCO as:

"the ability to identify, understand, interpret, create, communicate and compute using printed and written materials associated with varying contexts"

UNESCO Education Sector Position Paper, 2004, p.13

The 6C framework diverges from the 5C model by incorporating issues around language into discussions on literacy in the capabilities domain.

4.3.3. Capability

While the content dimension examines the presentation of ICT, the capability dimension investigates people's internal characteristics in relation to ICT. The original 5Cs model described "capability" as the skills and level of literacy required for non-adopters to improve

their participation in the labour force, as well as their quality of life. Bradbrook and Fisher defined ICT-literacy as the ability to use a broad range of continually evolving ICT content. This latter definition is used here to describe general ICT-skills in the 6C framework.

The 6C framework moves away from the topic of employability and focuses on ICT-related skills, which potentially improve overall quality of life. To measure capability, a discrete list of skills proposed in the Eurostat database (2014) is used to estimate level of skill (see Box 2-1). Eurostat categorised low, medium or high level of skill according to the number of ICT-related activities that an individual could perform from the list.

Box 2-1 Activities used to indicate computer and Internet skill levels.

<i>Computer skill</i>	Cut, copied, pasted Moved files, folders Created basic formulae in spreadsheet Compressed files Created computer programme Installed peripheral device (e.g. printer)
<i>Internet skill</i>	Used search engine Attached files to an email Posted message on online forum or chat room Made phone call using the Internet Engaged in file sharing (e.g. music, video) Created a webpage

Source: Eurostat tables [isco_sk_cskl_i] and [isco_sk_iskl_i]

As mentioned above, in the 6C framework the language facet is included as part of the capability dimension, as it is concerned with literacy. Therefore, the description of ICT-literacy used in the 6C framework refers specifically to a person's understanding of the language used in the context of ICT.

The final facet of the capability dimension in the 6C framework, taken directly from the 5Cs model, involves learning styles and needs, which enable people to acquire the necessary skills to engage with ICT.

4.3.4. Confidence

In the 5Cs model, motivation was the key driver of the confidence dimension. Bradbrook and Fisher referred to Foley et al.'s (2002) e-inclusion model, which identified a person's awareness of the benefits of ICT as the fundamental building block of ICT adoption: without awareness of its usefulness, individuals were unlikely to use ICT.

The confidence dimension in the 6C framework, on the other hand, is based on other e-inclusion models, such as Helsper (2008) and van Dijk (2005) which conceptualised individuals' attitudes towards ICT as a resource which facilitated or impeded e-inclusion. In short, attitudes were seen to underpin individuals' willingness to accept ICT into their daily lives (Helsper, 2008; Verdegem and Verhoest, 2008).

Another facet of the confidence dimension in the 6C framework is self-efficacy. Bradbrook and Fisher's 5Cs model included self-efficacy as a measure of individuals' abilities to employ ICT and it was included in the capability dimension. However, Helsper (2008), Mason et al. (2012) and Haddon (2000) noted that self-efficacy is matter of individuals' self-belief about their abilities, which is intrinsically linked to their attitudes. Self-efficacy can be deemed to be tantamount to confidence and therefore is analysed within the confidence dimension.

4.3.5. Cost

Cost is the "sixth dimension", a major addition to the original 5Cs model. In the 5Cs model, cost was a facet of the connectivity dimension (Bradbrook and Fisher, 2004). Similarly, van Dijk (2005) and Bentivenga and Guerrieri (2010) referred to cost and affordability within overarching dimensions related to material access to ICT (Almuwil et al., 2011).

Income is an indicator of an individual's purchasing power, which in turn reflects the degree of financial access a person has to ICT devices and service subscriptions, as well as overall ICT-engagement.

However, income and access to financial resources can also be seen as key indicators of social wellbeing (OECD, 2014), social inclusion (Mancinelli, 2007), and by extension, e-inclusion (Berry, 2011b; Helsper, 2008). In other words, cost is not a one-dimensional marker of ability to purchase equipment or pay a subscription fee. Rather, "cost" also evokes individuals' personal values and consumerist behaviours, and directly affects how individuals perceive the benefits of ICT. Cost also relates to the leverage of various stakeholder groups within the ICT industry, which can affect the shape of the market infrastructure, particularly with respect to ICT-based care. Therefore, as cost has far-reaching implications beyond simply facilitating

access to – and ownership of – ICT, the cost facet in the 5Cs model is elevated to a dimension in its own right in the 6C framework.

4.3.6. Continuity

The continuity dimension within the 6C framework stems from that in the 5Cs model, based on Dutton and Blank's (2011) argument that ICT has become such an essential part of society's infrastructure that it plays a central part in individuals' daily life. The 5Cs model therefore addressed the mechanisms employed to promote and fund the roll-out of e-inclusion initiatives to enable non-users to participate in Britain's digital society. The 6C framework extends the continuity dimension to include the social support resources identified by van Dijk (2005) as essential for continued ICT use. In other words, it addresses what type of support people need to improve their e-inclusion as well as the stakeholders who need to be involved in such endeavours. The continuity dimension is unique in addressing the full ICT market from several stakeholders' perspectives. Some aspects touch on topics discussed in other dimensions, such as financing which overlaps with the cost dimension

4.4. Quality of life

Social inclusion - and by extension e-inclusion - and quality of life are inextricably linked. For instance, to explain the background of her conceptual framework of e-inclusion, Helsper (2008) referred to several measures of social exclusion, including the Index of Multiple deprivation (Office of the Deputy Prime Minister, 2004) and ACORN (CACI Ltd, 2013), which incorporate indicators often associated with quality of life such as health, wellbeing and access to material and social resources. Her analyses then drew links between deficiencies in one's quality of life and lack of engagement with ICT.

Similarly, in Warschauer's scrutiny of the original digital divide theories, he examines causal relationships between access to ICT, social inequalities and quality of life. The first iteration of digital divide theory, which looked only at access (or lack thereof) to the internet, implied that lack of access to ICT "harms life chances" (p.7), which loosely interpreted is saying that lack of access is a cause of social inequalities and in turn negatively affects quality of life. Warschauer agreed this to be true to an extent, but further entertained the reverse also to be true: that social inequalities and quality of life influence access to ICT (2004, p. 7).

In earlier sections, I also referred to different concepts around social inclusion, and in particular how these concepts apply in old age. In the presentation of some of the contemporary discussion of the social inequalities experienced by older people, there are

implicit assumptions made about older people's quality of life insofar as various forms of "inequality" are implicit indicators of being at risk of having poor quality of life.

In Chapter 8, I investigate the impact of older people's use of ICT – both for mainstream and care purposes – on their quality of life (QOL). QOL is a complex concept, and there is no single accepted definition. However, most concur that QOL is a multi-faceted concept, including both objective and subjective "domains" of life, which generally include elements of physical state, social functioning, and emotional well-being (Bond and Corner, 2004, pp. 5–6).

A number of instruments have been developed to assess quality of life in varying contexts, many of which focus on health-related quality of life (HR-QOL) such as the SF-36 (Brazier et al., 1992), the Eq5D (EuroQOL Group, 1990) and the HUI® (Horsman et al., 2003). There is also a succession of HRQOL tools with a disease-specific focus to assess the effectiveness of medical interventions and treatments. For instance, DEMQOL was developed to measure HR-QOL for people suffering from dementia (Banerjee, 2012), and the EORTC QLQ C30 was designed to measure QOL in people undergoing cancer treatment (Longworth et al., 2014).

There are also a number of assistive technology QOL instruments, such as the Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST) (Demers et al., 2000), the Psychological Impact of Assistive Devices Scale (PIADS) (Jutai and Day, 2002) and the Assistive Technology QOL Scale (ATQOL) (Agree and Freedman, 2011). Together, these tools measure relevant effects of assistive technology use on several relevant domains with respect to QOL. However when taken separately, each instrument is limited to one or two particular QOL domains. For instance, the QUEST instrument focuses on the accessibility of devices and users' level of satisfaction with the related support services. The PIADS instrument concentrates on the psychological and emotional effects of using assistive technologies. The ATQOL arguably has the widest scope, however it has yet to be validated and used in empirical research.

In this research, the main focus is the use of ICT in day-to-day living for those both living in their own homes and within a social care setting. A more holistic QOL framework is therefore used, which captures the complexities of daily life as well as aspects of receiving care services. This framework includes elements from the Adult Social Care Outcomes Toolkit (ASCOT) (Netten et al., 2011), and the WHOQOL (The WHOQOL Group, 1998) models of QOL.

The Adult Social Care Outcomes Toolkit (ASCOT) is a QOL instrument designed to measure social care-related QOL. Based on Sen's seminal study of social capital and capabilities (Sen, 1985), the ASCOT model measures individuals' choice and control with respect to social care

services, rather than their functioning state (Netten et al., 2011). The capability approach captures the essence of many e-inclusion paradigms, as the latter aim to assess individuals' access to ICT in terms of their capabilities (e.g. physical and cognitive abilities, skills, literacy) and access to social capital (e.g. financial and social resources; public policy).

Box 2-2 sets out the eight domains of ASCOT, which include control over daily live, personal cleanliness and comfort, food and drink, personal safety, social participation and involvement, occupation, accommodation cleanliness and comfort, and dignity.

Box 2-2 ASCOT domains

Domain	Definition
<i>Control over one's life</i>	Ability to choose what to do and when to do it. Having control over daily activities
<i>Personal cleanliness and comfort</i>	Being clean, dressed and groomed to the level that the person feel comfortable and presentable
<i>Food and drink</i>	Has enough food and drink, which is nutritious, varied and culturally acceptable
<i>Personal safety</i>	Feeling safe and secure, free from abuse, harm or falling
<i>Social participation and involvement</i>	Content with social interactions with family, friends, and feeling part of the community
<i>Occupation</i>	Sufficiently occupied with a range of meaningful activities
<i>Accommodation cleanliness and comfort</i>	Cleanliness and comfort of home environment
<i>Dignity</i>	Psychological impact of using social care services according to users' personal sense of significance

Source: ASCOT: Main guidance, v2.1 (Netten et al., 2011)

Because the ASCOT was designed for measuring quality of life in a social care context, some dimensions are less fully defined for the needs of this research than would be desirable. For instance, the dignity domain focuses primarily on self-esteem, whereas there is a range of other emotions, such as anxiety, fear, contentment and optimism that might be captured. For this study, some dimensions and facets of the WHOQOL model were therefore merged with the ASCOT model to create a combined framework.

The WHOQOL tool is based on a multidimensional perspective of QOL, developed to be applicable to varying cultures throughout the world. It focuses on individuals' perspective of their position within their culture in relation to their goals, expectations and concerns (The

WHOQOL Group, 1998). In contrast to ASCOT’s capability approach, the WHOQOL considers individuals’ perspective on their state of being.

Box 2-3 sets out the six WHOQOL domains and the facets for each domain. The six domains include physical, psychological, level of independence, social relationships, environment, and spirituality. The WHOQOL also includes an overall QOL and general health assessment.

Box 2-3 WHOQOL domains

Domain	Facets
<i>Physical</i>	Pain and discomfort Energy and fatigue Sleep and rest
<i>Psychological</i>	Positive and negative feelings Thinking, learning, memory and concentration Self-esteem Bodily image and appearance
<i>Level of independence</i>	Mobility Activities of daily living Dependence on medication or treatments Work capacity
<i>Social relationships</i>	Personal relationships Social support Sexual activity
<i>Environment</i>	Freedom, physical safety and security Home environment Financial resources Health and social care: accessibility and quality Opportunities for acquiring new information and skills Recreation and leisure activities Physical environment (e.g. pollution, noise) Transport
<i>Spirituality</i>	Religion, personal beliefs
<i>Overall QOL and general health perceptions</i>	

Source: WHOQOL revised version, 2012

4.5. The combined QOL framework

There are many similarities in the domains and facets covered in the two QOL models. Where the models diverge slightly, they serve to complement each other.

This research aims to understand older people's needs in relation to ICT, with an underlying concern with care. The combined QOL framework consists of six dimensions, based primarily on the ASCOT model (Box 2-4). The first four dimensions, control over one's life, personal safety, social participation and involvement, and occupation are ASCOT dimensions, slightly amended to incorporate complementary facets of the WHOQOL model.

The remaining two dimensions, psychological wellbeing and physical health, are primarily based on the WHOQOL model. Psychological wellbeing is an expanded version of the ASCOT dignity dimension, including a broader scope of feelings suggested by WHOQOL. The physical health dimension and related facets are taken entirely from the WHOQOL model. There is no equivalent dimension in the ASCOT model, as this was not concerned to measure physical functioning.

Box 2-4 Quality of life domains of the combined QOL framework

Domains of combined QOL model	Facets of combined QOL model	WHOQOL facets not considered in combined model
Control over one's life	-Independence -Personal Cleanliness and comfort -Food and Drink -Accommodation cleanliness and comfort/home environment -Activities of daily living	-Dependence on medicine and treatment -Financial resources
Personal safety and security	-Feeling safe, secure, free from abuse and harm -Freedom from crime -Privacy ²	-Availability of health and social care ¹ -Transport -Physical environment
Social involvement	-Personal relationships with family, friends, -Feeling part of the community	-Sexual activity

and participation		
Occupation	<ul style="list-style-type: none"> -Paid employment/work capacity³ -Caring for others -Volunteer work -Recreation and Leisure -Information seeking/opportunities for learning new skills⁴ 	
Psychological wellbeing	<ul style="list-style-type: none"> -Dignity⁵ -Sense of personal significance -Positive and negative feelings -Self-esteem -Obtrusiveness/bodily image and appearance⁶ 	
Physical capability⁷	<ul style="list-style-type: none"> -Indicators of health status -Physical activity -Memory and cognition⁸ -Health-related behaviour -Health-related awareness and knowledge 	
<p>Notes:</p> <p>¹ Availability of health and social care services is a topic discussed in the market analysis in <i>Chapter 6</i></p> <p>² Privacy is an additional facet to the personal safety and security domain</p> <p>³ The “work capacity” facet of the independence domain of WHOQOL is discussed in the context of ability to carry out paid employment in the occupational domain of the combined QOL model</p> <p>⁴The Opportunities for learning new skills is a facet of the environmental domain of WHOQOL is introduced as the “information seeking” facet of the occupational domain in the combined model</p> <p>⁵The dignity domain of ASCOT is renamed the psychological wellbeing model after the WHOQOL psychological domain; dignity is a facet of the psychological domain in the combined model.</p> <p>⁶Obtrusiveness is related to the bodily image and appearance facet of the psychological domain of the WHOQOL model, and is introduced to the psychological wellbeing domain in the combined model</p>		

⁷Physical is not an original ASCOT domain and is taken from the “physical” domain from WHOQOL

⁸Memory and cognition are normally included in the psychological wellbeing domain of WHOQOL, but are considered to be part of the physical capability domain in the combined model

⁹The spirituality and personal beliefs facet of the WHOQOL model is not included in the combined QOL model

4.5.1. Control over one’s life

The control over one’s life domain in the ASCOT model is an individual’s self-assessment of their overall ability to live the lifestyle they chose. The notion of control is linked to the policy agenda around choice and independence for people with care needs (Department of Health, 2005b, 2006). The WHOQOL level of independence domain closely mirrors this aspect of ASCOT model, as it refers to activities of daily living (ADLs), mobility, and management of medication and treatments (see Box 2-3). The environment dimension of the WHOQOL model also includes items concerning the comfort of the home environment, which alludes to individuals’ control over their immediate surroundings. The original ASCOT model included a similar domain on accommodation cleanliness and comfort, suggesting elements of control over daily life with respect to being able to do household chores. The ASCOT model includes other dimensions which assess individuals’ satisfaction with their ADLs, such as personal cleanliness and comfort, food and drink, and (see Box 2-2).

Therefore, the WHOQOL model’s level of independence domain is merged with the ASCOT model’s control over one’s life domain in the combined framework. The three ASCOT domains referring to ADLs are included as facets of the control of daily living domain in the combined framework.

The final addition to the control over daily living dimension in the combined model concerns the financial resources facet of the environment domain in the WHOQOL model. Financial resources are also an indicator of independence as well as an important aspect of control; inadequate income restricts the activities and material goods one has access to (Bond and Corner, 2004). As financial independence is not an explicit facet of the ASCOT model, this facet was taken from WHOQOL’s environment domain to be part of the control over daily life domain in the combined QOL framework (Box 2-4).

The WHOQOL model also examines individuals' work capacity. This facet is included in the occupation domain in the combined framework.

4.5.2. Personal safety and security

Personal safety and security reflects individuals' perceptions of feeling safe and secure from physical harm, falling ill, crime or abuse. The WHOQOL model's environment domain also includes indicators of perceptions of safety and security.

Neither of the two base models include a specific facet concerning privacy, which is an important element of perception of safety, especially within the context of ICT. In this sense, maintaining control over one's identify and personal information from others is akin to the ASCOT facet of "being free from fear of abuse". Therefore the privacy facet is added to the safety and security domains of the combined model.

Facets of the WHOQOL model which are not included in the combined models include transport and physical environment with respect to pollution and noise as they have limited relevance to the use of ICT. Access to health and social care services is also not included in the combined model, although there is an effort in chapter 8 to understand the impact of the use of ICT-based care services on quality of life, and access to care services is one of the issues under consideration.

4.5.3. Social participation and involvement

The combined framework used for this study draws on the social participation and the involvement domain of the ASCOT model and the social relationships domain in the WHOQOL model, which are highly similar. Both models consider the types and extent of personal relationships in which individuals engage, as well as the mechanisms they use to acquire or maintain their social networks. The only omission in the combined model is the WHOQOL facet around sexual activity.

4.5.4. Occupation

The occupation domain in the ASCOT model considers individuals' satisfaction with their ability to engage in meaningful activities, including paid employment, volunteer work, caring for others, leisure or recreation (Box 2-2) (Netten et al., 2011). The WHOQOL model does not contain a similar domain, but it does include facets concerning recreation and leisure (environment domain) and work capacity (independence domain), both reflected in the list of meaningful activities in the ASCOT model. Therefore these WHOQOL facets have been moved to the occupation domain for the combined QOL framework.

The WHOQOL model also includes a facet concerning learning opportunities and access to skills training (environment domain – see Box 2-3), but the combined model adds activities around information seeking to these, because this is important for e-inclusion policy (Cabinet Office, 2014a) and therefore an essential component of the combined QOL model.

4.5.5. Psychological wellbeing

The dignity domain of the ASCOT model is reconstructed to align with the psychological domain of the WHOQOL model. Dignity and a sense of personal significance are important outcomes of social care services, as they describe specific outcomes to receiving care at a time of heightened vulnerability. The WHOQOL psychological domain, on the other hand, includes a number of indicators which reflect emotions such as positivity about the future, anxiety, depression, self-confidence, as well as a sense of value (The WHOQOL Group, 1998). The expanded range of feelings and emotions assessed in the WHOQOL model allows the framework to be more readily transferable across contexts. Therefore, the combined framework domain is based on the WHOQOL model, which incorporates the dignity dimension from the ASCOT model. The thinking, learning, concentration and memory facet of the WHOQOL psychological domain is included in the physical health domain, as it is considered to be an indicator of level of cognition. The body image and appearance facet of the WHOQOL model is not included in the combined framework, as it is not directly applicable to the subject of ICT use.

4.5.6. Physical capability

The final domain is physical capability, drawn from the physical domain in the WHOQOL model. There is no counterpart in the ASCOT model. Within the context of this research, the physical capability domain considers the association between using ICT and physical health and related behaviours.

In the White Paper, *'Our Health, Our Care, Our Say'* (Department of Health, 2006) and the recent *Care Act 2014* (Department of Health, 2014), the government has continued its pledge to pave the way for people to have more choice and control over their care. The deployment of home-based ICT care services in England was in part driven by policies for providing more flexible and responsive care and enabling people to take control over their own health (Milligan et al., 2011). Indeed, ICT-based care systems are designed to compensate – at some level – for physical, sensory and cognitive limitations (Age UK, 2010a), as well as to assist people to manage an illness through various behaviour modification interventions (van den Berg et al., 2012).

The ASCOT model is firmly rooted in the social model of disability (Netten et al., 2011) and facets concerning physical health status are not included. However, many ICT-based care services are designed to compensate for various physical and cognitive impairments (e.g. medicine reminders, fall detectors) and there is an implicit expectation that the services could have an effect on people's physical abilities (Age UK, 2010a), enabling them to better live the life of their choosing. Therefore, the physical capability domain in the combined model follows the ASCOT capability approach to QOL, but indicators of functional health status, such as sleep, fatigue, energy, and pain, are placed in the physical capability domain to help to gain an overall understanding of physical capabilities. The domain also includes facets which describe people's behaviours, knowledge and awareness of health issues that directly affect their physical capabilities.

As mentioned above, the thinking, learning, concentration and memory facets from the psychological domain of the WHOQOL model (see Box 2-3) are included in the physical health domain of the combined framework, as these are seen to be clinical indicators of cognitive abilities. For instance, several of these facets are components of the Mini Mental State Examination (MMSE) which is used to diagnose cognitive impairment related to a head injury or dementia (Folstein et al., 1975). As such, these facets are related to health, rather than to an emotional state.

5. Discussion

Old age is often associated with changes to working life and health status. These changes predispose many older people to several social inequalities including impoverishment, diminished social networks and emotional support, and lack of access to public and private services, which in turn can have a negative on their quality of life.

However, people are living longer, healthier lives and the parameters of "old age" are being reconsidered. Recent UK legislation has taken note of the fact that many older people remain healthy and active beyond the conventional retirement age, giving older people more freedom to continue to work, and more protection against ageist work practices. The current definition of older people follows conventions established by international organisations. However, it is important to be reminded that the older population is continually changing. Failing to update our notion of "old age" could lead to false assumptions about people interests, needs and lifestyle.

The concept of mainstream ICT covers a great range of technological systems, but this research concentrates on those devices, services and systems which are likely to have most import for

the quality of life of older adults. It might be noted that although digital TV is important for older people (OfCom, 2013a; Ofcom, 2014), they have not generally embraced the interactive applications of this media (Sourbati, 2011) and therefore it is not included here in the current definition of “mainstream ICT”. However, some aspects of policy related to digital television are discussed in chapter 6.

It has been shown that there are several definitions of ICT-based care services, such as telecare and telehealth. In the UK, telecare refers to services commissioned by adult social care departments, such as fall detectors and community alarms (Corbett-Nolan and Bullivant, 2012; Department of Health, 2011a). In the US, in contrast, telemedicine refers to all ICT-based care services, including those services known as telecare in the UK (Cardozo and Steinberg, 2010; Hill et al., 2010). For this reason, the definitions are harmonised to be able draw generalisation about these services from the international literature.

The 6C framework of e-inclusion draws mainly on Bradbrook and Fisher’s 5Cs of inclusion (2004), but other e-inclusion models by Helsper (2008) and Van Dijk (2005) were also drawn on. The 6C model departs from established e-inclusion models by adding the sixth dimension, cost. Through the analyses of ICT-use in the following chapters, I will aim to determine the legitimacy of cost as a stand-alone determinant of e-inclusion.

To assess the effects of ICT use on quality of life, I constructed a combined framework based on the ASCOT (Netten et al., 2011) and WHOQOL (The WHOQOL Group, 1998) instruments for measuring QOL. Both models embrace a holistic approach to QOL, diverging from the commonly narrow focus on health status of other QOL instruments.

Despite the differences in approaches, the two QOL models complement each other to form a broad QOL framework, which can be applied to study ICT use across different contexts. There are no specific QOL instruments developed to measure the effects of e-inclusion or the use of ICT in care. Therefore, like the cost dimension of the 6C, the analyses in Chapter 8 may shed light on the suitability of established QOL instruments with respect to ICT use.

Chapter 3 : Methodology and Data sources

1. Introduction

The purpose of this research is to gain a deeper understanding of the extent of older people's access to – and use of – ICT in different contexts by reference to the broad concept of quality of life. The principal research questions are:

3. *What is the level of engagement of older people with mainstream – and care-related – ICT?*
4. *How does this engagement affect their ability to fully participate in their communities?*

By linking these questions to the concepts within the 6C framework and the combined quality of life paradigm, a number of subsidiary research questions can be identified:

- f) What is the level of e-inclusion of the older population?
- g) What is older people's level of access to ICT-based care?
- h) In what ways do personal and environmental factors influence older people's access to mainstream ICT and ICT-based care?
- i) How does the use of ICT – both for mainstream and care-related purposes – affect the quality of life of older people?
- j) To what extent do contemporary indicators of e-inclusion reflect the level of participation of older people in their communities?

These research questions structured the approach taken both to explore the concepts of e-inclusion and quality of life, and to consider whether these concepts are applicable to the needs and lifestyle of the older population. Several different techniques were employed to answer the principal research questions, in other words there was a mixed-methods approach.

I conducted both primary and secondary analyses of quantitative and qualitative data, collected from a number of different sources. The quantitative methods included secondary analyses of project and survey data, allowing me to derive a broad measure of the influences and effects of e-inclusion on the lives of older people. I also investigated the nuanced effects of the six dimensions of e-inclusion using a combination of systematic review methods, to identify the evidence reported in the relevant literature. Such evidence includes the results of studies from all over the world, which use varying frames of reference and definitions of older people, e-inclusion and ICT-based care. This analysis revealed important themes and sub-themes with respect to the dimensions of the 6C framework of e-inclusion.

I also collected qualitative data from a small number of interviews to understand the insights of individual older people and key experts on the issues of ICT-based care.

By using both quantitative and qualitative data, the study can build on the strengths of each research approach: the findings highlight generalised trends in access to – and use of – ICT amongst the older population, which can be further explained by evidence presented in other studies, as well as the detailed insight into individuals’ personal observations and experiences (Creswell, 2009, p. 4). A final overview of the findings is given in the concluding chapter.

I also undertook quantitative analyses of secondary data from the Oxford Internet Surveys (OxIS) and the MonAMI project (see details below), in order to address the effects of the 6C framework dimensions on ICT use for a sample of older adults. A further exploration of this issue was undertaken in a realist review of the relevant literature, including both qualitative and quantitative evidence, together with the results of national surveys by the Office of National Statistics.

In the following sections, I describe the collection and sampling methods for the quantitative and qualitative approaches used to perform the secondary data analyses, the review of the literature, and the analysis of the interviews.

A timeline for the data collection activities is set out in Figure 3-2 at the end of this chapter.

2. Research design

The design of this research is based on a mixed method approach. Creswell (2014, p. 3) described mixed methods research as sitting at the mid-point of a “research methods continuum”, with quantitative and qualitative approaches at either end.

Qualitative research is typically undertaken to explore and understand how people or groups influence or are shaped by a social or human phenomenon. Qualitative data is presented in text from open-ended questions (Creswell, 2014, p. 4). The research is often inductive (but not exclusively), where researchers deconstruct text, such as interview transcripts or observational notes, identify subtexts and overarching themes, and interpret the deeper meanings of the data as a whole (Bernard and Ryan, 2010, p. 4). Qualitative research is also based on existing theory which can either provide a background, hypothesis or perspective, which can guide researchers into understanding the context as they ascribe meaning to narrative data (Creswell, 2014, p. 64). Qualitative research often entails exploring unknown or under-developed topics and phenomena, and therefore requires researchers to take more innovative and customised approaches to data collection and analyses (p.21).

At the other end of the “methods spectrum” lies quantitative research, which is used to test theories by measuring the relationship between variables. Variables are expressed as numerical data (often from closed-ended questions) analysed using statistical techniques and hypothesis testing (p.4) to validate or refute an a priori theory (p.19). Quantitative research typically follows traditional scientific methods of enquiry, where researchers adopt systematic procedures and adhere to a set of established research rules (p.21).

In the middle lie the mixed methods approaches, which involve collecting both quantitative and qualitative data and converging (triangulating) the different types of data. Mixed methods draw on the strengths of both quantitative and qualitative research, thus minimising the biases of each approach (Bowling, 2014, p. 222), and yielding a more complete picture of the problem than quantitative or qualitative approaches on their own (Creswell, 2014, p. 4). A mixed methods design permits researchers to use both structured quantitative analyses as well as more flexible qualitative approaches.

Mixed methods also entail triangulating the qualitative and quantitative data to identify congruencies and any inconsistencies, enhancing the validity of the different research approaches and allowing researchers to challenge the various methods of research (Bowling, 2014, p. 366).

2.1. Rationale

A convergent parallel mixed method design was chosen for this research for several reasons. Firstly, the research questions require adoption of several world views and, by extension, different research approaches. The first research question sets out to determine older people’s level of e-inclusion and their access to ICT-based care, which implies arriving at a *measure* of their engagement with ICT. This deterministic approach is often associated with quantitative research methods (Creswell, 2014, p. 7). By contrast, the second research question asks how (older) people engage with the digital society, and what meaning this has to their lives. This research objective closely resembles a constructivist philosophy often adopted in qualitative research (p.8).

Secondly, the individual components of the main theme of this research - older people, e-inclusion, access to ICT-based care, and quality of life - are vast and complex, and no single survey or dataset investigates them all in depth, either as singular topics or as a combined theme.

Similarly, the complexity of the research themes requires gaining in-depth perspectives from a range of informants with different expertise, making it necessary to investigate several sources of data.

Thirdly, the scope for collecting a large amount of qualitative data was limited by time and resources. As such, the themes emerging from the detailed narrative data of a small number of people may only reflect individuals' perspectives and may not necessarily be generalizable across the older population as a whole. On the other hand, limited published studies and survey data of older people's e-inclusion and quality of life are available, and can assist in providing some answers to the research questions. However, the results of previous work and closed-ended survey questions may be confined by the world views and frameworks adopted by previous researchers and survey designers, and risk leading to over-generalisation of older people's experiences. Given these constraints, there was a need to draw on all available data sources to provide the most useful answers to the research questions.

Finally, the aggregated topic of e-inclusion and related quality of life for older people is relatively under-researched. Furthermore, current e-inclusion and quality of life theories may not adequately conceptualise the current reality of the digital engagement of older people in England. To gain a deeper understanding of older people's experiences, I conducted open-ended, face-to-face interviews with older people and technical experts. Thus, an inductive, qualitative approach to analysing the (text-based) interview data could unearth issues and themes which relate to older people's specific position within the digital economy, and which are not explored in the surveys.

Thus, the nature of the research question and availability of data require a pragmatic approach, allowing for incorporation of different world views and assumptions, and multiple methods of data collection and analysis. Adopting a pragmatic world view, explains Creswell (2014, p. 11), is the philosophical foundation of mixed method research.

The specific mixed method design chosen was a convergent parallel method, which entails converging the qualitative and quantitative data from different sources, which were collected at a similar time. The main strength of mixed method approaches is in how they minimise the weaknesses inherent in both quantitative and qualitative data. This is achieved by triangulating the results from data which are collected using different methods to determine where the data converge or deviate. In turn, this can provide more in-depth explanations of the results from each dataset, and demonstrate the effectiveness of the measurement tools and frameworks used for sampling the sub-population in question (p.15).

3. Secondary data

The secondary data used in this thesis consists of material from the 2005 and 2011 Oxford Internet Surveys, statistics from the Office of National Statistics, and data from the user-evaluation component of the MonAMI trial.

3.1. Oxford Internet Surveys

To uncover broad quantitative trends in the e-inclusion of older people, secondary analyses were performed on the 2005 and 2011 datasets from Oxford Internet Surveys (OxIS), run by the Oxford Internet Institute of the University of Oxford (OII). OxIS datasets are made available for academic purposes upon request no less than two years after the data were collected. At the time of writing, the 2011 OxIS dataset was therefore the most recent dataset available.

An application was made to use the OxIS datasets via their online request form (Oxford Internet Institute, 2013a). Due to contractual restrictions on who can use the data, the OII grants permission to use the datasets on a case-by-case basis. The application was successful, and the terms and conditions agreed to, the datasets were transferred electronically via email in SPSS (IBM Corp., 2012) format. OxIS 2005 was provided by the Oxford Internet Institute on December 11, 2009. OxIS 2011 was provided by the Oxford Internet Institute on October 29, 2013.

3.1.1. Data collection

OxIS consists of comprehensive cross-sectional datasets of internet use by individuals aged 14 years and older in Great Britain. The surveys have been administered bi-annually in individual face-to-face interviews since 2003. The latest survey, the OxIS 2013, was the sixth series to be administered across Great Britain, but at the time of writing, the resulting data were not available for external use.

Part of the quantitative analyses consisted of observing changes in older people's e-inclusion over time and there was an aim to use the earliest OxIS dataset possible, in order to draw comparisons spanning the longest period of time. Although there was a dataset for 2003, its variables were considerably different from later versions, making comparison difficult, so the decision was taken to use the 2005 OxIS questionnaires as the initial point. There proved to be a number of variables of interest in 2005 which were the same or similar to those in 2011, so these two datasets were chosen for this study.

The wording and content of the OxIS questionnaires has continued to evolve in line with societal trends in access to – and usage of – internet networks and internet-enabled devices,

so the 2005 and 2011 OxIS interview schedules were not completely identical. Most questions concerning general ICT device and internet use were the same – or very similar – in both survey series (e.g. see QH10 in 2005 and QH7 in 2011 in Table 3-1 below). However, as each survey series aimed to capture the extent to which the “latest” ICTs were embedded in daily life, the ICTs of interest in 2005 (e.g. use of email) were necessarily different from those of interest in 2011 (e.g. mobile internet). As a result, some questions were unique to each questionnaire.

Table 3-1 illustrates a few examples of the differences between the 2005 and 2011 questionnaires with regard to household access to different ICT devices and individuals’ use of mobile telephones. The differences in the questionnaires reflect developments in Britain’s ICT infrastructure, such as digital broadcasting and mobile internet networks. The differences also indicate technological advances in ICT devices, including the improved functionality of certain devices (e.g. mobile phones) and the emergence of new devices (e.g. handheld tablets) (see QH21 in 2005 vs. QH11 in 2011 in Table 3-1).

Table 3-1 Sample questions in 2005 and 2011 OxIS questionnaires

2005	2011
<p>QH17</p> <p>Can you tell me if your household has (yes/no):</p> <ul style="list-style-type: none"> a. Cable TV b. Satellite TV c. Digital terrestrial TV (so you can get BBC3 or Freeview without having a special aerial) d. Digital Camera e. Web-cam for a computer f. iPod g. A handheld digital assistant (PDA) 	<p>QH6</p> <p>Can you tell me if your household has (yes/no):</p> <ul style="list-style-type: none"> a. Cable TV b. Satellite TV c. Digital Camera d. Web-cam for a computer e. Portable Mp3 player (e.g. iPod) f. A handheld tablet (e.g. PDA, Blackberry, or iPad) g. A hand held reader for books and magazines (e.g. Kindle or Nook) h. Games machine (e.g. Xbox, Nintendo, Playstation) i. A TV with a built-in connection to the Internet

<p>QH10</p> <p>How many working computers are available for people to use in this household?</p> <p>None</p> <p>One</p> <p>Two</p> <p>Three or more</p> <p>Don't know</p>	<p>QH7</p> <p>Whether or not they are connected to the Internet, how many working computers are available for people to use in this household?</p> <p>None</p> <p>One</p> <p>Two</p> <p>Three or more</p> <p>Don't know</p>
<p>QH21</p> <p>Besides making phone calls, do you use your mobile phone for... (yes/no)</p> <ul style="list-style-type: none"> a. Sending text messages b. Playing games c. Accessing email of the Internet d. Taking pictures 	<p>QH11</p> <p>Do you use your mobile phone for... (yes/no)</p> <ul style="list-style-type: none"> a. Making phone calls/Talking to others b. Sending or reading email c. Sending text messages d. Playing games e. Taking photos f. Sending photos g. Listening to music (Mp3s) h. Finding directions or location i. Browse or update a social network site j. Browse the Internet

The 2005 and 2011 OxIS questionnaires were divided into four parts. The first part was a general questionnaire for all respondents, including individual demographic variables (e.g. age, gender, household composition, marital status, health status, income, level of attained education, work), political views, information and trust, household access to mainstream ICT, personal use of mainstream ICT, and personal attitudes towards ICT.

The second questionnaire was only for people who used the internet, and included topics concerning the length of use, types of internet activities, sources of support for use, negative experiences when using the internet, and the effect of internet use on daily activities.

The third questionnaire was for respondents who did not use the internet at the time of the interview, but who had used it in the past. This questionnaire explored the experiences of ex-users when they had used the internet, the reasons for their decision to stop using the internet, and whether they might consider returning to -use the internet in the future.

The fourth questionnaire was for people who not only were not current users of the internet, but had never used it in the past. Its principal focus was why they did not use the internet, their opinions about whether being a non-user was helpful to them in their daily lives, proxy-use of the internet, and whether they planned to use the internet in the future.

The questionnaires for the 2003, 2005, 2007, 2009 and 2011 OxIS are freely available for download to the general public on the OII website at <http://oxis.oii.ox.ac.uk/research/methodology> (accessed on August 20, 2014).

3.1.2. Recruitment of participants

In order to ensure that each OxIS sample is representative of the diversity of the British population, sampling is based on a two-stage randomised process. The sampling method is identical in each series of research. This ensures that every adult over 14 years of age has an equal probability of being selected for an interview in each survey year (Oxford Internet Institute, 2013b).

The first stage consists of identifying sampling points in each of the ten Government Regions (South West, South East, London, East of England, Wales, West Midlands, East Midlands, North West, Yorkshire and the Humber, North East) in proportion of the region's population. In each Government Region, output areas (OA) are coupled with an adjacent OA according to their similarity in terms of their ACORN type. Coupled OAs with a combined population of 30 inhabitants or more are listed in descending order of their ACORN type. The population of adults aged 14 years and older of each OA couple are accrued down the list. The OII uses a random start and fixed sampling interval, where the required number of paired electoral districts are selected such that each OA had a probability of selection proportionate to its size.

In the second stage, within each selected OA, each OII interviewer is issued with 10 randomly selected postal addresses and asked to achieve a 60% response rate. If this is not achieved, interviewers put in a request for the issue of a new set of addresses from the OA, to be used in full or in part. In 2011, an additional 990 addresses were issued. The number of additional issued addresses in 2005 is not available. Table 3-2 provide details of the number of issued addresses and the outcomes of the visits made to addresses for the 2005 and 2011 waves.

Table 3-2 Outcome of address issuing and visits by OII interviewers

	2005		2011	
Addresses issued	3500		4490	
Address in area unfit for interviewer to work	450		330	
Properties visited				
Address Occupied	93%	2834	96.3%	4005
Interviewer unable to locate address	4%	123	1.8%	75
Commercial Property	1%	22	05%	21
Property vacant/no longer a dwelling/new build not occupied	2%	71	0.5%	21
Property vacant- old building		n/a	0.8%	35
Property vacant- new building		n/a	0.1%	3
Total	100%	3050	100%	4160

Interviewers are permitted to visit the closest inhabited property of vacant, destroyed or commercial properties. In 2011, 155 properties were visited as substituted properties to the issued addresses (Dutton and Blank, 2011). In 2005, the total number of substituted addresses was 392 (Oxford Internet Institute, 2005).

At each household, interviewers select respondents by asking the person who answers the door for permission to interview the adult of the household, aged 14 years and older, who has the next birthday. If this information is not known, then the respondents are selected according to the first name of the adult which starts closest to the beginning of the alphabet (Dutton and Blank, 2011).

In 2011, 2057 adults over 14 years of age were interviewed, representing a 49.4% response rate of visited addresses (Dutton and Blank, 2011). In 2005, 2185 adults were interviewed, representing a response rate of 72% (Oxford Internet Institute, 2005). The outcomes of the addresses which were visited by OII interviewers are presented in Table 3-3 below.

Table 3-3 Results of visits

	2005		2011	
Addresses visited	3050	100%	4160	100%
Interview obtained	2185	72%	2057	49.4%

Refusal by person answering the door	567	19%	482	11.6%
Refusal by selected household member	103	3%	842	20.2%
Quit during interview	n/a		41	1.0%
No contact after repeated visits	170	6%	583	14.0%
Not stated	20	1%	n/a	

3.1.3. OxIS reports

References to OxIS reports are not part of the secondary analyses *per se*. However, the results of the analyses of 2013 dataset reported in *OxIS 2013 report: Cultures of the Internet* (Dutton and Blank, 2013) part of the review of the literature.

3.2. Office of National Statistics

The Office of National Statistics (ONS) is the UK's largest independent producer of official statistics and is recognised as the UK's national statistical institute. The responsibilities of the ONS include collecting and publishing economic, population and society-related statistics at the national, regional and local levels. It is also responsible for collecting the England and Wales census every 10 years (Office for National Statistics, 2014b). The ONS is also the UK national statistical institute of the European Statistical System (ESS). The ESS is the partnership organisation between Eurostat and the national statistical institutes of the member states of the European Union.

As with the findings in the *OxIS 2013 report*, statistical findings from the Office of National Statistics (ONS) form part of the review of the relevant literature on older people's e-inclusion. Throughout the thesis, there are references to various ONS outputs, including the Opinions and Living Survey (OPN), Eurostat statistics, and the 2011 Census.

3.2.1. Data collection: Opinions and Living Survey

The Opinions and Living Survey (OPN) is a multi-purpose omnibus survey of the adult population aged 16 years and older in Great Britain and is the source of data about household access to – and individuals' use of – the internet. The OPN has been administered as a face-to-face interview on a yearly basis since 2006. Since 2011, the estimates refer to sample populations of Great Britain, whereas between 2006 and 2010, the statistics refer to the wider UK population.

The OPN consists of a core set of questions and a number of commissioned modules. Specific modules are developed for government, third sector and university organisations. With

respect to the module on internet use, this was developed in conjunction with Eurostat according to the benchmark indicators of e-inclusion set out in the *eGovernment Action Plan 2011-2015* (European Commission, 2014c) and *Digital Agenda for Europe* (European Commission, 2013a) policy frameworks. On a yearly basis, Eurostat develops a model questionnaire designed to gather data on household access to – and individual use of – the internet, embedded into the Opinion and Lifestyle Survey issued by the ONS (Eurostat, 2014a).

Box 3-1 lists the eight modules included in the model household survey for internet use. A copy of the 2014 model household questionnaire issued by Eurostat is available for download to the general public on Eurostat website at

<https://circabc.europa.eu/faces/jsp/extension/wai/navigation/container.jsp>.

Box 3-1 Modules of the Eurostat model household survey of Internet usage

Module A:	Access to ICT
Module B:	Use of computers, location and frequency of use
Module C:	Use of the Internet
Module D:	Use of “Cloud Services”
Module E:	Use of e-government
Module F:	Use of e-commerce
Module G:	E-skills
Module H:	Socio-demographic background characteristics

Where possible, the UK statistics used in this thesis were accessed directly through ONS. The relevant statistics on internet usage, collected as part of the Opinions and Lifestyle Survey (OPN) (REF), were accessed via the online *Statistical bulletin: Internet access – Households and Individuals, 2014* (Office for National Statistics, 2014a) and the online *Statistical bulletin: Internet access – Households and individuals, 2013* (Office for National Statistics, 2013b). The data were downloaded directly from the website in Microsoft Excel format.

3.2.2. Recruitment of participants

The OPN is a representative national survey of adults aged 16 years and older, which uses stratified random probability sampling techniques. The sampling frame consists of the Royal Mail’s Postcode Address File (PAF) of “small users”, which consists of approximately 27 million private households in the UK which receive fewer than 50 items of post each day (Office for National Statistics, 2014c).

The PAF sampling frame is stratified by region, household car ownership, socio-economic classification (NS-SEC) and age of the household reference person. Each month, 67 postal sectors are selected, with a probability proportionate to their size. Within each postal sector, 30 addresses are generated randomly, equating to a sample of 2010 each month. The survey aims to achieve a response rate of 60% each month.

Table 3-4 describes the yearly average response rates of the 2012, 2013 and 2014 surveys.

Table 3-4 Yearly average response rates

	2012	2013 ¹	2014 ¹
Rate of refusals	35%	33%	33%
Proportion of sample that could not be contacted		13%	9%
Response rate	62%	54%	55%
Notes:			
¹ Source: Information paper: Quality and Methodology Information. Opinions and Lifestyle Survey, February 2012			
² Source: Statistical Bulletin: Internet Households and Individuals, 2014, http://www.ons.gov.uk/ons/rel/rdit2/internet-access---households-and-individuals/2014/stb-ia-2014.html#tab-background-notes , accessed August 22, 2014			

For each sampled address, one respondent aged 16 years or older is randomly selected using a random table of numbers for each member of the household (Kish grid). A letter is posted to all sampled addresses prior to the interviews, informing potential respondents about the survey. Interviewers are instructed to call at a particular address eight different times on different days of the week. Face-to-face interviews are carried out by trained interviewers (Opinions and Lifestyle Team, 2013).

3.2.3. Eurostat

As mentioned above, the Opinion and Lifestyle Survey (OPN) module concerning household and individuals' use of the internet was developed in association with Eurostat (see Box 1), the official statistical office of the European Union.

The primary task of Eurostat is to harmonise, consolidate, and publish data collected from each Member State to ensure that they are comparable across the European Union. Eurostat does not collect primary-level data. Rather, the primary data is collected by the national statistical institutes in each member state. In the UK, data is collected by the ONS and is transmitted to Eurostat (Eurostat, 2014b). The harmonisation of data is in accordance to the

ICT Regulation (EC) no 808/2004 and Commission Regulation (EU) no 859/2013 to reflect the wider EU policy frameworks, *eGovernment Action Plan 2011-2015*, and *Digital Agenda for Europe*, around e-inclusion (Office for National Statistics, 2014a).

Organisations which develop modules for the Opinion and Lifestyle Survey receive their own copy of the final dataset, which includes the responses to the core OPN questionnaire as well as to the questions of the specific module for the entire sample. The full set of data collected from the household questionnaire on internet use is transferred to Eurostat on a yearly basis. For some topics of e-inclusion related to this study, the data are available only via Eurostat and not through the ONS.

The database of statistics related to e-inclusion is accessed through the “Information Society” theme of the Eurostat web-portal (Eurostat, 2014b). The relevant databases were downloaded directly in Microsoft Excel format.

3.2.4.2011 Census

In this thesis, the 2011 Census data is used to estimate the older population at local authority level.

Briefly, the last UK census was carried out on March 27, 2011. All households were sent the questionnaire by post. Each individual was legally obliged to complete the questionnaire either online or on paper. The topics covered in the census included demographic characteristics, household accommodation, relationships, migration, cultural characteristics, health and provision of care, qualifications, employment, workplace and journey to work.

The census data used in this thesis were accessed via the online *Statistical Bulletin: Population and Household Estimates for the United Kingdom, March 2011* (Office for National Statistics, 2013a). The ONS *Table KS102UK: 2011 Census: Age structure, local authorities in the United Kingdom* data was downloaded directly from the website in Microsoft Excel format.

3.3. The MonAMI project

At various points throughout this thesis, analyses of the quantitative and qualitative data generated from the MonAMI trial user-evaluation are reported.

The MonAMI project, which ran from September 2006 to May 2011, was funded under the European Commission’s FP6 framework in the area of research and technical development. MonAMI project partners conceived the “MonAMI system” as a proof of concept, to examine whether an ICT platform built on an open-architecture approach could technically support

telecare services on mainstreamed ICT devices, as well as bring social benefits to older people who have some functional limitations. To validate the MonAMI system, the project consortium conducted a three-month evaluation of the technical feasibility, long-term scalability, and the social and economic impact of the MonAMI system in three communities across Europe: Kosice, Slovakia, Zaragoza, Spain and Stockholm, Sweden.

The MonAMI system entailed an open platform gateway interface based on the OSGi framework (OSGi™ Alliance, 2012), a series of telecare services and applications, a series of bespoke sensors and actuators, a residential gateway, a touchscreen interface device, and a graphic user-interface (GUI) (Damant et al., 2013). The telecare services consisted of alarms (AMiSURE), home monitoring and control (AMiVUE and AMiCASA), reminder services (AMiPAL) and entertainment services (AMiPLAY) (Table 3-5).

Table 3-5 Description of MonAMI services

Service	Definition	Applications	Examples
AMiSURE	A series of alert services, notifying users and carers of unusual environmental conditions of the home. Also includes (user) presence alarm and visitor validation application	Social alarm, door, lights, windows, presence, temperature, gas, appliances, visitor validation (camera)	Gas and TempSURE send users an alarm when level of gas and/or room temperature are above or below “normal” range. The presence monitoring application, SureZONE, is configured according to time of day users are expected to be in a certain room of their home. Alarm is passively activated when person is absent or remains in the room for an extended period
AMiVUE	Allows users and carers to monitor the status (i.e. open/closed or on/off) of users’ present, appliances and home conditions, both at home and remotely	Door, lights, windows, presence, shutters temperature, humidity	Door and LightVUE allow users and carers to view the status (e.g. open or closed; on or off) of doors, lights, etc. both at home (using the residential gateway) and

			remotely (on a mobile device).
AMiCASA	Allows users to monitor and control conditions in the home	Door, lights, shutters, appliances	Permits users to both monitor status of appliances as well as control them by commanding them to “open” or “close” or to turn “on” or “off” using the residential gateway and GUI.
AMiPAL	Planning and reminder services	Agenda and time reminder	TimePAL is configured to send a text message to a specified number (carer) when the reminder service was not confirmed by user.
AMiPLAY	Therapeutic and social games	Games	A series of memory and activity games designed for users to either play alone or with others.

Source: Damant et al. (2010, 2013)

The MonAMI trial was adapted and coordinated locally at three sites by the Technical University of Kosice (Kosice, Slovakia), Royal Institute of Technology (Stockholm, Sweden), and the University of Zaragoza (Zaragoza, Spain) respectively, coordinated and led by the Personal Social Services Research Unit, London School of Economics and Political Science. Each site varied in terms of its samples of service users, care contexts, and the bundle of MonAMI services they had available for evaluation. The selection of the three sites was intended to provide a breadth of information about the potential value of the MonAMI system across different care settings and user profiles.

At each of the three sites, the MonAMI system was installed in the homes of older people with long-term care needs. The telecare services were delivered via a residential gateway, connected to a local area network (LAN) and wireless local area network (WLAN). Users’ homes were equipped with a series of devices consisting of sensors and actuators, which allowed for “inter-device communication” and provided real-time information about the home environment (e.g. room temperature, lighting conditions) for both the users and their carers. In addition, users were equipped with a user interface device consisting of a touch screen computer at the Slovakian and Spanish sites, and both a touchscreen computer and a

smartphone at the Swedish site (Falco et al., 2011; Lundberg, 2011; Simsik et al., 2011). Users access the services through the GUI, which was translated into the local language of each of the trial sites.

The coordinating trial centres differed in terms of the services and applications they offered to the participants at their centres. For instance, AMiPLAY was not available in the Swedish site and AMiPAL was not installed in the Spanish site; the GasSURE application was available only at the Slovakian site, and only the Spanish site offered the WindowVue application. Therefore, a bundle of MonAMI services was installed in each home, according to users' preferences and the availability of the services and individual applications at each site. Users were not limited to any number of services or service bundles. The parameters of each of the service applications were configured according to users' needs and lifestyle.

The objective of the user-evaluation of the MonAMI trial was to assess the social benefits of the MonAMI system in terms of its impact on the quality of life of users. The main interest of the MonAMI trial with respect to this thesis is the evaluation of the effects of the MonAMI system on older people's quality of life. Therefore, the remainder of the description of the methodology of the MonAMI trial focuses on this trial objective.

3.3.1. Data collection

The Personal Social Services Research Unit (PSSRU) of the London School of Economics and Political Science (LSE) was commissioned to develop the user evaluation of the MonAMI trial and to analyse the results. It was my role in the MonAMI project to design the evaluation in terms of the specific outcome criteria, and prepare the interview schedule, instrumentation, and protocol. I also designed and held training sessions with the interviewers in each of the three trial sites (Sweden, Slovakia, Spain) on the evaluation criteria and how to administer the questionnaire. Questionnaires were translated into the local language by the project partners at each of the respective trial sites. The interviews were conducted in the homes of the older people included in the study, and conducted in the local language by local project partners. The English versions of the MonAMI questionnaires are available in Appendix A.

Both qualitative and quantitative data were collected in a series of four face-to-face interviews with each trial participant. In collaboration with local site coordinators, I developed the interview schedule, which included a series of internationally recognised assessment tools as well as questions developed specifically for the project. The data collection were conducted by

local trial researchers who attended an interview training session at the LSE. Details of the interviews and the specific instrumentation are provided in Table 3-6.

Table 3-6 MonAMI trial interview schedule

Interview	Timing	Interview type	Data collected	Instrumentation
Baseline	Before installation	Structured interview	Demographic Use of social services Perception of safety Health status Level of independence in IADL Psychological wellbeing Social networking Level of e-inclusion	CSSRI (abridged) Falls efficiency scale (adapted) EQ5D Lawton- Brody IADL Scale WEMWBS Bespoke questionnaire
Configuration and personalisation	1-2 weeks post installation	Semi-structured	Accessibility of GUI and services	Bespoke configuration template
Mid-term	9 weeks post start of trial	Semi-structured	Acceptability of services Accessibility of GUI, user-interface devices and services	Bespoke questionnaire CEN/CENELEC-Guide 6 (adapted)
Post-trial	End of trial	Semi-structured	Safety/security Independence Health Psychological well-being E-inclusion	ASCOT (adapted) Bespoke questionnaire
Notes: CSSRI: Client Social Services Research inventory (Chisolm et al., 2000) IADL: Instrumental activities of daily living Lawton-Brody IADL Scale (Lawton and Brody, 1969)				

Fall-efficacy Scale (Tinetti et al., 1990)

EQ5D (EuroQOL Group, 1990)

WEMWBS: Warwick-Edinburg Mental Well-Being Scale (Tennant et al., 2007)

CEN/CENLEC Guide 6 (CEN and CENELEC, 2002)

ASCOT: Adult Social Care Outcomes Toolkit (Netten et al., 2011)

Source: Watters et al. (2011)

Before the MonAMI system was installed in participants' homes, local trial site interviewers met with participants for the baseline interview. This interview consisted of a structured questionnaire collecting socio-demographic data, and baseline indicators of quality of life and e-inclusion. Some unstructured open-ended questions were also included to allow participants to expand on some of the structured items of the questionnaires.

The second "configuration and personalisation" interview occurred within two weeks of the installation of the MonAMI system in participants' homes. Local trial site technicians met with participants to gather data on their preferences in terms of service applications as well as on their daily routines. This data was used by technicians to configure a set of personalised services according to participants' individual needs and lifestyle.

The mid-term interview was held at the half-way point of the trial. In a semi-structured interview, both quantitative and qualitative data were collected on users' perceptions of the acceptability and usability of the GUI, devices and services. The interview was also designed to reassess whether the service settings met participants' daily needs. The local technicians accompanied site interviewers at the interview to collect data on daily routines and preferences in order to re-configure the services according to participants' preferences.

The post-trial interview occurred at the end of the three-month trial and consisted of a semi-structured interview including quantitative and qualitative questions concerning the perceived benefits of the MonAMI system to their quality of life. Dimensions of quality of life and e-inclusion explored at the baseline interview were reassessed at the post-trial interview (Watters et al., 2011).

3.3.2. Recruitment of participants

The MonAMI partners set out to understand the feasibility of the MonAMI system within living care contexts, which included evaluating the effects of the project services on a number of stakeholders, including older people with care needs (users), their families and formal carers. For the purposes of this research, I focus on the elements of the MonAMI evaluation which relate to the older people with long-term care needs (users) who had the services installed in

their homes for the duration of the trial. Results of the analyses pertaining to the family and formal carers of the older users can be found in deliverable D34.3 on the MonAMI project website (www.monami.info).

Users were eligible to participate if they were 65 years or older and had a recognised need in at least one of the broad impairment groups: mobility, visual, dexterity, hearing and cognitive impairment. Users could experience impairment in more than one category. Potential users with severe cognitive impairment, as defined as a Mini Mental State Exam (Folstein et al., 1975) score of 9 or below, were excluded from the trial. In addition, all participants had to be in regular receipt of at least one form of health and social care service to assist with one or more activities of daily living or to monitor a chronic long-term illness.

Participants were recruited locally by trial site coordinators. Details of the care setting, recruitment techniques and the number of participants recruited in each site are provided in Table 3-7.

Briefly, local MonAMI trial site coordinators recruited eligible participants from different care settings. In Stockholm, participants lived independently in privately-owned apartments in two municipal-owned buildings dedicated to people aged 65 years and older. The local site coordinator recruited 31 participants by holding an information session about MonAMI at a home owners’ open meeting arranged by the municipal housing association. Participants from the Kosice site also lived in privately-own apartments. The local site coordinator initially recruited 25 participants through a local senior citizens’ advocacy group. Participants from Zaragoza lived in a 24-hour residential care facility. Local site coordinators worked with the formal care staff to identify 16 eligible participants for the trial. In addition, a parallel ‘usability study’ was also run at the same residential care home, where the MonAMI system was installed in a spare room of the care home. Seventeen different residents were invited to test the services for a half a day and to provide feedback about the accessibility of the GUI and the potential benefits of the MonAMI system to their daily lives. These additional 17 users are not included in the analyses in this thesis.

Table 3-7 Recruitment techniques and targets by site

Site	Locus of care	Recruitment technique	Number of participants

Stockholm	Lived independently in own apartments in two buildings owned by the municipality, dedicated to people aged 65 years and older.	Local trial coordinator, in conjunction with the home owners' facility manager, gave a presentation during an open meeting in the building, providing information about the aims of the trial and the use of the results. People attending the meeting were invited to join the trial.	Total n recruited: 31; including 1 drop-out Total n in trial: 30
Kosice	Lived independently in low apartments in the community	Participants were recruited through the cooperation of the local trial coordinator and a local advocacy group for older people.	Total n recruited: 25; including 5 drop-out and 2 ineligible users Total n in trial: 18
Zaragoza	Lived in a 24-hour residential care facility	After presentation made by local trial coordinator, residential home care staff made an initial selection based on inclusion criteria for the trial	Total n recruited: 16; including 2 ineligible users 17 in usability study Total n in trial: 14

Source: Watters et al (2011)

The final study included sixty-two older people participated in the MonAMI trial: 30 at the Swedish site, 18 at the Slovakian site and 14 from Spanish site (not including participants of the usability study). The MonAMI trial received local ethical approval at each trial site. Written informed consent was obtained from all participants by local trial coordinators.

4. Literature review

This thesis also includes a review of relevant literature. To undertake the review, I used various searching techniques including: searching for peer-reviewed journal articles in electronic literature databases; "snowballing" through bibliographies and reference lists for other useful resources, such as publications from seminal studies, reports and data sources; and hand-

searching for relevant grey literature on the websites of relevant government departments and third sector organisations. Further hand-searching was also used to capture all the relevant publications related to key studies.

4.1. Review methodology: epistemology and rationale

A literature review can be broadly defined as a search through the published literature to retrieve several sources of information relating to particular research questions, which are aggregated and synthesised into a single publication (Green et al., 2006). There are a number of approaches to undertaking a literature review including narrative, systematic, realist and meta-narrative reviews. Each approach is briefly described below. Subsequently, I discuss the rationale for the approach adopted in this study.

Narrative reviews, also referred to as unsystematic reviews, consist of narrative summaries of previously published findings. They serve to summarise the historical, theoretical and philosophical evolution of a particular issue. Narrative reviews can also provide a synopsis of the common discourse, debates and conclusions around an issue or topic. There are no established methodologies for conducting narrative reviews, nor any agreed guidelines for reporting findings (Green et al., 2006). Recent debates around review methodology heavily criticise narrative reviews for lack of methodological rigor and inconsistent reporting protocols (Hemingway and Brereton, 2009). Consequently, narrative reviews are useful for obtaining a brief review of a certain topic to help keep-up-to-date or spark debate about an issue, but they are less useful as a comprehensive evidence-base which can inform decision making. Few narrative reviews have been published in recent years, being replaced by systematic reviews, which follow more rigorous methods, and which can support evidence-based decisions (Green et al., 2006; Hemingway and Brereton, 2009).

Systematic reviews follow detailed, rigorous step-by-step methodologies (Green et al., 2006) with clearly defined a priori inclusion and exclusion criteria (Cipriani and Geddes, 2003). Therefore, unlike narrative reviews, systematic reviewers adopt a predefined format, asking a focused research question and - systematically - searching for evidence, critiquing studies, extracting relevant data and synthesising evidence (Pawson et al., 2005).

Green et al (2006) described systematic reviews as either qualitative or quantitative, the latter also known as a meta-analysis, to distinguish between the processes used to integrate the primary studies. Both types of systematic review follow similar search protocols and use similar critical appraisal frameworks to judge the quality of publications. Both also summarise and critically appraise primary studies to provide definitive answers to focused research

questions (Pawson et al., 2005). The main difference is that in meta-analyses, the results of the primary studies are statistically combined and pooled into a numerical value (Cipriani and Geddes, 2003). In general, the type of systematic review undertaken reflects the methodology of the primary studies included in the review. However, mixed methods systematic reviews are increasingly being used in clinical research to gain a more complete understanding of interventions (Hemingway and Brereton, 2009).

Recent developments in review methodology have led to emergence of a range of approaches, including realist and meta-narrative reviews, which maintain traditions upheld by systematic reviews around transparency of methodology and inclusion criteria used, but differ in terms of their underlying focus and overall purpose (Gough, 2013). Systematic reviews are designed to critique a body of literature and to understand the sequential – or linear - cause of a particular intervention, event or relationship. In contrast, realist reviews are exploratory, and seek to explain the generative cause of an event or relationship. Pawson et al (2005) described the purpose of a realist review as understanding the outcomes (O) of two events, the underlying mechanism (M) that connects the events, and the overall context (C) that defines the events. Therefore, realist reviews address research questions with a broader focus than those investigated under traditional systematic reviews. Realist reviews are therefore not theory-driven (Gough, 2013), nor do they follow a particular formula, but rather adopt a pluralist and flexible approach, marrying quantitative and qualitative methods and using a number of search strategies including database searching, snowballing, reliance on grey literature, and forwards and backward citations. Another important deviation from the traditional systematic review is that, rather than adopting an *a priori* approach to aggregate evidence, the realist review process is configuring and iterative (Gough, 2013).

Overall, realist reviews are more inclusive than systematic reviews, both in terms of sources of information searched, as well as quality of primary studies included in the review. Rather than excluding certain sources for their lack of scientific rigor, it is the diversity of the sources and information that is the strength of the realist review, precisely as it helps shed light on the nature of the “CMO” relationships. In sum, Pawson et al (2005) defined realist reviews as “what works for whom in what circumstances and why?” But realist reviews do have limitations. Chief among them is the lack of depth to which each subtopic is reviewed. This is mostly due to the broad scope of the realist review and the lengthy iterative processes needed to formulate the search, appraise the publications, synthesise and interpret the findings.

Another methodology to emerge recently is the meta-narrative review. Meta-narrative reviews are designed to explore the evolution of different approaches and research traditions related to a particular issue over time and to map the main issues related to the research question in an overall summary. A meta-narrative review consists of several smaller reviews, one for each identified research perspective, which are summarised into an overarching review. Similar to the realist review, the meta-narrative review is used to address broad research questions and adopts a pluralistic, pragmatic approach to identifying relevant literature from a broad range of sources and combines qualitative and quantitative methods (Wong et al., 2013). Also similar to the realist review, the meta-narrative is configuring and iterative, uses emerging concepts and the findings are employed to shed light on an issue (Gough, 2013).

The primary difference between meta-narrative and realist reviews is in the types of research questions they address. Meta-narrative reviews look at how issues were researched and the findings consist of a configuring map of the ideas, debates, and research related to a topic (Wong et al., 2013), whereas realist reviews are concerned with the context, mechanisms and outcomes of a causal relationship. The evidence is then interpreted, critiqued and synthesized to describe the overall picture of the relationship (Gough, 2013).

The prospective method used to search the literature followed a traditional systematic review in the current study. However when examining the review process undertaken in retrospect, it became clear that many realist review techniques were also used. There are a number of reasons for employing a range of methods.

Firstly, a systematic review was undertaken in the first instance as this was the approach with which I was most familiar. Indeed, at the time my study began in 2004, the “newer” review methodologies were not fully developed (Pawson et al., 2005). However, when researching the peer-reviewed literature for relevant studies about the primary research questions, it became clear that these would not provide an overall picture of the “CMO” relationships related to older people’s level of e-inclusion and access to ICT-based care, as set out in the primary search questions (see Introduction, section 1 of chapter 3).

This leads to the second reason for employing a mix of review methods. To gain insight into the CMO relationships involved in the relatively unknown topics of older people’s e-inclusion and access to ICT-based care, it was necessary to search a number of sources beyond the peer-reviewed literature identified in the electronic databases, including the grey literature, institutional reports and newspaper articles. As a result, the review became an iterative

process, where the themes and related search terms were continually refined as the overall picture of older people's engagement with ICT in different context unfolded.

Thirdly, the research questions set out to understand older people's engagement with ICT in different contexts, which requires covering a range of varied disciplines including health and social care policy, sociology, gerontology, and media and communications, and commerce, as well as exploring varying ideologies and world views. Approaching the literature from a diverse range of disciplines helped the review include primary studies employing varied methodologies.

Therefore, similar to the underpinning methodology of the overall study, which uses both qualitative and quantitative research methods, the review evolved into a pragmatic search of both quantitative and qualitative studies from a number of different sources; an approach which is associated with a realist review (Pawson et al., 2005).

4.2. Database review

Modern technologies develop at a rapid pace, constantly shifting the pertinence of certain issues around ICT-markets, such as access and affordability. In particular, across time, different "cohorts" of older people will face varying challenges according to the digital environments in which they live. Therefore, in order to identify the current and comparable body of literature around the e-inclusion of older people and their access to ICT-base care, I restricted the database review to peer reviewed journal articles published between January 2007 and August 2012. The search was updated in February 2014.

In addition, the development, delivery, and evaluation of ICT involves stakeholders across several disciplines, such as media studies, engineering, medicine and affiliated fields, social care and economics. The broad body of literature covered thus, of necessity, included a range of research outcomes not directly relevant to the research questions of this thesis. I also restricted my search to databases which focused on relevant disciplines, including ICT and communications (Library, Information Science and technology abstracts, Communications and Mass Media complete), social sciences (International Bibliography of Social Sciences, PAIS International, SocIndex Full text, Web of Science™ Core Collection), psychology (PsycINFO), and medicine and affiliated disciplines (CINAHL Full text, Pubmed). The literature databases were accessed using the electronic library services of the London School of Economics and Political Science (LSE).

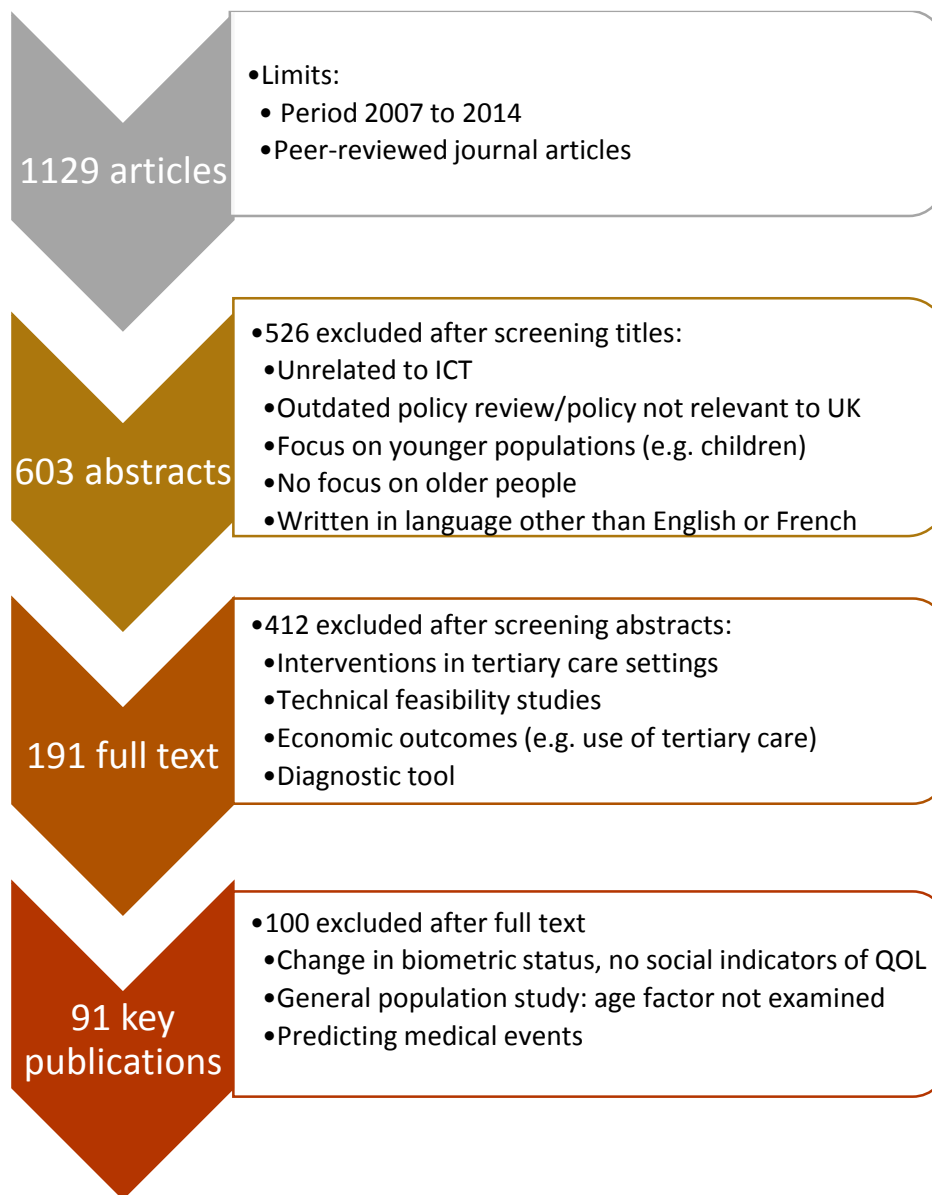
Keywords reflecting the topical discourse concerning older people, e-inclusion, mainstream ICT, and ICT-based care were used to construct Boolean terms for the search strategy described in Table 3-8.

Table 3-8 Boolean terms for search strategy

	Boolean terms
Search 1:	SU("older people" OR "elderly")
Search 2	TX("digital inclusion" OR "e-inclusion" OR "digital divide")
Search 3:	TX("internet" OR "?phone" OR "computer" OR "digital technology")
Search 4:	TX("telecare" OR "telehealth" OR "telemedicine" OR "smart?home")
Search 5:	(Search 2 OR Search 3 OR Search 4)
Search 6:	Search 1 AND Search 5

Figure 3-1 describes the results of the search and screening process to identify the body of key articles. The initial search yielded 1129 unique references. After screening the titles, abstracts and full texts, in turn, for their relevance in terms of older people’s access to ICT and its effect on their quality of life, the final selection for the review included 91 key articles. The main reasons for exclusion included documents which did not include any reference to ICT usage, studies which did not perform analyses of older adult sub-samples, or studies which took place in tertiary care settings. Studies were also excluded if the primary outcomes focused solely on the technical feasibility of the ICT system, changes in biometric status of the sample, changes in use of health and social care services and the use of ICT for care practitioners. Articles were excluded if the same author published more one than one article from the same study: in these cases, the most recent article which included analyses of older people’s use of ICT or the effects of ICT on their general quality of life was included.

Figure 3-1 Review in literature databases



4.3. Snowballing search

More articles and reports were identified through the bibliographies of journal articles and reports. The snowballing also resulted in identifying seminal studies published before 2007. These studies were cited several times by other authors and were still considered relevant and therefore are also included in the final literature review.

4.4. Hand-searching

In order to complement the database search and to identify the relevant body of grey literature, I performed hand-searches for publications by specific government and third sector

organisations. I also performed a hand-search for supplemental publications around key studies.

First, to identify the relevant UK policy documents, I conducted a search on the Gov.uk web-portal, using keywords such as “e-inclusion” and “digital inclusion” and “internet”. The search was narrowed to relevant Government departments, including the Cabinet Office, the Department for Culture, Media and Sport, the Department for Work and Pensions, the Department for Business, Innovation and Skills and the Department of Communities and Local Government. A similar search on the Gov.uk web-portal focused on publications from the Department of Health, with keywords such as “telecare” and “telehealth” and “remote care”.

Next, I performed hand-searches using keywords such as “e-inclusion”, “internet”, “telecare” and “remote care” on the websites of third sector organisations dedicated to research and services into issues around ageing and older people, including Age UK and the International Longevity Centre-UK. I also did a hand-search of CORDIS, the European Commission’s repository for information on all EU-funded research projects.

5. Interviews

Between April 2010 and February 2013, I held interviews in England and Wales with 34 technical experts, eight individual older people and six older people attending a focus group. The interviews were held in two series. In the first series, I interviewed 23 technical experts as an extension of the MonAMI project to help inform the issues around e-inclusion policy and the deployment of advanced ICT-based care systems in the UK.

The second series of interviews was part of the data collection for the project *E-inclusion of older people and access to “ICT-care sector” of older people in England*, funded by the National Institute for Health Research (NIHR) School for Social Care Research (SSCR). The second series focused on the e-inclusion of older people and their access to public online services.

5.1. Qualitative data analysis: epistemology and rationale

There are a number of approaches to analysing qualitative data. According to Bernard and Ryan (2010), there are four overarching groups of qualitative analyses. The first group of analysis methods examine the data (text of document) as a whole to identify patterns. This technique is associated with discourse and narrative analyses as well as phenomenology. The second type divides text into segments according to themes, which are analysed quantitatively or qualitatively. This group includes methods such as content analysis and grounded theory. In the third grouping, the basic “units” of analyses are the words themselves. This group includes

the key-word in context method, for instance. The final group identified by Bernard and Ryan are the mixed-methods approaches, which include ethnographic decision modelling. Not included in their typology is the framework analysis approach, but which Bowling (Bowling, 2014, p. 402) describes as an approach for sorting, categorising and interpreting qualitative data collected in unstructured interviews. The analysis methods are described briefly below.

Discourse analysis involves the close study of language, widely used in social interaction (Gale et al., 2013). This analysis entails a very detailed study of an exchange, which can be verbal, or involve multimedia communication, whereby the researcher carefully looks at both the substance of what is said as well as how language is used. This analysis is used in a range of disciplines including linguistics, social psychology, sociology and social practice. It is also commonly used to study topics related to gender relations and social control. Studies of the latter topic has given rise to a variation called critical discourse analysis (Robson, 2011, p. 372), which focuses on how written and spoken language reflects wider social and political inequalities (Bowling, 2014, p. 364).

Bernard and Ryan (2010) classified phenomenology under the overarching narrative analysis approach. Both approaches are concerned about the study of human experience and meaning in everyday life (Gale et al., 2013). Narrative analyses centre on the story told by interviewees, and focus on the content, structure, plot, setting, activities and presentation of the story. Phenomenological research focuses on the story-telling experience, rather than on the content of the story. Researchers attribute meanings to the experience of phenomena and develop an “essence” description (Creswell, 2014, p. 196). Undertaking a phenomenological approach requires that researchers identify their own biases such that they can identify the true essence of the data, free of their personal experiences. Similar to grounded theory, phenomenological research is an iterative process, where the “essence” description is developed along with the data collection.

Grounded theory (GT) is both a research methodology as well as an inductive style of data analysis, arising from the research (Robson, 2011, p. 147). In GT theory studies data collection and analysis occur concurrently. During the data collection process, researchers look for patterns in the data and develop theories for these patterns through a series of hypothesis. These hypotheses are continually tested and refined in subsequent data collection until the theories become “saturated”; when additional information does not add further insight to the developed theory (p. 148).

Content analyses are methods of systematically coding and analysing qualitative data (Bernard and Ryan, 2010, p. 287), or the quantitative analysis of what is in a text (Robson, 2011, p. 349). Most often, the data of a content analysis is not collected through observation, interviews or surveys. Context analyses are applied to pre-existing texts and documents that have been produced for a different purpose than for empirical research, such as newspaper articles or speeches (p. 351).

In contrast to grounded theory, content analysis is deductive. It involves categorising and coding text data according to a priori theory or knowledge. The distribution and frequency of the “context units”, which can be codes, words, themes or phrases, are subsequently counted and compared to make objective inferences about the data (Bowling, 2014, p. 442).

Briefly the Key-Word-In-Context (KWIC) approach is used to understand the context associated with certain words. Most KWIC analyses use automated software, which identify whenever the term is used in a text. The researcher then analyses and interprets the context for each of the uses of the word. The findings can be used to compare the uses of a word across authors or particular discourses.

Finally, framework analysis (FA) is not aligned with a particular philosophical, theoretical or methodological approach (Gale et al., 2013; Srivastava and Thomson, 2009). Rather, it is a flexible approach that can be applied to many forms of qualitative research across several disciplines.

Framework analysis involves systematic searching for patterns and themes in interview data, coding each fragment of data according to the identified themes, iteratively comparing and reviewing the data across a matrix, and interpreting and presenting the findings (Bowling, 2014, p. 402). Framework analysis is not particularly aligned with either inductive or deductive approaches. Frequently, a combination of methods is employed: the coding and analysis can be guided by pre-determined theoretical frameworks. At the same time it is often recommended to implement “open coding” techniques in order to identify emerging concepts, themes, typologies, or connections in the data (Gale et al., 2013).

5.1.1. Rationale

The research method used to collect the qualitative interview data consisted of a “semi-structured” approach. Face-to-face interviews were conducted with older people and experts by asking open-ended questions based on a topic guide to steer the interview around dimensions of the 6C framework (Bowling, 2014, p.391). Elements of each of the analysis approaches described above are relevant to the research questions and methods of the study.

For instance, the language, stories, experiences and words are important for developing a complete picture of the essence of the “digital phenomenon” from older people’s perspective.

However Gale et al (2013) suggested that the choice of analysis method should be driven by the research questions. Indeed, the primary research questions have two implicit aims. Firstly, this study sets out to determine older people’s level of e-inclusion and access to ICT-based care; essentially validating the concept of e-inclusion for the older population. The second aim is to understand how their e-inclusion affects their ability to participate in their communities. The latter aim implies exploration of a relatively uncharted social experience.

To realise both these aims requires different analytical approaches. In the first instance, to test the concept of e-inclusion requires basing the analysis and interpretation of the results on the a priori e-inclusion 6C framework, which is a deductive approach. In the second instance, to discover the context of older people’s digital engagement and their role in their community requires a more open-coding, inductive approach, which will reveal new ideas and themes around – and associations between - these topics. Therefore, having carefully considered the various analysis methods described above, the framework analysis is the best “fit” with the current study as it is not tied to any particular discipline or social discourse, and can be adapted for use with a combination of both deductive and inductive approaches (Gale et al, 2013).

5.2. Series 1

The first series of interviews centred on the objectives of the MonAMI project to validate the feasibility of an open ICT platform to deliver telecare services which has demonstrable social benefits to older people with care needs living in a community setting. In conjunction with the MonAMI trial user-evaluation, I held a series of interviews with UK experts to gain a wider understanding of older people’s level of e-inclusion, and issues around the ICT-based care market and infrastructure in Britain. I received ethical approval to conduct the interviews with experts from the LSE’s Research Committee (London School of Economics Research Division, 2014) on April 22, 2010.

Between April 2010 and September 2011, I conducted interviews with 23 experts, including ICT-based care service commissioners, e-inclusion policy experts, academics, and stakeholders from the private and third sectors. Experts were identified through recommendations by PSSRU colleagues, other expert interviewees, and through the review of the relevant grey literature. Table 3-9 lists the number of interviewees by sector and named organisation of this

first interview series. Table 3-9 Series 1 interviews by sector, organisation and number of Interviewees

Sector	Name of Organisation	Number of interviewees	Interview format
Central Government	Department of Communities and Local Government	1	Face-to-face
Local Government	Kent County Council (2) Westminster Local Authority Tower Hamlets Council Worcestershire County Council	5	Face-to-face
NHS (W1T)	Southampton Newham	2	Face-to-face
Social Enterprise/ Private sector	UK Online Insight Social Research, Ltd (2) Advanced Digital Institute	4	Face-to-face
Registered Charities	Citizens Online King's Fund Foundation for Assistive Technology (F.A.S.T.) (Women's) Royal Volunteer Service	4	Face-to-face
University	Department of Media and Communications, LSE (1, 1) Imperial College (2) Department of Primary Care and Population Health, UCL	5	Face-to-face
Research Centre (University affiliate)	London Knowledge Lab	1	Face-to-face
Consultancy	Castlegate Consultancy	1	Via Skype
Total interview time			25 hours, 27 minutes
<p>Notes:</p> <p>(2)= Indicates that two experts were present for one interview</p> <p>(1,1)= Indicates that two experts were interviewed from the same University department, but in separate interviews</p>			

From the government sector, I interviewed one person who worked for the Department of Communities and Local Government and telecare/telehealth service commissioners from four local authorities (Kent, Westminster, Tower Hamlets and Worcestershire). I also held interviews with two service commissioners from Primary Care Trusts (PCT) in Southampton and the London Borough of Newham. At the time of the first series of interviews, primary care was organised into PCTs, which have since been replaced by Clinical Commissioning Groups.

From the third sector, I interviewed representatives from social enterprises and registered charities. This included one person from UK Online, a social enterprise to improve e-inclusion amongst marginalised groups across the UK (UK Online Centres, 2014a); two people from Insight Social Research, Ltd., dedicated to researching housing, community development, older people, disability and telecare (Insight Social Research LTD, 2006); and one person from the Advanced Digital Institute, a not-for-profit small and medium enterprise (SME), which offers technical services for businesses and has completed several projects in the area of telehealth and remote monitoring (advanced digital institute, 2014).

Interviewees from national charities included representatives from Citizens Online, a charity set up to address issues of e-inclusion and whose directors wrote the 5Cs of digital inclusion framework, the foundation of the 6C framework of this thesis (Citizens Online, 2014); the King's Fund, heavily involved in the Whole Systems' Demonstrator (WSD) project, a randomised controlled trial of telecare and telehealth services in three local authorities in England; the Foundation for Assistive Technology, an organisation which promotes partnerships between stakeholders of the assisted living sector, and the Royal Volunteer Service (at the time of interviewing, called the Women's Royal Volunteer Service), providing technical and social support to older people for the Digital Switchover in certain parts of the UK (Royal Voluntary Service, 2014).

I also held interviews with six academics from three universities and one affiliate organisation. These included two staff from the Department of Media and Communications at the London School of Economics and Political Science (LSE), one of whom was an expert on e-inclusion and the other had previously conducted research on the use of ICT with disadvantaged groups. An interview was held with two researchers at Imperial College, involved in the WSD project. A member of staff from the Department of Primary Care and Public Health at University College London was interviewed, whose main interests lay in e-health. I also interviewed a researcher from the London Knowledge Lab, an independent research centre resulting from a collaboration between Birkbeck College and the Institute of Education (London Knowledge

Lab, 2014). The interviewee had conducted research on the role of ICT in people’s everyday lives. Finally, I spoke to a freelance consultant (Castlegate Consultancy) who worked in policy development at the European Commission level in the area of e-health.

The information sheet, informed consent form and topic guide for the series one interviews with technical experts are found in Appendix B.

5.3. Series 2

The interviews in Series 2 were part of a scoping exercise funded by the School for Social Care Research, in which I investigated the e-inclusion of older people and their access to ICT-based social care in England. A core part of the research design was to triangulate the views of experts and the experiences of older people who used - or did not use - ICT with the findings from a review of the literature. The project received official ethics approval from the (national) Social Care Research Ethics Committee on June 13, 2012.

Between June 2012 and February 2013, I conducted interviews with 14 older people and 11 experts. Eight of the older people were recruited from an Age UK Centre in Oxfordshire, and were interviewed on their own in a one-to-one interview. The age of Interview participants ranged from 68 to 88 years; five were women. These interviews lasted an average of half an hour each. The topic guide for the one-to-one interviews with individual older adults is found in Appendix C, Section 3.1.

I also held a focus group attended by six people aged from their mid-50s to 80s. The focus group lasted over 2 hours. Table 3-10 provides details about the number, gender distribution and approximate age range of the participants of the individual interviews and focus group.

Table 3-10 Description of participants of Series 2 individual interviews and focus group

	Total number of participants	Number of women	Age group	Total interview time
Individual Interviews	8	5	Age range: 68- 88 years mean: 77.8 years	3 hours, 58 minutes
Focus group	6	4	Approximate age range: Late 50s – 80s mean: n/a	2 hours, 10 minutes

Participants of the focus group were recruited through the Service Users and Carers Advisory Group (SUCAG) of PSSRU at the LSE. SUCAG comprises a group of carers and users of social care services who meet a few times a year to discuss various ongoing research projects being undertaken by PSSRU researchers. Invitations to attend the focus group were sent via word of mouth by PSSRU colleagues to both SUCAG members and to friends and relatives who met the inclusion criteria. The inclusion criteria to attend the focus group was being at least 65 years of age. As the invitation to the focus group was extended to all SUCAG members, one participant did not meet the criteria. However, the participant was a carer of older people and attended the focus group to provide her perspective on access to ICT by older people with complex needs.

I mediated the discussion of the focus group by using a topic guide developed around the 6C framework. A copy of the topic guide is provided in the Appendix C, Section 3.2.

The series 2 interviews also included interviews with eleven experts in the fields of e-inclusion and general service delivery for older people. Potential expert interviewees were identified either through the grey literature, suggestions made by PSSRU colleagues or recommendations from other experts. Table 3-11 provides details on the number of expert interviewees by sector and representing organisations.

Table 3-11 Series 2 interviews by Sector, organisation and number of Interviewees

Sector	Name of Organisation	Number of interviewees
Think Tank	International Longevity Centre-UK (ILC-UK) (2)	2
Registered Charities	Social Care Institute for Excellence (SCIE) (2)	2
	Age UK (2, 1, 1)	4
Social Enterprise	Digital Unite	1
University	King's College London	1
Consultancy	(Freelance)	1
Total interview time		7 hours, 9 minutes
Notes: (2)= Indicates that two experts were present for one interview (2,1,1)= Indicates that two experts were present for one interview, and two more separate interviews were held with one person each		

Most of the interviews were with experts from the third sector. One was held with two people from the ILC-UK, who had a specific interest in the e-inclusion of older people. One was

conducted with two people from the Social Care Institute for Excellence, an independent charity which develops a range of skills and knowledge resources for social care practitioners and commissioners (Social Care Institute for Excellence, 2014). Both interviewees were involved in projects which looked at uses of ICT in social care. I also interviewed four experts from Age UK centres who were involved in both the development and delivery of e-inclusion programmes to older people in their communities. One expert was from an Age UK centre in London. Two experts were managers from Age UK Oxfordshire headquarters, and one expert was an ICT trainer at the same Age UK centre (in Oxfordshire) where I held interviews with older people (Age UK, 2013a). One was a volunteer ICT-trainer, who had several years' experience working as an engineer for a large telecommunications company. I also interviewed a senior executive of Digital Unite, a social enterprise dedicated to providing digital skills training (Digital Unite, 2014a).

In the university sector, I interviewed one academic with interests in services for older people. Finally, I interviewed a freelance consultant who specialises in policy development for the third sector.

The topic guide for the series two interviews with technical experts is found in Appendix C, Section 3.3.

6. Discussion

To address the key research questions of this thesis, I adopted a pragmatic approach that allowed me to draw on a number of research methods and data sources. Described as a convergent parallel mixed method design, this blending of both qualitative and quantitative methods offers benefits that are greater than can be derived from a single approach (Bowling, 2014, p. 419).

I was also able to explore several data sources, including from national surveys, such as the OxIS and Opinions and Lifestyle Surveys, as well as data from smaller trials such as the MonAMI project. I also explored the qualitative and quantitative evidence presented in the literature from other studies and reports.

The pragmatic approach of the study also lent itself to using more inclusive and flexible approaches to the review and analyses of the literature and qualitative data; I adopted elements of both a traditional systematic as well as a realist approach to review the literature, and relied on a framework method approach to analyse the interview data.

In the following chapters, I present the findings of the various types of analyses using both quantitative and qualitative data sources using the 6C model to organize and understand the wealth of information. This was achieved by triangulating the various data sources, which highlighted the consistencies and disagreements in the research methods and which in turn helped to enhance the validity of the research (Robson, 2011, p.158).

Figure 3-2 Timeline of data collection



Chapter 4 : Measuring the level of e-inclusion of older people

1. Introduction

There are approximately 10.8 million people aged 65 years and older in Great Britain, representing approximately 16.4% of the population as a whole (Office for National Statistics, 2013a). Naturally, the older adult population is very diverse in terms of socio-demographic characteristics, interests and needs. This is also true with respect to their skills, perceptions and attitudes towards ICT. Indeed, estimates provided by the Office for National Statistics (2014a) confirm that the older people's engagement with ICT is highly heterogeneous: approximately 40% of people aged 65 years and older do not use the Internet, and of the older population which does use the Internet, 42% use it on a daily basis, 13% on a weekly basis and 5% less than weekly.

In this chapter, I set out to measure the different levels of e-inclusion of the older population in Great Britain and to assess the effects of a number of potential influencing factors on older people's ICT engagement. In pursuit of these aims, I construct a graduated e-inclusion scale which measures level of ICT engagement according to access to ICT devices, level of ICT skill and frequency of Internet use. The scale is also used to observe changes in levels of e-inclusion of the older adult population over time. I then estimate a series of linear regression models in order to explore the significance of the effects of the 6C framework dimensions on older people's e-inclusion.

2. Methodology

Current definitions of e-inclusion have shifted from an earlier notion of a clear digital divide, which described a binary state of having – or not having – internet access (Norris, 2001, chap. 1), to suggest a continuous degree of engagement with ICT, ranging from no engagement to fully being engaged. Recent conceptualisations have also sought to take into account the implications of perpetual connectivity brought on by the advent of wireless and mobile internet capabilities, underpinned by access to “smart” ICT devices (Dutton and Blank, 2011).

In order to quantitatively measure the level of e-inclusion of older people in Britain, I examined data collected in the Oxford Internet Survey (OxIS) in 2005 and 2011, kindly supplied by the Oxford Internet Institute (OII) upon request. OxIS 2005 was provided by the Oxford Internet Institute on December 11, 2009. OxIS 2011 was provided by the Oxford Internet Institute on October 29, 2013. The OxIS consists of comprehensive cross-sectional datasets of internet use

amongst adults aged 14 years and older. Data were collected bi-annually in individual face-to-face interviews across the Britain, starting in 2003.

In order to ensure that the each sample was representative of the diversity of people in Britain, sampling was based on a randomised two-stage process for each survey (Oxford Internet Institute, 2013b). The first stage consisted of the selection of a random sample of 175 pairs of output areas (OA), stratified by region and coupled according to the similarity of their ACORN type. The second stage entailed generating 10 random postal addresses for each OA. Interviewers were asked to achieve a 60% response rate from the 10 addresses. If this was not achieved, new sets of addresses from the OA were issued. At each household, interviewers selected respondents by asking the person who answered the door for permission to interview the adult in the household who had the next birthday. If this information was not known, then the respondents were selected according to the name of the adult which started closest to the beginning of the alphabet (Dutton and Blank, 2011).

The structured surveys were administered by face-to-face interviews with the selected respondents in their homes. In the 2011 survey, the sample size was 2,057, representing a response rate of 52% (Dutton and Blank, 2011). In the 2005 survey, the sample size was 2,185 representing a response rate of 72% (Oxford Internet Institute, 2005).

3. Analyses

The following statistical analyses consist, first, of an ordinal scale of e-inclusion. Second, in order to characterise older people at each level of e-inclusion, I performed cross-tabulations of proxy variables for the dimensions of the 6C framework. Briefly, the 6C framework of e-inclusion consisted of the person-centred and environmental factors which were thought to influence the adoption - and continued use - of ICT. These factors included connectivity (internet and device access), content (perceived relevance and accessibility), capability (skills), confidence (self-efficacy), cost (affordability) and continuity (support).

Third, I ran a series of regression models to test the significance of the characterising variables. Finally, I compared the 2011 and 2005 levels of e-inclusion of the adult population by age-group.

3.1. A scale for e-inclusion

The e-inclusion scale, developed for this research, stratified level of engagement with the internet and related ICT devices according to three factors: access to internet-enabled devices, frequency of internet use, and level of related skill. The set of parameters used to delineate

each level of e-inclusion were influenced by user typologies described in Dutton and Blank (2011) and Ferro et al. (2011). Dutton and Blank's typology distinguished new generation (NG) from first generation (FG) users. NG users were the early adopters of current trends in internet-enabled ICT devices and mobile internet applications, who used the internet as a central part of their daily lives, and who embraced "on-the-go" and "always on" attitudes to using the internet. The parameters Dutton and Blank used to define NG users included using a mobile phone to access the internet or having access to several internet-enabled devices such as a tablet computer, an e-reader or several computers. In comparison, FG users were defined as latent adopters who accessed the internet less frequently and rarely (if at all) used a mobile device to access it. To define the highest level of e-inclusion on the scale developed in this chapter, I used the same parameters as Dutton and Blank used to define NG users (see Table 4-1).

According to Dutton and Blank's typology, the remaining users were FG. The FG group were further divided into three categories of user-types, according to Ferro et al.'s typology, based on frequency of use and skill. Ferro clustered users according to skill, using number and types of internet activities as proxy measures. The first cluster, "sporadic users", were seen to have only a limited use of the internet; "basic users", in contrast, demonstrated more regular usage of the internet, but limited to email and information searches. "Advanced users" were defined as those who employ the internet not only for email and information searching, but also for a wide range of other purposes, including purchasing online, using voice-over-Internet-protocol (VOIP), and blogging. Similar parameters were used to define the "advanced", "moderate" and "basic" user-groups in this research (Table 4-1).

In the e-inclusion scale developed here, "advanced users" are similar to Ferro's advanced users and consist of those who use the internet daily – or several times a day – for email, information searches and other activity. "Moderate users" also closely following Ferro's "basic user", are those who use the internet for email, information searches, or both, on a daily basis or more. Both "advanced" and "moderate" users may also use the internet for other activities on a less-than-daily basis. "Basic users", is again similar to Ferro's "sporadic user" type and comprise those who only use the internet on a weekly basis or less for any activity.

Table 4-1 E-inclusion typology

E-inclusion scale	Criteria
New Generation user ¹	<p>2005 aggregate variable includes Internet users who live in a household with:</p> <ol style="list-style-type: none"> 1) 3 or more computers; or 2) Access to the Internet using a handheld device such as a mobile phone or a personal digital assistant (PDA) <p>2011 aggregate variable includes internet users who either use two or more of the following Internet applications from a mobile phone:</p> <ol style="list-style-type: none"> 1) Browsing the internet 2) Using email 3) Updating social networking site 4) Finding directions; <p>Or live in a household with two or more of:</p> <ol style="list-style-type: none"> 1) 3 or more computers 2) A tablet computer 3) An e-reader
Advanced user ²	Internet users who use email, information searching ³ , and one or more other Internet activities ³ daily or several times a day.
Moderate user ²	Internet users who use email and/or information searching ³ daily or several times a day
Basic user ²	Internet users who do not use any Internet activity daily, but do undertake internet activity weekly or less often
Ex-User ⁴	Respondents who stated they do not currently use the internet, but have done so in the past
Never-user ⁴	Respondents who stated they do not currently use the internet and have never done so in the past
<p>Notes:</p> <p>PDA: Personal digital assistant</p> <p>¹ Classification based on Dutton and Blank's user typology (2011)</p> <p>² Classification based on Ferro et al.'s user typology (2011)</p> <p>³ Variables from the 2005 and 2011 OxIS questionnaires which are included as the aggregate "daily information searching" and "daily other Internet activities" variables in current e-inclusion scale are listed in Table 4-2</p> <p>⁴ Classification based on OxIS questionnaire</p>	

Finally, the OxIS was also developed to understand the characteristics of those who did not use - as well as those who had abandoned the use of - the internet. Therefore, the ex-user and never-user groups of the e-inclusion scale consist of original variables in the OxIS datasets. Ex-users are respondents who claimed that they did not currently use the internet, but who had used it in the past. Never-users are those who not only do not use the internet but had not used it in the past.

3.1.1. Deriving the “new generation” level of e-inclusion

Table 4-1 describes how the “new generation” level of e-inclusion variable was derived in both the 2005 and 2011 datasets. Computing the “new generation” variable in 2011 dataset consisted of the same process as described by Dutton and Blank (2011) to create the NG user type. NG users in Dutton are those who either used a mobile phone to perform at least two internet-related activities or who lived in a household which owned two of following sets of devices: three computers, a tablet, or an e-reader.

Because mobile ICT technologies with internet capabilities were not as developed in 2005, the 2005 OxIS survey did not include the same set of variables as the 2011 survey. For instance, tablet computers and e-readers became available on the market only in 2010 (Nations, 2014). Therefore, variables used to construct the “new generation” variable from the 2005 survey were chosen to match as closely to the 2011 variables as possible, and which demonstrated “early adopter” behaviour (Mancinelli, 2007). As a result, the “new generation” variable consists of individuals who lived in a household with three or more computers or access the internet using a handheld device, such as a mobile phone or a personal digital assistant (PDA).

3.1.2. Deriving the “advanced”, “moderate” and “basic” levels of e-inclusion

The “advanced”, “moderate” and “basic” levels of e-inclusion for the scale were based on the typology proposed by Ferro et al. (2011), which differentiated level of use, based on ICT-skills, and frequency of usage. ICT-skills were assessed by considering the number and types of internet activities a person engaged in. More specifically, Ferro looked at the use of email, together with internet searches and other types of internet activities, and considered whether these activities were undertaken daily, or less often. This approach was adopted when developing the e-inclusion scale for this research.

The OxIS 2005 and 2011 surveys posed several questions around engaging with the internet in differing ways, such as using email, conducting different types of internet searches, and engaging in other types of internet activities. All questions relating to engaging in different Internet activities were asked only to respondents who declared that they were internet users.

Responses were measured on a 6-point scale, where 5 indicated usage “several times a day”, 4 indicated “daily” use, 3 was “weekly” use, 2 was “monthly” use, 1 was “less-than-monthly” use, and 0 was “never” used. Table 4-2 below lists the relevant internet activity variables included in the OxIS 2005 and 2011 questionnaires respectively.

In order to distinguish the advanced and moderate users from basic users in Ferro’s model, I considered first the frequency of internet usage. Advanced and moderate users engaged in internet activities on a daily basis, whereas basic users engaged with the internet weekly or less often. Therefore, I created binary variables from all of the relevant internet activities (see Table 4-2) in each of the 2005 and 2011 OxIS datasets, where the responses of “daily” and “several times daily” were coded as “1” and all other frequencies were coded as “0”.

Table 4-2 List of Internet activity variables from 2005 and 2011 Oxford Internet Survey datasets

Internet skills	2005	2011
Checking email ¹		
Internet searching²		
Searching for news (local, national, international)		
Searching for local events		
Searching for sports information		
Searching for jobs		
Searching for humorous content		
Searching for information on family tree		
Searching for health or medical care information		
Searching for information on people		
Finding/checking facts		
Looking up definition of words		
Searching topics of personal interest (Browsing Web for general purposes (2005))		
Checking weather forecast		
Finding location of house, office or public venue		
Comparing products and prices (Getting information about a product (2005))		
Looking at religious/spiritual sites		
<i>Total number of variables related to Internet searches</i>	<i>12</i>	<i>12</i>
Other Internet activities³		
Making travel plans		
Using instant messaging		
Using chat rooms		

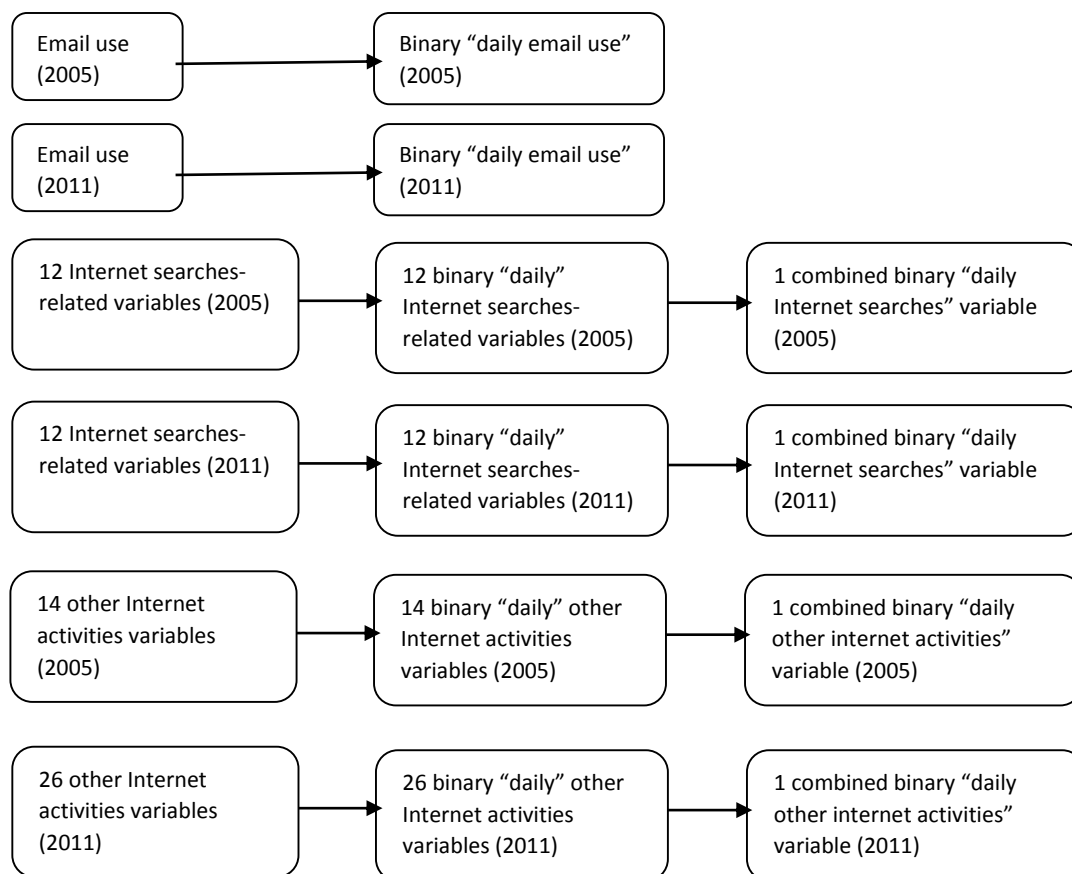
Using Internet for work purposes		
Making/receiving calls over the Internet		
Writing blog		
Maintaining a personal website		
Posting message on discussion board		
Posting photos on the Internet		
Checking/updating profile on social network site		
Posting video clips		
Posting creative work		
Listening to music online		
Watching films online		
Watching TV programmes online		
Using Internet for distance learning or job training		
Playing games		
Downloading music		
Downloading videos		
Uploading videos or music files		
Downloading or listening to music		
Downloading or watching videos		
Listening to radio online		
Buying product online		
Paying bills		
Using online banking		
Financial investing		
Ordering groceries		
Selling things		
<i>Total number of variables related to Other Internet activities</i>	14	26
Notes		
¹ The “email use” variable remains unchanged from the original 2005 and 2011 OxIS questionnaires		
² The “internet searches” variables for the 2005 and 2011 datasets consists of combining the 12 variables listed for each of the 2005 and 2011 OxIS questionnaires		
³ The “other internet searches” variables for the 2005 and 2011 dataset consists of combining the 26 variables from the 2011 OxIS questionnaire and the 14 variables from the 2005 OxIS questionnaire respectively.		
⁴ Shaded cells indicate that the same or similar variable is included in the dataset		

Next, in order to classify the level of usage according to skill (or type of usage), I created a new variable in each of the 2005 and 2011 datasets around “daily email use”, “daily internet

searches”, and “daily other internet activities”. There were some differences between the 2005 and 2011 questionnaires. The 2005 questionnaire included fewer internet activities, but also included some activities which were not repeated in the 2011 questionnaire, such as searching for weather information and information about one’s family tree. When possible, the same – or similar - variables from both the 2005 and 2011 datasets were used to create aggregate variables for internet searching and other internet activities (see Table 4-2).

To categorise the different internet activities listed in Table 2 according to the typology suggested by Ferro, I created binary variables according to frequency. The binary variable indicating daily email use was left unchanged. The 12 binary variables for each of the 2005 and 2011 datasets concerning internet searches were combined. A second derived binary variable was then created where the values of 1 and above of the combined variable was coded as “1” to indicate daily internet searches, and a value of 0 was coded as “0” to indicate less than daily searches. The same process was repeated to create a binary “daily other internet activities” variable from the 14 and 26 alternative activities in the 2005 and 2011 OxIS questionnaires respectively. Figure 4-1 illustrates the process of deriving binary variables indicating level of ICT-skills and frequency of use from the original variables in both the 2005 and 2011 OxIS datasets.

Figure 4-1 Process for deriving variables for e-inclusion scale from 2005 and 2011 OxIS datasets



3.1.3. Ex-users and never-users level of e-inclusion

Ex-users and never-users were identified using the original variable in the 2005 and 2011 datasets. Respondents were asked if they currently used the Internet. The response of “yes” was coded as 1; the response of “no, but did so in the past” was coded as 2; and the response of “no, never have used in the past” was coded as 3.

3.2. Statistical Analyses: Characterising older people’s e-inclusion

3.2.1. Factors that influence older people’s level of e-inclusion

A series of cluster analyses and cross-tabulations were conducted to examine the user characteristics in 2011, at each level of the e-inclusion scale (see Table 4-1). The variables used included age, gender and indicators of five of the six dimensions of the 6C model. Details about each of the dimensions of the 6C framework are provided in Chapter 2. Briefly, the five dimensions included in the analyses in this chapter are content, cost, capability, confidence, and continuity. The connectivity dimension, which deals with access to the internet, was not included in the analyses, as the user typology itself was based on internet use.

Variables from the 2011 OxIS questionnaire were chosen as indicators of the dimensions of the 6C model, according to how closely they fitted the definition of the dimension. In addition, only questions which were posed to all OxIS respondents were chosen as proxy variables.

Some questions more closely represented some of the 6C dimensions, but were asked for only a subset of the sample (e.g. certain questions were asked only of internet users and not of ex-users or non-users).

The indicators, proxy variables and measurement scales for each of the five dimensions are listed in Table 4-3 . The content dimension consists of two aspects: perceived relevance and accessibility. The proxy variable, indicating perceived relevance, measures respondents’ level of agreement – or disagreement – with the statement, “*The internet makes life easier*”. The proxy measure of accessibility is the dichotomous variable of the existence (or non-existence) of a self-reported health problem or disability limiting respondents’ ability to do everyday tasks. This was chosen under the assumption that older people with a limiting condition with respect to ADLs would also experience physical, sensory or cognitive limitations when using ICT.

Table 4-3 Variables from 2011 OxIS used as indicators of the dimensions of the 6C framework

5 dimensions of 6C framework	Indicator	Specific survey questions (OxIS, 2011)	Measurement
Content	Perceived relevance	(QI2a) The Internet makes life easier.	5 point Likert scale from “Strongly disagree” =1 to “Strongly agree” = 5
	Accessibility: Health status or disability	(QD16) “Do you have a health problem or disability which prevents you from doing everyday tasks?”	Yes/No
Cost	Perceived affordability: yearly household income	(QSC2) Total yearly household income before tax?	Ascending incremental list of range of incomes.
Capability	Education level	(QL2)What was last type of educational institution you have attended or are attending	Options condensed to create list in ascending order: <ol style="list-style-type: none"> 1. Primary school 2. Secondary education: secondary/special school or equivalent 3. Tertiary

			education: Sixth form/Technical/Adult community/Further education college or equivalent 4. Higher education: University or equivalent
Confidence	ICT-related anxiety	(Q1c) "I get nervous using technologies because I might break something"	5 point Likert scale from "Strongly disagree" =1, to "Strongly agree" =5
Continuity	Potential level of support in household	(QD04) How many adults over the age of 18 are living in your household	Continuous number

Several studies (Mason et al., 2012; OfCom, 2013a; Randall, 2010) use household income as an indicator of perceived affordability of ICT. Therefore, I also used yearly household income as an indicator for the cost dimension. Attained level of education is often used as an indication of skill – or ability to acquire skill (Leppel and McCloskey, 2011; Mason et al., 2012). Similarly, I used a variable representing a list of respondents’ last educational institution attended to indicate the capability dimension. The original 2011 OxIS questionnaire included eight categories of institutions, which I condensed to four to represent primary, secondary, further and higher educational institutions (see Table 4-3).

Studies by Adams et al. (2005) and Dutton and Blank (2011) reported a tendency for older people to experience anxiety around the potential to break ICT equipment and have commented that this subsequently impeded their use of ICT. I included a similar measure of anxiety as an indicator of confidence towards using technology.

Finally, ONS (2014) statistics revealed that 59% of households comprising a single adult aged 65 years and older did not have an internet connection, compared to 20% of households comprising two adults, where at least one person was aged 65 years or older. Analysts (Heart and Calderon, 2013; Morris et al., 2007; Selwyn et al., 2003) have noted the essential role family members play in older people’s adoption – and continued use of – ICT. The continuity dimension is represented by the number of adults living in the respondents’ household.

3.2.2.Changes in level of e-inclusion over time

In order to assess whether older people’s levels of e-inclusion has changed over time, I performed a second series of analyses comparing older people’s levels of e-inclusion in 2005 to their levels = in 2011. The analyses were designed to observe changes across age-groups: comparisons were made within the older adult population as well as between younger and older age-groups. In order to observe changes within the older adult population, the older population was subdivided into “younger-older” people, aged 65 to 74 years, and “older-older” people aged 75 years and older. This subdivision follows OfCom *Communications Market Reports* (2013a; 2014), Eurostat estimates, and Office for National Statistics *Statistical Bulletins* (2014d) which also used these age bands to mark changes within the older adult population. The older age groups were also compared to the younger adult populations including the 55 to 64 years - and the 18 to 54 years – age categories.

The analyses consist of cross-tabulations of each of the variables indicating level of e-inclusion and age-group for both the 2005 and 2011 datasets. The comparisons between the 55 to 64 age group and the 65 to 74 age category were made in order to observe any possible migration between different levels of e-inclusion as pre-retirement adults became older. The 18 to 54 age group served as a comparison, to note differences between levels of e-inclusion in younger and older adults.

3.2.3.Regression analyses: Influence of the “6Cs” on older people’s Internet access

Three linear regression models were calculated in order to examine whether the 6C dimensions had significant effects on the levels of e-inclusion. These effects were run against two definitions of e-inclusion. In the first and second regression models, e-inclusion is defined in the same way as for the e-inclusion scale: according to a multifactorial concept, consisting of a combination of access to different devices, frequency of usage and skills. The dependent variable for first and second series of regression models therefore is an ordinal variable indicating one’s *level of e-inclusion* (Table 4-1): “never-users” were coded as 1 to indicate the lowest level of e-inclusion, and “NG” users were coded as 6 to indicate the highest level of e-inclusion. Table 4-4 outlines the coding for the dependent variable used in the multifactorial models of e-inclusion.

Table 4-4 Coding for dependent variable for multifactorial models

User-type	Code
Never-user	1

Ex-user	2
Basic user	3
Moderate user	4
Advanced user	5
New generation user	6

The second definition of e-inclusion was based on Dutton and Blank's (2011) approach, whereby new generation are distinguished from first generation users based on the *number and type of ICT devices* to which an individual had access – or owned. This is definition of e-inclusion is used for regression model 3.

The dependent variable for the connectivity approach consisted of an additive scale, indicating the number of internet-enabled devices used by a respondent – or to which he/she had access. To create the dependent variable, I combined seven variables from the 2011 OxIS dataset into a single variable, providing a count of the number of devices each individual used or had access to. Box 4-1 lists the variables from the 2011 OxIS dataset used to create the dependent variable, which include personal use of a computer and a mobile phone, and household ownership of a webcam, tablet computers or Personal Digital Assistant (PDA) (e.g. Apple's iPad, Samsung's Galaxy, or Blackberry), e-reader (e.g. Amazon's Kindle), games console (e.g. Xbox or Playstation), and television with a built-in internet connection (smart TV). The webcam, while not internet-enabled in itself, was included, as its primary use is for accessing videoconferencing services over the internet (e.g. Skype).

Box 4-1 Variables from 2011 OxIS dataset used in combined dependent variable

Personal use of computer
Personal use of mobile phone
Household ownership of webcam
Household ownership of tablet computer or personal digital assistant
Household ownership of e-reader
Household ownership of games console
Household ownership of Smart-TV

The independent variables for all of the regression models consisted of the variables which described the dimensions of the 6C framework (see Table 4-3). The connectivity dimension,

which concerns access to home internet access, was excluded from the regression models, due to the redundancy of measuring effects of a household internet connection on the household ownership of devices used to access the internet. Indeed the Pearson correlations between household internet connectivity and the dependent variable in regression models 1 and 2 ($r = 0.955$, $n=362$, $p=0.000$) and the dependent variable in model 3 ($r=-0.712$, $n=355$, $p=0.000$) demonstrated high levels of bivariate correlation (Tabachnick and Fidell, 2001).

When the independent variable for household internet connectivity was removed from the regression models, the Pearson correlations did not indicate high levels of bivariate correlation between any of the independent variables, or between the independent variables and each of the dependent variables.

Three series of regression models were estimated to assess the effects of age, gender and the dimensions of the 6C framework. In the first series, including models 1a through to model 1f (Table 4-6), the dependent variable consisted of the *level of e-inclusion*. Model 1a estimated the effects of age and gender on e-inclusion. Models 1b through to 1f adjusted for age, gender, and one each of the variables representing the five dimensions of the 6C framework separately.

Model 2 estimated the effects of age, gender and all of the variables representing the five dimensions of the 6C framework together on *level of e-inclusion* as the dependent variable. Model 3 estimated the effects of age, gender and all the variables representing the dimensions of the 6C framework together on e-inclusion on *number of ICT devices* as the dependent variable (see Table 4-7).

The independent variables were added to the models via forward stepwise selection, where the probability of entering the model was 0.05 and the probability for remaining in the model was 0.1. A significance level of 0.1 was used as a threshold for significance.

All analyses were conducted using IBM SPSS Statistics 21 (IBM Corp., 2012).

4. Results

Table 4-5 provides a summary of the characteristics of the sample of people aged 65 and over from the 2005 and 2011 OxIS datasets. Also summarised in Table 4-5 Demographic profile, access to ICT of adults aged 65 years and older in 2005 and 2011 is the proportion of older people who had access to different types of ICT in 2005 and 2011.

Table 4-5 Demographic profile, access to ICT of adults aged 65 years and older in 2005 and 2011

	2005	2011
<i>n</i> =	277	560
Mean age (years)	73.5	74.4
% aged 75 years or older	31.0	44.5
% female	48.7	55.9
% living in single-adult household	37.9	51.8
% self-rated health “poor” or “very poor” (2005)	18.4	
% with self-rated health problem or disability (2011)		35.6
<i>Access to ICT</i>		
% personal use of the Internet	26.4	29.5
% personal use of a computer	31.8	27.7
% personal ownership of a mobile phone	57.0	61.9
% household ownership of a hand held PDA (2005)	2.2	
% household ownership of a hand held PDA or tablet computer (2011)		2.7
% household ownership of an e-reader (2011 only)		0.9
Notes:		
PDA: personal digital assistant		

Source: OxiS, 2005; 2011

Both samples had a similar average age, but the 2011 sample had a higher proportion of “older-old” people (44.5%) compared to the 2005 sample (31.0%). Also compared to 2005, there was a greater proportion of female respondents in the 2011 survey, and a greater percentage of older people living in single-adult households.

In the 2011 survey, 35.6% of the older population claimed to have a limiting health problem or disability. In comparison, only 18.4% of older respondents in the 2005 survey rated their health as “poor” or “very poor”. The disparities in self-reported health can be mostly attributed to in differences in the questions between the 2005 and 2011 surveys.

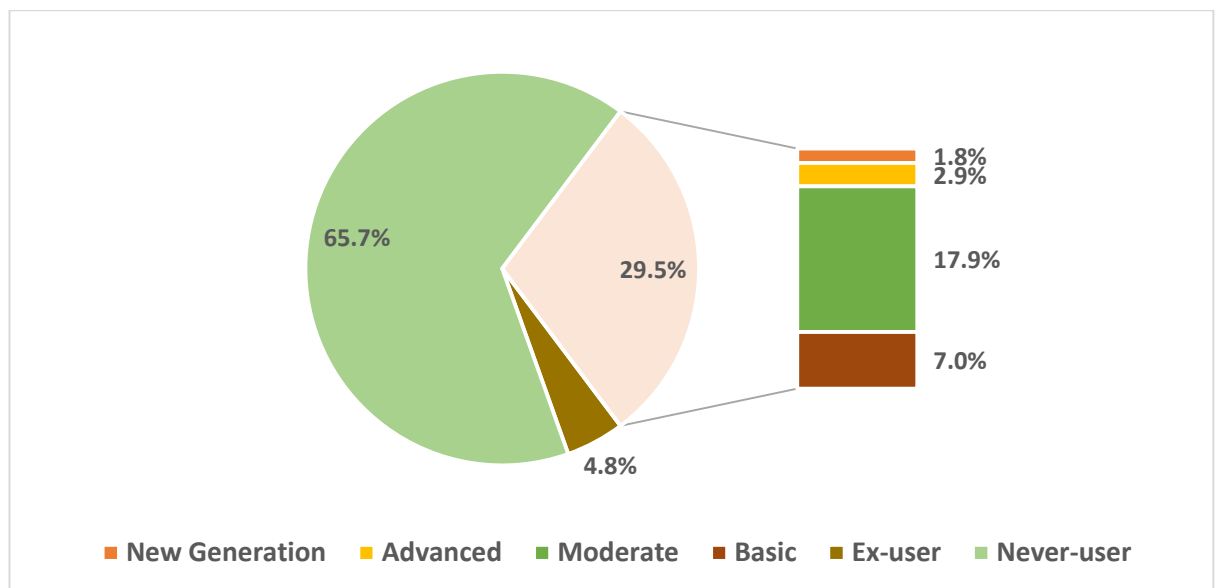
With respect to access to - and use of - ICT devices and the internet, there was a 5 percentage point increase in the number of older people who were currently using the internet, from 26.4% in 2005 to 29.5% in 2011. There were similar differences in computer and mobile phone use. The proportion of older people using a computer decreased from 31.8% in 2005 to 27.7% in 2011 (27.7%). At the same time, mobile phone ownership amongst older adults grew from 57% in 2005 to 61.9% in 2011. This could represent a shift in using mobile phones over computers for simple internet-based tasks, like email.

There were also a slightly higher proportion of respondents in 2011 living in households which owned a hand-held tablet and/or PDA (2.7%) compared to 2005 (2.2%). Some of the increase is likely to be due to the increased availability of different types of hand-held ICT devices by 2011, such as the tablet computer (e.g. iPad) introduced on the market in 2010.

4.1. Typology of older people’s level of e-inclusion

Figure 4-2 illustrates the distribution of the proportions of people aged 65 years and older at each level on the e-inclusion scale.

Figure 4-2 Distribution of people age 65 years and older across levels of e-inclusion



The distribution across the levels of e-inclusion demonstrates that over two thirds (70.5%) of the older sample did not use the internet; they were either ex-users (4.8%) or never-users (65.7%). Of the 29.5% who used the internet, the largest proportion were at the moderate level of e-inclusion (using the internet on a daily basis for email and/or information searches). Users at the basic level of e-inclusion (i.e., using the internet weekly or less often) represented almost a quarter (23.8%) of internet users aged 65 years and older. At the other end of the e-inclusion scale, a small minority (2.9%) of the total older sample were at an advanced level of inclusion and an even smaller proportion of the sample (1.8%) could be considered part of the new generation level of e-inclusion.

4.2. Characteristics of older people according to level of e-inclusion

Figure 4-3 demonstrates the mean age of the older adult sample according to level of e-inclusion. The results show a general trend of increasing mean age as the level of e-inclusion moves down the scale.

Figure 4-3 Mean age (years) of people aged 65 years and older according to level of e-inclusion

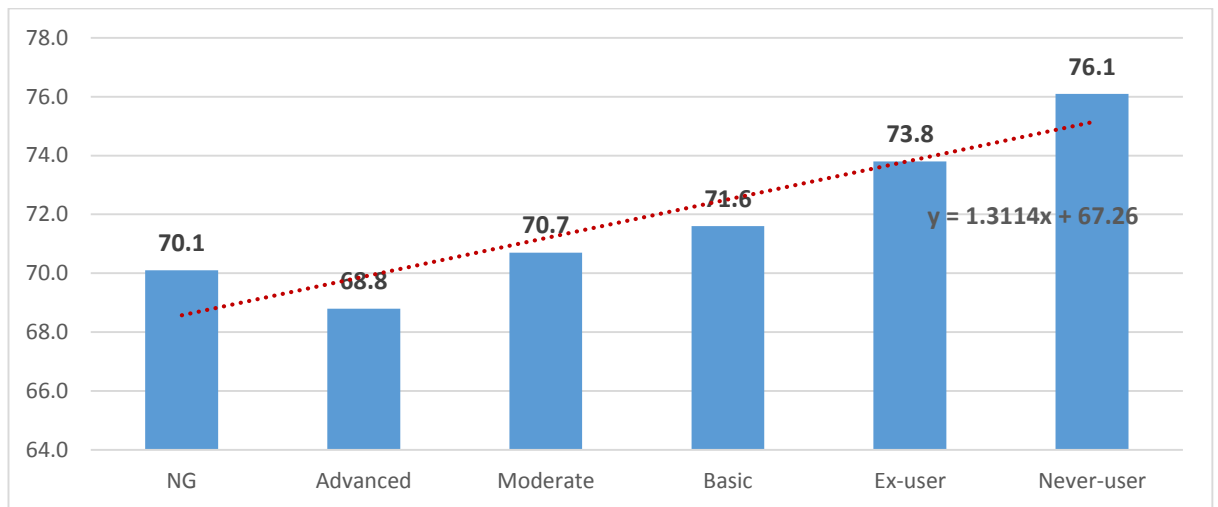
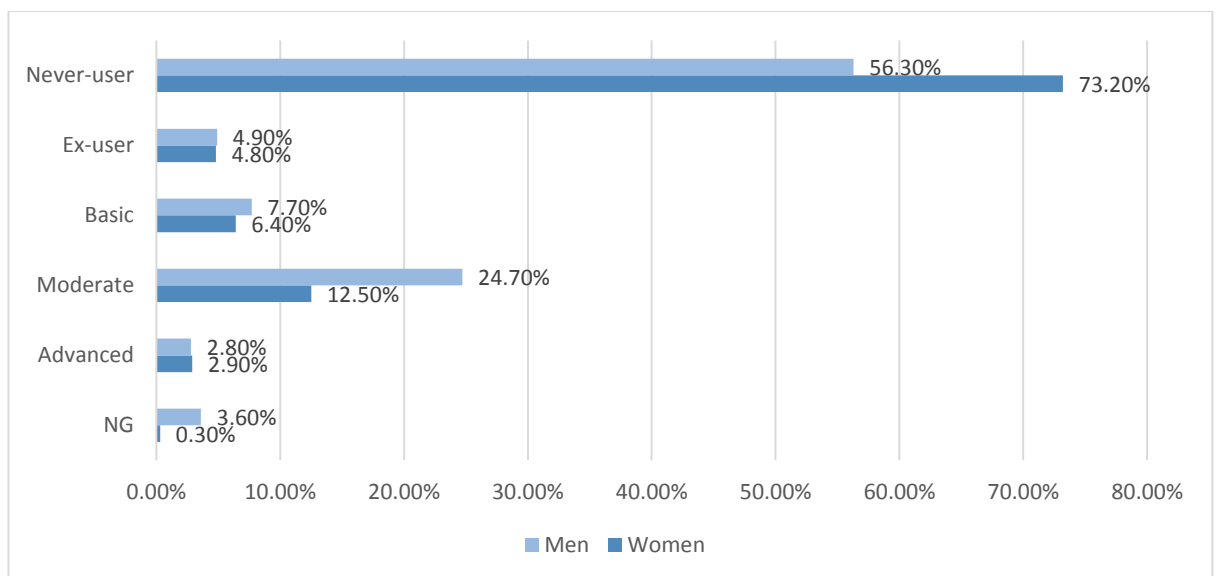


Figure 4-4 shows the proportion of women and men aged 65 years and older at each level of e-inclusion.

Figure 4-4 Proportion of women and men aged 65 years and older at each level of e-inclusion



There were similar proportions of women and men at the advanced, basic and ex-user levels of e-inclusion. The proportion of men (3.6%) at the new generation level of e-inclusion was 12 times higher than the proportion of women (0.3%) at the same level; the proportion of men (24.7%) at the moderate level of e-inclusion was approximately twice as high as the proportion of women (12.5%) at the same level. Finally, the proportion of women who were never-users (73.2%) was almost 17 percentage points higher than the proportion of men who were never-users. Results of a Pearson chi-squared analysis ($\chi^2 = 26.449$, $p < 0.000$) demonstrated a significant relationship between gender and level of e-inclusion.

The findings of the cross-tabulations between the dimensions of the 6C framework are illustrated in Figures 4-12 to 4-17 at the end of this chapter. The results are discussed according to each level of the e-inclusion scale in the sections below.

4.2.1. New generation

Less than 2% of older adult sample were found to be at the new generation level of e-inclusion (Figure 4-2). The average age of older NG Internet users was 70.1 years (Figure 4-3). The results demonstrated that only 3.6% of the older men in the sample, and 0.3% of the women in the sample reached the NG level of e-inclusion (Figure 4-4). In comparison, according to the Oxford Internet Survey 2011 Report (Dutton and Blank, 2011), 51% of people in employment and 52% of students were NG users in 2011.

In terms of the content dimension, NG users fully embraced the benefits of the internet (Figure 4-12) and no one in the sub-sample reported any illness or disability which might have implied that their accessibility of ICT interfered with their use of the devices and the internet (Figure 4-13).

With respect to the cost dimension, all NG had yearly incomes over £20,000 and almost a third of respondents had incomes over £50,000 (Figure 4-14). Also in terms of the capability dimension, the NG groups had the highest proportion of attendees of higher education (44%) among all groups (Figure 4-15). For the confidence dimension, only a minority (10%) of NG users admitted to being nervous about breaking the ICT equipment (Figure 4-16). Finally, in terms of continuity and informal support, all NG users lived with at least one other adult in their household (Figure 4-17).

4.2.2. Advanced

The advanced user-group were also a small minority of the older population (2.9%) (Figure 4-2). Advanced users were the youngest group, with an average age of 68.8 years (Figure 4-3). The advanced level of e-inclusion represented similar proportions of men (2.8%) and women (2.0%) of the sample. (Figure 4-4).

In terms of perceived relevance and accessibility, none of the advanced users disagreed with the notion that the internet benefits daily life, although approximately a quarter did not have an opinion either way (Figure 4-12). Over 26% of advanced users claimed to have a limited health problem or disability, which is a higher proportion than the users at the moderate – and basic – levels of e-inclusion, who were lower down on the e-inclusion scale (Figure 4-13).

In terms of the cost dimension, there was a relatively even distribution amongst the three lower income-levels, and less than 10% of advanced users lived in a household with a yearly income between £30,000 and £40,000. None of the higher income levels were represented in the advanced user group (Figure 4-14). On the other hand, advanced users had a high proportion of higher- and tertiary-level education attendees, compared to user groups lower down on the e-inclusion scale (Figure 4-15).

The proportion of advanced older users who expressed anxiety about using technology (18.8%) was higher than found in users at the NG and moderate levels of e-inclusion, but lower than users at the basic, ex-user and never-user levels of e-inclusion (Figure 4-16). Finally, 18.8% of advanced older people lived in single-adult households, which was lower than the moderate, basic, ex-user and never-user levels of e-inclusion (Figure 4-17).

4.2.3. Moderate

The moderate level e-inclusion represented the largest group of older Internet users (60.7%) (Figure 4-2). The average was 70.7 years (Figure 4-3), and the proportion of women (12.5%) was approximately half the size of the proportion of men (24.7%) (Figure 4-4).

At the moderate level, there was a small proportion (4%) of users who disagreed about the relevance of the internet, compared to the NG and advanced user-groups where none of the respondents expressed disagreement (Figure 4-12). Over 13% of moderate users reported a limiting health problem or disability; which was lower than the proportion of older people with a health problem or disability at the advanced, basic, ex-user and never-user levels of e-inclusion (Figure 4-13).

The levels of household income were varied at the moderate level of e-inclusion, but most moderate users had yearly household incomes between £12,000 and £30,000 (Figure 4-14). Levels of attained education followed the expected trend whereby the proportion of higher and tertiary- level education attendees was lower at the moderate level than the NG and advanced levels, and higher than basic, ex-user and never user levels (Figure 4-15).

After the NG group, the moderate group had the lowest levels of ICT-related anxiety (Figure 4-16). Finally, the proportion of older people at the moderate level of e-inclusion followed the emerging trend where the proportion of single-adult households increased as the level of e-inclusion decreased (Figure 4-17).

4.2.4. Basic

Almost a quarter (23.8%) of older internet users were at the basic level of e-inclusion (Figure 4-2). The average age (71.6 years) was the highest compared to all other groups of older internet users (and lower than non-user groups) (Figure 4-3). Approximately 7.7% of the women in the sample and 6.4% of the men were in the basic user-group (Figure 4-4).

Over 13% of basic users disagreed that the internet is beneficial to daily life, which was higher than users at the moderate level (4%), and lower than older people at the ex-user level of e-inclusion (30.8%) (Figure 4-12). At the same time, 15.4% of basic users had a limiting impairment, which was higher than the moderate level of e-inclusion (13.1%) and lower than the proportion of people with a limiting impairment at the ex-user level (29.6%) (Figure 4-13).

Over half (53.8%) of basic users lived in a household with a yearly income of £20,000 or less (Figure 4-14), and 62.2% of basic users last attended a secondary – or equivalent – educational institution. In contrast, only 13.5% of basic users attended higher education (Figure 4-15).

Over 30% of older people in the basic group admitted to having some ICT-related anxiety (Figure 4-16) and over a third (35.9%) lived in single-adult households (Figure 4-17).

4.2.5. Ex-user

Ex-users represented less than 5% of people aged 65 years and older (Figure 4-2). They had an average age of 73.8 years, (Figure 4-3) and there was a similar proportion of men (4.8%) and women (4.9%) (Figure 4-4).

Over 30% of ex-users did not agree that the internet improves daily life (Figure 4-12) and a similar proportion (29.6%) had a limiting impairment which could interfere with the accessibility of ICT (Figure 4-13).

Over 79% of the ex-user group lived in households with a yearly income of £20,000 or less; over 58% had an income of £12,000 or less (Figure 4-14). Over 69% of ex-users had last attended secondary – or equivalent – education (Figure 4-15).

Half of the ex-user group claimed to be nervous when using ICT (Figure 4-16) and 55.6% lived in single-adult households (Figure 4-17).

4.2.6. Never-user

The never-user group was the largest group of older adults (Figure 4-2) as well as the oldest, with an average age of 76.1 years (Figure 4-3). The highest proportion of women (73.2%) in the sample were represented in the never-user level. The highest proportion of men (56.3%) in the

sample were also in the never-user category. It can be seen that there was a large discrepancy in the proportion of men and women in the never-user category (Figure 4-4).

Over 1 in 4 people in the never-user group disagreed that the internet makes life better, which was the highest rate of disagreement across all user-types (Figure 4-12). In addition, 45.5% of never-users had a limiting health or disability, which was also the highest rate of self-reported impairment across all user-groups (Figure 4-13).

Almost 90% of never-user households had an income of less than £20,000 per year (Figure 4-14). Over 82% last attended a secondary-level educational institution. In addition, 5.5% of never-users last attended a primary or equivalent level institution, the only level of e-inclusion to include respondents with less than secondary-level education (Figure 4-15).

Over 60% of never-users admitted to feeling nervous about using technology (Figure 4-16) and a similar proportion (62.8%) lived in single-adult households (Figure 4-17). In both cases, never-users had higher rates than other user-types.

4.3. Regression analyses

Table 4-6 displays the first series of linear regression models which predict the effects of age and gender (model 1a), and then age, gender and each of the five dimensions of the 6C framework individually on older people's level of e-inclusion (models 1b through to 1f). The results of the regression models 1a through to 1f show a significant negative relationship between level of e-inclusion and age. Men are also significantly more likely to be at higher levels of e-inclusion than women.

Table 4-6 Linear regression models 1a to 1f: effects of 6C dimensions on level of e-inclusion

Model 1a-f: Effect of age, gender; and age, gender and each of the 6Cs on level of e-inclusion												
	Model 1a		Model 1b		Model 1c		Model 1d		Model 1e		Model 1f	
	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value
Constant	7.51	0.000 ***	4.926	0.000 ***	5.218	0.000 ***	5.792	0.000 ***	7.715	0.000 ***	6.059	0.000 ***
Age	-0.346	0.000 ***	-0.259	0.000 ***	-0.257	0.000 ***	-0.305	0.000 ***	-0.289	0.000 ***	-0.296	0.000 ***
Gender (female=1)	-0.168	0.000 ***	-0.136	0.001**	-0.095	0.025**	-0.136	0.000 ***	-0.082	0.039 **	-0.133	0.001**
Perceived Benefit			0.295	0.000 ***								
Health problem or disability (yes=1)			-0.187	0.000 ***								
Income					0.378	0.000***						
Education level							0.403	0.000 ***				
Nervousness									-0.340	0.000 ***		
n adults in HH											0.194	0.000 ***
n	560		464		422		548		513		560	
R ²	0.158		0.281		0.286		0.317		0.262		0.191	
Adjusted R ²	0.155		0.275		0.281		0.314		0.257		0.187	
F-statistic(p-value)	52.115 (0.000)***		44.560 (0.000)***		55.765 (0.000)***		84.345 (0.000)***		60.142 (0.000)***		43.829 (0.000)***	
Max. Cook's distance	0.018		0.019		0.078		0.024		0.025		0.056	

Notes: *** p<0.001; ** p<0.01; * p<0.05; HH: household; Independent variables were entered via forward stepwise

Models 1a through 1f also demonstrated that, when introduced separately along with age and gender, each of the five dimensions of 6C framework had a significant effect on older people's access to internet-enabled ICT devices. Model 1a demonstrated that both age and gender had negative, significant effects on level of e-inclusion. However the adjusted R^2 value of Model 1a (0.155) was the lowest adjusted R^2 of the Model 1 series, suggesting that age and gender alone only explain a small part of the variance in the level of e-inclusion.

Model 1b showed that respondents who agreed that the internet makes live better were significantly more likely to have access to ICT-devices, compared to those who disagreed, and respondents with a limiting health problem or disability were significantly less likely to have access to ICT compared to people with no stated health problems or disabilities. The addition of the content variables showed an improvement in the adjusted R^2 value (0.275) compared to Model 1a (0.155), underlying the important effect of perceived benefit and accessibility of ICT.

Results for Model 1c and Model 1d display that yearly household income and higher attained levels of education both significantly increased the likelihood of e-inclusion respectively.

Adjusted R^2 values of 0.281 and 0.314 respectively were also higher, suggesting that the costs and capability dimensions had greater influence over level of e-inclusion compared to other dimensions, when adjusted for separately.

Increased nervousness about using technology in Model 1e was significantly associated with decreased levels of e-inclusion. The adjusted R^2 value (0.257) was higher compared to Model 1a (0.155), which points to the relevance of confidence in addition to age and gender.

Finally Model 1f shows that a higher number of adults living in a household with others was significantly positively associated with older people's access to internet-enabled technologies, and in turn their level of e-inclusion. However, the number of household members along with age and gender only explained 18.7% of the variance in level of e-inclusion.

Table 4-7 displays the results of regression models 2 and 3. In model 2, the dependent variable is the level of e-inclusion. In model 3, the dependent variable is the number of internet-enabled devices. For both models, all of the independent variables (age, gender and the five dimensions of the 6C framework) are entered together via the forward stepwise method.

Table 4-7 Linear regression Model 2 (level of e-inclusion) and Model 3 (number of devices)

	Model 2: Effects of age, gender and dimension of the 6C framework on <i>level of e-inclusion</i>		Model 3: Effects of age, gender and dimension of the 6C framework on <i>access to ICT devices</i>	
	β	p-value	β	p-value
(Constant)	3.694	0.000***	3.324	0.000***
Age	-0.192	0.000***	-0.247	0.000***
Gender (Female=1)	-0.038	0.363	0.005	0.911
Perceived benefit	0.187	0.000***	0.181	0.000***
Health problem or disability (yes=1)	-0.085	0.044**	-0.093	0.035**
Income	0.218	0.000***	0.096	0.057*
Education level	0.245	0.000***	0.159	0.001**
Nervousness	-0.202	0.000***	-0.188	0.000***
Number of adults in household	0.079	0.095*	0.162	0.001**
N=	422		422	
R ²	0.457		0.413	
Adjusted R ²	0.447		0.401	
F-statistic (p-value)	48.491 (0.000)***		34.659 (0.000)***	
Max. Cook's distance	0.039		0.107	
Notes:				
*** p<0.001; ** p<0.05; * p<0.1				
Independent variables were entered via forward stepwise				

The estimates of both regression models demonstrated a tendency for men to have higher levels of e-inclusion than women, however the effect of gender did not reach significance.

Model 2 demonstrates that age has a significant negative relationship with the level of e-inclusion, where higher age is associated with lower levels of e-inclusion. Having a health problem or disability also has a significant negative effect on the level of e-inclusion, which could be an indication of the challenges that people face using ICT when they have physical or

cognitive limitations. Also unsurprisingly, being nervous about breaking ICT is significantly negatively associated with level of e-inclusion.

Predictably, perceived benefit has a significantly positive effect on the level of e-inclusion. The results imply that the more value individuals attribute to the internet, the more they use the internet and as a result, they gain more ICT experience and skills (model 2). Perceived benefit is also significantly associated with number of internet-enabled devices (model 3). This suggests that those who perceive more benefit from ICT have access to a larger number of devices and consequently ICT plays a more central role in their daily lives.

Yearly household income is also positively associated with the level of e-inclusion, which emphasises the affordability dimension of ICT. However in model 2, income reaches a significance level of $p < 0.000$, whereas in model 3 the significance level of income only reaches $p < 0.1$. The borderline significance level in model 3 could be related to the falling prices of ICT devices over time, which makes ICT more affordable for people across income brackets.

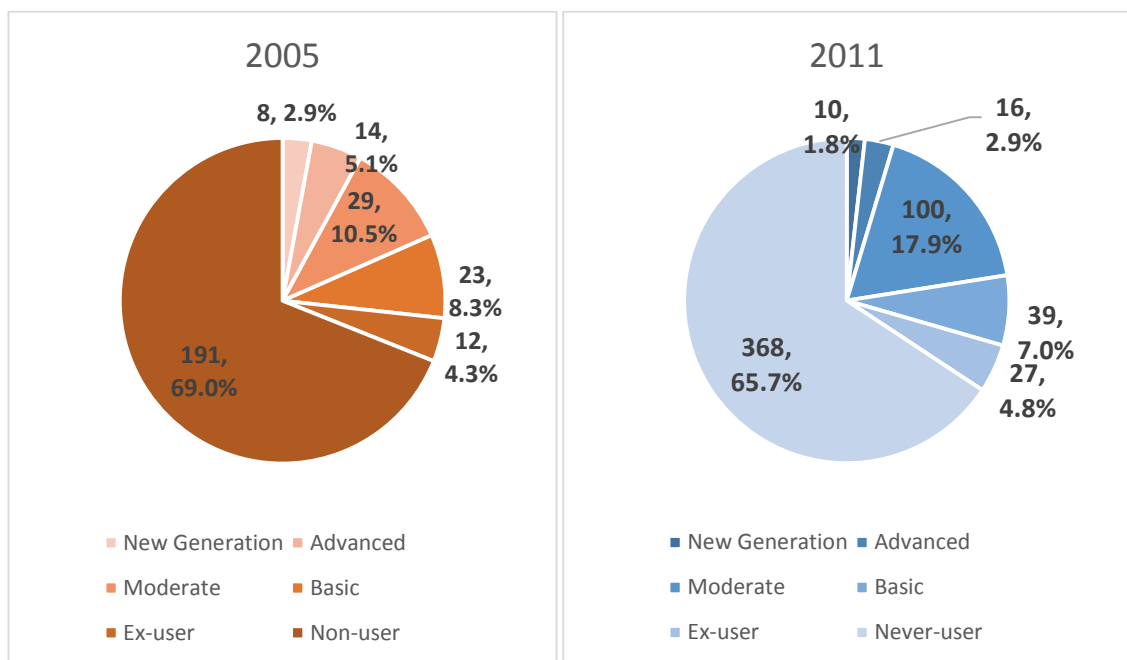
Education level also has a positive significant effect on the level of e-inclusion, which implies that older people's former occupation and subsequent level of exposure to ICT strongly affects their level of e-inclusion. The number of adults living in the same household is significantly associated with the level of e-inclusion at the $p < 0.1$ level in model 2, suggesting that a higher number of people is not a strong predictor of level of e-inclusion when defined as access to devices, use and skills. However, model 3 demonstrates a significant positive effect with number of people in the household at $p < 0.05$. This suggests that a higher number of people in a household increases the likelihood of access to more ICT devices for older household members.

Overall, regression models 2 and 3 demonstrate quite high adjusted R^2 (0.447 and 0.401, respectively) for this kind of analysis. This implies that the dimensions of the 6C framework are strong predictors of both the level of e-inclusion when defined by internet usage, skills and access to devices, and also of an e-inclusion definition based only on access to devices. The results of the Cook's distance test show that model 2 (0.039) is less affected by outlier cases than model 3 (0.106). Indeed, the case-wise diagnostics of model 2 showed only two cases which were badly predicted by the model, compared to model 3, where there were six cases which were not predicted by the model.

4.4. Changes over time in the level of e-inclusion of older people

Figure 4-5 Distribution of user-types of people aged 65 years and older in 2005 and 2011. Figure 4-5 displays the distribution of user-types in the samples of older adults in the 2005 and 2011 OxIS datasets. The notable changes include an increase in the proportion of older people at the moderate level of e-inclusion in 2011 (17.9%) compared to 2005 (10.5%), and a decrease in the never-user level of e-inclusion from 69% in 2005 to 65.7% in 2011. There was also a slight increase in the proportion of ex-users from 2005 (4.3%) to 2011 (4.8%), and a slight decrease in the proportion of users at the basic level of e-inclusion from 8.3% in 2005 to 7% in 2011.

Figure 4-5 Distribution of user-types of people aged 65 years and older in 2005 and 2011

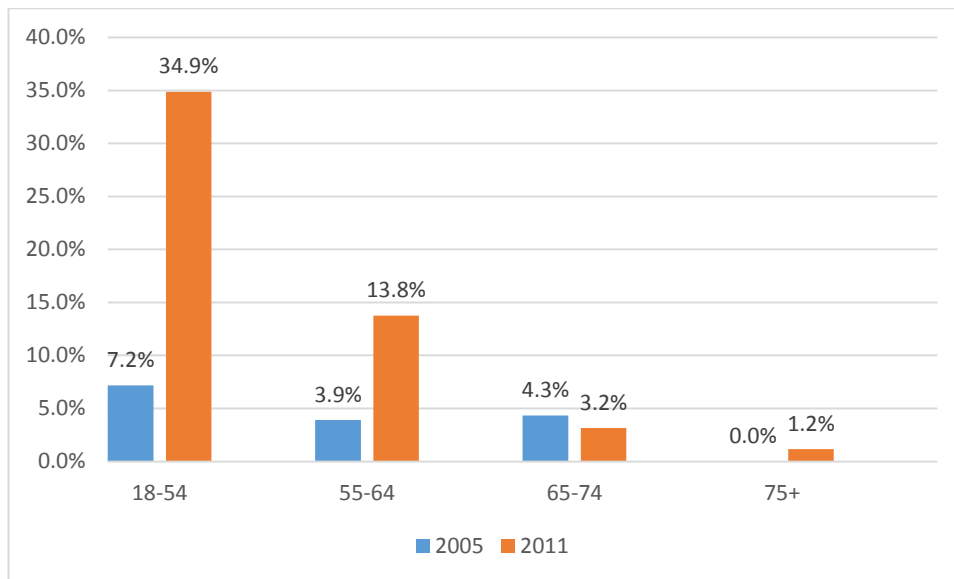


Note: total n= 277 (2005); total n= 560 (2011)

Figures 6 through to 11 describe the proportions of respondents at each level of e-inclusion according to age-band in 2005 and 2011. The results of the changes over time are discussed according to user-type in the following sections

Figure 4-6 displays the proportion of users at the new generation (NG) level of e-inclusion across different age groups in 2005 and 2011. The proportion of younger adults (aged 18 to 54 years and 55 to 64 years) who became NG users rose markedly between 2005 and 2011. However the rate of increase in proportion of NG users over time decreased with increasing age group.

Figure 4-6 New generation users by age group and year



When considering the 65 to 74 years - and 75 years and older – age groups together, there is little change in the proportion of older NG users between 2005 and 2011. However, the results show that in 2011 the proportion of NG users aged 65 to 74 decreased and the proportion in the 75 years and older increased, compared to the 2005 figures. This could suggest that a segment of the 2005 NG users group aged to become part of the 75 and older group, and maintained their level of e-inclusion. Figure 4-6 demonstrates the proportion of internet users who were at the advanced level of e-inclusion, according to age-group in 2005 and 2011. The proportion of younger adults aged 18 to 54 years and 55 to 64 years in the advanced user-group increased from 2005 to 2011. The proportion also increased in the 65 to 74 year old age-group, but it decreased for the 75 years and older group. Furthermore, when considering the 65 to 74 years and 75 and older age-groups together, the proportion of advanced users decreased between 2005 and 2011.

Figure 4-7 Advanced users by age group and year

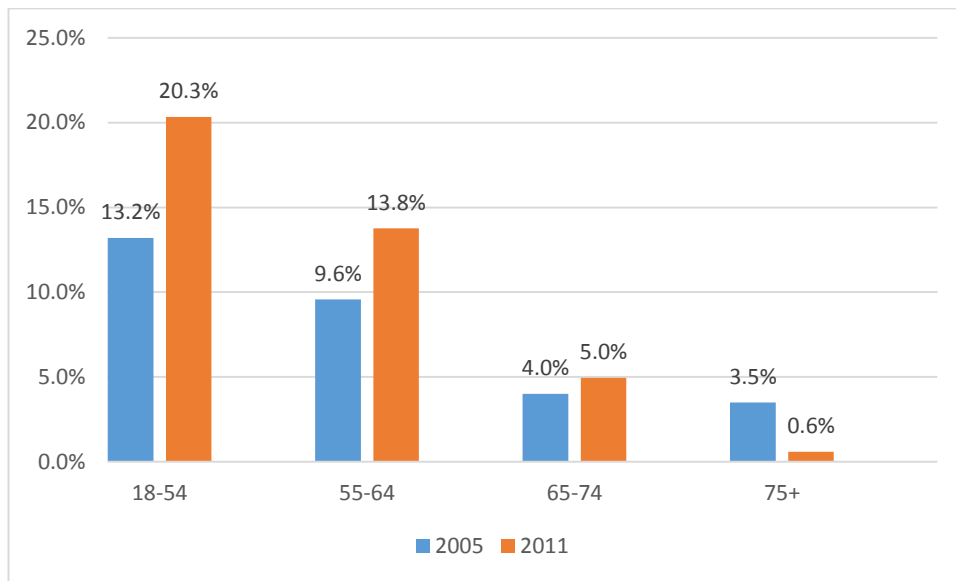
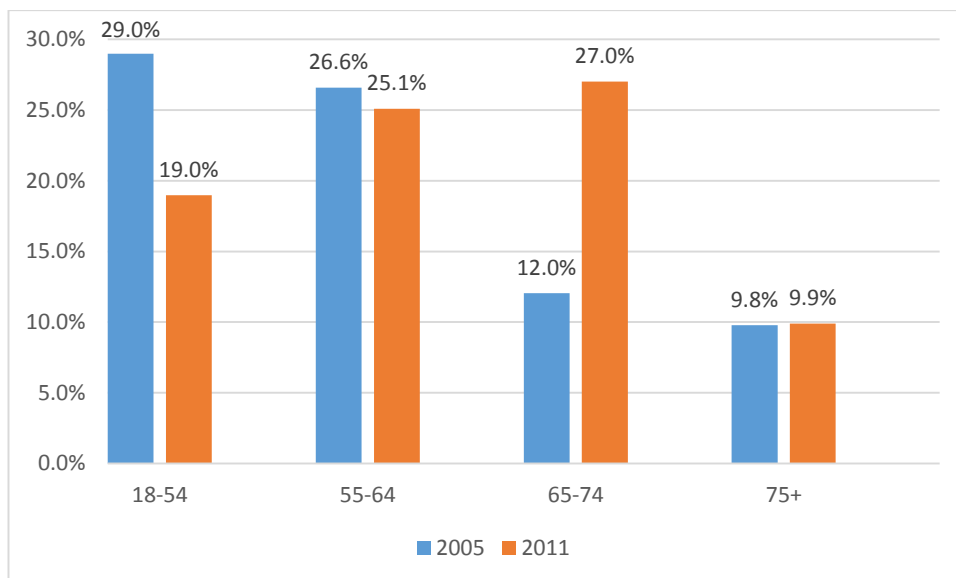


Figure 4-8 shows the proportion of those at the moderate level of the e-inclusion scale according to age-group in both 2005 and 2011. The results demonstrate a decrease in the proportion of 18 to 54 year-olds and 55 to 64 year olds at the moderate level. However, the proportion of 65 to 74 year olds at the moderate level in 2011 was more than double that in 2005. In the 75 years and older age-group, the proportion remained relatively constant between 2005 and 2011.

Figure 4-8 Moderate users by age group and year



The results of the analysis of the basic user-group are presented in Figure 4-9. The proportions of people in the 18-54 and 75 years and older age-groups dropped sharply between 2005 and

2011. In contrast, the proportions in the 55 to 64 and 65 to 74 age-groups stayed relatively constant.

Figure 4-9 Basic users by age group and year

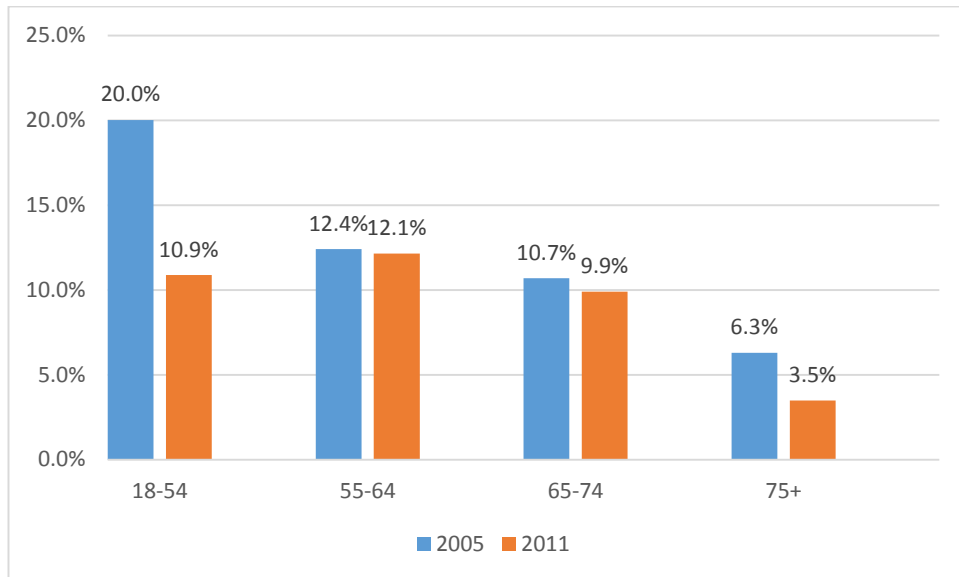


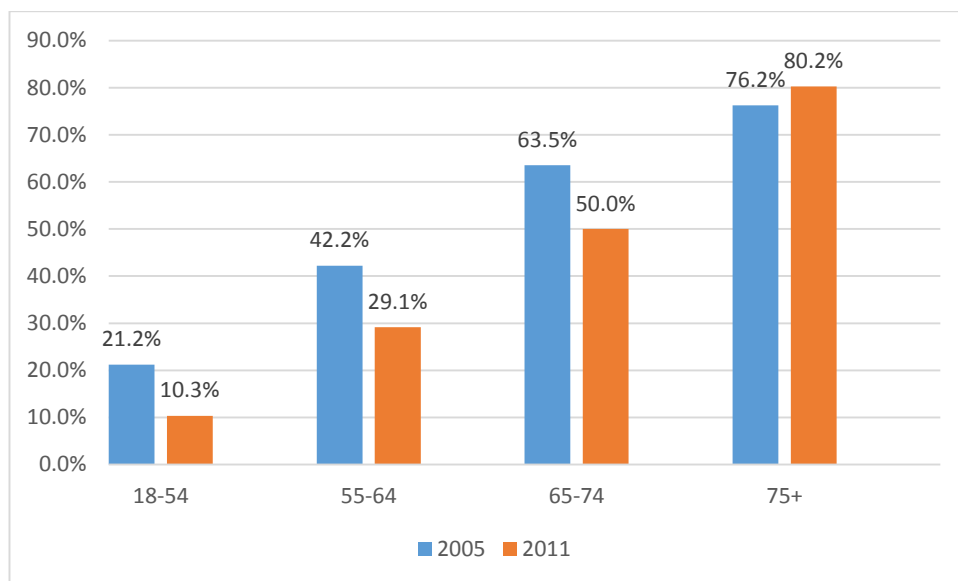
Figure 4-10 displays the proportion of people in each age-group who are ex-users of the internet in 2005 and 2011. The proportion of ex-users aged 18 to 54 years in 2011 is almost half of that in 2005. There was also a small decrease in 65 to 74 year-old ex-users. However there was an increase in the proportion of ex-users in all other age-groups over the same time span.

Figure 4-10 Ex-users users by age and by year



Finally, Figure 4-11 presents the proportion of those who have never-used the internet by age-group and year. In both 2005 and 2011, the proportion of those in the never-user group increased with increasing age. When comparing within age groups, the proportion of those who never used the internet decreased between 2005 and 2011, with the exception of those 75 years and older, where the proportion of those never-using the internet increased from 76.2% in 2005 to 80.2% in 2011.

Figure 4-11 Non-users by age group and year



5. Discussion

In this chapter, I set out to gain a deeper understanding of the level of e-inclusion of older adults in England, and to investigate the factors which influence older people's adoption – and continued use – of ICT.

To address these aims I created an e-inclusion scale, which consisted of merging Ferro et al.'s (2011) multi-dimensional typology of advanced, moderate and basic users with Dutton and Blank's (2011) dichotomous typology of new versus first-generation users. Dutton and Blank's approach proved to be useful for demonstrating the extent to which the older population is embracing the latest trends in Britain's digital society. His typology also serves as an indicator of an individuals' ability to sustain their level of e-inclusion in an ever changing digital environment. Using Dutton's parameters to define the highest level of e-inclusion revealed that only a very small minority of older people (1.8%) partake in this level of ICT engagement.

However, Dutton's model is effectively a variation of early digital divide paradigms, which focused solely on material access to ICT to define inclusion. Furthermore, his typology was

based on an assumption that when an ICT device is available in a household, it is also being used. Digital divide approaches have been increasingly criticised, as it has become clear that that simple access to digital resources can explain only a small part of the disparities in ICT use (Stellefson, 2008), and that the concept of e-inclusion needs to be examined beyond the extent to which people have the appropriate “kit” (Mancinelli, 2009). Ferro et al.’s user typology, based on usage and skills, was incorporated into the scale in order to capture other elements of e-inclusion.

My analyses validated the concerns of e-inclusion theorists about the limitations of using a one-dimensional approach to defining e-inclusion. In the first instance, using Dutton’s typology yielded three cases from the 2011 dataset where people aged 65 years and older lived in households with the requisite ICT equipment to qualify them as new generation users, but where the individuals themselves claimed to have never used the internet (these cases were subsequently reclassified as never-users). Also, the difference in the adjusted R² values of the regression analyses in Model 2 (0.447) and in Model 3 (0.401) implies that a multifactorial definition of e-inclusion (Model 2) is more revealing of the personal and environmental circumstances surrounding individuals’ use of the Internet, compared to using a definition based only on the number of devices available (Model 3).

5.1. Trends in older people’s e-inclusion

The e-inclusion scale was also developed in order to characterise the older population at each level of e-inclusion. The analyses, which looked at the predictive effects of personal and environmental factors (delineated by the 6C framework) on older people’s level of e-inclusion, uncovered trends which have been observed in other studies.

Firstly, the analyses revealed a significant negative association between age and e-inclusion, which support similar findings from several other studies on ICT adoption (Atkinson et al., 2008; Feist et al., 2010; Lopez et al., 2011; Morris et al., 2007; Schmeida and McNeal, 2007; Selwyn et al., 2003; Stellefson et al., 2008; Takahashi et al., 2011; Xie, 2003).

Secondly, results demonstrated a significant inverse relationship between poor health and disability and e-inclusion. This finding corroborates results from other studies which demonstrated that older people who had better self-rated health were more likely to use ICT compared to those with poorer self-rated health (Cresci et al., 2010; Damant et al., 2013; Heart and Calderon, 2013).

Third, the analyses uncovered a strong significant association between level of attained education and level of e-inclusion. Results from the analysis implied that level of education had the most powerful effect on e-inclusion: the regression analysis displayed in Model 1d (Table 4-6) demonstrated that, after adjustment for age and gender, education level explained over 30% of the variance in level of e-inclusion; this was the highest variance of all regression estimates of the 6C dimensions when analysed separately in Models 1a through to 1f. Other studies also showed the effect of education on ICT usage (Ferro, 2011; Helsper, 2008). For instance, Mason (2012) found a strong association between the measure of internet use and whether any qualifications were reported. Takahashi (2011) discovered that people with 12 years or more education were more likely to use the internet via a computer to seek health information. Leppel and McCluskey (2011) found a higher proportion of people with at least some college education amongst users compared to non-users of online shopping services in the 50 to 69 year – and the over 70 years - age groups. Czaja et al. (2006) discovered a high level of computer use amongst a “well educated” sample of older people.

Finally, the analyses exposed an inverse relationship between technology-related nervousness and level of e-inclusion revealed. Similar findings have been reported elsewhere. For instance, Adams (2005) reported both quantitative and qualitative findings on how older people’s ICT-related efficacy affected ICT usage. Dutton (2011) found that older and retired people were the least likely to use ICT and the most fearful of breaking the technology. Similarly, the Independent Age report: *Supporting people at home* (2010) confirmed that breaking the equipment was a common concern for the older population.

5.2. Findings “off”-trend

The characterisation analyses also revealed some unexpected findings.

The first of the surprising results concerns inconsistency around the issue of gender and e-inclusion. The cross-tabulation of gender and level of e-inclusion in this study demonstrated that a higher proportion of women (73.2%) were never users, compared to the proportion of men (56.3). Also, at the moderate level, the proportion of men (24.7%) was considerably higher than the proportion of women (12.5%) and the same was true at new generation levels (3.6% v. 0.3% respectively) (Figure 4-4). Furthermore, regression models 1a through to 1f showed that age and gender were both significantly inversely associated with level of e-inclusion. These patterns may be as expected and could reflect a cohort effect (Czaja et al., 2006). For instance compared to older men, fewer older women held jobs when they were younger which required ICT skills and have subsequently had little or no exposure to the

internet over their lifetime (Blažun et al., 2012). Other studies have shown an association between gender and access to ICT (Ferro et al., 2011; Helsper, 2008; Schmeida and McNeal, 2007; Singh et al., 2009; Wong et al., 2009). For instance, Richardson (2005 – in Koch 2009) reported a higher prevalence of technophobia in older women compared to men; inhibiting women's adoption of ICT. Similarly Czaja et al. (2006), Lai et al. (2010) and Blazun et al. (2012) reported higher levels of computer-related anxiety in older women compared to men, which also affected their adoption of the Internet.

But Figure 4-4 also demonstrated that the pattern of ICT-engagement among women was not consistent at all levels of e-inclusion, nor did it necessarily follow conventional assumptions. The proportion of women at the ex-user, basic and advanced levels of e-inclusion is similar to the proportion of men at these levels. These inconsistencies came to light in the regression modelling estimates. In Models 1a through to 1f, gender had a significant negative association with the level of e-inclusion defined by the multifactorial approach, implying that women were less likely to have higher levels of e-inclusion compared to men. However, when gender was included in the more elaborate regression models (Models 2 and 3;

Table 4-7), the association between gender and e-inclusion did not reach significance. The similarities in men and women's engagement at these levels of e-inclusion may be indicative of the influence of other factors on e-inclusion. For instance, the ex-user and basic level of e-inclusion may suggest the effects of deteriorating health on both men and women's ability to use ICT. At the other end of the scale, the equal presence of women and men at the advanced level of inclusion may indicate a shift in types of Internet activities that people engage in to connect with family who live abroad, such as using VOIP applications (Gatto and Tak, 2008; Sayago and Blat, 2010).

Second, the cross-tabulation with number of adults living in the household revealed that none of the older adults at the new generation level lived alone, compared to 62.3% of the older adults at the never-users level who lived in single-adult households. These findings are validated by ONS results, where households with two adults, where one adult was at least 65 years old, were almost twice as likely (69%) to have an internet connection than a household consisting of a single adult 65 years or older (36%) (2013). The regression analyses uncovered some inconsistencies with respect to the effect of the number of people in the household on e-inclusion. The number of people in the household had a significant ($p < 0.05$) positive effect on e-inclusion when the latter was defined by the number of devices (Model 3), but the association between household composition and the multifactorial definition of e-inclusion

was significant at $p < 0.1$ (Model 2). The results of Model 3 can be attributed to Dutton and Blank's (2011) methods for defining NG users, which can unwittingly include non-users as some inclusion criteria consider household ownership - rather than personal use - of devices. Therefore it is unsurprising to find that living in a household with a greater number of people will increase the likelihood that a household member will own ICT devices, thereby increasing the individual older person's "access" to this equipment.

On the other hand, the borderline significance of $p < 0.1$ in Model 2 could be suggestive of how older people elicit support for usage and skills. Perhaps many older people rely on a single person in the household to support their e-inclusion; their level of e-inclusion is not proportionately augmented by the number people of in the household. Social support can be an important aspect to older people's level of e-inclusion, but the support needs to be select and personal.

Third, the results of the cross-tabulation of household income and levels of e-inclusion showed unsurprising results at either extreme of the e-inclusion scale: there were high proportions of older adults with low incomes at the ex-user and never-user levels, and high proportion of older adults with high levels of income at the new generation level. However, older people's income levels at other points on the scale did not follow a consistent trend. In addition, the significance of the income variable differed across the regression analyses. Income significantly affected older people's *level of e-inclusion*, when defined as a combination of access to devices, skills and frequency of use (Model 2, $p < 0.000$). But the effect of income only reached borderline significance in Model 3 ($p < 0.1$), where the dependent variable consisted of access to ICT devices.

Some analysts have suggested that income and cost have become less relevant barriers to e-inclusion as the relative price of ICT has decreased over time (Almuwil et al., 2011; Tak et al., 2010). This could partially explain the diminished effect of income on the number of devices older people have access to (Model 3). However in Model 2, where the definition of e-inclusion includes usage, skills, and devices, the significant effect of income may reflect higher levels of education and in turn past employment, which in turn could indicate someone's exposure to - and attitudes towards - ICT.

5.3. Changes over time

Figures 6 to 11 compared the level of e-inclusion between 2005 and 2011, revealing drops in basic, moderate, ex-user and never-user levels of e-inclusion, and increases in advanced and NG levels of e-inclusion amongst adults aged 18 to 54 years. These results replicate Dutton's

observations about the cultural shift in British society whereby the internet is a central part of daily life (Dutton, 2011; 2013).

In the older adult population, there was a decrease in never-users by more than three percentage points, and a surge of moderate users by more than seven percentage points over the six-year time-span (Figure 4-5). Furthermore, Table 4-5 displays a change in the types of devices that older people use, where computer use has decreased and mobile phone usage has increased amongst people aged 65 years and older. The leading explanation for the fall in proportion of never users and the changes in device usage is the movement of some of the 55 to 65 year-old mobile phone and internet users into the 65 to 74 year-old age category (Figure 4-5)

The increase in the proportion of older adults at the moderate level of e-inclusion between 2005 to 2011 could be an effect of people migrating from being formally employed to retirement and a subsequent shift in their ICT priorities: people go from using a multitude of skills to operate complex ICT devices and programmes, to using ICT for email and search engine applications.

The comparisons over time also reveal little gain in internet use amongst the 75 years and older age group; instead there are increases in ex-users and never-users among that age-group. Furthermore the user-typologies described in an earlier section demonstrated that non-users, including a large proportion of adults age 75 years and older (Figure 4-11), are the most socially disadvantaged of all user-groups. Non-users have the highest prevalence of poor health and disability, the lowest levels of household income, the lowest levels of attained education, and the highest proportion of single-adult households. Non-users were also least likely to perceive any benefits from using ICT and report the highest rates of ICT-related anxiety. These findings further support Helpser's (2008) analyses, which demonstrated that many people who are "e-excluded" also suffer from other forms of social exclusion.

These findings may in part reflect UK e-inclusion policies, which failed to address the needs of 65 to 74 year-olds who lacked the necessary characteristics to engage – or to continue to engage (Sus-IT project, 2011) - with ICT as they entered into the older age category. In particular, older people who disengaged with the internet to become ex-users may have encountered life circumstances - unrelated to skills and motivation - which impeded their continued use. A deterioration in health status leading to the poorer ability to access devices, budgetary constraints or a lack of informal support are all significant obstacles to older non-

users adoption of ICT, and could equally lead older technology-users to abandon ICT (Olphert and Damodaran, 2013; Sus-IT project, 2011).

5.4. Limitations

One limitation of the e-inclusion scale developed for this research is the lack of refinement within the non-user groups. This is particularly important as the specific needs of – and obstacles for – this group are of most interest in terms of policy. The GDS recently developed a nine-point *Digital Inclusion Scale* (DIS) based on skills and attitudes towards ICT, using data from the BBC and ONS; this includes three subdivisions of non-use: never have used and never will use, ex-user, and willing – but unable – to use (Cabinet Office, 2014a). This approach was designed to assist in the development of more targeted programmes for non-users according to the specific barriers preventing their ICT engagement. Over the coming years, as the GDS scale becomes more widely used in practice, it will be possible to observe the sensitivity of the DIS in terms of the needs and attitudes of non-users and, in turn, how it serves to create more targeted policies. The development of the e-inclusion scale in this research was guided by the availability of data. Future surveys on internet use would need to delve into non-users' attitudes and motivations, in more depth.

A second limitation lies in the differences between the 2005 and 2011 OxIS surveys, which could have led to errors in estimates of the changes over time, both across user groups and age-bands. For instance, some of the NG parameters were not available in 2005 (e.g. tablet computers were not available on the market until 2010 (Nations, 2014) and mobile internet capabilities were less sophisticated). I tried to compensate for these differences with more permissive inclusion criteria (Table 4-2). As a result, there could be over-estimation of the number of users in the NG level of e-inclusion in 2005, as well as the size of the change in the NG category over time.

There were also differences in the number and types of internet searching activities discussed in the two questionnaires (Table 4-3). These differences could have affected the number of older people who engaged in daily internet searches and daily other internet activities (see Figure 4-1), which could have affected the estimates of the proportion of older adults in the advanced, moderate and basic levels of e-inclusion in 2005. Subsequently, this could have had an effect on the size of the changes between 2005 and 2011.

Finally, the cross-tabulations of user characteristics and the level of e-inclusion revealed results at the advanced level which diverged from expected trends for several variables. Findings from the regression analyses demonstrate that health status, perceived benefits and nervousness

are significant predictors of e-inclusion. However, the results of the cross-tabulations showed that advanced users were on average the youngest and were more likely to have a limiting health problems compared to users at lower levels of e-inclusion. In addition, fewer advanced users agreed that the internet was a benefit to their lives than users at the moderate level of e-inclusion; and more advanced users expressed ICT anxiety compared to moderate users. These anomalies raise the question as to whether the advanced level of e-inclusion was correctly defined, and there is need for further refinement of the scale.

All in all, the analyses showed that older people are engaged with the internet to varying degrees. The results also showed that their engagement is affected by number of interrelated personal and environmental factors. The analyses also highlighted the challenges in quantifying level of e-inclusion, and emphasises the need to support findings with qualitative data.

6. Chapter 4 figures

Figure 4-12 Older people's degree of agreement/disagreement with the statement: "The internet makes life better" at each level of e-inclusion

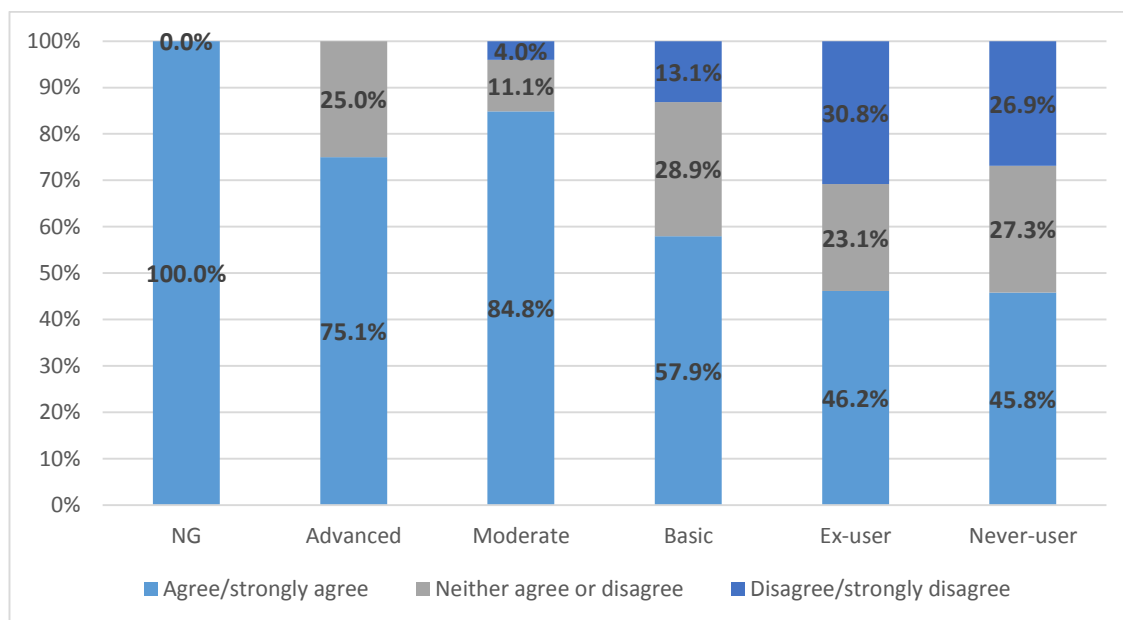


Figure 4-13 Proportion of older people with and without health problem or disability with limited their ability to perform activities of daily living at each level of e-inclusion

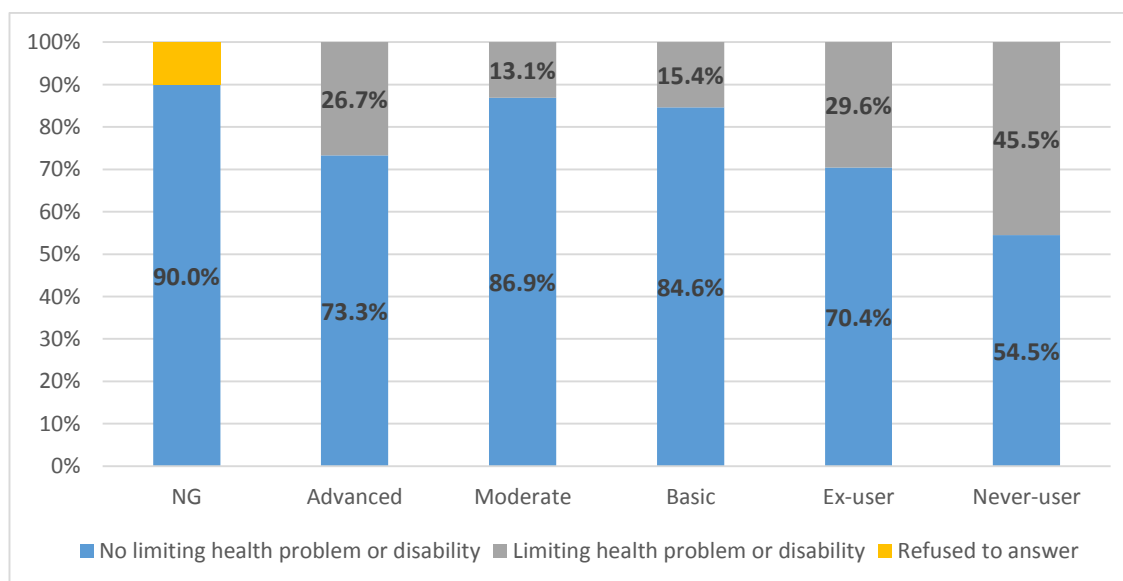


Figure 4-14 Yearly household income across sample of older adults at each level of e-inclusion

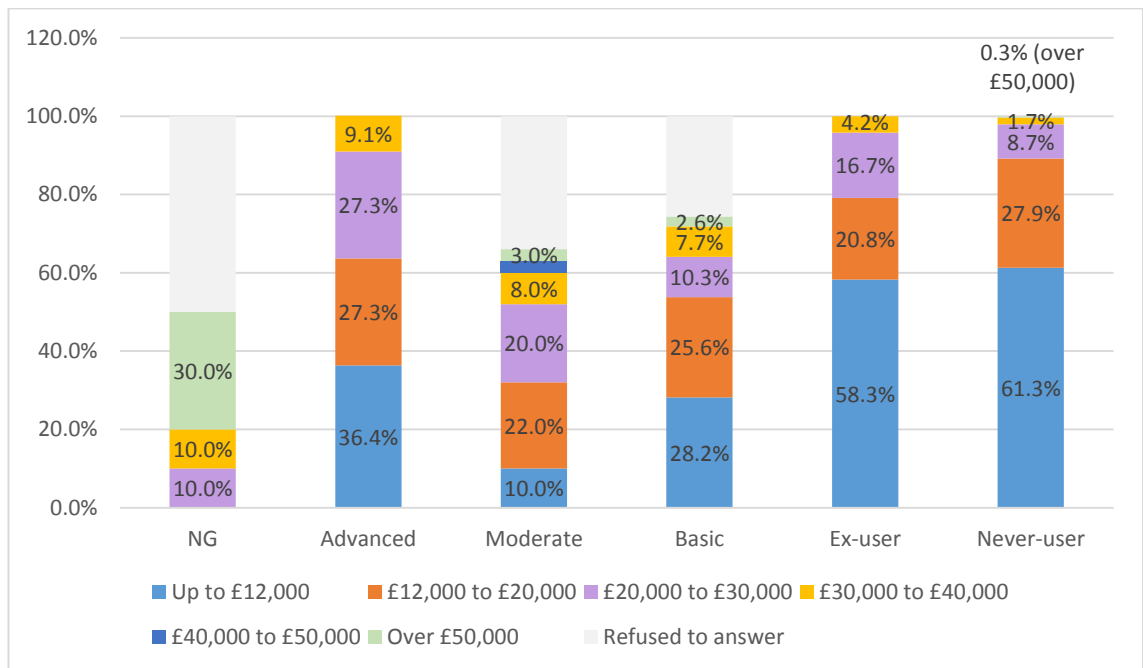


Figure 4-15 Level of attained education at each level of e-inclusion

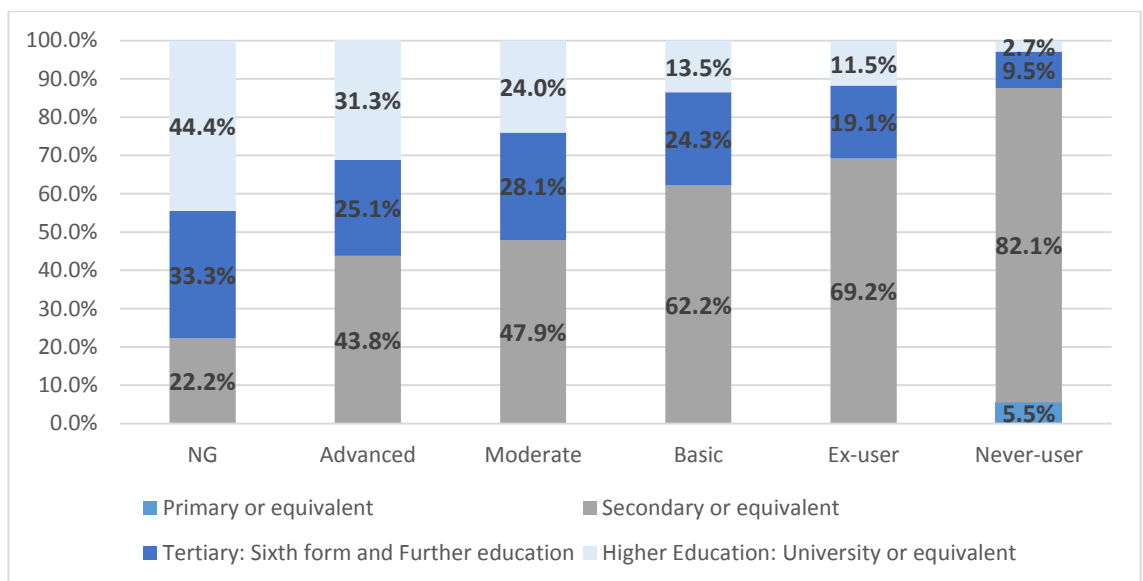


Figure 4-16 Level of agreement/disagreement with statement: “I get nervous using technology; I might break something” at each level of e-inclusion

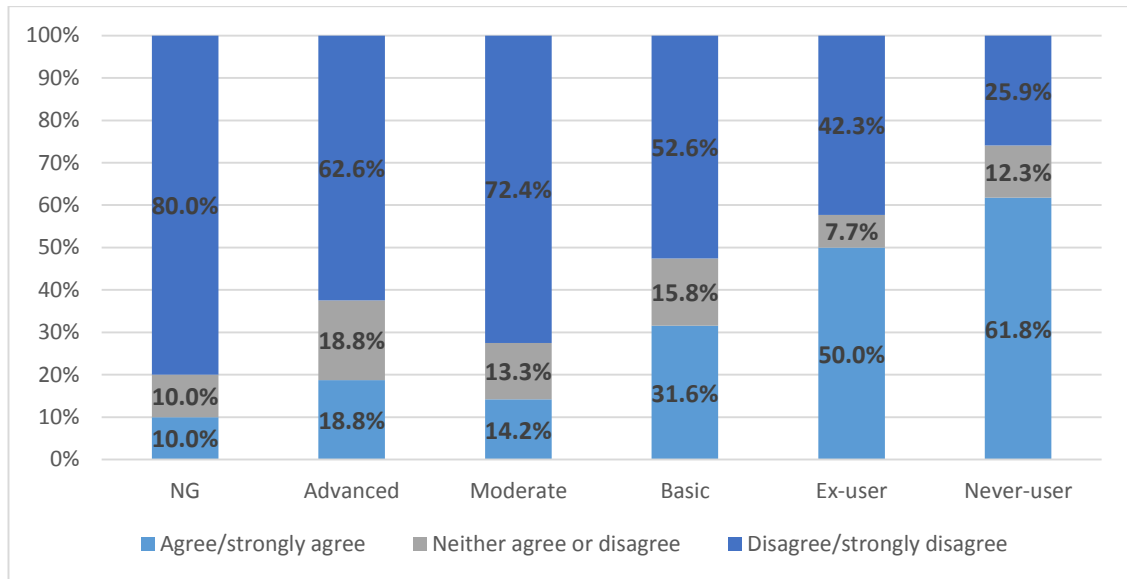
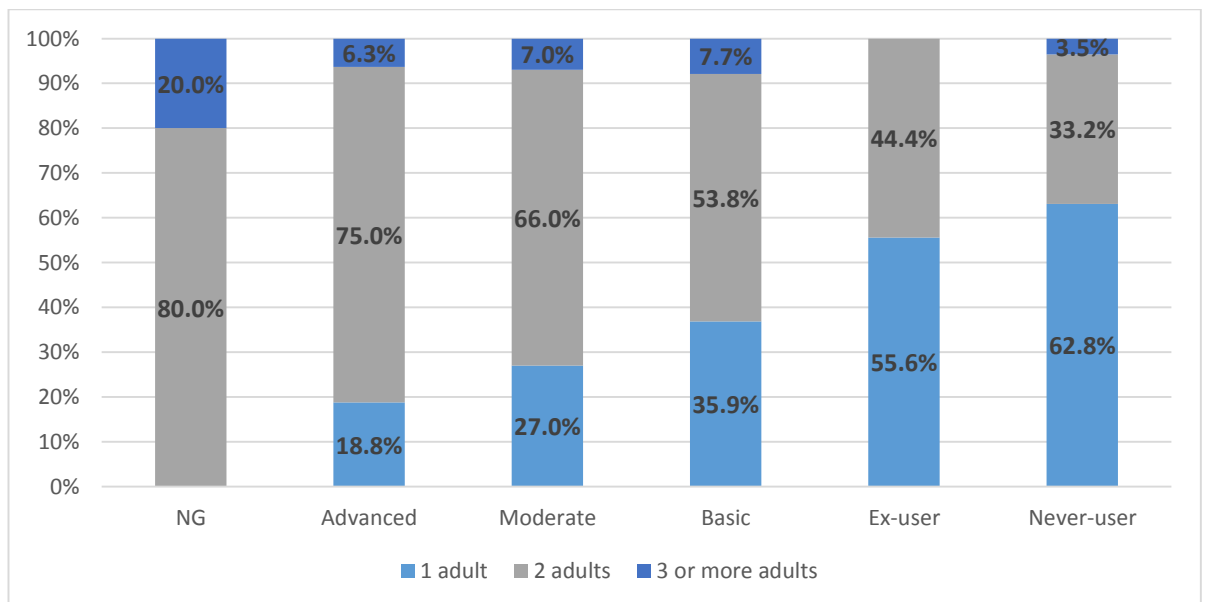


Figure 4-17 Number of adults aged 18 years and older living in the household at each level of e-inclusion



Chapter 5 : Person-centred effects on e-inclusion: review of the literature

1. Introduction

This chapter explores the extent to which person-centred characteristics influence older people's e-inclusion and access to ICT-based care. These comprise four of the six dimensions of the "6C framework" set out in Chapter 2 and include content (relevance and accessibility), capability (skills), confidence (self-efficacy) and cost (income and affordability). The remaining two dimensions of the 6C framework (connectivity and continuity) are environmental and are explored in chapter 6.

2. Methodology

The primary data source for this chapter is a review of the relevant peer-reviewed, policy and grey literature. Details on how the papers were identified are provided in chapter 3. Briefly, a combination of searches in electronic databases, hand searches and snowballing techniques were used to identify the literature pertaining to older people's e-inclusion, and their access to ICT-based care.

In the review of the capability dimension, the findings from the literature were supplemented by secondary analyses of Eurostat data, concerned with assessing skill levels. Details of the methods pertaining to the Eurostat datasets are also offered in chapter 3. The Eurostat researchers determined skill-level according to the number of defined computer and internet functions respondents could perform (

Box 5-1). According to the Eurostat classification, a "low" skill level refers to a person's ability to perform one or two of the listed internet activities; "medium" skill level indicates an ability to perform three or four activities; and a "high" level of skill refers to being able to perform at least five internet functions.

Box 5-1 Activities used to indicate computer and Internet skill levels

<i>Computer skill</i>	Used a mouse to launch programme such as an Internet browser or word processor Cut, copied, pasted information on screen Moved files, folders
-----------------------	---

	Created basic formulae in spreadsheet
	Compressed files
	Created computer programme
<i>Internet skill</i>	Used search engine
	Attached files to an email
	Posted message on online forum or chat room
	Made phone call using the Internet
	Engaged in file sharing (e.g. music, video)
	Created a webpage

Source: Eurostat (2014c)

The Eurostat estimates of each level of computer and internet skill for people aged 65 to 74 years, 75 years and older, and the total population were downloaded into a Microsoft Excel file for further analyses.

The review of the confidence dimension also includes a secondary analysis of the 2011 OxIS dataset (see chapter 3 for details on the OxIS data and methods). Six variables of the 2011 OxIS dataset describe confidence levels in performing various activities on a 4-point Likert scale: (1) “not confident at all”, (2) “not confident”, (3) “fairly confident”, and (4) “very confident”. The six variables were transformed for this study into binary variables where, “not confident at all” and “not confident” were coded as 0 (and hereafter labelled as “not confident”) and “fairly confident” and “very confident” were coded as 1 (hereafter labelled as confident). This recoding allowed me to conduct a Pearson chi-squared analysis to investigate the relationship between age and ICT self-efficacy. The analysis was performed using SPSS 21 (IBM Corp., 2012).

Throughout the analysis, I also cite findings from the *Cultures of the Internet: The Internet in Britain: OxIS Internet Survey 2013 Report* (Dutton and Blank, 2013) and estimates on internet use provided by the Office of National Statistics (2014a).

3. Results

3.1. Content

The content dimension of the 6C framework centres on the perceived relevance of ICT and its accessibility. Both topics address the appropriateness of the design of ICT, but perceived relevance considers users’ subjective appraisal of the design of the ICT in terms of its benefits

and usefulness in their daily lives, whereas accessibility focuses on users' objective experiences with the usability of ICT.

3.1.1. The relevance of mainstream ICT to older people

Several reports asserted that older people's perception of the relevance of ICT was crucial to their e-inclusion (Age UK, 2010a; Choudrie et al., 2010; Czaja et al., 2006; Sinclair, 2010).

Qualitative evidence presented by Hill et al. (2008) revealed that older people's adoption of ICT was contingent on their perceptions of its benefits and practical value to their daily lives. Other qualitative studies by Hernandez et al. (2009) and Weaver et al. (2010) found that older participants' adoption of ICT was dependent on whether they perceived an obvious advantage to using ICT, beyond their usual methods of accessing services and resources.

There is a growing body of literature that describes the ways in which older people find ICT to be relevant and beneficial to lives. Martinez et al. (2012), Hernandez et al. (2009), Walsh & Callen (2011) and Hardhill & Olphert (Hardhill and Olphert, 2012) showed that older people commonly perceive mobile phones as useful in emergency situations. Adams et al. (2005), Dutton & Blank (2013), Carpenter & Buday (2007) and Sayago et al. (2010) reported that older people welcome a computer as a useful means for accessing the internet, which was useful for communicating with friends and family via email or Skype. Selwyn et al. (2003), Dutton & Blank (2011), Olson et al. (2011) and Robertson-Lang et al. (2011) showed that many older people perceive the internet as useful for accessing information. Choudrie et al. (2010) and Koopman & Reid (2009) discussed older people's use of the internet for making travel arrangements and pursuing their hobbies. Finally, a minority of older ICT users found the internet beneficial for online shopping and banking (Morris et al., 2007; Stroud, 2012), and playing games (Choudrie et al., 2010; Plaza et al., 2011).

There was also substantial evidence demonstrating the relationship between a perceived lack of relevance of ICT among older people and their decision not to use it. Hernandez et al. (2009) reported that 82% of older non-users perceived ICT to be either unnecessary, i.e. having no concrete benefit, or was not of interest. Dutton & Blank (2013) revealed that nearly all (96%) retired non-users of the internet stated a "lack of interest" as the main reason for their non-use. Morris et al. (2007) also found that 60% of their sample of older adults stated a lack of interest for their reason for not using the internet. Carpenter & Buday (2007) reported the most common reason given for not using a computer was a lack of interest. Finally, Feist et al. (2010) demonstrated that perceived lack of usefulness decreased with age: 42.8% of participants aged 55 to 64 years old agreed that "new technologies are very useful", but this

proportion decreased to 31.9% of 65 to 79 year-olds and further decreased to 9.5% of people aged 80 years and older.

Many older non-users did not perceive mainstream ICT to be relevant to their needs and perspectives at their stage in life (Roberts, 2009). The Age UK report: *The Golden Economy* (2010b) cited the view that most internet content was directed at the “youth culture” and alienated the older adult population. Dutton & Blank reported that over two-thirds (67%) of their retired sample who did not use the internet claimed that their non-use was because it “was not for people of my age” (2013). The Ofcom *Communications Market Report* (2011) stated that 24% of people 65 years and older felt they were “too old” to use the internet. Feist et al. (2010) discovered that nearly 44% of those 80 years and older claimed that ICT was of no use to their lives, compared to 11.6% and 17.6% of 55 to 64 year olds and 65 to 79 year-olds respectively. These findings were echoed by Selwyn et al. (2003), who found that over a fifth (21%) of respondents stated they were “too old” to use ICT.

3.1.2. The relevance of ICT-based care for older people

Several studies reported that older people rated ICT-based care services as relevant, useful and highly satisfactory. Damant et al. (2013) found that a significantly more *MonAMI* participants perceived telecare services as useful to their day-to-day lives than those who thought they were not useful. Similarly, Lai et al. (2010) showed that 91% of older participants perceived motion monitoring services - and 84% of older participants perceived wearable vital signs monitoring services - to be useful. Chou et al. (2013), Cardozo & Steinberg (2010) and Wong et al. (2012) demonstrated that older participants in their respective studies rated telehealth and medicine reminder services highly in terms of perceived usefulness.

There were also studies, however, which reported that older people did not perceive ICT-based care services as relevant. Boonstra & van Offenbeek (2010) and Sanders et al. (2012) reported that older users found telecare services inflexible and the range of applications too narrow. Botsis & Hartvigsen et al. (2008), Lauriks et al. (2007), Brignell et al. (2007) and Milligan et al. (2011) found that these services lacked scalability, as older people’s needs changed and is increased, particularly in the case of people with Alzheimer’s disease.

A number of studies reported on the relationship between older people’s perception of the relevance of ICT-based care and their perceived need for care. Nijland et al. (2009) found that older people and those with chronic conditions were significantly more motivated to use e-consultation services compared to younger adults and participants with fewer care needs.

Similarly Cheek et al. (2005) and Turgeon-Londei et al. (2009) found that many older people displayed a need for feeling safe and secure which was a driving force in their adoption of ICT-based care services, such as smart-home technologies and video monitoring services. Conversely, other studies demonstrated that ICT-based care services were not perceived to be relevant when older people did not perceive a need for the services (Boonstra and van Offenbeek, 2010; Karunanithi, 2008; Liddy et al., 2008; Lorenzen-huber et al., 2011), such as when they did not perceive themselves to be “ill enough” (Lai et al., 2010; Sanders et al., 2012; Turgeon-Londei et al., 2009; Wagner et al., 2012).

3.1.3. Accessibility of mainstream devices

The “accessibility” of an ICT system, service, device or interface refers to the ease with which users can physically and cognitively use, manipulate and understand its content.

There is evidence that the accessibility and usability of mainstream ICT devices and the internet fail to meet the needs and capabilities of the older adult population and consequently act as barriers to e-inclusion for many older people (Age UK, 2010b). Feist et al. (2010) reported that 29.6% of their sample of people aged 55 years and older would “use new technologies if they were easier to use”. These findings were corroborated in a frequency analysis of the 2011 OxIS dataset, which revealed that over 60% of non-internet users aged 65 years and older claimed that the internet was “too difficult to use”.

Specific accessibility issues reported concerned the challenges older people face when experiencing age-related changes in their physical, sensory and cognitive abilities (Hawthorn, 2000). Several studies described the physical challenges older people face when using various peripheral equipment, such as a mouse or a keyboard (Hill et al., 2008; Tse et al., 2008), or gripping and pressing buttons on a mobile phone or remote control (Hardhill and Olphert, 2012; Independent Age, 2010; Leora, 2008; Williams et al., 2010). Eastman & Iyer (2004), Sayago & Blat (2010) and Carpenter & Buday (2007) also discussed the poor accessibility of computers and the internet for older people who have arthritis, tremors or “achy hands”. Older people experiencing deteriorating eyesight found operating ICT, such as mobile phones, difficult due to the size of fonts on the buttons and screens (Leora, 2008; Olphert and Damodaran, 2013; Williams et al., 2010).

Cognitive issues have also been identified. Burmeister (2010) and Hardhill & Olphert (2012) reported on the effects of the age-related decline in “mechanical cognition” and memory loss on older people’s abilities to navigate and to retrieve information from the Internet. Studies by

Adams et al. (2005), Carpenter & Buday (2007) and Hill et al. (2008) reported findings concerning the difficulties older people's experienced in understanding menu structures and how to navigate computer operating systems and email (Sayago and Blat, 2010). Related findings were reported in Atkinson (2008) showing that respondents felt that their age made it difficult to understand ICT.

There is only limited evidence on the accessibility of touchscreen devices, such as smartphones and tablet computers, and it is mixed. Generally, touchscreen devices were expected to be "age-friendly" (Stroud, 2012) due to their intuitive application-based interfaces and improved manipulability compared to the use of a mouse and keyboard (van Isacker et al., 2010; Stroud, 2011). Wong et al. (2012) reported that older participants rated the "perceived ease of use" of services delivered on a touchscreen "desk table" as "good". Mertens et al. (2012) reported on the reduction in error rate of older people with hand tremors when using "swabbing motions" on touchscreens, compared to "tapping" and "clicking" techniques when using a computer mouse. However, Sadri's (2011) survey of ambient intelligence discovered that the majority of older people found tablet computer interfaces difficult to comprehend. Alvseike & Brønning (2012) also found that tablet computers were not effective for people with cognitive impairment.

3.1.4. Accessibility of ICT-based care

There was evidence suggesting that ICT-based care devices and services had poor accessibility for older people (Demeris et al., 2009; Ding et al., 2011; Ludwig et al., 2012; Tak et al., 2010). Demeris et al. (2009) described that the fonts, colours and layouts of web-based applications of some telemedicine systems were not user-friendly for older people. Walsh and Callan (2011), Karunanithi (2008), Mahoney and Mahoney (2010), Garceau et al. (2007) and Wagner et al. (2012) reported that some older participants described pendant alarms as too bulky, cumbersome and awkward to wear. Wong et al. (2012) relayed that an interactive remote health consultation system was not deemed easy to use by older participants. Boonstra & van Offenbeek (2010), Milligan et al. (2011) and Karunanithi (2008) recounted that home monitoring and community alarm services had inadequate reach, confining older people with impaired mobility to a restricted area within their home. Similarly, some (albeit only a small proportion) respondents in Lai et al.'s (2010) study of telecare found the services "inconvenient" or "confusing". Poor sound quality of audio equipment (videophone, emergency call phone) posed difficulties for older people with hearing impairment (Cheek et al., 2005; Demeris et al., 2009; Garceau et al., 2007). Finally, a lack of memory-aid features on

monitoring and alarm equipment made services inaccessible for people with cognitive impairments (Botsis and Hartvigsen, 2008; Brignell et al., 2007; Karunanithi, 2008; Lauriks et al., 2007; Milligan et al., 2011).

3.2. Capability

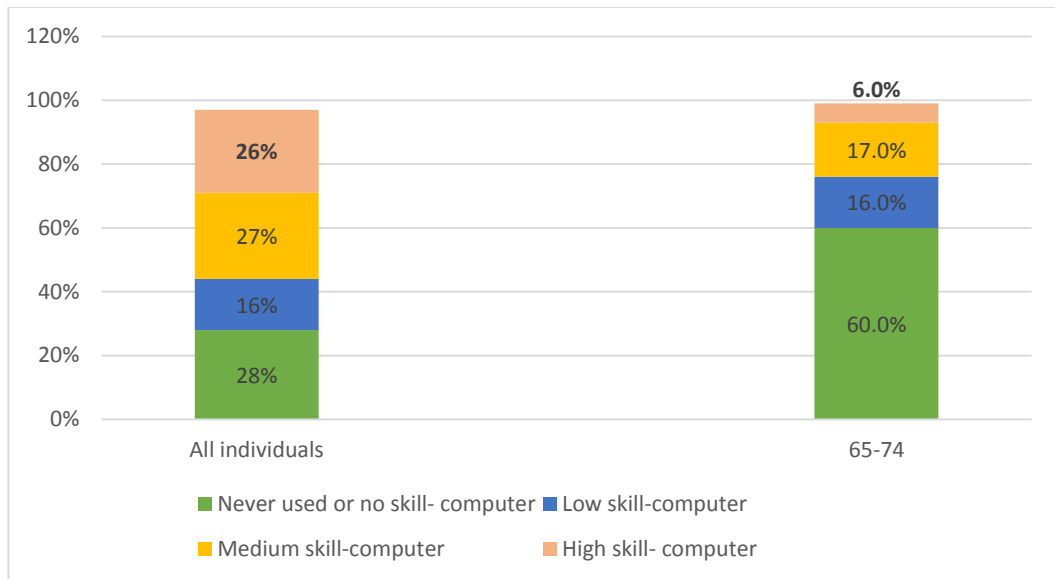
Central to the capability dimension of the 6C framework are skills, literacy, language and learning.

3.2.1. ICT skills and age-related changes

Many researchers noted a trend in the “generational divide in ICT skills”, where older people demonstrated less ICT-related knowledge and fewer relevant skills compared to younger generations (Takahashi et al., 2011; Wright and Wadhwa, 2010). Wagner’s (2010) review of computer use by older adults revealed a strong negative relationship between age and ICT-abilities. Olson et al. (2011), Leppel & McCloskey (2011) and Mason et al. (2012) reported that, compared to younger adults, older people had poorer levels of operational skills needed to use the internet, such as scrolling and clicking. Olson et al. (2011) further noted that compared to younger adults, older people had limited experience (and by extension, skills) with operating systems and software. Finally, Dutton & Blank’s (2013) analysis of the 2013 OxIS dataset revealed that over two-thirds of retired respondents who did not use the internet explained that they “did not know how” as a reason their non-use, compared to 57% of employed non-users.

Eurostat estimates on levels of computer and internet skills also displayed generational differences in ICT-capabilities. Figure 5-1 provides estimates of the computer-related skill-level of people aged 65 years and older in the UK in 2012 (Eurostat, 2014c). The results demonstrate that the majority of older people had either never used a computer or had no related skills, compared to less than 30% of the population as a whole. Only approximately 29% of people aged 65 to 74 years had some level of computer skill, compared to over 70% of all individuals. The statistics also show that computer skills declined sharply when comparing the older age group (75 years and older) to “younger older” people and the total population. Only 16% of people aged 75 years and older had some level of computer skill I, compared to 39% of adults aged 65 to 74 years, and 69% of all individuals in the UK.

Figure 5-1 Level of computer skill of individual in the UK (2012)

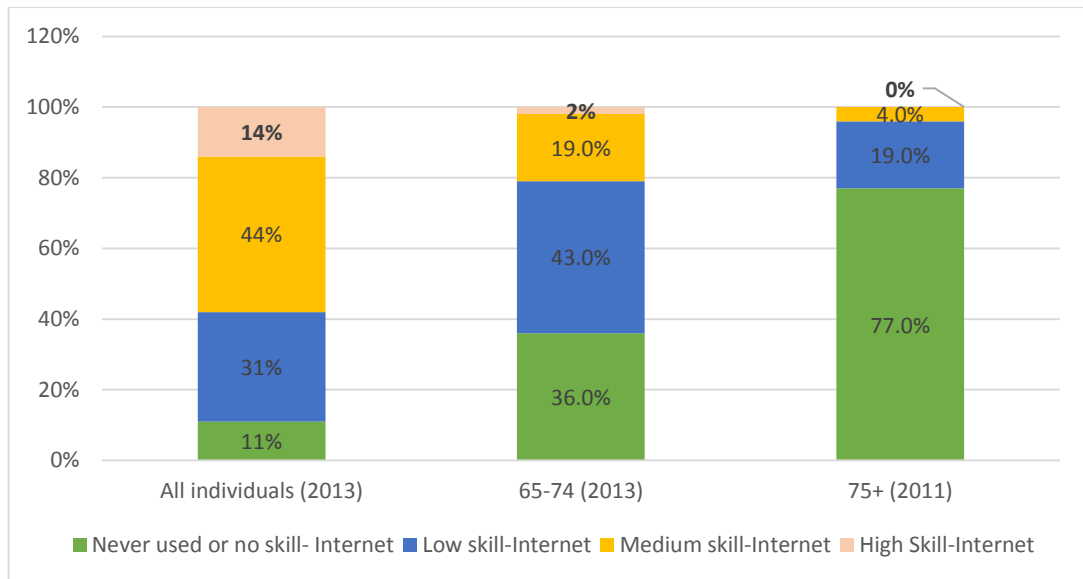


Source: Eurostat, 2014

Figure 5-2 shows estimates of internet skills of individuals in the UK in 2013 (Eurostat, 2014d). A large proportion of older people had either never used the internet or had no internet skills, compared to the population as a whole. The largest proportion of never-users (and not skilled) of the internet were in the 75 years and older age group; this was more than twice the proportion of 65 to 74 year olds, and seven times the proportion of the total population.

The skills gap between the 65 to 74 year olds and the population as a whole is narrower than that of people aged 75 years and older. In fact, the proportion of the 65 to 74 years old group with low-level skills (43%) is similar to the proportion of the population with medium-level skills (44%). This may reflect a change in the number and types of internet activities in which older people engage, when they move from formal employment to retirement.

Figure 5-2 Internet skill levels of individuals in the UK (2013)



Source: Eurostat, 2014. Note: Estimates for 75+ age group based on 2011 values

A higher proportion of people in all age-groups have some internet skills, compared to computer skills. Indeed, 63% of people aged 65 to 74 years had internet skills, whereas only 39% claimed to have computer skills. Similarly, 23% of people aged 75 years and older had internet skills (according to 2011 estimates), whereas only 16% said they had computer skills. This may indicate the increased use of alternative devices to access the Internet.

3.2.2. Language

Czaja et al. (2006) highlighted the cognitive abilities needed to acquire ICT skills, such as those required to develop a new contextual vocabulary. A small number of reports referred to the difficulties experienced by some older people with technical jargon. The Age UK report *Technology and older people: evidence review* (2010a) suggested that older people's lack of familiarity with technical language made it difficult for them to fully comprehend the benefits of using ICT. Hill et al. (2008) reported that some older people had such a poor grasp of the technical language that this led them to perceive ICT as complex, in turn creating psychological barriers to ICT use. Adams et al. (2005) presented qualitative findings which demonstrated that older participants found the language incomprehensible, and "bad" for people of their age.

3.2.3. Experience, education and skills

Several authors measured ICT skills according to their experience and exposure to ICT (van Deursen and van Dijk, 2011; Feist et al., 2010; Helsper, 2008; McMurtrey et al., 2011). Morris (2007) found that exposure to the internet was positively related to skill levels. Slegers et al. (2008) demonstrated a strong association between experience and skills; heavy computer

users showed a greater mastery (in computer skills) compared to light computer users, illustrating that skills grow and improve with increased experience. Adam's (2005) quantitative analyses revealed that older people acquired more ICT skills as they increased their use of ICT.

Some studies used level of education as an indirect proxy measure of experience and skills, where education is an indicator of type of employment, which in turn describes level of experience and exposure to ICT (Leppel and McCloskey, 2011; Mason et al., 2012). There was strong evidence demonstrating the positive relationships between level of attained education and adoption of ICT in the general population (Atkinson et al., 2008; European Commission, 2007a; Randall, 2010; Stellefson et al., 2008; Takahashi et al., 2011; Wagner et al., 2010; Xie, 2003).

Some reports pointed to a direct link between the educational attainment of older people and their use of modern ICT. Wagner et al.'s (2010) review demonstrated a consistently positive relationship between education and computer use amongst older adults. Mason et al. (2012) found a strong association between the measure of internet use and whether respondents (of all ages) reported having any qualifications. The report further confirmed that level of attained education level was a strong predictor of non-use amongst older people. Blazun et al. (2012) showed an association between older women's level of formal education (in Finland and Slovenia) and their curiosity to gain new knowledge. Selwyn et al. (2003) also observed that computer use was more common amongst those aged 70 or less who had continued their education beyond the age of 16. Leppel & McCluskey (2011) found a higher proportion of people with at least some college education amongst users, compared to non-users (of online shopping services), amongst participants both in the 50 to 69 age group and those in the over 70 years age group. The latter study supports the hypothesis above that college education allows individuals to feel more comfortable with technology.

Czaja et al. (2006) also argued that older people's skills were result of cognitive abilities that are partly a result of a cohort effect, where many became 65 just as ICT was becoming mainstream. In contrast, the levels of exposure to ICT among younger people prompted them to develop different learning patterns.

3.2.4. Skills for care

Research on the potential association between older people's ICT capabilities and their use of ICT-based care services is limited. A small number of studies reported that older people's lack of skill or experience did not impede their use of ICT-based care services. Harjumaa &

Isomursu (2012) found that older users learned to use the specific technology very well in each of six case studies (meal delivery, grocery ordering, wellness management, way-finding, medicine management and video-assisted communication services), even though many participants were not familiar with ICT. Lopez et al. (2011) showed that a lack of previous experience with technology did not prevent participants from using video tele-consultation services. Similarly, Marziali & Donahue (2006) discovered that even though half of the participants had never used a computer, almost 80% claimed that the carer web portal website was easy to use.

However, other reports suggested that a lack of (mainstream) ICT-related skills and experience could present a barrier to older people's adoption of ICT-based care. Takahashi et al. (2011) found that older people's more limited internet experience, compared to younger adults, inhibited them from searching for online health information. Cheek et al. (2005) suggested that the operational skills associated with mainstream ICT could affect older people's use of smart-home technologies. Nijland et al. (2009) revealed that, compared to younger adults, older people appeared to have lower levels of internet and email skills, which affected their use of the e-consultation service between patients and general practitioners.

A small number of studies reported that unfamiliarity with (mainstream) ICT vocabulary occasionally presented barriers to older people's use of ICT-based care. Kim (2009) suggested that the evolving ICT-language and related culture was a contributing factor to older people's exclusion from ICT-based care services, such as electronic health records. Such et al. (2006) conducted a simulation experiment of smart-home technology which showed that older participants generally found the language and text of the interface to be inappropriate for their age group. Sanders et al. (2012) also noted that terms used to describe some mainstream ICT, such as "Bluetooth" and "broadband", alienated care recipients and ultimately influenced their decision to abandon telehealth services.

Some studies found that older participants' cognitive skills had an impact on their ability to understand – and to use – ICT-based care services, such as telecare alarms (Garceau et al., 2007), fall detection systems (Milligan et al., 2011), smart-home technologies (Cheek et al., 2005) and electronic medical records (Chan et al., 2009).

3.2.5. Learning needs

It is generally acknowledged that older people are capable of learning to use ICT (Independent Age, 2010). Adams (2005) and Selwyn (2003), and reported that a large proportion of their

samples taught themselves to use ICT. Furthermore, a frequency analysis of the 2011 OxIS dataset revealed that 68.7% of internet users aged 65 years and older (n=165) claimed to have “worked things out on their own without help”. However, several researchers commented that older people are especially receptive to learning new ICT skills when their needs, interests and lifestyle are taken into account (Burmeister, 2010; Woodward et al., 2011; Wright and Wadhwa, 2010).

Several sources provided suggestions on the kinds of learning environment which is especially conducive to older people. The evidence demonstrated the effectiveness of one-to-one training (Blažun et al., 2012; Morris et al., 2007; Woodward et al., 2011) in a supportive, relaxed environment (Blaschke et al., 2009; Czaja et al., 2006; Stollefson et al., 2008) at a slow, informal pace (Independent Age, 2010; Woodward et al., 2011). Providing feedback and the ability to stop the instructor to ask questions were also considered important (Czaja et al., 2006; Woodward et al., 2011). Hands-on, practical, supervised lessons have also been shown to help older people retain information (Woodward et al., 2011). Several sources emphasised the effectiveness of peer- learning, where older people learn from each other (Freddolino et al., 2010; Independent Age, 2010; Magnusson et al., 2004; Takahashi et al., 2011). Indeed, many analysts called for focused, age-specific training (Atkinson et al., 2008; Blažun et al., 2012; Feist et al., 2010; Woodward et al., 2011).

3.2.6. Learning needs for care

Several sources pointed to the need for hands-on training for older people to use ICT-based care services ((Botsis and Hartvigsen, 2008; Cheek et al., 2005; Harjumaa and Isomursu, 2012), and stressed the importance of taking into account older people’s needs and existing skill levels (Nijland et al., 2009), especially for those with cognitive impairment (Botsis and Hartvigsen, 2008; Cheek et al., 2005). Harjumaa & Isomursu (2012) demonstrated that even services which used more “intuitive” interfaces, such as touch screens, needed to be appropriately introduced to older people so that they could learn the mechanics and gestures necessary to operate the equipment appropriately. Robertson-Lang et al. (2011) highlighted the need for specific training for older adults about the dangers of the internet, particularly with developing the skills to appraise the quality of websites giving out health information.

Tse et al. (2008) demonstrated that bespoke e-health training was not only beneficial to older people in terms of helping them improve their familiarity with health information, but also assisted in mastering their computer skills and increasing their interest in the internet. Tailored education was also seen to improve overall skill level and to reach those (i.e. older people)

who are currently excluded from the services because of a lack of skill, and who stand to benefit the most (Nijland et al., 2009).

3.3. Confidence

The confidence dimension of the 6C framework refers to attitudes and self-efficacy.”

3.3.1. Attitudes towards mainstream ICT

The positive association between older people’s attitudes and ICT adoption are widely demonstrated in the literature (Age UK, 2010a; Berry, 2011a; Feist et al., 2010; Helsper, 2008; Mason et al., 2012). Most studies described older people’s negative attitudes and anxieties about using mainstream ICT. Specific concerns included breaking ICT equipment (Adams et al., 2005; Dutton and Blank, 2011; Independent Age, 2010), internet fraud and abuse of personal information (Dutton and Blank, 2013; Hill et al., 2008; Independent Age, 2010; Leppel and McCloskey, 2011; Mason et al., 2012; Wright and Wadhwa, 2010), and the “potential health risks” of using ICT such as radiation (Carpenter and Buday, 2007). Dutton & Blank (2013) also discovered that over a quarter (27%) of retired non-users said that bad experiences with viruses led them to stop using the internet.

There were noted variations in attitudes within the 65 years and older age group. Reviews of older adult’s ICT-use by Wagner et al. (2010) and Xie (2003) suggested that as age increased, attitudes towards ICT became more negative. Empirical evidence from Feist et al.’s (2010) study showed that people aged 65 to 79 years demonstrated strongly positive attitudes towards ICT, whereas people aged 80 years and older were distinctly more negative. Marquié et al. (2002) demonstrated that older people were less confident in their computer skills compared to younger people. Feist et al. (2010) found that over 60% of participants aged 80 years and older felt they were “too old” to learn about new technologies, compared to 22.2% of people aged 65 to 79 years, and 8.7% of participants aged 55 to 64 years, suggesting a sense of self-doubt about their ability to learn among the most elderly.

Some studies reported on gender differences in attitudes towards ICT. Wagner et al.’s (2010) review suggested that, overall, men experienced less computer-related anxiety and had more positive attitudes towards technology than women, although one study reported no relationship (Laguna and Babock, 1997). Koch and Hägglund’s (2009) review revealed that older women considered themselves more “technophobic” than older men. Empirical evidence from Czaja et al. (2006) suggested that older women exhibited more anxiety and less positive attitudes towards computers compared to older men. Lai et al. (2010) found that significantly

more older men in their sample used computers compared to women. And, Singh et al. (2009) found men 1.25 times more enthusiastic than women about e-mail consultation services with general practitioners.

Overall, the literature suggests that older people were deeply ambivalent towards ICT (Helsper, 2008; Selwyn, 2004; Xie, 2003). Several studies noted that older people used ICT for only a limited number of functions (Olson et al., 2011; Wagner et al., 2010), and only when it did not interfere with their daily life (Hernandez-Encuentra et al., 2009; Selwyn, 2004). Paul & Stegbauer (2005) reported that older people perceived the internet to be interesting, but also believed it to offer too little content in relation to their needs. Participants in the study by Hill et al. (2008) expressed the view that the internet was useful for communicating with others and as an educational tool. The perceived relevance of the internet waned, however, for applications such as online shopping or banking, as these activities were considered an intrusion into daily routines. Dutton & Blank (2011) found that 30% of retired respondents who did not use - or ceased to use - the internet because they perceived it to be “too time consuming” (p.57), suggesting that ICT was seen to distract them from other daily activities.

3.3.2. Attitudes towards ICT-based care

A small body of literature was found concerning older people's attitudes to ICT-based care, with mixed evidence. Kim et al. (2009) found an over 90% satisfaction rate amongst older participants in their study of electronic patient health records. Chau et al. (2012) reported similarly high proportions of their older sample were satisfied with vital signs monitoring (91%) and medication reminder services (60%). Wong et al. (2012) showed that older participants expressed either “great” or “good” willingness to use interactive telehealth services (including a medication reminder, an interactive doctor-patient consultation tool, and a real-time vital sign-monitoring system).

However, results from Boonstra & van Offenbeek (2010) depicted older participants as vulnerable and fearful towards telecare technology. Wagner et al. (2012) review of wearable technologies and Garceau et al.'s (2007) study of a telecare alarm system reported that older people expressed fears of damaging the equipment. Singh et al. (2009) noted older people's attitudes towards an email consultation service for older people with their general practitioners (GP) were more polarised. Approximately half (51.7%) of the sample were “not at all enthusiastic” about the service. Furthermore, measured enthusiasm for using the service decreased as age increased.

Researchers also highlighted that even when older people had positive attitudes towards ICT-based care systems, this did not always translate into a willingness to adopt the services. Turgeon-Londei et al.'s (2009) study demonstrated that participants were "favourable" or "partly favourable" towards video-monitoring fall detection services, although half did not agree to adopt the ICT system because it was considered too complex or participants did not consider themselves ill enough for the services. Haarjuma & Isomursu (2012) found that older participants had generally positive attitudes towards life-style management services during a trial, but many participants did not perceive any value from the services and consequently they were rarely adopted as part of their daily lives. Chou et al. (2013) reported that the majority of older participants either "agreed" or "strongly agreed" that they were willing to use the services. However, their willingness faded once the notion of paying for the services out-of-pocket was introduced.

3.3.3. Self-efficacy and mainstream ICT

Several researchers commented on the powerful effects of older people's ICT self-efficacy on their engagement with technology. Czaja et al. (2006) and Atkinson et al. (2008) reported that older participants with lower self-efficacy and confidence levels were less likely to adopt technology. Conversely, evidence in Wagner et al. (2010), Woodward et al. (2011), and Jung et al. (2010) found that older people with higher levels of self-efficacy were more likely to engage with ICT.

There is also a lot of evidence of a "vicious cycle" of low ICT self-efficacy, which stymied the e-inclusion of older people. Reisenwitz et al. (2007) found that older people's poor self-efficacy inhibited them from using ICT, and in turn from gaining the experience needed to improve their skills and consequently their self-confidence. Slegers et al. (2008) discovered that frequent computer users increased their sense of mastery over time, whereas "light" computer users did not, illustrating the effect of experience on ICT self-efficacy and use. Feist et al. (2010) also showed that prior experience and familiarity affected self-efficacy and use of technology: older participants were "very comfortable" with more established technologies, such as televisions, microwaves and telephones, but were less comfortable with newer ICT, such as the internet, satellite navigation devices and personal computers. In contrast, several studies reported that older people's confidence improved once they gained ICT experience (Adams et al., 2005; Blažun et al., 2012; Czaja et al., 2006; Eastman and Iyer, 2004; Feist et al., 2010; Hill et al., 2008; Selwyn et al., 2003), which in turn led to increased use of ICT.

Older ICT-users displayed a range of levels of self-efficacy; poor self-efficacy was not reserved for non-users. Rather, a large proportion of older ICT users had poor levels of self-efficacy. Dutton & Blank estimated that 49% of retired internet users rated their internet-related skills as “good” or “excellent” (2013). McMurtrey et al. (2011) found that approximately 35% and 30% of older participants were either “somewhat” or “very” satisfied with their computer and internet skills respectively.

Similar trends were found with respect to older people’s self-efficacy with mobile phones. Hardhill & Olphert (2012) reported that despite almost all (90.2%) older participants owning a mobile phone, less than two-thirds were confident in using it to talk to people. One third described their abilities less confidently as being able to “cope”, and 3% were “scared”. Furthermore, confidence levels dropped with respect to being able to perform other functions on their phone, such as taking photographs and texting. Similarly, Roberts (2009) demonstrated that the majority of people aged 65 years and older owned and used a mobile phone, but only three in ten older mobile owners said they were “confident” with performing unfamiliar functions, such as sending texts.

The results of a cross-tabulation analysis of the 2011 OxIS dataset, demonstrated that older people had varying levels of self-efficacy according to the type of Internet activity (

Table 5-1). For instance, a higher proportion of older people were confident about their ability to judge the reliability of internet sites compared to those who were not. Similarly, more older people were confident about using the internet to gather information than not. Overall, older Internet users appeared to be less confident in their abilities to remove a virus from their computer, participate in online discussions and upload photos.

Table 5-1 Comparison of confidence levels of Internet activities between older and younger people

	65+		<65		PEARSON CHI- SQUARED, P-VALUE
	Not confident at all/ n(%)	Fairly confident/ Very confident n(%)	Not confident at all/ Not confident n(%)	Fairly confident/ Very confident n(%)	
JUDGING THE RELIABILITY OF AN ON-LINE SOURCE	51(32)	108(68)	201(17.4)	951(82.6)	19.01, p=0.000
USING THE INTERNET TO GATHER INFORMATION	12(7.4)	151(92.7)	59(5)	1110(95)	1.52, p=0.218
REMOVING A VIRUS THAT INFECTED THE COMPUTER	110(69.6)	48(30.4)	549(48.5)	582(51.5)	24.34, P=0.000
PARTICIPATING IN A DISCUSSION ONLINE	104(74.2)	36(25.7)	423(39.3)	654(60.7)	61.11, P=0.000
UPLOADING PHOTOS TO A WEBSITE	98(61.6)	61(38.3)	354(31)	789(69)	57.91, P=0.000
LEARNING NEW TECHNOLOGY	78(50.3)	77(49.7)	285(24.9)	859(75.1)	42.34, P=0.000

Table 5-1 also demonstrates the significant association between age and confidence levels. There were no significant differences in confidence levels for conducting internet searches between people aged 65 years and older and those under the age of 65. However, there were significant differences in the confidence levels for all other activities between older and younger people. Erickson & Johnson ((2011)) also reported that older people had varying of levels of self-efficacy for different uses of the internet. Self-efficacy was significantly correlated with using the internet for communication (e.g. email or online communities), information searches, but not significantly related using the internet for entertainment purposes.

3.3.4. Self-efficacy with ICT-based care

A small number of studies investigated the impact of older people's confidence and self-efficacy in the context of ICT on their use of ICT-based care. In all of the studies identified, older people's ICT-related confidence and self-efficacy proved to have a profound effect on their adoption of ICT-based care. Early reviews by Cheek et al. (2005) and Magnusson et al. (2004) found that older people's low-self-efficacy with regard to their computer skills had a negative impact on their uptake of smart-home and telecare technologies respectively. Sanders et al. (2012) conveyed that a lack of confidence in ICT skills was a lead reason for older people's withdrawal from the *Whole System Demonstrator* trial of telecare and telehealth technology. Nijland et al. (2009) discovered that older people's self-perceptions of a lack of appropriate internet skills created a barrier to their usage of e-consultation services with their GP. Harjumaa & Isomursu (2012) suggested that the poor uptake of medicine reminder services was due to older people's reluctance to let care personnel know when they experienced problems with using the ICT service.

3.4. Cost

Cost covers facets concerning income, purchasing power and perceived affordability.

3.4.1. Income and e-inclusion

A number of reports provided evidence concerning the relationship between income and ownership – and use – of ICT. Randall (2010) demonstrated that (all) UK households in the 10th highest income distribution are 3.5 times more likely to have an internet connection and three times more likely to own a computer than households in the lowest 10th income distribution. According to the OfCom *Communications Market Report* (2013a), ownership and usage of all mainstream ICT devices and internet networks was higher amongst ABC1 social-groups than DE social-groups. Dutton & Blank (2013) observed a widening gap in access to ICT between higher income and lower income groups: in 2013, 93% of (all) respondents on the highest

incomes were “new generation users” (users who have access to several internet-enabled devices, see chapter 4), compared to 57% of those in the lowest income group. The 36 percentage point difference in 2013 represented an increase from a 24 percentage-point difference between income levels of new generation users in 2011.

A strong association between older people’s income and their access to ICT was also reported in the international literature. Mason et al. (2012) found a strong, significant relationship between internet use and older people’s household income in England. A study by Carpenter & Buday (2007) in the United States demonstrated that (older) computer users had higher incomes compared to non-users. Furthermore, non-users often cited financial reasons for not using a computer. A study of a sample of older Australians by Atkinson et al. (2008) showed a statistically significant relationship between income and computer ownership and Internet access.

3.4.2. Perceptions of affordability of mainstream ICT

While income is an objective indicator of purchasing power, it was found that some studies indicated that older people’s subjective perceptions of the affordability of ICT were powerful determinants of their e-inclusion (Hill et al., 2008; Independent Age, 2010, p.19). Wagner et al.’s (2010) review identified six studies which concluded that cost was perceived to be a barrier to older people’s use of ICT (Carpenter and Buday, 2007; Festervand and Meinert, 1994; Mann et al., 2005; Opalinski, 2001; Saunders, 2004; White and Weatherall, 2000). Turgeon-Londei et al. (2009) reported that older people with very little experience with mobile phones, DVD players and computers cited affordability as one of the most common reasons for not using these technologies. Feist et al. (2010) found that approximately 30% of people aged 65 years and older stated that “technologies were too expensive for me.” Dutton & Blank’s analyses of the OxIS 2013 data demonstrated that half of retired non-users stated that the internet being “too expensive” was a reason for their non-use (2013).

In addition, researchers observed that older people’s perception of the affordability of ICT affected their perception of the benefits of ICT. Czaja et al. (2006) found that older people who perceived ICT as unaffordable were more likely to discount the value - and their need - of the ICT, and consequently were less likely to acquire ICT. In a similar vein, Wagner et al. (2010) and Hill et al. (2008) suggested non-use was often attributed to a lack of perceived benefit as a result of a perception of unaffordability. In line with these findings, the Ofcom *Communications Market Report* (2012) and Selwyn (2004) suggested that some older people were uncomfortable about admitting that cost was a factor inhibiting their ICT-use and gave

alternative reasons for their non-use of ICT. Therefore a proportion of older people who state that they have a “lack of interest” in ICT, may be disguising underlying financial constraints.

Older people’s perceptions of the affordability of ICT was found to be rooted in their values about spending and their related consumption habits, with ICT perceived as a luxury good, rather than a tool for improving the quality of their lives (Weaver et al., 2010). Indeed, observations in the Age UK report *The Golden Economy* (2010b) suggested that older people, regardless of income, were more hesitant about spending compared to younger generations: 45% of people aged 65 years and older with the highest income-levels had the lowest levels of expenditure, compared to 27% of people aged 30 to 49 years.

Haddon (2004) further commented that although many older people have built up substantial savings over their lifetime, many remain extremely judicious about spending money, especially on goods and services that have on-going costs such as ICT. The Independent Age report *Older people, technology, and community* (2010) noted that older people’s concerns about the escalating costs of maintaining, updating, and replacing hardware, software and security packages influenced their perception of affordability and consequently, their adoption of ICT. Dutton & Blank (2013) showed that 70% of retired non-users stated that they did not use the internet because a “computer [was] no longer available”, which could be interpreted as a disinclination to continually invest in ICT.

3.4.3. Who pays for ICT-based care?

The evidence demonstrated that health and social care reimbursement policies had a strong effect on older people’s perceptions of the affordability of ICT, and consequently their access to ICT-based care. The international literature described a general uncertainty about reimbursement which affected both older people’s perception of affordability as well as their adoption of services (Chan et al., 2009; Singh et al., 2009; Zweijssen et al., 2011). Harjumaa & Isomursu (2012) and Tse et al. (2008) found that older people perceived the costs of those ICT-based care services which relied on mainstream devices (e.g. a laptop computer or mobile telephone) and networks (e.g. an internet connection) as high, when they were not reimbursed for new equipment. A study by Nijland et al. (2009) of e-consultation services demonstrated that, compared to younger people, older people were significantly more likely to argue that a “lack of reimbursement” for using the service by their insurance company was a barrier to use.

Studies of ICT-based care systems using bespoke devices also demonstrated the effects of perceived affordability on the adoption of the services by older people. Lai et al. (2010) reported that older participants had financial concerns about adopting remote motion and vital sign monitoring and alarm services which incurred a monthly subscription charge. Turgeon-Londei et al. (2009) found that the majority of older participants agreed they would use the telecare systems only if they were “free” or “affordable”. Chou et al. (2013) reported that older people’s “willingness to continue [to] use” telecare services diminished when they were introduced to the idea of being charged a fee. Boonstra & van Offenbeek (2010), studying the deployment of telecare services in The Netherlands, found and that less well-to-do clients needed reassurance that there were no costs associated to the care-alarm system in order to encourage their participation in the study. Similarly, Matthews et al. (2010) reported that although most of the older sample people perceived benefits of ICT-based care services to their quality of life, they were concerned that the costs were prohibitive.

Only one reference was identified which explored the effects of older people’s consumption values and behaviour on their adoption of ICT-based care services. Garceau et al. (2007) found that many older people indicated that the 24-hour remote monitoring service was too expensive, despite having sufficient funds to pay for it. It transpired that the underlying reason for their perception of unaffordability was a sense of guilt for spending their savings on themselves, rather than passing them onto their children.

The vast majority of telecare services deployed in England are first generation pendant alarm systems (Kubitschke and Cullen, 2010; Sethi et al., 2011), provided by local care authorities to older people with an assessed level of need. There is great variability in how local authorities dispense telecare services, but most local councils distribute telecare services according to the *Fair Access to Care Services* (FACS) guidance, where clients assessed as having substantial or critical-level needs receive the services free of charge (at point of use), or for a small monthly fee (Corbett-Nolan, 2012). Barlow et al. (2012) identified a small private market for remote care services and also reported the challenges in measuring the size of this market and the characteristics of the clients. Given that many local authorities distribute telecare services according to FACS guidance, the private market may comprise clients with lower-level needs (e.g. needs assessed as less than “severe” or “critical”) who were denied care services from a public care authority.

4. Discussion

In this chapter, the literature on older people's e-inclusion and access to ICT-based care has been reviewed through the lens of the four person-centred dimensions of the 6C framework. It was found that the use of ICT – both for mainstream and care-related purposes – by older people is affected by a number of interrelated factors. It was also noted that ICT is not neutral or free of context (Berry, 2011a; Hill et al., 2008), but reflects the designs and ideals of a subculture which often alienates older people, particularly those in the “oldest old” group. This estrangement may, in turn, foster a sense of ambivalence, defiance and self-doubt concerning their abilities to conform to the new cultural norms.

Yet many older adults do adopt ICT, perceiving it to be relevant to their lives, albeit with an ambivalence about a culture where ICT can encroach on so much of their of daily life. Similarly, when older people had an identified care need, they welcomed ICT-based care that they found useful, but were quick to dismiss such services if the technology interfered with their daily routines or challenged their self-perceptions as able and independent.

The recorded unanimous expression of “lack of interest” amongst people who did not use ICT could suggest – in part - a resistance to the established “digital order”. However, many observers question whether their reluctance to take up ICT is based on informed judgements, but, rather, may be a front for underlying anxieties, poor levels of awareness, low self-efficacy, lack of skill, or financial constraints (Berry, 2011a; OfCom, 2012). Indeed, those making UK e-inclusion policy have identified lack of perceived relevance and self-efficacy as key barriers to e-inclusion and have pledged to increase efforts to promote awareness and ICT-skills training (Cabinet Office, 2014b).

The force of the digital culture was also highlighted in the evidence concerning accessibility, revealing an industry-wide focus on youth which has led to a systematic disregard for the needs, preferences and capabilities of older people. There appears to be a tendency in the literature to blame older people, rather than the ICT design, for their lack of engagement, reinforcing the view that older people should adapt to ICT, rather than considering how ICT design might be amended to suit their needs (Hernandez-Encuentra et al., 2009). Moreover, there is also growing interest in the importance of accessibility and capability in the delivery of care.

The accessibility of ICT for older people is at an impasse. ICT designed to be age-friendly has been shown to be stigmatising and can equally impede the e-inclusion of older people (Berry,

2011b; Hernandez-Encuentra et al., 2009; Roberts, 2009). Furthermore, the evidence concerning ICT-based care suggests that bespoke services often fail to respond to the variability and scalability of older people's care needs.

UK e-inclusion policy does not directly address the accessibility of ICT. A number of inclusive design guidance and standards, such as the British Standard on Inclusive Design Management BS7000-6 and W3C, have been developed to ensure that designers take into account the needs of older and disabled people (Age UK, 2010b). There have also been several appeals for older people to take an integral, active role throughout the design process, so that the ICT services produced are relevant, usable and culturally appropriate (Age UK, 2010a; Karunanithi, 2008; Milligan et al., 2011; Xie, 2003). However, industry leaders have criticised inclusive design approaches for stifling innovation (Age UK, 2010b), and designers rarely respect the developed standards (Roberts, 2009). One could argue that the inaccessibility of ICT devices and the internet is a breach of the *Disability Discrimination Act* (2005) and further attention at the policy level is needed to promote an inclusive digital society for all.

The literature on older people's capabilities paints a negative picture of older people's e-inclusion. On balance, compared to younger populations, a smaller proportion of the older adult population have ICT skills, and the levels of skill are comparatively lower. Skills, as assessed by prior exposure to ICT, also had a strong effect on older people's self-efficacy, and consequently on ICT use. Furthermore, a small body of evidence suggests that poor ICT skills and self-efficacy potentially affect older people's adoption of ICT-based care.

Older people's confidence was strongly associated with their adoption of ICT. Most studies described older people's general attitudes and self-efficacy in a negative light. However, there was evidence to show that attitudes and self-efficacy varied according to specific ICT activities. In particular, older people had high levels of self-efficacy for familiar functions such as internet searching and using a mobile phone to make calls. This suggests that self-efficacy is linked to older people's perceived relevance of - and motivation to use - ICT. Moreover, the evidence suggests that a large number of older ICT users are self-taught (Selwyn et al., 2003; Adams et al., 2005), implying that when older people identify a benefit from ICT to their daily lives, many have the determination and capability to learn the skills needed (Independent Age, 2010; McMurtrey et al., 2011). This could also suggest that generalised low levels of self-efficacy and feelings of inadequacy about their digital skill-set could be the result of pressures to conform to a particular "digital" standard of ICT prowess.

With respect to cost, perceptions of the affordability of mainstream ICT and ICT-based care seem to have a powerful effect on older people's engagement with technology. Many e-inclusion theories have not addressed cost as a major contributing factor to ICT adoption. There is general agreement that as relative prices of ICT fall over time, the importance of cost as a barrier to e-inclusion is diminished (Almuwil et al., 2011; Helsper, 2008). Furthermore, although many older people have low incomes, there are vast differences in wealth across the older population (Czaja et al., 2006; Moss et al., 2013). Indeed, the Age UK report *The Golden Economy* (2010b) points out that the mean wealth of households headed by people aged 65 years and older is higher than that of households headed by people aged 44 years and younger. It is therefore false to assume that older consumers as a demographic group lack economic influence in the ICT market (McMurtrey et al., 2011).

However, in the context of older people seeking to find their place in an "unfamiliar" digital environment, the evidence suggests that cost has a powerful effect on their perceptions of relevance and willingness to participate. Indeed, the cost dimension raises some important questions about access to ICT-based care. There remains a lack of understanding of how many people with care needs in the UK are denied access to telecare and telehealth services because of an inability to pay for private services. In principle, the introduction of personal budgets to social care users could remove some of the cost barriers, but there a number of uncertainties concerning the reimbursement and delivery of ICT-based services not directly commissioned by local authorities (Barlow et al., 2012).

This analysis has highlighted that many older people actively participate in the digital society. However, they have specific ICT needs and preferences, which are not always in line with the standards and expectations of contemporary digital culture. Their level of e-inclusion, set against these standards, may not adequately reflect the degree to which older people would like to access – and use - ICT in a way that allows them to participate in their communities.

5. Limitations

There were some limitations arising from the chosen method of reviewing the literature. Firstly, using precise Boolean search terms in several electronic databases, under strict systematic review guidelines, produced only a limited number of "hits", and this search did not identify pivotal studies which had been found previously through an informal search. The research questions cover a range of topics, drawing from several disciplines, and in order to identify a broader array of relevant evidence across different perspectives, a second set of

Boolean terms (which are described in Chapter 3) was created to be more inclusive, if less precise.

This strategy indeed produced a large number of “hits” (see chapter 3). The search also highlighted the diversity in how each of the main issues of this study is defined. For instance, the term “older people” was at times used interchangeably with retirement. At other times, particularly in market research, “older people” referred to people over the age of 35 years, who were outside the “youth” market. Similarly, the search results included primary studies which investigated older people’s use of a wide range of ICT, from internet use, to the use of a basic telephone (in the context of ICT-based care), as well as the use of assistive devices which did not have an ICT component, such as walking frames and grab rails.

Secondly, the final selection of studies from the electronic database search provided important evidence on older people’s e-inclusion within the 6C framework. Most studies were descriptive with small samples. Pawson et al (2005) described the “hierarchy of evidence” commonly used for appraising the quality of studies in a systematic review. As such, several of the identified studies would be considered of poorer quality and in turn excluded from the evidence base in a conventional systematic review.

Thirdly, there is sometime a time delay in evidence reporting in the peer-reviewed literature, with results appearing several years after study completion. Given the fast-moving nature of digital technologies, these published results may not fully reflect current reality. Similarly, there were very few empirical studies which included samples of older people from the UK. Drawing from the experiences of past generations of older people in other parts of the world can shed light on the situation for older people in the UK in the current day for some of the “universal” and “timeless” issues related to e-inclusion, such as the effects of physical and cognitive impairment on ICT use for instance. However, other dimensions of e-inclusion may be more sensitive to the timing and to the socio-political context of the study, such as the implications of cost on access to ICT. Therefore, evidence from a long time in the past and/or from outside in the UK needs to be carefully appraised for its relevance to older people in the UK in the current day.

A final shortcoming of using a conventional systematic approach to the review is the poor coverage of industrial market reports, obtained through employing electronic database. The electronic databases include the literature from finance and management sciences, however the databases do not include references to the extensive, detailed reports produced by consulting firms. Market reports can be identified through a search engine or by referring to

the bibliography of grey literature reports. Nevertheless, due to the high purchase fees associated with market reports, my access to the findings was limited to what was referenced in the grey literature. Therefore, relevant results of these reports were relayed when possible, with the caveat that the “second-hand” results may include an interpretive bias by the intermediary publication.

Overall, the limitations of the adopted literature search stem from the incongruence between the rigidity of the review methodology and the exploratory nature of the research questions. The approach taken to review was based on the methodological principles of a systematic review, which entailed adhering to a strict *a priori* search protocol and inclusion criteria. Systematic reviews are predominantly useful for aggregating the evidence around focused, linear research questions. In contrast, the aims of this research are to explore more complex relationships between older people and their digital environment. As discussed in chapter 3, “CMO” research questions are often aligned with realist reviews, which allows researchers to take a flexible, pragmatic and pluralist approach to reviewing the literature (Pawson et al., 2005). Consequently, the mismatch between the review methodology and the subject matter of the study left the research questions of this study largely unanswered, when adhering stringently to the results of the systematic review of the literature.

As the research questions of this study have a broad scope, I implicitly adopted some of the methods proposed by realist review theorists (Gough, 2013; Pawson et al., 2005), to compensate for the limitations of a systematic review methodology and to develop a complete picture of the contexts (mainstream and care-related), mechanisms and outcomes of older people’s engagement with ICT. Therefore, the overall review strategy undertaken did not strictly follow one approach; a combination of review methods were used, which may have compromised the attention given to some issues around older people’s engagement with ICT. However in retrospect, this outcome can also be attributed to a realist review approach, which is summarised by: “what works, for whom and in what circumstances” (Pawson et al., 2005).

Chapter 6 : Connectivity and Continuity

1. Introduction

Just as the previous chapter considered evidence on the person-centred dimensions of the 6C framework, this chapter explores the effects of the two environmental dimensions of the 6C framework – connectivity and continuity – on older people’s e-inclusion and access to ICT-based care. Both of these dimensions concern aspects of the “digital market”: ‘connectivity’ refers to the political, commercial and economic factors which affect individuals’ material access to – and demand for - ICT devices and internet networks and ‘continuity’ maps the different sources of support for enabling their engagement.

2. Methodology

As before, these issues were addressed by a combination of methods including a review of the peer-reviewed and grey literatures, secondary analyses of the 2011 OxIS dataset, primary analyses of interview data with technical experts, and estimates provided by the Office of National Statistics and Eurostat. Methods of data collection for each source were described in chapter 3.

In order to examine these environmental dimensions, I adopted a stakeholder approach (Freeman, 1984), where key stakeholders are grouped according to their interests in – or relationships with – with the central concept. When organised in this way, it is possible to discuss both the interaction between stakeholder groups and the value that each stakeholder group adds to the market (Griseri and Seppala, 2010, p. 31).

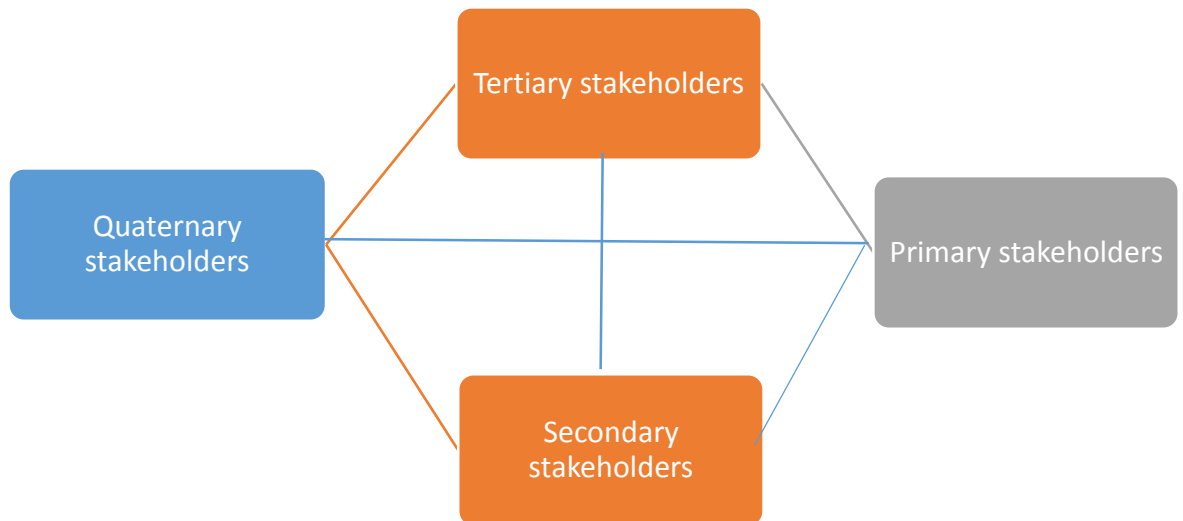
To identify the stakeholder groups, a useful model was found in the typology in the *Ambient Assisted Living Roadmap* by the European Ambient Assisted Living Innovation Alliance. This had been developed to analyse key forces in the European ICT-based care market across the policy, public, and private sectors, with quaternary, tertiary, secondary and primary stakeholders (AALLIANCE, 2010). A description of each stakeholder group is provided in Box 6-1 below.

Box 6-1 Stakeholder groups

<i>Quaternary stakeholders</i>	European and national agencies which develop the political, economic, and legal context of the market
<i>Tertiary stakeholders</i>	Commercial organisations which supply ICT networks, hardware, software, services and applications to other stakeholder groups
<i>Secondary stakeholders</i>	Local government, health and social care agencies, housing providers, or third sector organisations which provide services to primary stakeholders.
<i>Primary stakeholders</i>	Service users and their families, friends and unpaid carers

This typology was used for both the mainstream ICT and ICT-based care markets, but there are some differences between these two markets in how the stakeholder groups interact with each other. Figure 6-1 describes the relationships between stakeholder groups in the mainstream ICT market. Quaternary stakeholders affect all other stakeholder groups through their policies, standards and legislation for the development of – and access to – ICT. Tertiary stakeholders include telecommunications operators (e.g. BT, Virgin, Sky, EE), hardware (e.g. Apple, Samsung, Nokia), software (Microsoft) and applications (Android, iOS) developers. In the mainstream ICT market, tertiary stakeholders provide ICT directly to the consumers in any stakeholder group. For example, individuals can purchase a broadband subscription from a telecommunications operator, and a local authority can purchase computer equipment from an ICT distributor. Secondary stakeholders include local governments, health and social care agencies, and third sector organisations which purchase ICT from tertiary stakeholders and provide services to primary stakeholders. Primary stakeholders consist of the users of ICT devices and services, including older people and their unpaid carers, such as family members, friends and neighbours.

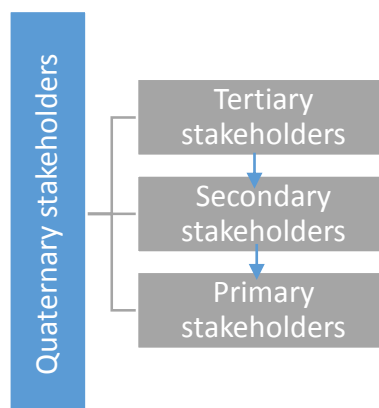
Figure 6-1 Stakeholder configuration of mainstream ICT market



Source: Adapted from Ambient Assisted Living Roadmap, AALIANCE (2010)

Figure 6-2 illustrates the stakeholder configuration for the ICT-based care market. Quaternary stakeholders have a similar role in the ICT-based care market to that described above. In contrast to the mainstream ICT market however, tertiary stakeholders in the ICT-based care market provide the majority of the ICT devices and services directly to care services providers in the secondary stakeholder group.

Figure 6-2 Stakeholder groups configuration for the ICT-based care market



Source: Ambient Assisted Living Roadmap, AALIANCE (2010)

The secondary stakeholders here are local care and housing agencies providing health and social care services, including ICT-based care services to primary stakeholders. The primary stakeholder group, as above, consists of older people with care needs and their carers.

An analysis of roles of the different stakeholders with respect to the connectivity and continuity dimensions is presented separately below. For the connectivity dimension, I begin by describing the role of quaternary stakeholders in terms of the relevant policies for both e-inclusion and ICT-based care. I then provide an overview of the different types of mainstream ICT and ICT-based care to which older people have access. Finally, the ways in which each of the tertiary, secondary and primary stakeholder groups facilitate older people's connectivity are addressed.

For the continuity dimension, I describe the support provided by each of the tertiary, secondary and primary stakeholder groups.

3. Quaternary stakeholders: setting the policy context

3.1. E-inclusion Policy

Since the internet became mainstream in the mid-1990s, EU and UK policies aimed to harness its power to improve the productivity and efficiency of both national and international trade. However, there was also recognition that the internet introduced new forms of social exclusion and governments set out to address the widening "digital divide" between those who had and those who did not have access to ICT, including the internet (Timmers, 2008).

In 1999, the European Commission launched the *eEurope- an Information Society for All* initiative, which set out to ensure that all citizens could enjoy the benefits of the digital age (European Commission, 2014d). Shortly thereafter, the eEurope 2002 Action Plan was announced which aimed to improve the speed of – and access to – the internet and promised to invest in skills, with a particular emphasis on younger people and working in the "knowledge based economy" (European Commission, 2013b).

At the same time, the UK government set up the *Office of e-envoy* in order to enable all individuals and businesses to benefit from new technologies and the internet. Also, in noticing the emerging divides between internet users and non-users along traditional social indicators, the Department of Trade and Industry (DTI) instituted a policy that citizens in deprived neighbourhoods should have access to public internet facilities (Talbot, 2006).

As the use of the internet and related ICTs became more widespread, there was growing concern about those left behind. EU e-inclusion policies began to set specific targets to address

groups of citizens who were more vulnerable to the risk of exclusion, including older people. With the signing of the European Union's (EU) *Riga Ministerial Declaration* (2006), 34 European countries pledged to minimise the gaps in ICT usage of marginalised groups by increasing the availability of broadband internet across all regions of the European Union, increasing levels of digital literacy and skills, improving the accessibility standards of government websites, and working towards an accessibility regulatory framework (European Commission, 2006).

3.1.1. ICT infrastructure

In 1999, the *Office of e-envoy* set out to ensure that all UK citizens would have access to the internet if they wanted to. This led to the launch of the UK Online Centre initiative in 2000 by the Department for Education and Skills (DfES), constituting a network of local Public Internet Access Points (PIAPs) computer terminals with internet access installed in (mainly) public libraries, community centres, post offices and primary schools, open to the public at no cost (Talbot, 2006). By 2003, it was estimated that the network included approximately 6900 centres (Bradbrook and Fisher, 2004) and over 95% of the UK population lived within five miles of a PIAP (Morris et al., 2007). Today, the Department of Business Innovation and Skills (DBIS) and the Department for Work and Pensions (DWP) continue to fund the work carried out in over 5,000 *UK Online Centres* to provide low cost access to ICT equipment and the internet, as well as digital resources to help build community services across the UK (UK Online Centres, 2014a).

Meanwhile, internet technologies continued to evolve. Broadband internet was rapidly becoming the industry standard for speed and reliability; leaving narrowband – or “dial up” - customers in “broadband poverty” with inferior levels of service (Adams et al., 2005; Helsper, 2008; Schmeida and McNeal, 2007). Internet standards were raised yet again with the introduction of new generation access (NGA) internet – or “superfast broadband” - which offered yet faster and more reliable connections, and opened up new opportunities for communication and data sharing.

The changing digital landscape led to the *Digital Britain White Paper* (2009), where the UK government outlined its strategy for positioning Britain as a leading digital economy. Included in these plans was a commitment to improve overall participation in Britain's digital society by both i) minimising the gaps in supply of the broadband infrastructure and online services and ii) addressing the failings in demand for the internet and ICT due to lack of affordability, perceived benefits and necessary skills.

The supply-side strategies centred on modernising Britain's broadband infrastructure. This included the Universal Service Commitment of 2 Mbit/second internet connectivity by 2012, where over 99% of the UK internet exchanges were to be DSL-enabled, providing speeds of at least 2 Mbit/second, and funds to support the roll-out of NGA internet to 90% of UK homes and businesses by 2017. In a revised *broadband strategy*, the government expanded its commitment to support the deployment of NGA to 95% of the population by 2017, with funding of over £1 billion to stimulate the commercial investment of super-fast broadband and mobile phone coverage in rural, and hard-to-reach areas of the UK. The remaining 5% of the population would be guaranteed a 2 Mbps DSL connection (Department for Culture Media and Sport, 2013).

The European Commission also identified the modernisation of the digital infrastructure as a key priority in the *Europe 2020* strategy for economic growth (European Commission, 2014e). The *Digital Agenda for Europe: A Europe for 2020 Initiative Pillar VII*, the flagship initiative of the strategy, set a target that all households in the EU should have access to broadband speeds of 30 Mbits/second by 2020 and committed €1bn to support the development of cross-border public services, and seed funding for high-speed broadband projects (European Commission, 2013a; Wadhwa, 2011, p. 40). However, some expert interviewees criticised the government's approach to the modernisation of the broadband infrastructure. One expert noted that a market-led approach will deepen inequalities of access between rural and urban, deprived and affluent regions:

"If the government is serious about making broadband a priority then it needs to put some money upfront. The commercial interest will drive connectivity to where the money is, which means urban centres, wealthy centres. If there [is a] serious attempt to get universal "plumbing" in, then there needs to be public policy with some financial commitment to help it happen."

Advanced Digital Institute, analyst

Another expert commented that broadband should be a normal part of everyone's daily life and that government has a duty to devote more resources to delivering more equitable and affordable broadband services:

"There is a need for a socially acceptable cost for broadband technology to every house. It ought to be part and parcel of everyday life."

Worcestershire County Council, telecare commissioner

UK policy makers explored other avenues to improve the e-inclusion of disadvantaged groups, including television, considered by many to be the internet platform for the future. Television

was a familiar and widely accepted technology and therefore introducing digital technology with the potential of internet access was deemed a logical conduit to e-inclusion for the excluded (Sourbati, 2011).

To facilitate the transition towards digital broadcasting, the Department of Culture, Media and Sport (DCMS) and the BBC ran the UK-wide *Digital Switchover Scheme* between 2007 and 2012 to ensure that vulnerable people in the UK would continue to be able to watch television after the analogue signal was switched off. The scheme included information and support services to older people and people with disabilities, through a combination of demonstration videos and visits by local volunteer and community organisations. Equipment, installation, aerial upgrades and free aftercare for 12 months were also made available. Over 1.3 million received assistance on the scheme (BBC, 2014b). While the scheme was successful at enabling the transition towards digital television, it proved to be ineffective in improving older people's use of internet-based interactive services (Sourbati, 2011).

3.1.2. Digital skills

In 2009, to assist with demand-side issues, the Cabinet Office appointed a new Champion for Digital Inclusion (CDI) to spearhead the government's policies for improving the e-inclusion level of the (then) 10 million adults in the UK who did not use the internet (Choudrie et al., 2010). The CDI founded the flagship programme *RaceOnline 2012* and the subsequent *Go ON UK* (2014a) in order to elicit support from public, private and third sector organisations. This was seen as a pledge to establish a cross-sector partnership network that would support and fund existing local, grass-roots initiatives involved in raising awareness of the benefits of e-inclusion, and in providing skills training (Capgemini Consulting, 2012).

Recently published results from the *BBC Media Literacy* study reveal a continued shortage of basic internet skills, affecting more than one in five people in Britain (BBC, 2014c). This gave rise to the *UK Digital Inclusion Charter* (2014b), which pledged to reduce the number of people who were offline by 25% every two years until everyone possible would be e-included. Among the Charter's aims were to work with a common definition of skills and capabilities, renew the government's commitment to support Go ON UK's local efforts for improving non-users' motivation to go online, and to continue working in partnership with public, private and third sector organisations to raise awareness about the internet, and to develop the skills base.

In their recent *Technology Policy Manifesto* (2014), the Policy Exchange estimated that it would cost approximately £141 per person to provide non-users with the skills needed to use the internet. For the population of non-users aged 65 years and older, this amounted to an

investment of approximately £676.8 million. These costs were expected to be offset by savings of approximately £1.7 billion in terms of a reduction in paper-based and telephone-based transactions, as well as a reduction in the use of health services to manage the repercussions of loneliness and social isolation (Copeland et al., 2014).

3.1.3. e-government

Delivering online versions of local services was initiated by European policies, such as the *Ministerial Riga Declaration* (2006), and the *e-Government Action Plan 2011-2015* (2014c). In the UK, the White Paper *Transformational Government* (2007) lay the foundations for the development of e-government services, such as the cross-government Directgov, the initial governmental portal which provided centralised access to the wide range of online public services. Some local authorities also developed local online services, including information portals, online fine payments, and online requests for care services (Kolsaker and Lee-Kelley, 2008).

Subsequently, the Champion for Digital Inclusion established the *Government Digital Service* (GDS) in order to improve the overall coordination and efficiency of e-government services. Directgov was soon replaced by Gov.uk, a centralised web portal for all online government services, policies and advice managed by the GDS (Cabinet Office, 2014c).

Shortly after its inception, the GDS announced its *Government Digital Strategy*, outlining proposals for the *Digital by Default* policy, which aimed to “digitise” the most used government public-facing online transactions in order to deliver better, more transparent services at a lower cost ((Copeland et al., 2014; Lewis, 2012). The policy acknowledged that a large number of adults continued to lack access to the internet and built in the “*assisted digital*” programme to enable non-internet users to access government services using traditional means such as in-person or by phone (Government Digital Service, 2014).

3.1.4. E-inclusion policy for older people: findings from the literature and interviews

UK government policies have been criticised for their focus on the development of superfast broadband networks, which has comparatively dwarfed demand-side initiatives such as digital skills training (Berry, 2011a; Helsper, 2008; Independent Age, 2010; Mason et al., 2012; Sourbati, 2011). Ragoobar et al. (2011) highlighted that without sufficiently stimulating demand for internet services, investors – including the national government - will not get adequate returns on their investment into technical infrastructure development. This, in turn, would stunt efforts to achieve a nation-wide roll-out of superfast broadband, and risks the further deepening of existing inequalities in internet access.

Criticism has been particularly acute for the *Digital by Default* policy, which aimed to digitise the most commonly used online public services to achieve more transparency at lower costs (Communications Consumer Panel, 2012; Lewis, 2012; Mason et al., 2012). This policy has been viewed as a disservice to people who do not use the internet, many of whom are older people. Some observers have suggested that the creation of online services often leads to a two-tiered system, where there is a decrease in the number – and quality – of traditional face-to-face services (Helsper, 2008; Stroud, 2012). It was also expected that the *assisted digital* programme, which provided alternative means for accessing government services, would inconvenience older non-users (of the internet) in terms of time, effort, and costs (Communications Consumer Panel, 2012), and potentially exacerbate their e-exclusion (Mason et al., 2012). A similar opinion was expressed by one expert interviewee:

“Digital by Default is not good when everybody is not able to be digital. It needs to be implemented after everybody who is going to need it [becomes e-included], otherwise [e-exclusion] will increase.”

SCIE, programme manager

It was also noted that UK e-inclusion policies failed to address the specific needs of older people. The Age UK report *Technology and Older People Evidence Review* (2010a) noted that over half of the websites investigated failed to meet basic accessibility and comprehensibility standards (Curran et al., 2007). Roberts (2009) and the Age UK report *The Golden Economy* (2010b) commented that inclusive design standards, such as Management BS7000-6 and W3C, have contributed to the development of some accessible ICT devices and websites. However, it was also noted that the government’s stance is to encourage a vibrant innovative and competitive ICT market and there is reluctance to enforce regulations on design (Age UK, 2010b).

Berry (2011a) noted that these policies side-lined issues which affect older people in favour of policies targeting younger, disadvantaged groups. One expert interviewee agreed that the national government’s e-inclusion agenda for older people was underdeveloped:

“No-one [at the national government level] has the responsibility to address [e-inclusion for older people]. There is a policy black hole. No-one has addressed the questions around how pensioners will access Universal Credit, for instance. The Universal Credit take 40 minutes to fill in for a competent ICT-user. How are [older] people who have minimal ICT skills going to access the service? No-one has looked into how to stimulate the demand to use the [Universal Credit] system.”

Digital Unite, analyst

Age UK (2012) asserted that there was a need for an increase in direct public funding to address e-inclusion, so that older people would be able to use the online services that national and local government promote. Mason et al. (2012) and Age UK (2012) also suggested that a similar campaign to the *Digital Switchover Scheme* should be instituted for the internet, to provide personalised assistance to older people on how to get online. One expert interviewee agreed:

“[Older] people need support. The digital switchover is a good example of how that was done successfully with systems in place to protect [vulnerable people].”

ILC-UK, senior researcher

3.2. Policy for ICT-based care

In recognition of the growing demand for – and the increasing costs of – care, the signatories of the *Riga Ministerial Declaration* agreed to work within the broad policy guidelines of the European Commission’s *i2010 initiative on e-inclusion*, which set out to create a more inclusive digital environment in Europe (European Commission, 2009). In line with that initiative, the Declaration agreed to focus on older people’s access to ICT systems, which would enable them to live independently in their communities (2006). To increase the demand for ICT-based care, the *Declaration* aimed to remove some market barriers, such as the lack of inter-operability between ICT systems and the deficiency in ethical standards around privacy and data protection.

The ensuing *Ageing well in the Information Society* (2007b) action plan promised to create a more inclusive digital environment, with an emphasis on optimising older people’s quality of life, health and independent living. The strategy was to encourage working partnerships between stakeholders within the ambient assisted living (AAL) sector, to invest in technologies which enable independent living and to promote the large-scale deployment of AAL technologies.

In the UK, demand for telecare services was encouraged by the instigation of the *Preventative Technology Grant* (PTG), an £80 million pump-priming fund, allocated between 2006 and 2008, to support local authorities to invest in telecare services, with the view of enabling older people to live in their homes safely and securely and to prevent unnecessary hospital admissions. The long-term aims of the PTG was to lay the foundations for a more integrated care system between local social care, housing, health, and emergency response services in terms of the planning, procurement, and delivery of telecare (Department of Health, 2005a).

The PTG was put to a range of uses. All forms of ICT-based care equipment and services which promoted the independence and dignity of users was funded by the grant, which included basic community alarms as well as more sophisticated monitoring systems. For instance, some local authorities used it to fund small scale local pilot projects, whereas others funded the a full scale roll out of telecare as an established part of their care services (Empirica GmbH et al., 2010). Since then, several UK policies have discussed the routine use of telecare and telehealth services as a main feature in the redesigning of the health and social care system. The White Paper, *Building the National Care service* (2010b), promoted the use of telecare systems by housing and social care providers in order to provide care and reassure older people living at home (Clark and Goodwin, 2010).

At the same time, the government recognised the gap in knowledge around the scalability and effectiveness of ICT-based care on a national scale. In 2008, it launched the *Whole Systems Demonstrator* programme (Telecare Services Association, 2013a), the world's largest randomised controlled trial of ICT-based care, involving over 6,000 users, 238 GP practices over three sites in Newham, Kent and Cornwall (Department of Health, 2011a). The headline findings of the trial were that telehealth services could help reduce mortality, reduce hospital admission and diminish the length of hospital-stays (Steventon et al., 2012). However, the economic evaluation of the WSD showed that the probability that telehealth interventions were cost-effective was low (Henderson et al., 2013). Furthermore, the findings concerning telecare services showed that there was no impact on the rates of hospital admission, length of inpatient stay or residential care admission. In addition, compared to the control group, the intervention group (telecare users) had higher levels of GP contact (Steventon et al., 2013).

Despite the findings of WSD, the government launched the *Three Million Lives* (3ML) campaign in 2011 to encourage the integration of care services and to empower people with long-term conditions to self-manage their care through the use of ICT-based care (NHS England, 2012). The 3ML campaign was endorsed by the *2012 Concordat* between the Department of Health (England) and the UK telehealth and telecare industries, which outlined their commitment to work together under the 3ML banner to accelerate the full deployment of ICT-based care (Department of Health, 2012b).

Recent adult social care policies continue to encourage the deployment of ICT-base care to promote self-managed and personalised care. The *Caring for our future* White Paper (2012a) billed the deployment of telecare through the 3ML campaign as a means of enabling service users to gain more control over their care. The subsequent *Care Act 2014* stipulated that care

services should be restructured by a shift away from a “one-size-fits all” approach to a personalised care model with improved access to personal budgets and direct payments. The Act also instituted changes in the funding structure of social care by lowering the minimum means test requirements and putting a cap on the amount individuals spend on care, making publically funded services available to a wider pool of people with care needs. The subtext of the Act allows for more choice and control for people to obtain specific services that appropriately suit their needs, at the same time promoting their independence and preventing the need for intensive care and support (The Rt Hon Norman Lamb, 2014). As such, the *Care and Support Guidance* issued under the *Care Act 2014* encouraged local authorities to offer a range of personalised options for care, including ICT-based care, which support “the outcomes that people want” (Department of Health, 2014).

4. Connectivity

The connectivity dimension refers to material access to ICT devices, services and networks. The following analysis reviews the roles played by different stakeholder groups in facilitating older people’s material access to ICT. Their level of connectivity is defined by their use of various ICT devices and services.

The connectivity section begins with an overview of the mainstream and ICT-based care that older people use and to which they potentially have access. This is followed by a description of the roles of each of the tertiary, secondary and primary stakeholder groups in providing older people with access to ICT.

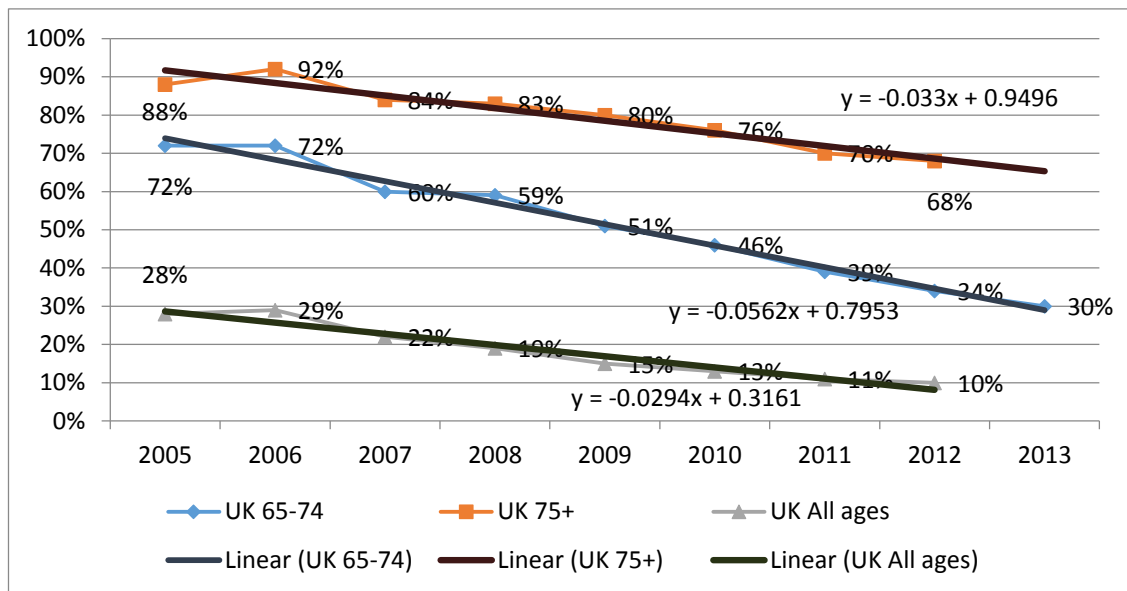
4.1. Overview of older people’s connectivity to mainstream ICT

This section describes the use of various ICT devices, including the internet, computers, mobile phones, and tablet computers, by older people in the UK.

Figure 6-3 displays the proportion of people in the UK who have never used the internet between 2005 and 2013. There is a systematic decrease in the proportion of people across all age-groups who have never used the internet. The 65 to 74 year-old age group have the fastest rate of decrease: in 2005, 72% of this group had never used the internet compared to 30% in 2013. The rate of decrease amongst people aged 75 years and older ($m = -0.033$) was similar to the UK population as a whole ($m = -0.0294$). In 2005, almost 90% of the oldest age-group had never used the internet; the prevalence of non-use decreased to 68% in 2012, representing a change of 20 percentage points. The proportion of the general population who never used the internet decreased only 18 percentage points between 2005 and 2012.

However, the general population had a lower rate of non-use at baseline. Therefore their slow decrease is likely an artefact of a ceiling effect.

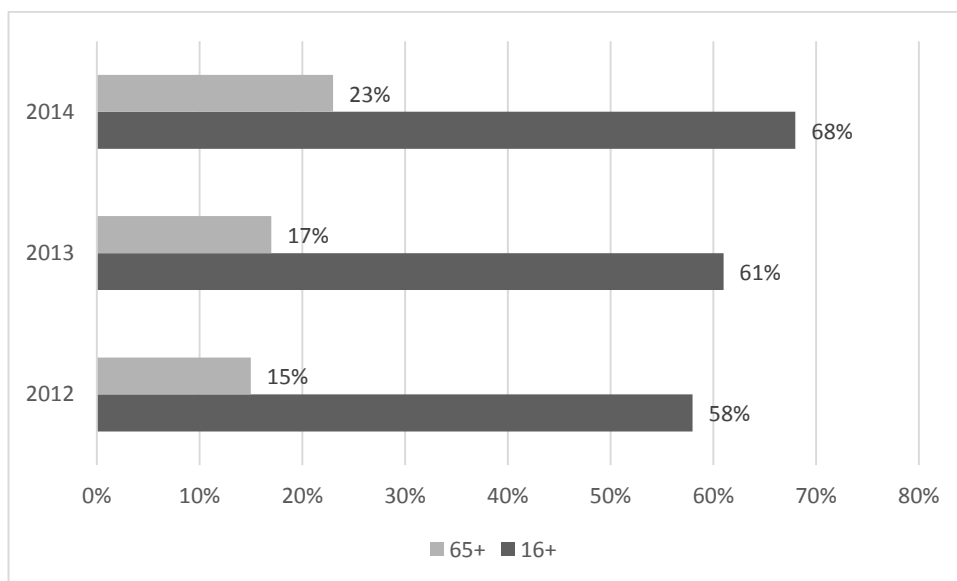
Figure 6-3 Proportion of people in the UK who have never used the internet by age group, 2005 to 2013



Source: Eurostat (2014e)

Figure 6-4 displays the proportion of older people who accessed mobile internet networks, using any handheld device including a laptop, notebook, netbook, tablet computer or mobile phone, in 2014.

Figure 6-4 Proportion of Individuals who access the Internet “on the go”, 2012 to 2014 (GB)



Source: ONS (2013b, 2014a; 2012)

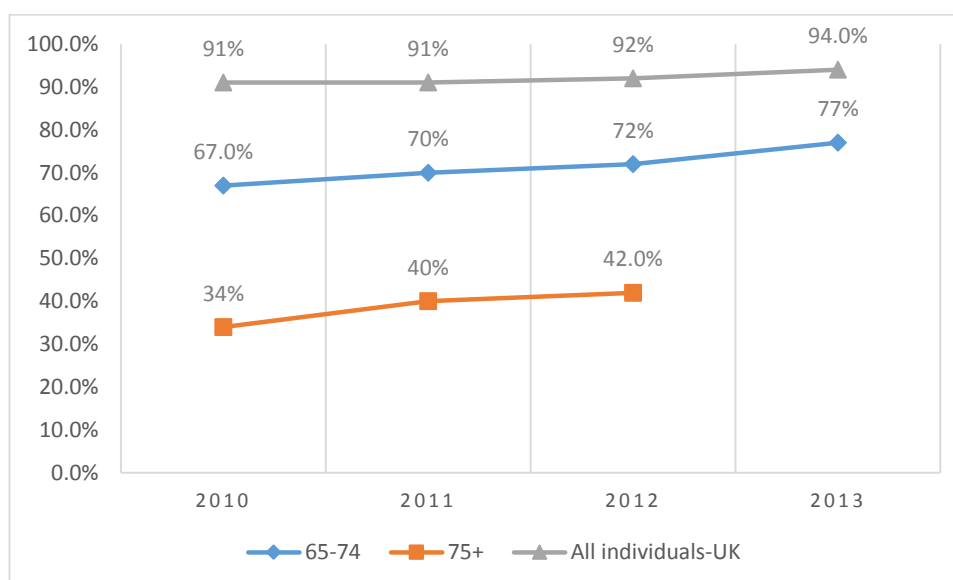
It can be seen that the proportion of older people accessing mobile internet networks is consistently lower than the adult population as a whole. However, the rate of increase in the older population is higher than that of the general adult population: between 2012 and 2014, there was a 53% increase in the percentage of adults aged 65 years and older who were using mobile internet, compared to a 17% increase in adults aged 16 years and older over the same time period.

4.1.1. Computer access

Figure 6-5 displays the proportion of people in the UK who had ever used a computer between 2010 and 2013. This proportion rose to almost 95% in 2013. Older adults have a markedly lower rate of computer use: in 2013, 77% of people aged 65 to 74 years had used a computer and 42% of people aged 75 years and older (in 2012).

Computer use amongst the older population has shown a more rapid increase, compared to the UK population as a whole. There is a ten percentage point increase in the 65 to 74 year age-group and an eight percentage point increase in the 75 years and older age-group. The larger increases are due to the ceiling effect observed amongst the general population, where the baseline computer-usage rate in 2010 was already over 91%.

Figure 6-5 Proportion of people who ever used a computer across time, by age-band (UK)



Source: Eurostat (2014f)

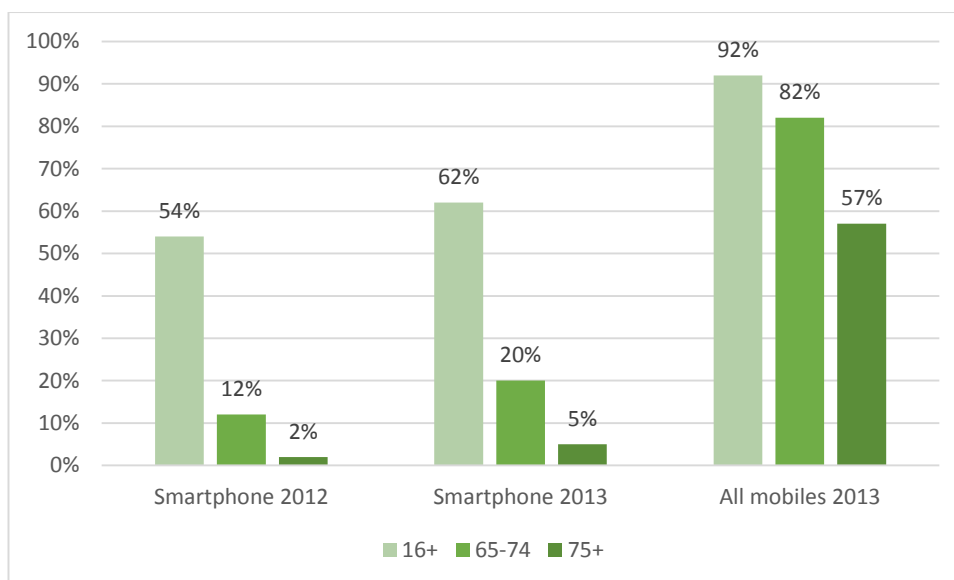
4.1.2. Mobile phones

Smartphone use has risen for all age groups. In 2012, 51% of the adult population used a smartphone with increased to 62% in 2013. The proportion of adults aged 65 to 74 years who used a smartphone increased from 11% in 2012 to 20% in 2013. The increase in smartphone use among people aged 75 years and older went from 2% in 2012 to 5% in 2013.

Figure 6-6 demonstrates the use of mobile phones, as well as smart phones, by adults aged 65 years and older and adults aged 16 years and older. There is a 10 percentage point difference in mobile phone usage between those aged 65 to 74 years (82%) and the adult population as a whole (92%). In comparison, only 57% of adults aged 75 years and older use a mobile phone.

Smartphone use has risen for all age groups. In 2012, 51% of the adult population used a smartphone, which increased to 62% in 2013. The proportion of adults aged 65 to 74 years who used a smartphone increased from 11% in 2012 to 20% in 2013. The increase in smartphone use amongst people aged 75 years and older went from 2% on 2012 to 5% in 2013.

Figure 6-6 Use of mobile phones and smart phones in 2013 by age (GB)



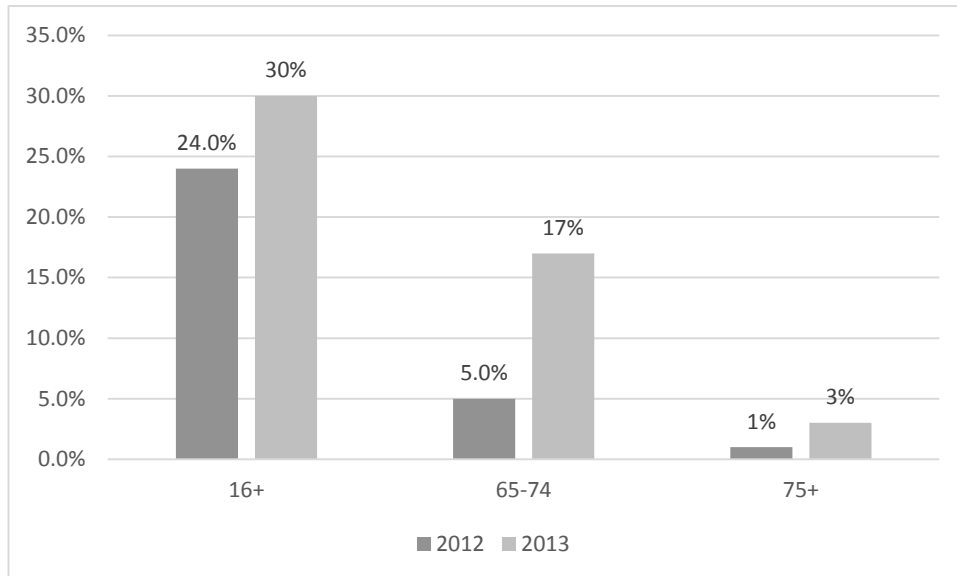
Source: OfCom Adults' media use and attitudes report (2014)

4.1.3. Tablet computers

Figure 6-7 illustrates the proportion of older people who own a tablet computer. Between 2012 and 2013 there was an increase in tablet computer ownership in all age groups. The

sharpest increase was amongst people aged 65 to 74, where it more than trebled. In comparison, the tablet ownership in the adult population as a whole has increased 25%.

Figure 6-7 Proportion of adults in the UK who own a tablet computer in 2012 and 2013



Source: OfCom Adults' media use and attitudes report (2014)

4.2. Overview of older people's connectivity to ICT-based care

There is great variability in the estimates of the proportion of older adults in the UK who receive ICT-based care. Kubitschke and Cullen (2010) suggested the proportion of people aged 65 years older in the UK using telecare services was between 14 and 16%, equating to approximately 1.3 million older people (using 2011 Census population estimates). The "official" estimates reported that approximately 1.5 million people (of all ages) in England use telecare services (Corbett-Nolan and Bullivant, 2012).

However, the audit report of telecare services in England (2012) found that councils reported only approximately 241,500 telecare users in 2011/2012. Barlow et al. (2012) also suggested that official figures are inflated and estimated to be approximately 350,000 ICT-based care users in Great Britain at any one time.

Telehealth in the UK is a nascent market (Berry et al., 2013) and the size of the market is uncertain. Barlow et al. (2012) cited a report that estimated the number of telehealth users in the late 2000s to be approximately 22,500.

The provision of telehealth has historically been linked to select hospital services (Kubitschke and Cullen, 2010), but it is increasingly offered as part of mainstream NHS disease

management services for people with long-term conditions, such as chronic obstructive pulmonary disease, heart failure and diabetes (Berry et al., 2013; Taylor, 2012). Furthermore, recent reports on the progress of the *3 million lives* project have suggested an increase in the deployment of telehealth services through the establishment of seven pathfinder sites across England. It was estimated that approximately 100,000 people benefitted from telehealth services in 2013 (Healthcare UK, 2013).

I did not identify any data on the number of older people who access specific telecare or telehealth services.

4.3. Tertiary stakeholders connecting older people to mainstream ICT

Tertiary stakeholders, as the main suppliers of ICT, facilitate older people's connectivity. The mainstream ICT market consists of the numerous commercial organisations which research, develop, distribute and sell ICT hardware, software, applications and networks (Technology Strategy Board, 2008).

For instance, large telecommunications companies, such as BT, Sky, EE and Virgin provide access to communication networks such as a telephone line, a mobile phone or internet connection (Ragoobar et al., 2011). Wholesale broadband services are also supplied by smaller Internet Service Providers (ISPs), such as PlusNet (plusnet, 2014) and Primus Saver (Primus, 2014). Mobile phone and internet services are provided by large mobile telecommunications companies, such as Vodafone (Vodafone Limited, 2014), 3 (Hutchison 3G UK Limited, 2014), and EE (EE Limited, 2014).

Tertiary stakeholders also include hardware developers and manufacturers. Some of the household names of computer systems include Dell (Dell Inc, 2015), Apple (Apple Inc, 2014a), Lenovo (Lenovo, 2014) and Acer (Acer Inc., 2014). Amongst the top mobile phone manufacturers (including smartphones) are Samsung, Apple and HTC (Woollaston, 2013). The tablet computers market is dominated by Apple's iPad and Samsung's Galaxy (Edmond, 2014).

There are another group of tertiary stakeholders who produce operating systems and software packages for mass consumption. Well-known operating systems are produced by Microsoft (Windows) (Microsoft, 2014), Apple (iOS) (Apple Inc, 2014b) and Google (Android) (Google, 2014).

4.3.1. Uneven connectivity

Broadband poverty once described the inequalities experienced by those who lacked access to digital subscriber line (DSL) broadband and who continued to rely on narrowband dial-up

services (Adams et al., 2005; Helsper, 2008; Schmeida and McNeal, 2007). The main cause of inequalities in take-up was geographical disparities in broadband coverage. Rural regions typically had poorer levels of access to faster broadband services compared to urban areas, as there was less competition between internet service providers and, as a result, less investment in updating networks (European Commission, 2007a).

Internet technologies continued to evolve and a new generation of Internet networks emerged. The new generation access (NGA) internet - also known as superfast broadband – entailed internet networks based on fibre optic, cable and power-line connections. NGA Internet provide even wider bandwidths, use more efficient materials and unlike DSL and dial-up services, which use existing copper-wire telephone lines, they run on independent lines. Therefore NGA internet allows for the faster transmission of a larger amount of data and supports more “traffic” at peak times when the demand for the internet is high (Ragoobar et al., 2011). The wider bandwidth also supports data-rich applications, such as video streaming, video conferencing and high definition television, which has stimulated the development of a range of new services and applications (European Commission, 2014f).

Table 6-1 sets out the decrease in household DSL broadband connections in favour of NGA Internet. In 2012, 52% of households in Great Britain had a DSL internet connection. This proportion decreased to 42% in 2013. At the same time, NGA connections increased from 30% to 42% over the same time period (Office for National Statistics, 2013b)(see Table 6-1).

Table 6-1 Types of household Internet connection

	%	
	2012	2013
DSL broadband	57	45
(NGA) broadband via cable, optical fibre, ethernet, PLC etc	30	42
Broadband via satellite, public wifi	6	8
Mobile broadband via mobile phone network (handset or dongle/card)	12	17
Dial up access over a normal telephone line or ISDN	1	-
Mobile narrowband connection (less than 3G)	1	1

Source: Office for National Statistics (2013)

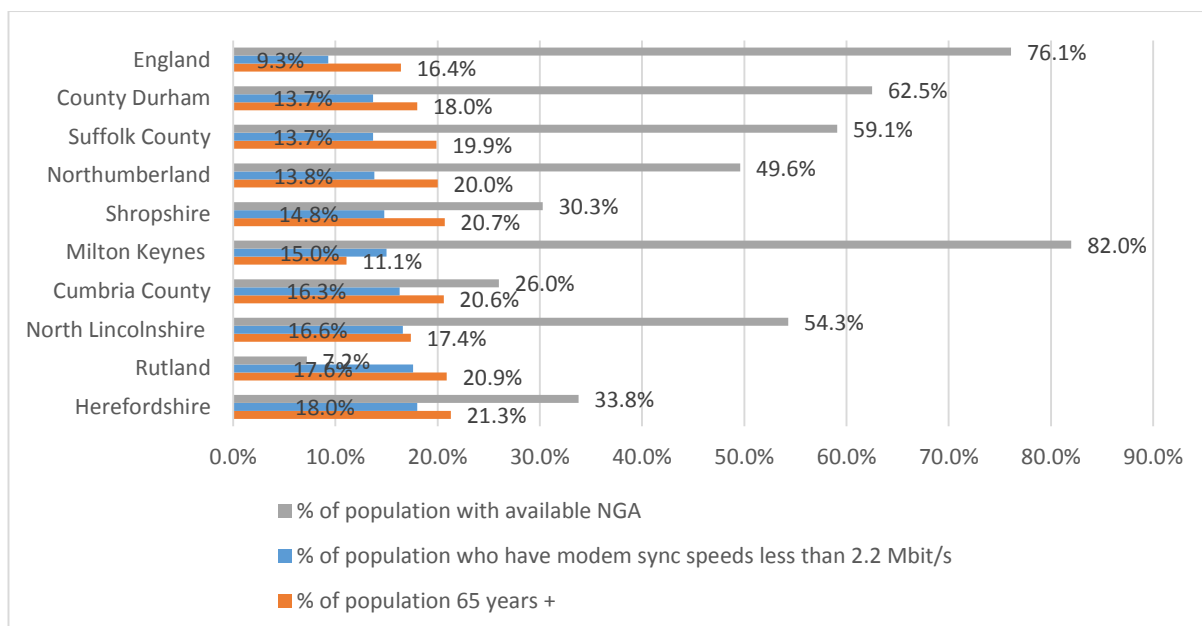
In the *Technology Manifesto* (Copeland et al., 2014), analysts have noted that the increased demand for internet services, with ever-more data-rich content, makes slower internet speeds inadequate. Activities such as downloading documents, streaming music and video files, cloud computing, music and video downloading and voice-over IP are generally extremely slow or impossible (Bandwidth Pool, 2014). Indeed, Woodward et al. (2011) called attention to the growing necessity for high-speed internet at home in order to access many ICT applications: a lack of home access to adequate bandwidth could become a barrier to the e-inclusion of some older people. Choudrie et al.'s (2010) findings confirmed that access to - and the speed of - broadband services were the most important technical factor influencing older people's adoption of the internet.

However, partly as a result of the government's market-led approach to the modernisation of the internet infrastructure (Department for Business Innovation and skills and Department for Culture Media and Sport, 2009), there have been geographical disparities in the development of NGA networks across the UK. The initial roll-out was concentrated primarily in densely populated and more affluent areas, where consumers are typically more advanced and more frequent internet users (Communications Consumer Panel, 2012; Ferro et al., 2011; Ragoobar et al., 2011; Vicente and Lopez, 2011), and where the return on investment is most assured (Ragoobar et al., 2011).

Figure 6-8 lists the administrative authorities in England with the highest proportion of households with internet services of less than 2 Mbit/second. Also shown is the proportion of the population in each authority which have access - although not necessarily a subscription - to NGA Internet. Finally, (OfCom, 2013b).

Figure 6-8 shows the proportion of people aged 65 years and older living in each of these authorities. Other areas of the UK, where over 15% of the population have access to broadband speeds of less than 2Mbits/second, include many regions of Wales and most of Northern Ireland (OfCom, 2013b).

Figure 6-8 Areas in England with highest rates of access to less than 2Mbit/s (2013)



Sources: OfCom Fixed Broadband Maps, 2013; Census, 2011

The information provided in (OfCom, 2013b).

Figure 6-8 demonstrates that in the nine administrative authorities in England with the poorest levels of internet speed, between 13.7% (Suffolk County) and 18% (Herefordshire) of the local population are affected. Eight of these nine authorities (the exception is Milton Keynes) have an older population greater than the English national average of 16.4%. The Table also shows that the level of access to NGA networks in each of the eight authorities (again, the exception is Milton Keynes) is lower than in England as a whole: the proportion of the population with access to NGA ranges from 7.2% (Rutland) to 62.5% (County Durham), which is lower than the England average of 76.1%.

The data in (OfCom, 2013b).

Figure 6-8 should not be taken to imply that all residents in regions with low internet speeds are 65 years and older: many older residents of these regions will have subscriptions to NGA Internet services. However, (OfCom, 2013b).

Figure 6-8 illustrates that the market-led NGA roll-out inherently discriminates against areas with large older populations. Older residents in areas with a poor internet infrastructure are limited to basic internet functions and unreliable connections, and are at risk of becoming progressively more disadvantaged (Mason et al., 2012).

4.3.2. The “disconnectivity” of commercial stakeholders

On the whole, commercial stakeholders seem to ignore the fact that many older people do not have the abilities or resources to access their products (Weaver et al., 2010). Stroud (2012) and the Age UK report *Technology and older people: evidence review* (2010a) noted that in order to improve profit margins, private firms used digital channels to promote and trade their products, which actively discriminates against older people who do not – or cannot - access the internet. As a result, these business practices create a two-tiered service structure, whereby customers who are not online – many of whom are older people - receive poorer quality services than online customers (Stroud, 2012; Weaver et al., 2010). Age UK (Lewis, 2012), Mason et al. (2012) and Wright and Wadwha (2010) and Weaver et al. (2010) also underlined some ethical concerns about online cost savings, suggesting this creates a price discrimination whereby offline customers subsidise online ones. This is particularly problematic as non-users (of the internet) characteristically experience several forms of social exclusion and stand to gain the most from the cost-savings offered online (Helsper, 2008).

Analysts also noted that ICT providers invest a large proportion of their development and marketing resources into targeting younger, “economically productive” people, where demand is most assured (Paul, 2005; Stroud, 2012; Independent Age, 2010). Expert interviewees also made similar observations. One expert interviewee commented that ICT providers gain large profit margins from “up-scaling existing customers” by encouraging them to buy the latest models of devices they already own and there is less attention to widening the market to non-users (The Knowledge Lab, researcher). Another interviewee commented that although some advertising campaigns have emerged which are subtly directed at the older market, these advertisements are still in the minority:

“Apple have recently done some adverts for the iPad, which featured someone with grey hair doing the [swoosh movement]. That was their attempt to market to older people, saying: “You can be cool and older as well.” But the vast majority is marketed at young people. ICT isn’t being sold to older people.”

UK Online, analyst

The growing “silver economy” has been widely touted as a potentially lucrative market opportunity, and an important driver for encouraging older people’s e-inclusion (Finn and Wright, 2011; McMurtrey et al., 2011; Timmers, 2008). However, Plaza et al. (2011) and Wright and Wadwha (2010) noted the practical difficulties in developing marketable ICT applications for older consumers base that do not have an online presence. Furthermore it was

suggested that if a clear business case existed for age-friendly ICT products, it would have been pursued (Independent Age, 2010). As one expert interviewee summarised:

“If the market thought there was a profit in applications and content for older people, [ICT developers] would have made them. They have not.”

Department of Communities and Local Government, policy analyst

The challenges around the development of ICT for older people are evident in “age-appropriate” marketing campaigns, which often emphasise infirmity and frailty (Price, 2011; Roberts, 2009), an image that only a minority of older people identify with (Independent Age, 2010). For example, Berry (2011a) found that social networking sites designed for the older market were unattractive as they segregated older people from mainstream users. Some expert interviewees also noted the dilemma of mainstream ICT for older people:

“[When developing “age appropriate” ICT] you end up with a sub-standard market with very sub-standard technologies which are designed for older people. [The technologies] are terrible.”

The Knowledge Lab, researcher

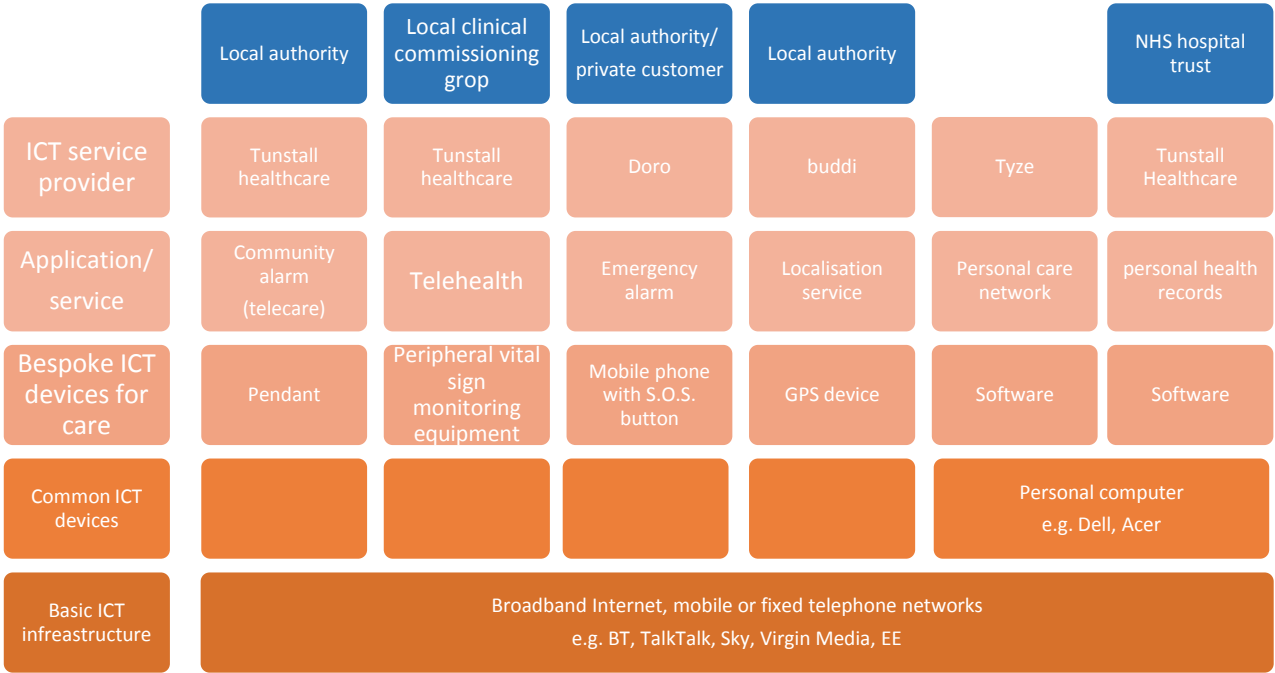
Moreover, UK e-inclusion policy does not directly address the issue of the accessibility of ICT. A number of inclusive design guidance and standards, such as the British Standard on Inclusive Design Management BS7000-6 and W3C, have been developed to ensure that designers take into account the needs of older and disabled people (Age UK, 2010b). There have also been several appeals for older people to take an integral, active role throughout the design process, so that the ICT services produced are relevant, usable and culturally appropriate (Age UK, 2010b; Karunanithi, 2008; Milligan et al., 2011; Xie, 2003). However, industry leaders have criticised inclusive design approaches for stifling innovation (Age UK, 2010b), and designers rarely respect the developed standards (Roberts, 2009). It has been argued that inaccessible ICT devices and certain websites are in breach of the *Equality Act* (2010) (Age UK, 2010b; Lewis, 2012), but little action has been taken to redress the inequalities created by the ICT sector.

4.4. Tertiary stakeholders connecting older people to ICT-based care

As in the case of mainstream ICT, tertiary stakeholders facilitate older people’s connectivity to ICT-based care by acting as the main source of supply of device and services. Unlike the mainstream ICT market, however, ICT-based care devices and services are commissioned from tertiary stakeholders by secondary stakeholders on end-users’ behalf. However, some components of the care system, such as the basic ICT infrastructure (e.g. an internet connection), are purchased directly by end-users.

Figure 4-9 illustrates the different stakeholders which supply various components of ICT-based care services. It also suggests possible commissioning scenarios between tertiary and secondary stakeholders. Figure 6-9 was created using findings from the MonAMI project, expert interviews and information on company websites.

Figure 6-9 Tertiary stakeholders in ICT-based care



Source: Adapted from Damant et al. (2011)

Briefly, large telecommunications companies, such as BT, EE and TalkTalk, provide the basic communications infrastructure for ICT-based care systems, such as an internet network, fixed or mobile phone connection. Most telecare and telehealth services use bespoke devices which have been designed by a tertiary stakeholder firm (e.g. Tunstall (Tunstall, 2014a)) for the specific applications of the service (e.g. a pendant for a community alarm). However, a small number of second and third generation ICT-based care services use a mainstream ICT device interface, such as mobile phones, smartphones, personal computers and tablets (Kubitschke and Cullen, 2010). These services rely on common ICT hardware provided by computer and mobile phone manufacturers. For example, Tyze (REF) is an online service designed to bring together all stakeholders caring for an individual together on to a signal personalised website. The aim is to improve coordination and communication between health, social care, housing, unpaid carers and service users, where there is a single repository about the service users' history, care needs and care plan. This service can be accessed through any internet-enabled device.

There are a number of ICT-based care systems available on the market, but there is little information about the numbers of people who receive different types of services. The discussion here of the types of available ICT-based care devices and services is divided between services which employ bespoke devices and those which rely on mainstream ICT. Bespoke devices include ICT equipment which has been manufactured for the specific purpose of the care service. In contrast, recent developments in ICT-based care incorporate mainstream ICT devices such as touch screens, mobile phones, and the internet as the service interface as a way of improving the overall access and acceptability of care service (Technology Services Association, 2013).

4.4.1. ICT-based care: supply of bespoke devices

The most common form of ICT-based care system used in the UK is the first-generation, basic pendant community alarm system based on a simple telephone line (Hill et al., 2010; Kubitschke and Cullen, 2010; Sanders et al., 2012; Sixsmith and Sixsmith, 2008; Taylor, 2012; Walsh and Callan, 2011). The penetration of more advanced forms of ICT-based care remains slow and underdeveloped (Essen, 2009; Kubitschke and Cullen, 2010). Sethi et al. (2011) reported that less than 1% of service users employed more advanced forms of ICT-based care services, which rely on sensors and internet protocols. Kubitschke and Cullen (2010) suggested that approximately 3% of the population aged 65 years and older used second or third generation telecare. The Healthcare UK report *Digital health: working in partnership* (2013) found that approximately 300 telecare monitoring centres relied on broadband networks,

Web-2.0 services and complex algorithms to predict adverse events in the home, suggesting that the penetration of second generation telecare services could be higher than earlier estimates.

Several types of community alarm device which include a base unit connected to a landline telephone, and push-button device designed to be worn around the neck or wrist, are available on the market. When activated, a signal is sent via a landline telephone connection to a response receiver. A response centre – which could be run by the local authority, housing provider, or independent provider - receives the alert, which then notifies the appropriate person or member of staff to attend to the call. In some cases, family members or friends receive the alert (Technology Services Association, 2013).

Second-generation telecare systems include passive monitoring and alert systems. Unlike first-generation systems, users do not activate an alarm. Rather, the technology is designed to send passive alerts when “abnormal” conditions are detected, according to pre-programmed parameters (Kubitschke and Cullen, 2010). Second generation services generally constitute internal sensors and one or several peripheral devices (e.g. pill dispenser carousel or enuresis pad) which transmit wireless signals (e.g. using Bluetooth) to a base unit. Most base units are connected to a telephone line, which sends alarms to the response team. However, emerging trends in second and third generation systems demonstrate an increased use of internet networks, increased computing power, and sophisticated algorithms to detect and send signals to monitoring and response centres (Healthcare UK, 2013; Kubitschke and Cullen, 2010). Examples of second generation telecare systems include fall detectors, gas and flood detectors, smoke alarms, incontinence sensors, medication dispensers, and activity monitors (Technology Services Association, 2013). Global Positioning System (GPS) technology is used in localisation services for people with tendencies to wander (Karunanithi, 2008; Lauriks et al., 2007; Wadhwa, 2011).

Third-generation ICT-based care generally refers to telehealth services and includes regular vital sign or location data (e.g. collected daily or several times daily or weekly), which is sent to care professionals who monitor overall wellbeing and health status (Kubitschke and Cullen, 2010). The aim of third generation services is to streamline care visits where users are contacted based on their needs, rather than as a routine (Technology Services Association, 2013).

Similar to telecare systems, telehealth systems have a central hub to which peripheral equipment (e.g. sphygmomanometer, thermometer, scales, glucometer) are connected –

either with a wire or wirelessly. Data from the hub are sent via a telephone line or the internet to a healthcare professional (Koninklijke Philips Electronics N.V., 2012; Technology Services Association, 2013; Tunstall, 2014b). There are also experimental telehealth services which include “smart clothing”, consisting of sensors embedded into clothing which can detect vital signs (e.g. heart rate) or falls (with a GPS sensor) while services users are “on the go”. Signals are then transmitted to a care practitioners via a mobile ICT device (Ludwig et al., 2012; Wagner et al., 2012).

Third generation systems present similar opportunities for social care services. For instance, the monitoring of bed occupancy or use of the living room at certain times of the day for people with tendencies to wander (Technology Services Association, 2013).

4.4.2. ICT-based care: mainstream devices

Advances in mobile telephony also allow people to access the internet and satellite signals from outside of the home, opening up options for integrating mainstream ICT devices into the delivery of care (Kubitschke and Cullen, 2010). This has led to a new branch of ICT-based care services, *mCare*, which use mobile phones and other handheld devices to allow service users to access telecare and telehealth services while they are away from home (Telecare Services Association, 2013d).

Examples of *mCare* services described in the literature include the use of personal digital assistants (PDA) and mobile phones within the context of decision support applications for end-of-life care (Demiris et al., 2011). Also as previously mentioned, there may be a role for mobile devices in the transmission of data from “smart clothing” (Wagner et al., 2012). Other recent innovations in *mCare* include the Doro mobile phone, which aims to serve both mainstream and telecare applications. It is designed for older customers in particular according to accessibility principles, and includes an emergency alert button (Communications Consumer Panel, 2011, p. 29). The phone permits services users to use the phone for mainstream purposes as well as to contact a named person, or response centre, with the touch of one button in the case of an emergency (Doro AB, 2014).

MCare also extends its reach to “smart” devices. For example, *dDocoboAPP™*, a service which runs on Android-compatible smartphones and tablets, allows users to record their vital signs via wireless signals from peripheral devices and to send the data to a web-based Clinician server (Docobo Ltd., 2014).

The use of email in e-consultation services between GPs and service users is another example of an internet application that has a use in ambulatory care (Sheaves et al., 2011; Singh et al., 2009). In particular, evidence from Nijland et al. (2009) suggested that older people appreciate the flexibility and convenience of email consultation services, as it enables them to contact health practitioners from any place.

Innovations using cloud computing have also been used to deliver care. Products such as Tyze (Tyze Personal Networks, 2013), create a centralised personalised web-based network for care service users, where client care-related information can be passed between all stakeholders involved in their care, including family carers and care practitioners. Using a web-based platform, service-user information can be accessed anywhere, it prevents clients from having to repeat their history to different care agents, and it encourages the integration of different care agencies. The Tyze system has been piloted in some local authorities (London Borough of Camden, 2011). However, it is unclear how many care authorities currently use Tyze.

Voice-over Internet Protocol (VOIP) and streaming media applications, such as video-conferencing, facilitate interaction between older people and their formal carers. Researchers suggested that such services are useful tools for clinicians in monitoring service users' illness. It was also suggested that the services are beneficial for patients in terms of maintaining some form of social contact (Brignell et al., 2007; Kubitschke and Cullen, 2010; Lauriks et al., 2007; Lopez et al., 2011). Initial results from a pilot study in a Manchester GP surgery which uses Skype to hold consultations with clients, found that VOIP and videoconferencing technologies improved communication between clinicians and patients. It also allowed clinicians to obtain non-verbal data, which would otherwise be missed when using a telephone (Bostock, 2013).

4.4.3. The responsibility towards appropriate design

The role of tertiary stakeholders is to supply ICT-based care devices and services to secondary stakeholders (i.e. service providers), which appropriately respond to the needs and capabilities of older people and people with disabilities. Such services need to be accessible, reliable, interactive, affordable, scalable, retain users' sense of privacy, and be free of social stigma (Karunanithi, 2008; Wagner et al., 2012). Therefore tertiary stakeholders have an implicit responsibility to ensure that the design of their ICT supports older people's adoption – and continued use of – ICT-based care services.

Several reports demonstrate that ICT-based care often fails to meet these standards (AALIANCE, 2010; Ding et al., 2011; Zweijssen et al., 2011). For instance, Roberts (2009) noted that ICT-based care services often do not have the scope to respond to the varied needs of

older people receiving care. Mahoney and Mahoney (2010) relayed experts' views that wearable ICTs should be redesigned in order to make the devices invisible to other people or to look more like jewellery in order to encourage uptake of the services.

Furthermore, the literature has discussed the fact that older people resist using ICT-based care services they perceived as obtrusive (Chan et al., 2009; Sanders et al., 2012; Sixsmith and Sixsmith, 2008; Walsh and Callan, 2011). Several other studies presented evidence on the stigma attached to ICT designed for care. A comprehensive description of the literature on accessibility is provided in chapter 5, and on the obtrusiveness of – and privacy concerns around - ICT-based care in chapter 8.

4.4.4. Reliability of ICT-based care services

Market analysts have raised the issue of the effects of internet speed on the reliability of ICT-based care services. Kubitschke and Cullen (2010), Hill et al. (2010) and Tak et al. (2010) commented on the necessity of a fast internet connection to support more advanced remote care services which perform several functions simultaneously. Lewin et al. (2010) highlighted the need for interactive telecare services, such as those with video links, to have continuous high speed broadband connections. Demiris et al. (2011) noted that telecare alarm systems require an immediate response and therefore a fast connection not influenced by “user traffic” is essential. Sethi et al. (2011) added that the uneven distribution of NGA Internet networks could interfere with the timely and reliable delivery of ICT-based care in certain areas of the country, leading to inequalities in access to ICT-based care services. One expert interviewee concurred that broadband services are inadequate to run care-related services:

“Cheap Internet service providers customise [services] to a mass market, which will tolerate occasional breakdowns. Cheaper offerings have made [the internet] both less robust and reliable. This is bad news if you want to provide health or emergency services, which have to be 99.9% reliable.”

London School of Economics, researcher

As noted in chapter 7, several expert interviewees expressed concern about the reliability of network connections to deliver ICT-based care. One expert commented on the “black out” zones of mobile networks in certain parts of city centres which interfered with mobile signals. This was especially problematic for location services for people who wander (Westminster council, telecare commissioner). Boulos et al. (2007) reported similar failures of the GPS signals of the CAALYX system due to interference in urban areas.

The electrical infrastructure of period buildings was also found to be inadequate to support telecare services. Older buildings often required disruptive and costly retrofit operations in order to install adequate power and broadband networks (Kent County council, telecare commissioner). Another expert noted the interference of cable networks (e.g. Virgin Media or Sky) with telecare alarm signals (King's Fund, project manager). The battery life of ICT devices used for care services was also mentioned as a hazard to the reliability of care services (The Knowledge Lab, researcher).

4.5. Secondary stakeholders connecting older people to mainstream ICT: local government

Local authorities facilitate residents' connectivity to the internet – and to their local communities more generally - by providing free public access points to the internet and by developing local e-government services.

4.5.1. Free public access to the Internet

By providing venues where residents' can gain access to ICT, local governments indirectly contribute to the continuity of their ICT engagement. For instance, local authorities host over 5,000 *UK Online Centres* in public libraries, day centres and schools across the UK. The UK Online Centres offer free or low cost access to computer terminals and internet access points, as well as accommodating ICT adult training courses. Local authority venues also host periodic e-inclusion events organised by third sector organisations. For instance, several public libraries held Age UK's annual "*itea and biscuit week*" events, which offered advice and support to older people on how to use the internet. Local libraries and learning centres also host some of the 43 *UK Online Centre's* older people's specialists centres (UK Online Centres, 2014a).

The evidence suggests that secondary stakeholders make only minor contributions towards older people's connectivity to mainstream ICT. Selwyn et al. (2003) found that only 8.8% of their older sample used computers in public libraries. Hill et al.'s (2008) qualitative study revealed that older people felt it was inconvenient to use the internet in public venues. Carpenter and Buday (2007) suggested that accessing public venues could be problematic for older people with mobility impairments and poor transport links. One expert interviewee commented on the obstacles for older people using public venues:

"Libraries have reduced opening hours and they tend to use fairly basic desktop technology. Also, there are a lot of younger people doing their homework [in the library]. That's not good enough for citizen access."

SCIE, programme manager

A frequency analysis of the 2011 OxIS dataset confirmed that under 10% of internet users aged 65 years and older gained access through public libraries (Table 6-2).

Table 6-2 Location of Internet access for people aged 65 years and older

LOCATION OF INTERNET ACCESS	PERCENTAGE OF INTERNET USERS AGED 65+ (N=165)
HOME	98.2%
TRAVELLING: MOBILE/WIRELESS/DONGLE	10.3%
ANOTHER PERSON'S HOME	13.1%
AT WORK	6.5%
AT SCHOOL/AT UNIVERSITY/ INTERNET CAFÉ	1.3%
PUBLIC LIBRARY	5.8%
	8.4%

Source: 2011 OxIS data

A new generation of ICT devices and internet networks has been introduced to the market which allows for ubiquitous internet access, and consequently has altered the meaning of connectivity. In response to these trends, there has been an emergence of local communities which provide free – or low cost - Wifi broadband access to their residents. For instance, the city council of Norwich distributed 200 antennae to allow free wireless access throughout the city. CommunityUK.net, a public-private-third sector partnership, provides free Wifi internet access to residential areas and local businesses, such as in Leigh Park in Hampshire (Berry, 2011b; CommunityUK, 2014). The York council also announced the expansion of its free city-centre Wi-Fi scheme (Reed, 2014). The precise number of communities which provide free wireless access is unknown.

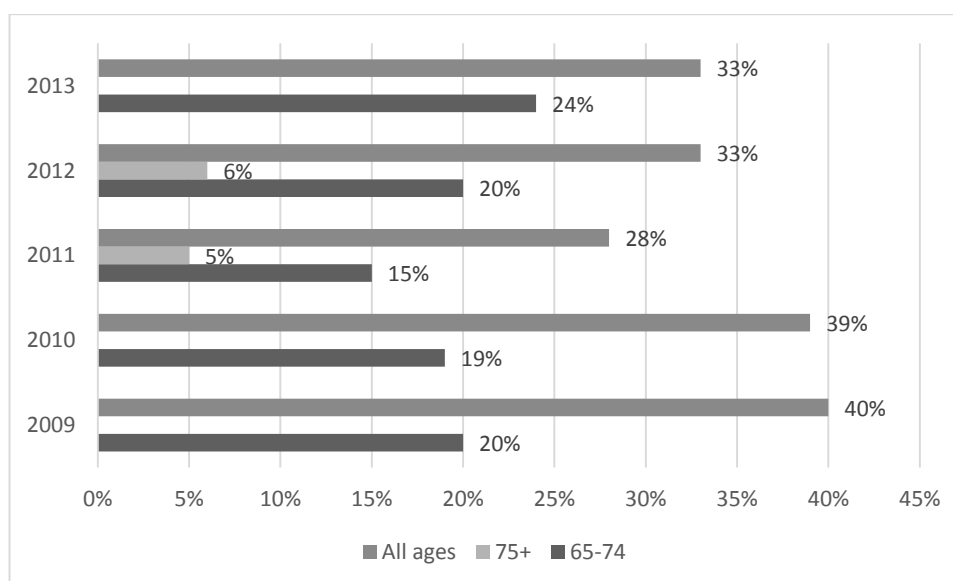
The evidence suggests that older adults are increasingly using wireless internet networks. The results in Table 6-2 above demonstrate that 10.3% of older people accessed the internet while “on the go” in 2011. More recent ONS estimates suggest an increase of mobile internet networks amongst older adults: in 2014 23% of people aged 65 years and older used “Internet on the go”, representing an increase of 7 percentage points from 2013. It is unclear whether older people are accessing the free wireless networks made available by some local authorities. The increased use of wireless internet networks amongst the older population could suggest a growing need for accessing essential services away from home, and a need for local authorities to contribute to facilitating their access to these services.

4.5.2. Local e-government

Most local governments have developed websites and internet applications which provide access to a range of local services, including traffic reports, local activity information, paying fines and taxes, and job postings. Initially, local e-government services were linked to the Directgov web portal. Now, local government online services can be accessed directly via a local web portal or through Gov.uk. Local information can also be accessed through the *Looking Local* web portal, a national service which offers centralised local information from a number of councils, housing associations and health organisations across the UK on a variety of ICT media (Independent Age, 2010; Looking Local, 2014).

Some reports suggest that older people seldom use local e-government services. The collaborative report by Fujitsu and Age UK *“Online government services: and the offline older generation”* (2011) showed that 70% of older respondents would continue to access local services in person, even if more local services were put online. A similar proportion disagreed that an increase in local online services would encourage them to use the internet more. Figure 6-10 displays Eurostat estimates demonstrating that less than a quarter of older people aged 65 to 74 years used online government services to access local information in 2013. The data for 2011 and 2012 also reveal that only a small minority of people aged 75 years and older used the internet to access local information.

Figure 6-10 Use of online government services to access information between 2009 and 2013 by age group



Source: Eurostat, 2014

Contrary to the Fujitsu and Age UK report, the estimates suggest that the proportion of people aged 65 to 74 who used online government services increased slightly from 20% in 2009 to 24% in 2013. At the same time, the proportion of the population as a whole which used e-government services had decreased from 40% to 33% over the same time period. Experts also commented that local authorities need to take more direct responsibility for enabling older people's e-inclusion. One noted that policies can influence older people's levels of engagement with local e-government services. However, he was also critical of the quality of current e-government services, suggesting they were inaccessible to older people:

"Public policy on the way local online services are designed can be very influential, but most local government websites are [of extremely poor quality]."

Advanced Digital Institute, analyst

One expert implied that local authorities should also take some responsibility for residents' access to broadband networks:

"Local authorities need to take the lead on [older people's e-inclusion] in relation to the [online] services for which they are directly responsible, such that they can enable access [to services] to the whole community. Local authorities need to think about the [NGA roll-out] strategy for their [local] populations."

SCIE, programme manager

A third sector employee similarly implied that local authorities have a responsibility towards ensuring that older people have adequate support and resources as the *Digital by Default* policy comes into effect:

"Some of [the local authorities] have not even begun to think about the implications of Digital by Default. They're nowhere near budgeting to pay for Age UKs and other people who are delivering digital inclusion to provide that service, to make it possible for the [older] people in their area."

Age UK Oxfordshire, programme manager

On the other hand, one expert suggested that local authorities need to take an active role in coordinating local access to ICT with commercial and third sector organisations, rather than in directly providing access:

"Local authorities should certainly make [ICT access] available to other kind of community groups, where older people would normally go. For instance, they could do deals with PC World [or other ICT providers] so that there is cheap access. They could [set up] volunteer schemes where people can help, or [schemes with] a reputable repair person who can come out and fix things."

Age UK London, programme manager

4.6. Secondary stakeholders connecting older people to ICT-based care: care services providers

The role of the care sector in facilitating older people's connectivity to – or access to - ICT-based care is through providing care services. Figure 6-9 illustrates that the ICT-based care market has a “silo” structure, where telecare and telehealth services are commissioned by separate health and social care agencies (Barlow et al., 2012; Taylor, 2012). Telecare is commissioned by local authorities which have a responsibility for delivering social care (Corbett-Nolan and Bullivant, 2012) and telehealth is funded by the National Health Service (NHS) and commissioned by GP-led Clinical Commissioning Groups (CCG) (Taylor, 2012). Housing associations also provide telecare services.

4.6.1. Local authority providers of ICT-based care

The primary roles of local authorities are to commission telecare equipment and services from tertiary stakeholders, and to provide monitoring and response services. The local procurement and deployment of ICT-based care varies greatly across the country. For instance, in 2011/2012 Sunderland Council spent over £4.3 million on telecare services, whereas West Berkshire spent less than £700. Some councils reportedly have thousands of telecare users (e.g. Sheffield), whereas others serve less than 20 users (e.g. Swindon). Overall, telecare expenditure in England has increased by 15% over the three years prior to 2012; in 2011/2012, the total expenditure was reported to be over £50 million (Corbett-Nolan and Bullivant, 2012).

Approximately 80% of local service providers prioritise eligibility for ICT-based care services according to the *Fair Access to Care Services* (FACS) guidelines, which categorise clients' needs as “low”, “moderate”, “substantial” or “critical”. Local authorities are free to decide the level at which people are eligible for social care services. According to the audit report, many local authorities provide telecare services to people who have “substantial” or “critical” level needs. Interviews with telecare commissioners confirmed that they used the FACS guidance:

“We work with the Fair Access to Care system. If their needs are critical or substantial, then they would get the equipment for [free]. Beneath that level, [service users] have to pay for [the telecare].”

Worcester county council, telecare commissioner

Interviews with telecare commissioners in four local authorities indicated that they employed a number of different commissioning arrangements to procure ICT-based care. In some cases, local authorities purchased equipment from an ICT-provider and commissioned a third-party installation firm to set up the equipment in the home. The local authorities directly managed

the monitoring and response system, which sent the appropriate assistance to a service user who had raised an alarm (Worcester and Tower Hamlets councils, telecare commissioners). However, evidence provided by AALIANCE (2013) suggests that there is a growing number of councils adopting “managed service models” (see Box 6-2), which entails subcontracting out the management of the monitoring and response services to tertiary stakeholders (e.g. Tunstall) (Berry et al., 2013). A range of managed services models are currently in use.

Box 6-2 Managed care models for ICT-based care in England

Model	Revenue stream for ICT-provider	Advantages to service provider	local authority
Equipment only	Purchase equipment outright Pays equipment maintenance and replacement fees	Minimised monthly subscription fees Guarantees stock	Lewisham
Equipment plus	Purchase equipment outright or; Percentage of equipment upfront plus monthly fee Per service-user fee for triage service	Guarantees stock Flexibility in controlling up-front costs according to demand	Birmingham
Patient revenue to provider	Purchase percentage of equipment with upfront and some on-going monthly fee Care authority charges service users fees	Minimises effort to generate demand Improves access to services users of all levels of need according to FACS	Nottingham future project (REF)
Paid per month	Equipment and services paid in monthly fees	Minimises initial upfront costs Shares risk as not bound to using equipment for long periods (obsolescence of equipment) Minimised hidden costs of maintenance and replacement	Gloucestershire NHS commissioners of telehealth services

Source: AALIANCE2, D3.2, 2013

4.6.2. Local health NHS providers of ICT-based care

The roles of the local NHS bodies are to commission telehealth equipment and services from tertiary stakeholders by Clinical Commissioning Groups, and to interpret and respond to service users' vital signs sent via the telehealth system.

There is great variability in how telehealth is promoted and deployed across the UK.

Encouraged by initiatives such as the *Whole Systems Demonstrator* and the *3 Million Lives* campaign (Department of Health, 2012a), the Department of Health in England entered into a Concordat with the UK telecare and telehealth industry in order to accelerate the roll-out of ICT-based care services (Department of Health, 2012b). However, there are several barriers in the ICT-based care market in England, which has made the future deployment of telehealth uncertain. Two expert interviewees discussed barriers to the large-scale development of telehealth services. One suggested that commissioning telehealth through GP-led Clinical Commissioning Groups would lead to localised variability in telehealth service provision:

“With GP commissioning at the practice level, the government cannot mandate a particular direction of travel, because there’s no power to do so. You can’t say with one hand we are going to empower the GPs to commission, and on the other hand say: “you’ll do this with telehealth.” The most they can do is give guidance. Certain areas will follow it and certain areas won’t. So [telehealth] it can’t become [mainstreamed] in that sense.”

Newham Primary Care Trust, programme manager

In contrast, NHS Wales and NHS Scotland have run demonstrator projects which have yielded results favouring the use of telehealth and both are developing plans to secure more long-term solutions to care (Taylor, 2012). Northern Ireland has adopted the largest roll-out of telehealth within its mainstream NHS services for users with diabetes, heart and respiratory disease and stroke.

4.6.3. Housing providers of mainstream ICT and ICT-based care

Some housing providers have undertaken a role in older people's connectivity by installing internet connections throughout their premises. Indeed, one expert commented on a government initiative in sheltered housing schemes, explaining that sheltered housing was a cost-effective channel for improving older people's e-inclusion. He also noted that assisted living settings had built-in support networks:

“Sheltered housing is a really good area to introduce a lot of ICT. It is cheap, it is assisted living, you have got an audience who are quite receptive, and who want their lives made easier. You also have the registered social landlord there to help them.”

However, access to the internet for older people living in social housing - or in a residential care setting - is dependent on the housing or care provider organisation (Sinclair, 2010). According to carehomes.co.uk (2014), of the over 20,000 care homes in the UK, only 4,178 provide access to the internet. One expert interviewee concurred that housing providers for older people needed to reconsider their responsibilities and standards of practice in order to enable older people access to – and use of - ICT:

“The standards around what level of service should be expected for older people and for people with disabilities is never explicit. There used to be debates around whether to provide fitted carpets. The questions then became about en-suite toilets. Now the debate is about ICT.”

SCIE, project manager

Telecare services, such as community alarms and 24-hour monitoring services, are also sometimes commissioned by housing associations (Aragon Housing Association, 2014; Technology Services Association, 2013). However, there are generally poor levels of coordination between the housing sector and other care providers. As telecare commissioner interviewees noted, care agencies which install competing systems can lead to challenges in delivering the appropriate level of care to service users:

“Private supported accommodation have their own built in alarm systems. [Local authorities] can’t put in [their] telecare technology on top of that because the [housing providers] won’t [allow it]. Even if they do let you install your telecare, there is an issue around sending in response [staff]. The property owners won’t let anybody in.”

Kent County Council, telecare commissioner

4.7. Primary stakeholders connecting older people to ICT-based care: personal networks

Older people’s informal networks are important intermediaries in older people’s access to ICT. Interview data from Selwyn (2004) and Hill et al. (2008) revealed that few older participants in their studies purchased computers themselves; rather they acquired them through their adult children. Martinez (2012) found that 53% of older participants in their study acquired their mobile phones as gifts.

Heart et al. (2013) and Selwyn et al. (2003) further noted that some, albeit a minority, older adults accessed computers in the homes of relatives. Morris et al. (2007) found that 10.1% of older participants accessed a computer and the internet at the home of a relative or friend.

Similar results were reported in Table 6-2: 13.1% respondents aged 65 years and older accessed the internet at someone else’s home.

There was also evidence suggesting that family members act as proxy-users of the internet for older people (Helsper, 2008). Morris et al. (2007) found that a small proportion did not use computers or the internet themselves, but rather took advantage of their relatives’ skills. Hill et al. (2008) noted that older non-users gained access to the internet by proxy more often than in public venues. Olphert and Damodaran (2013) presented evidence of a case study where an older woman with physical impairments gained proxy access to the internet through her husband.

Table 6-3 displays an analysis of the 2011 OxIS dataset, indicating that the children and grandchildren of older non-users and ex-users of the internet frequently act as proxy-users. However, due to the high proportion of “missing” responses, the results may not adequately reflect the use of the internet by proxy of the older adult population.

Table 6-3 Source of help to use the internet by ex – and non – users aged 65 years and older

	EX-USERS (N (%))	NON-USERS (N(%))
FRIEND	1 (14.3)	8 (15.1)
PARTNER/SPOUSE	0	7 (13.2)
CHILD/GRANDCHILD	7 (87.5)	51 (87.9)
SIBLING	1 (14.3)	6 (10.9)
INTERNET CAFÉ STAFF	0	0
LIBRARY STAFF	0	0

Expert interviewees also discussed proxy users of technology for older people. They suggested that proxy use of ICT is more widespread than is generally appreciated:

“The fact is, [many family members] are proxy users of technology. People get familiar with [ICT]; they don’t become users but they somehow find a way. [Proxy use] is under-researched. Much of it exists but we don’t know about it.”

London School of Economics, researcher

“We found this idea of proxy users and resources spread throughout people’s social networks. Particularly, with older adults, those networks are quite complex: interfamily and outside the family.”

The Knowledge Lab, analyst

5. Continuity

The continuity dimension examines the support which the different stakeholder groups provide to older people to ensure their adoption – and continued use – of mainstream ICT and ICT-based care.

5.1. Tertiary stakeholders supporting older people to use mainstream ICT

Both the grey literature and interview data highlighted private sector initiatives which have implemented national government e-inclusion policies, such as the *Digital Inclusion Strategy* (2014). Through corporate responsibility programmes, many commercial stakeholders have entered into partnerships with local or national government, and third sector organisations (Independent Age, 2010). For instance, the flagship *Go ON UK* charity was founded by several large private organisations, such as EE, TalkTalk, E-ON, and Lloyds Banking Group. In addition to financial support, commercial partners have offered access to some of their wide-ranging networks, allowing partners to pool their expertise and extend their outreach (Cabinet Office, 2014a; Go ON UK, 2014a). For instance, British Telecom works alongside Citizen's Online in the *Get IT Together* campaign, which offers individualised internet access, training and advice to older people, people with disabilities and job seekers (Cabinet Office, 2014a). Age UK's nationwide "*Techy tea party*", backed by Go ON UK, was hosted in over 500 EE stores where staff provided free advice and support to older people on how to use internet-enabled devices and to get online (Age UK, 2014b).

Age UK's *Engage Business Network* is another example of a cross-sector organisation which has contributed towards understanding the older adult market. Made up of over 50 businesses, the *Engage* network provides information and services on how to access the older consumer market. Business members also exchange marketing and design expertise towards the development of inclusive design standards (Age UK, 2013d). For example through the *Engage* network, Age UK, BT, Dixons' Sales Group, McDonalds, Microsoft, British Gas, Marks and Spencer, Sky, and Barclays developed the Age OK accreditation scheme, which identifies and promotes products and services which are judged to be "age friendly" (Age UK, 2010b).

Expert interviewees also discussed some of the contributions that the private sector made towards their organisations, including sponsorship and training materials from firms, such as Google (Citizens Online) and Microsoft (SCIE). Three experts also mentioned the high-quality support that Apple stores offer to their potential and existing customers, which was summarised by one interviewee:

“Apple have got a very good reputation in terms of their customer support, and learning and training. They provided free training, and they are also quite good in terms of their outreach.”

SCIE, programme manager

Nevertheless, several observers commented that the private charitable contributions towards promoting e-inclusion were disproportionate to the profits they made from services (Citizens’ Online, analyst) which effectively exacerbated (older) non-users’ isolation from society (Mason et al., 2012; Wright and Wadhwa, 2010). Indeed, experts recognised that the commercial sector is involved in sponsorship activities. However they also implied that many corporate sponsorship activities were tokenistic, and that private organisations could contribute more instrumental support:

“Everybody is prepared to create a user toolkit, or a DVD, or whatever, but who is actually sitting with that old person [showing them things]?”

Citizens Online, analyst

“There is not enough [sponsorship by big providers]; it is their corporate responsibility to do more.”

ILC-UK, executive

Researchers suggested that tertiary stakeholders should extend their social responsibility obligations (Hernandez-Encuentra et al., 2009; Mason et al., 2012). Indeed, experts also suggested that ICT providers had a corporate responsibility to address the broader e-inclusion agenda:

“The commercial sector is the big elephant in the room with ICT, which everyone talks about. They make all of [the devices and services]. There needs to be a way of getting [these concerns] into their agendas, where the digital divide has to be part of what they do as part of their corporate responsibility.”

The Knowledge Lab, analyst

Other experts also proposed that commercial ICT providers should incorporate the coordination of community-level e-inclusion activities within their business models. Experts inferred that these business models are investments into future customers, and will ultimately yield profits in the long run (Digital Unite):

“There could be community initiatives where perhaps someone is a good supplier of phones and a good suppliers of computers could actually get together and do [a tutorial]. But this is where the commercial sector could come in and revolutionise it and they know that in the longer term it is in their interest to do so.”

ILC-UK, executive

Another expert suggested that the commercial sector organisations which ignore their corporate responsibility will be reproached in the future for their exclusionary approaches towards vulnerable non-users:

“[ICT providers] have a ‘corporate responsibility’. They will get reproached in the future on a number of issues to do with the Internet, in the same way that the food sector has got.”

Digital Unite, analyst

5.2. Tertiary stakeholders supporting older people to use ICT-based care

Older people’s adoption and continued use of ICT-based care is inhibited by a number of market barriers. Firstly, in the UK, the ICT-based care device market is highly fragmented, with over 80 companies - including several SMEs – competing in the market. The leading company, Tunstall Healthcare, holds the biggest market share. Other firms include Docobo, TyneTec and Phillips Healthcare (Taylor, 2012). The technology care firms also develop the software solutions for supporting the monitoring and response services for telecare systems (Berry et al., 2013; Tunstall, 2014c). Each firm develops proprietary platforms for their services which leads to inflexible systems, which ultimately reduce the availability of a range of services to meet individual consumers’ needs (Kubitschke and Cullen, 2010).

The second issue concerning the continuity of implementing ICT-based care is the lack of a clear ethical framework for the integration of mainstream internet networks into the care system (Chan et al., 2009; Hill et al., 2010; Wadhwa, 2011; Wright and Wadhwa, 2010). Concerns about the privacy of older people (Blaschke et al., 2009; Cheek et al., 2005; Essen, 2009; Matthews et al., 2010; Sanders et al., 2012; Wadhwa, 2011), confidentiality and informed consent when using monitoring services (Chan et al., 2009; Cheek et al., 2005; Demeris et al., 2009; Independent Age, 2010; Karunanithi, 2008; Kidd et al., 2010; Liddy et al., 2008; Williams et al., 2010; Zweijssen et al., 2011), especially for those who lack capacity (Mahony and Mahony, 2010; Wagner et al., 2012) remain largely unresolved.

There are also ethical concerns over third party access to personal data with respect to using the internet and mobile networks to transmit monitoring and health data. In particular, there is a lack of clarity around the role of telecommunication operators, who do not have caregiving expertise, with respect to handling the data while “in transit” (Karunanithi, 2008; Kubitschke and Cullen, 2010; Sheaves et al., 2011; Wagner et al., 2012; Williams et al., 2010). There are also ethical questions around the possible deepening isolation of older people as technology replaces human services (Kubitschke and Cullen, 2010; Milligan et al., 2011; Wadhwa, 2011). One expert raised similar ethical concerns around privacy, security and trust. She also

commented that these concerns become more complex as different providers enter remote care market:

“There are a set of debates [in Europe] around privacy, security and trust. If your bank or insurance scheme were to expand its services, would you trust it more versus if your health authority were expanding its services?”

Castlegate Consultancy, consultant

Finally, questions remain unanswered concerning who pays for what elements of ICT-based care within the complex mix of private, public and third sector actors in the provision of services. In particular, social care services departments often bear the cost of the services, but the savings are realised in the health sector, for example through a reduction in hospitalisations (Barlow et al., 2012; Cardozo and Steinberg, 2010; Kubitschke and Cullen, 2010; Singh et al., 2009; Zweijssen et al., 2011).

Questions around reimbursement become more convoluted when mainstream ICT devices and networks become integrated into a care system. There are underlying assumptions that the device interfaces and subscription charges are primarily privately funded. However, subscription charges for superfast broadband exceed DSL by up to seven fold (Cable.co.uk, 2014), and there is also the procurement, maintenance and upgrading costs of the ICT equipment to consider. Therefore, some older people will face barriers arising from the costs of ICT, even if NGA connectivity is a possibility. One expert interviewee described the barriers to the take-up of ICT-based care created by older people’s perceptions of the costs of the underlying internet infrastructure:

“There is a very low percentage of people over the age of 65 that have got broadband in their house [in our local authority]. There is a need [to implement] a socially acceptable cost for broadband technology into every house [so that we can deliver telecare services].”

Worcester, telecare commissioner

5.3. Secondary stakeholders supporting older people to use mainstream ICT

5.3.1. The third sector

There are several prominent examples of third sector organisations devoted to improving the e-inclusion of vulnerable groups in the UK, such as Digital Unite (Digital Unite, 2014a), Citizens’ Online (Citizens Online, 2014), Digital Outreach and Convey (Digital Outreach and Convey, 2014), the Tinder Foundation (Tinder Foundation, 2014), and UK Online Centres (UK Online Centres, 2014a). Their primary collective aims are to encourage non-users of ICT to adopt – and to continue to use – ICT by raising awareness of the benefits of e-inclusion, providing

information about ICT devices and services, facilitating public access to computers and the internet, and developing the skill sets of people who are digitally excluded (Age UK, 2010a; Choudrie et al., 2010; Independent Age, 2010; Sourbati, 2011). Findings from Digital Outreach's *Get Connected, Get Online* (2010) programme showed that third sector involvement made a positive impact on older people's confidence and their attitudes towards the internet (Agnew and Ripper, 2011). Several expert interviewees who worked for third sector organisations described their involvement in e-inclusion initiatives. A few experts also discussed their work in raising awareness of the importance of older people's e-inclusion amongst policy makers:

"[Part of our role is to] raise the importance of the delivery of IT training to older people, who are going to be forced to use IT in order to access the services that the government wants to deliver."

Age UK Oxfordshire, programme manager

The Digital Champion for Inclusion (DCI) founded the *Race Online 2012*, followed by the *Go ON UK* charities in order to pool resources and knowledge from different sectors in order to encourage people to get online. The DCI also established a "digital champion network", initially comprising of 100,000 local volunteer who help non-users to get online (Cabinet Office, 2011). Currently, Go ON UK coordinates the digital champion initiative which has transformed into a network of local partnerships between individuals, businesses and local third sector organisations which help individuals, small businesses and local charities improve their digital skills (Go ON UK, 2014b).

Many third sector organisations work in successful cross-sector partnerships, such those coordinated by the Go ON UK charity. For instance, UK Online Centres receives core funding from the Department of Business Innovation and Skills (DBIS) and the Department for Work and Pensions (DWP) and operates 5,000 PIAP in conjunction with the Tinder Foundation, Go ON UK, BT, Microsoft, and Learn May Way (UK Online Centres, 2014b). UK Online Centres also provide a range of training courses and tutorials (UK Online Centres, 2014c). Third sector expert interviewees also described the partnerships they had with other charities and the commercial sector:

"[We] work in partnership with third sector organisations such as Age UK and Digital Unite and others. They will set up the National Days in their projects and we will encourage our project officers to run events around that time. There has been some good partnering."

Citizens Online, analyst

Some third sector organisations run e-inclusion programmes specifically for older adults. Age UK is the largest national charity dedicated to improving the quality of life of older adults (web REF). With the support of private, public and other third sector organisations, Age UK delivers a number of nation-wide programmes to promote the benefits of using ICT in later life. These programmes include on-going ICT-courses and tutoring, outreach programmes and ICT taster sessions. For example, as noted above, Age UK, in collaboration with EE, ran a national “*techy tea party*” to promote the benefits of being online to older people (Age UK, 2014b). Previously, Age UK organised annual “*itea and biscuits weeks*” events, which consisted internet taster sessions hosted in local public venues (Age UK, 2010a). Age UK also works in collaboration with e-inclusion charities, such as Digital Unite, to offer digital skills to older people in their annual “Spring Online” event (Digital Unite, 2014b). Data from the expert interviews also showed that the third sector provides support to vulnerable older people who may not have their own informal networks:

“We agreed to bring computers into our Community Clubs, which are typically attended by people in their late 80s and 90s. This is probably the only thing in their weekly calendar that they will do. They are not institutionalised, they are not yet in a care home, but our lot tend to have frailties.”

Age UK Oxfordshire, executive

“The Silver Surfers: they are a huge community. Some of it has come out of the fact that nobody is showing [older people] how to use - and enable them to use - [the internet].”

Kent County Council, telecare commissioner

Other skills and training programmes designed for older adults include *UK Online Centres*: 43 “older people specialist” centres scattered across the UK to help older adults learn how to use ICT in their communities (UK Online Centres, 2014d). Third sector organisations were also involved in executing the *Digital Switchover Scheme* (BBC, 2014b; Lewin et al., 2010; Sourbati, 2011). Organisations such as the Age UK, Women’s Institute, the Royal Volunteer Service and Age UK trained volunteers who visited older people who were eligible for support and provided individual, step-by-step assistance with reconfiguring their televisions (RVS Wales, outreach employee).

Some third sector organisations also play a role in distributing recycled ICT equipment, such as laptop and desktop computers, to older people at reduced cost. Examples of organisations which recycle include some local chapters of Age UK (2012) and recycle-pc.co.uk (Recycle-pc,

2014). (Recycle-pc, 2014). One interviewee from Age UK also mentioned that they ran a scheme which distributed reconditioned computers to older people:

“We ran a project where we gave out free computers for four years.”

Age UK London

There was no evidence of any third sector organisation delivering ICT-based care.

5.3.2. Housing sector

The Department for Work and Pensions (DWP), the Department for Communities and Local Government (DCLG) and the Tinder Foundation established the *Digital Deal* (2013) collaboration, which included pump-priming funding for social landlords to improve tenants' digital skills and access to the internet. Twelve social housing providers took part in the *Digital Deal Challenge* (digital housing hub, 2014) and instituted programmes, such as developing ICT recycling centres (Magenta Group), turning resident's TV into internet access devices (Golden Gates Housing Trust, Cheshire), and providing residents with free access to digital services through Looking Local (Cottsway Housing, Oxford).

Despite a search of relevant and logical sources, no data were found on whether these programmes benefitted older people specifically.

5.4. Secondary stakeholders supporting older people to use ICT-based care

There are several secondary stakeholder organisations which promote the integration of ICT-based care into mainstream health and social care systems. Since the *Preventative Technology Grant* and the *Whole Systems Demonstrator* project, the 3 Million Lives campaign was launched to champion the integration of ICT-based care within the national health and social care system through improved partnerships between care providers, patients and technology suppliers (NHS England, 2012).

There has also been a significant increase in the availability of funding for stimulating the large-scale roll-out of ICT-based care services. In particular, *Innovate UK* (formally the *Technology Strategy Board*), an independent advisory body, funds and supports several projects under the *Assisted Living Innovation Platform* (ALIP), which investigate the scalability of ICT-based care in communities across the UK. For example, the *Delivering assisted living lifestyles at scale* (DALLAS) project, aims to incorporate ICT-based care into the devolved national care systems across four communities (Innovate UK, 2014). ALIP also funds projects such as *CoModel*, which set out to identify the barriers in the market which prevent the adoption of ICT-based care and to propose suitable business models (Parr and Down, 2014).

Through joint investments by the *Public Health Agency of Northern Ireland* and the *European Centre for Connected Health (ECCH)*, the *TF3 consortium* (including Tunstall, S3 and FoldHousing) launched the large-scale roll-out of telehealth services to approximately 6,000 people with diabetes, heart and respiratory disease and stroke in Northern Ireland. To date, it is the largest mainstreamed telehealth service in the UK (Berry et al., 2013; Taylor, 2012).

However, the ICT-based care market is highly fragmented, and there remains a lack of integration between – and across – care service providers (Barlow et al., 2012; Kubitschke and Cullen, 2010; Lewin et al., 2010; Taylor, 2012). ICT-based care is procured by local care agencies, where several different stakeholders may each be working towards their own care interests and financial frameworks. This results in highly fragmented purchasing of ICT-based care, which in turn can lead to poor buying power by secondary stakeholders – and this can affect the quality – and deployment – of services (Barlow et al., 2012; Kubitschke and Cullen, 2010; van Offenbeek and Boonstra, 2010). Most importantly, it may ultimately have an impact on older people’s adoption of ICT-based care services (Harjumaa and Isomursu, 2012; Kidd et al., 2010; Singh et al., 2009).

Furthermore, secondary stakeholders have a role in stimulating the adoption – and continued use – of ICT-based care by older people. In particular, the review of the literature revealed that their adoption of ICT-based care was influenced by the opinions of care professionals they trusted and relied on. Singh et al. (2009) found that clients’ whose general practitioner (GP) was enthusiastic about e-consultation were 1.3 times more likely to be enthusiastic, compared to clients whose GP was not enthusiastic. Johnston et al.’s (2011) review of telehealth in palliative care identified a study where participants expressed a willingness to accept videoconferencing equipment in their homes, particularly if it was recommended by a health care professional (Parker Oliver et al., 2005). van Offenbeek and Boonstra (2010) showed that telecare users were influenced by the attitudes of their care team; many formal carers did not find it in their interest to replace home visits by ICT-based care. Harjumaa and Isomursu (2012) also found that when care practitioners did not perceive any added value in ICT-based services to their own roles in providing care, older participants were not motivated to use them. The expert interview data also demonstrated that frontline staff have an important influence over older people’s adoption of ICT-based care. Telecare commissioners explained their role in encouraging older people to adopt the ICT-based care services and devices:

“Sometimes clients are unsure: “Oh. I just can’t get on with this. Can you take it away?” So, we will do everything in our power, without being too coercive, to ensure that that

person keeps the [telecare service], because they obviously need it. It is important that at the assessment and installations stages, we are very clear about what devices are.”
Tower Hamlets Council, telecare commissioner

Several reports have discussed the impact of care practitioners’ reluctance to propose ICT-based care on the overall deployment of services. Kubitschke and Cullen (2010), Barlow et al. (2012); Boonstra and van Offenbeek (2010), Chan et al. (2009), Singh et al. (2009), Crossen-Sills et al. (2009) and Cardozo and Steinberg (2010) noted resistance by care practitioners when there was any uncertainty concerning how they would be reimbursed for their time. Chan et al. (2009) further commented that some care professionals had concerns about the quality and security of the ICT-based care services and subsequently were less enthusiastic about endorsing them. Barlow et al. (2012), Lewin et al. (2010) and Taylor (2012) presented clinicians’ concerns about the quality of the evidence around the cost-effectiveness of ICT-based care, which has arguably delayed the roll-out of telehealth services in England. Kubitschke and Cullen (2010), Lloyd (2010) and Boonstra and van Offenbeek (2010) found evidence to suggest that care practitioners’ resistance to changing entrenched working patterns prevented the deployment of ICT-based care, even when other market barriers were removed. Qualitative interviews with front-line staff involved in the delivery of the telehealth services of the *Whole Systems Demonstrator* trial revealed that many GPs were concerned that the services would introduce additional workload pressures and potentially impede their professional autonomy (MacNeill et al., 2014). Two expert interviewees made similar observations about GPs’ concerns about their workload:

“GPs’ endorsement is essential to do anything clinical in your locality, particularly in community-based care. When GPs feel it will add to their workload, they will actively prevent things from moving forward.”

Kent County Council, telehealth commissioner

“There is an issue of incentives. Health care providers are incredibly powerful individuals. If [ICT-based care] creates more work for them and they can’t see the benefit to their immediate selves, GPs are not going to do it.”

Imperial College, senior researcher

5.5. Primary stakeholders supporting older people’s use of mainstream ICT and ICT-based care

5.5.1. An informal network for e-inclusion

The informal sector includes family members, friends, neighbours and other unpaid carers who have any role – specified or unspecified - in the lives of individual older adults. Several sources in the literature have highlighted the influence of informal networks on older people’s level of

e-inclusion. Heart et al. (2013), Selwyn et al. (2003) and Morris et al. (2007) showed that living with a partner had a significant positive effect on older people's adoption of ICT. These findings were also reflected in ONS estimates (2014a), which suggest that households with two adults, where one adult was at least 65 years old, were almost twice as likely (80%) to have an internet connection compared to households consisting of a single adult 65 years or older (41%). According to the 2011 UK Census, over 33% of people aged 65 years and older in England and Wales live alone (Office for National Statistics, 2014e).

A number of studies have described the role of informal networks in encouraging older people to adopt ICT. Selwyn (2004), Hill et al. (2008) and Weaver et al. (2010) found that some older people adopted ICT after being pressed to do so by younger family members. Other studies have noted that being able to communicate with family and friends gave many people a reason to use ICT (Hardhill and Olphert, 2012; Hurme et al., 2010; Olphert and Damodaran, 2013; Wagner et al., 2010; Weaver et al., 2010). In contrast, experts described the effect on older people's ICT-use when they did not have an online network. One expert explained an example of an older person who had access to ICT, but did not have access to a social network:

"[Some care] residents [were] prepared to have a go with email but they couldn't find any family members or friends who wanted to respond. So, another barrier is the [lack reciprocity] of family and friends, and not just [older people's] own inclinations."

SCIE, programme manager

Two other experts discussed the deeper effects of the social exclusion of disadvantaged older people on their e-inclusion:

"Maybe [older people] have social networks, where they have people who can come and help them. The people on these estates [that I worked with] didn't have computers, didn't have access to people who had computers. It is a vicious circle of disadvantage."

Independent consultant

"It is just that small group of people that don't have family, friends or people involved in social services, who could slip through the net. People on low incomes. They will have a problem."

Royal Volunteer Service, service manager

The evidence showed that people in the informal networks of older adults also provided ICT training and auxiliary support. Adams et al. (2005) reported that over half of participants in her study were taught to use the internet by family and friends. Hernandez et al. (2009) found that several participants learned to use ICT through family and friends. Hill et al.'s (2008) qualitative evidence described the instrumental support that family members give to older people when they are "stuck" in the course of using the Internet. Findings from a frequency analysis of the

2011 OxIS data confirm that “family and friends” can be one of the most important sources of help for older people when they have questions about how to use the internet (Table 6-4).

Table 6-4 Sources of help to use the internet in the past year by people aged 65 years and older

SOURCE OF HELP	PERCENTAGE OF INTERNET USERS (N= 165)
WORKED THINGS OUT ON THEIR OWN WITHOUT HELP	68.7%
FAMILY AND FRIENDS	60.6%
TRAINING COURSE	17.6%
WORK OR SCHOOL	12.4%
LIBRARY	9.7%
PAID SOMEONE	3.7%
INTERNET CAFÉ	0.6%

Source: OxIS, 2011

Two experts also discussed the role of family members and friends in providing support to older people in using ICT:

“If an 85 year old woman is not feeling confident enough to [use mainstream ICT], maybe she will have a younger family, her children and grandchildren. It becomes about them supporting her to [use ICT].”

Westminster Local Authority, telecare commissioner

“[Older people] have got friends and relatives who assisted them to use the [digital switchover] technology.”

Royal Volunteer Service, service manager

Two other experts described the potentially negative effects on older people’s e-inclusion when they do not have consistent or ongoing support from their informal networks:

“Often sons or daughters have encouraged their [older parents] to buy a computer. [Their children have] given them a quick lesson: “This is what you do, right bye, Mum;” expecting them then to be able to use email. [However, the older people] are sitting there, struggling.”

Age UK Oxfordshire, ICT tutor

5.5.2. Informal networks delivering ICT-based care

In 2010, there were approximately two million adults receiving unpaid care in the UK; approximately 44% of unpaid care recipients were aged 70 years and older. The monetary value of unpaid adult care in 2010 was estimated at £61.7 billion, equivalent to 4.2% of GDP and representing a threefold increase from 1995 (Office for National Statistics, 2013c). The care provided by family, friends and other unpaid carers is central to the continued operation of the UK's care market.

The informal sector clearly plays an instrumental role in the care of older people who use ICT in a care context. Kubitschke and Cullen (2010) noted that unpaid carers are often the first point of call when older telecare users raise an alarm. Results from studies by Hardhill and Olphert (2012) and Martinez-Pecino et al. (2012) noted that family and friends were often contacted via a mobile phone in the case of an emergency. Two experts also explained that family and friends often provide instrumental support to older people who use ICT-based care. One expert illustrated examples of family members who help older service users use the equipment:

“We’ve had very few people say: “I can’t manage the buttons or I can’t see the screen,” because some of those people live with a spouse or they’ve got a daughter who comes in every day or they’ve got a carer they’re quite happy to go through the questions with.”

Southampton Primary Care Trust, telehealth commissioner

Another expert explained that family members can provide reassurance and encouragement to telecare service users:

“[Telecare commissioners] have got to be reassuring. It is also good to have carers there or family members who can also reassure that client.”

Tower Hamlets Council, telecare commissioner

There is also evidence that primary stakeholders play a visible role in financing ICT-based care for older people, although the extent of their contribution is unclear (Barlow et al., 2012). Taylor (2012) reported that in 2010, approximately 10% of the telecare market consisted of private spending, estimating that each telecare user paid £66 in installation and response-centre fees. Kubitschke and Cullen (2010) found that user charges for ICT-based care services ranged from 10 to 25 Euros per month (in 2010 prices), depending on where people lived.

The Deloitte report further highlighted that an increasing number of people are buying telehealth-type equipment from pharmacies, such as blood pressure monitoring systems. Purchase of mainstream ICT equipment, such as the *Wii Fit*, could also be considered a form of financing telehealth, where users relay data about their progress to a care professional. These types of purchase are not included in official estimates of out-of-pocket spending (Taylor, 2012).

Market analysts have suggested that primary stakeholders will play an increasing role in financing ICT-based care (Barlow et al., 2012; Lewin et al., 2010). Lewin et al. (2010) proposed a progressive “managed service model” (Berry et al., 2013), whereby primary stakeholders might finance ICT-based care equipment and services initially, with the costs transferred to public care authorities when service users’ needs progress to a “severe” or “critical” level. Some expert interviewees also discussed potential self-funding business models, financed by adult children. One expert commented on the concerns of adult children about the safety of their older parents with care needs, but due to financial pressures cannot withdraw from the workforce. As such, the expert suggested that many adult children would willingly contribute to a self-funding financing model of ICT-based care:

“People would probably like to buy telecare for their [elderly] parents. These options are often not available, but maybe they will become available.”

Newham Primary Care Trust, programme manager

Other experts suggested that future self-funding models of ICT-based care should focus on the benefits to *carers*. One pointed out that it is the adult children with caring responsibilities who become the primary customers of ICT-based care:

“The obvious thing to do is to get your revenues from [adult] children.”

Advanced Digital Institute, analyst

Another expert agreed that carers’ needs should be considered, but warned of the ethical implication of taking that approach:

“For health-related services, what are you trying to achieve? Is it about getting the services to the people who need it? You might need to aim your services to the people in between. This is quite contentious because the quality of the services won’t be the same as if the service users were engaged themselves.”

London School of Economics, senior researcher

There is considerable debate about the extent to which primary stakeholders should finance care. Barlow et al. (2012) and Chan et al. (2009) noted that care agents – in the health sector

especially - have exhibited some reluctance to provide response services to alerts from un-prescribed and individually purchased equipment.

6. Discussion

In this chapter, I set out to explore the influence of the two environmental dimensions (connectivity and continuity) of the 6C framework on older people's engagement with ICT. I structured the analysis around the four broad stakeholder groups which shape the mainstream ICT – and ICT-based care – markets.

Organising the mainstream and care ICT-markets according to quaternary, tertiary, secondary and primary stakeholders allowed me to gauge the extent of connectivity of older people and to explore the contribution that different groups make towards facilitating their access to ICT, as well as some of the barriers created. In the following section, I triangulate the various sources of evidence to arrive at a better understanding of older people's level of connectivity and sources of support.

6.1. Connectivity

Across a number of sources of evidence (ONS, Eurostat, and OfCom, it was found that there is a substantial gap between the level of connectivity of older adults' to various ICT devices and internet networks and that of the general population, although this gap is steadily narrowing. There is a similar degree of convergence between sources of national-level statistics (ONS, Eurostat and OfCom) on the clear demarcation between "younger old" and "older old", it can be seen that usage rates of all types of ICT devices and internet networks amongst the 65 to 74 year-old age group is in fact rising faster than the rates for the population as a whole. However, ICT-usage amongst people aged 75 years and older lags markedly behind the rest of the population; usage is also increasing, but at a noticeably slower rate compared to the younger-old age group. It must be said that older people's connectivity to mainstream ICT remains a concern, particularly that of the "older old" age group. Similar divisions within the older population were also found in the results of the quantitative analysis of the OxIS 2011 data (see Chapter 4). However these data showed a much lower rate of internet use (19.8%, see figure 11 in chapter 4) by the sample of respondents aged 75 years and older compared to Eurostat data for 2012 (32%, see figure 3 in chapter 6). Differences in adoption rates between the younger-old and the older-old population were also highlighted in the interviews with experts (see sections 4.2.3 and 4.4.1 in chapter 7). The reason for the 12 percentage-point difference between the OxIS and Eurostat estimates is difficult to unpick, and may be due to question wording, or how internet use (or non-use) is defined.

The evidence around older people's connectivity to ICT-based care is sparse. Firstly, the number of older people who use ICT-based care is unclear. People aged 65 years and older are the principal client-group of ICT-based care (Taylor, 2012), yet most estimates of usage are based on adults of all ages. Furthermore, there are large variances in estimates of how many people use telecare, ranging from 350,000 (Barlow et al, 2012) to 1.5 million (Corbett-Nolan, 2012). Discrepancies in data sources may be due to the number of agencies involved in delivering ICT-based care services (e.g. local authorities, housing associations, health authorities, private individuals), and lack of transparency in how ICT-based care is defined and reported. The validity of the estimates is therefore difficult to establish.

Secondly, the number and type of people who might benefit from care is uncertain. There is a level of correspondence across different sources of evidence to suggest that the ICT-based care market is growing in terms of both expenditure (Barlow et al., 2012; Taylor, 2012) and the number of ICT-based care clients (Corbett-Nolan and Bullivant, 2012). There is also some agreement that there is a gap between the number of people who might benefit from these services and those who actually receive them. However, there is lack of clarity on what criteria each report uses to define the potential beneficiaries of ICT-based care.

With respect to supplying ICT, the evidence in the literature showing that tertiary-level stakeholders are focused on commercial activities which often alienate large segments of the older adult population, was also noted by experts. Areas with large numbers of older people remain underserved with poor broadband connections, and the design and marketing strategies of mainstream devices and services are aimed at younger customers. Tertiary stakeholders in the ICT-based care market, on the other hand, offer several innovative solutions which provide older care recipients with more portable and personalised services.

Nonetheless, at times, their designs appear to place substance over style, which can be off-putting for older people. Evidence of the stigmatisation attached to ICT developed specifically for older people was found in the literature (Price, 2011; Roberts, 2011; Independent Age, 2010) and was validated by expert interview data. Similar findings were not identified in the interview data with older people as issues around stigma were not directly addressed in these interviews.

The interests of tertiary stakeholders in both markets are firmly guarded by quaternary policy makers. The *Government Digital Strategy* (2014) demonstrates national government's commitment to promoting the UK as a highly innovative and competitive digital economy (Digital Britain, 2009, OECD, check). Yet actual policies suggest a reluctance on the part of the

government to support regulations and standards on ICT design, which might stifle innovation (Age UK, 2010b; Lewis, 2012).

Some policies, such as the Department of Health's *Concordat* (2012) with the telecare and telehealth industry, attest to the support of quaternary stakeholders' for the innovations of tertiary stakeholders in the ICT-based care market. But quaternary stakeholders in the health and social care sectors also need the cooperation of government departments which oversee the modernisation of internet networks to ensure that the basic technical infrastructure can support reliable ICT-based care services throughout the country.

In the mainstream ICT market, secondary stakeholders generally provide generic services with the aim of "connecting" the community, but which, according to analyses of OxIS (Table 6-2) and Eurostat data (Figure 6-10), the majority of older people do not use. Some governments recognise the evolving nature of connectivity and are developing wireless services in efforts to democratise the internet throughout the community, not simply in a library or day centre. There are some examples of good practice, such as the co-hosting of e-inclusion events and *UK Online* specialist centres by secondary stakeholders, which especially target older people. These initiatives can be a good source of support, but exist as local projects, which paradoxically reinforce geographical inequalities in ICT access. Experts also commented on the pockets of good practice as well as the generalised lack of cross-sector consistency and coordination across the country (see chapter 7, section 4.6.2 on the uneven distribution of ICT services for older people). However, evidence from different data sources suggests that a more even distribution of ICT training services across the country would not necessarily entice large numbers of older non-users to use the internet. Table 2 demonstrates that only a minority of older people access the internet outside of the home. In addition, expert interviewees confirmed that original PIAP model (Talbot, 2006) did little to enable older non-users to adopt ICT.

In the ICT-based care market, several different secondary stakeholders are responsible for providing services to older people with care needs. There is a great deal of variability in the provision of care both within and across stakeholders groups. Furthermore, local authorities and housing associations independently decide how to distribute services according to need, introducing elements of a postcode lottery into older people's access to ICT-based care.

The postcode lottery is a theme which appears in the review of both evidence bases regarding the distribution of mainstream and ICT-based care services for older people, which highlights one of the effects of devolving power to local governments.

Literature findings around the involvement of family and friends in older people's connectivity to mainstream devices (Selwyn, 2004, Hill, 2008, Martinez, 2013) was confirmed by interviews with both older people and experts (see chapter 7). These results were also supported by the regression analysis of OxIS 2011 data (see table 7 in chapter 4), which demonstrated a significant relationship ($p < 0.01$) between the number of people living in a household and older people's access to ICT devices.

There was also support for the literature findings in the interview data on the use of family members as proxies. Different data sources revealed the varying roles that proxies play in older people's connectivity. The literature sources and expert interviewees discussed proxy use as a way for older people to access an additional set of skills. Older interviewees (who were internet users), on the other hand, discussed the use of proxies as a form of protection of their privacy.

6.2. Continuity

Several sources (Carpenter and Buday, 2007; Communications Consumer Panel, 2012; Independent Age, 2010) commented that an adequate support mechanism was vital in any effort to foster older people's motivation both to adopt and to sustain their use of ICT (Berry, 2011a; Independent Age, 2010; Mason et al., 2012; Sourbati, 2011). Such support could come from a range of both informal and formal resources (Hernandez-Encuentra et al., 2009; Olson et al., 2011; Population et al., 2014).

The evidence found in the literature suggested that older people gain most of their support to adopt and to use mainstream ICT from their informal networks. Primary stakeholders assist older ICT users by motivating, training, and financing their ICT adoption. Primary stakeholders also play important supportive roles in the delivery of ICT-based care, both in terms of responding to alarms as well as financing the services. Quantitative findings from OxIS 2011 (see table 4 above) also demonstrated that family and friends were the second most common source of support for using the internet, after figuring things out on their own. Interviews with older people also revealed the various forms of support they receive from family and friends, including encouragement, financing, training and maintenance of equipment. Experts from third sector organisations concurred that family members often offered financial support to use ICT, both for mainstream and care purposes.

However a few experts commented that there is an inconsistency in the amount of teaching and encouragement from family and friends. Indeed, the results revealed that often the role of

third sector organisations is to provide ICT encouragement and training for (mostly) older people who do not have family support. This finding was further validated by the older interviewee data, as many of the older people in that sample, who were recruited from an Age UK centre, were widowed or were carers for spouses living in residential care settings.

There was also a strong link between household composition and ICT adoption, where older people living alone were less likely to have an internet connection. Similar findings were recorded in Hill et al. (2008) and Heart et al. (2013), emphasising that there are a large number of older people living alone who are at risk of e-exclusion. It can be argued, however, that it is important not to undermine older people's self-determination. A number of writers have shown that most older people work out how to use the internet on their own without help (Adams et al., 2005; Eastman and Iyer, 2004; Selwyn et al., 2003). Support and assistance may be vital for the e-inclusion of some older people, but these are not essential for all.

In the mainstream ICT market, the largest source of formal support comes from third sector organisations. Several national charities and social enterprises work to promote the benefits of being online and to provide training services. . Sources from both the literature (Agnew and Ripper, 2011; Mason et al., 2012) and the interviews with older people (see chapter 7, section 3.6.2) confirmed that third sector organisations are considered trustworthy by older people (Agnew and Ripper, 2011; Mason et al., 2012). Furthermore, the coordination efforts of the Go ON UK organisation has mobilised resources from across various sectors to deliver successful e-inclusion outreach programmes and to create a network of digital champions across the country (Digital Skills, 2014).

The third sector's role as a conduit for e-inclusion is endorsed by quaternary stakeholders, including most recently the *Digital Inclusion Charter* (2014), where the government extended its commitment to the Go ON UK initiative. Some third sector organisations have criticised government efforts for being tokenistic (Choudrie et al., 2010), for channelling resources away from individual charities in favour of Go ON UK backed initiatives (Citizen's Online, Director), and for a lack of attention to older people's specific needs (Berry, 2011; Mason, 2012). Indeed, comments from other experts supported this view and suggested neither national nor local government bodies are doing enough to directly support older people's e-inclusion. Rather, one expert noted that local authorities are reducing the number of public services, such as libraries, which act as sources of ICT access for some older people (see chapter 7, section 4.6.2). At the same time, experts noted that government bodies (both local and national) have instituted online services (e-governance) without also providing adequate financing and

support mechanisms for older people or people with disabilities to access these services, which some argued deepens the existing inequalities of access for vulnerable people.

Several third sector organisations have highlighted the comparatively minor role that commercial organisations have played in supporting older people's continued use of ICT. Expert interviewees (from the third sector) questioned the lack of involvement from the private sector, as this was seen to be largely responsible for the many of the barriers to older people's participation in the digital economy. Experts also called for the government to challenge the private sector to fulfil its corporate responsibility towards promoting e-inclusion.

Like the mainstream ICT market, the main sources of support for encouraging the adoption of ICT-based care come from secondary stakeholders. Quaternary policy makers in the UK also support the promotion of ICT-based care in order to mitigate the effects of an ageing population, to encourage older people's independence and to avoid lengthy hospitalisations (Care Act, 2014). The government has pledged its support of the *3 Million Lives* (3ML) campaign.

In contrast to the mainstream ICT-market, ICT-based care experts alluded to problems in the level of coordination between service providers in the ICT-based care market is problematic. 3ML bears some resemblance to the Go ON UK organisation in terms of championing the roll-out of ICT-based care for people with chronic illness. However, the campaigns differ in several ways. The ultimate goal of Go ON UK is to encourage individuals to use a singular ICT platform, the internet. In contrast, 3ML is geared to promoting the deployment of a range of ICT-based care services from competing technology providers to other secondary stakeholders. Moreover, the 3ML initiative has to contend with stakeholders' uncertainties about reimbursement, security, ethics, evidence and change in long-standing work practices (Cardozo and Steinberg, 2010; Crossen-Sills et al., 2009; DG Information Society and Media, 2007; Essen, 2009; Finn and Wright, 2011; Frost et al., 2010; Independent Age, 2010; Wadhwa, 2011). Furthermore, results of the WSD shed doubts on the cost-effectiveness of ICT-based care (Henderson et al., 2013).

In addition, unlike Go ON UK, 3ML is not a neutral organisation with a broad reach across several markets and industries. Established by NHS England, 3ML focuses on promoting cross-sector partnerships which deliver telehealth solutions. As such, there is potential to improve the coordination across stakeholders when services are defined as telehealth. ICT-based care services which lie outside the remit of healthcare, such as telecare, could be isolated, thus reinforcing the silo market structure, which was described in the literature (Barlow et al., 2012;

Kubitschke and Cullen, 2010) as well as by ICT-based care experts. The latter intimated that ultimately the quality of care is compromised when care agencies (e.g. councils and housing associations) work independently of each other.

All in all, in the body of literature, it was strongly urged that redressing digital inequalities requires a constellation of stakeholders at every level of the supply chain, from the public, private, and third sectors as well as informal networks (Helsper, 2008; Mason et al., 2012; Wright and Wadhwa, 2010). However, evidence from the literature, experts, older people and third sector organisations suggests that there is a degree of “disconnect” between older people and the various stakeholder groups.

In the mainstream ICT market, this miscommunication could stem from a generalised lack of understanding of the highly heterogeneous older adult market (Age UK, 2010b). Wright and Wadhwa (2010) and Plaza et al. (2011) attribute the poor relationship to older people’s lack of online presence, which is highly plausible, given that 28% of people aged 65 years and older have never used the internet (ONS, 2014).

However, the body of evidence from different sources offers a different interpretation. It suggests that many older ICT users are disinclined to *personally* engage with the market place. Rather, experts, older people and some sources of literature point to many older people’s reliance on their informal networks to purchase, acquire, and even use ICT on their behalf, suggesting that many older people voluntarily limit their contact with the very stakeholders who might influence their connectivity and continuity.

A similar disconnect may be affecting the ICT-based care market. This market is driven by a need to manage a high demand for care services with diminishing resources. As such, there are suggestions of a “supply push” by certain stakeholder groups, rather than a “demand pull” by care recipients (Barlow et al., 2012; Essen, 2009). With potentially over a million people with care needs who do not have access to remote care services, it can be suggested that ICT-based care market policies are not organised around primary stakeholders’ needs and, furthermore, that older people are not engaged with the stakeholders who design and deliver their care.

Chapter 7 : From the ground up: qualitative analysis of interview data with older people and technical experts

1. Introduction

“I want to keep going – I don’t want to end up a cabbage...” explained a 77-year old man. Like many older people I interviewed, he was motivated to engage with ICT, but he also undertook painstaking research to find the precise equipment he needed because he wanted it to perform the right functions at the right cost. His attitude was similar to sentiments expressed by many of the older people I interviewed: there was a distinct willingness to engage with “digital society”, coupled with an air of unwillingness to be taken over by a techno-centric culture which had developed from under their feet, and which made their world unrecognisable in many ways.

In this chapter, I investigate the influence of key dimensions of the 6C framework on older people through the interviews with older ICT users and experts. I also explore additional themes uncovered by the interviews. Section two describes the methodology for the analysis of the interview data. In section three, I describe the results of the analysis of the interviews with older people. In section four, I describe the results of the analysis of the interviews with experts. The results of all interviews are synthesised and discussed in section five.

2. Methodology

In this chapter, I draw on data obtained from interviews with older people, experts and participants of the MonAMI trial. Full details of the recruitment practices and data collection for the interviews are provided in Chapter 3. A brief summary of the timing, types and numbers of participants, design and location of the interviews are provided in Table 7-1.

Table 7-1 Series of interviews

	Timing	Participants	N participants	Design	Location
Series 1	April 2010- September 2011	Experts in e- inclusion and ICT-based care	23	Semi- structured	United Kingdom
MonAMI trial	October 2010- April March 2011	MonAMI service users: older people with care needs	Total: 62 Sweden: 30 Slovakia: 18 Spain: 14	Structured questionnaire including open-ended questions	Sweden Slovakia Spain

Series 2	July 2012- October 2012	Experts in e- inclusion and ICT-based care	11	Semi- structured	United Kingdom
	June 2012	Focus group of older people	6	Semi- structured	United Kingdom
	October 2012- February 2013	Individual older people; members of the public	8	Semi- structured	United Kingdom

2.1. Summary of data collection, recruitment and participant characteristics

The first series of interviews, held between April 2010 and September 2011, concentrated on the factors influencing older people's e-inclusion and the deployment of advanced forms of ICT-based care. I held semi-structured interviews with 23 experts from across university, public sector and third sector organisations with experience of e-inclusion for older people, and the development – or delivery – of ICT-based care across England and Wales (see Appendix B for information sheet, consent form and topic guide). These were initially recruited through recommendations by PSSRU colleagues and subsequently through the grey literature and via the recommendations of other (expert) interviewees

Table 7-2 provides details of the number of experts interviewed and the organisations they represented.

Table 7-2 Series 1 expert interviews by sector, organisation and number of Interviewees

Sector	Name of Organisation	Number of interviewees	Interview format
Central Government	Department of Communities and Local Government	1	Face-to-face
Local Government	Kent County Council (2) Westminster Local Authority Tower Hamlets Council Worcestershire County Council	5	Face-to-face
NHS (W1T)	Southampton Newham	2	Face-to-face
Social Enterprise/ Private sector	UK Online Insight Social Research, Ltd (2) Advanced Digital Institute	4	Face-to-face
Registered Charities	Citizens Online King's Fund Foundation for Assistive Technology (F.A.S.T.) (Women's) Royal Volunteer Service	4	Face-to-face
University	Department of Media and Communications, LSE (1, 1) Imperial College (2) Department of Primary Care and Population Health, UCL	5	Face-to-face
Research Centre (University affiliate)	London Knowledge Lab	1	Face-to-face
Consultancy	Castlegate Consultancy	1	Via Skype
<p>Notes:</p> <p>(2)= Indicates that two experts were present for one interview</p> <p>(1,1)= Indicates that two experts were interviewed from the same University department, but in separate interviews</p>			

I also make use of interview data collected by local interviewers during the five-month MonAMI trial. Between December 2010 and April 2011, 62 older people with care needs, living in three communities across Europe (Stockholm, Sweden; Kosice, Slovakia; Zaragoza, Spain),

were interviewed at four time-points throughout a trial concerning the accessibility of the MonAMI system and its perceived benefit to their quality of life. Full details of the MonAMI services, recruitment practices and data collection of the MonAMI trial are provided in Chapter 3. Table 7-3 provides a short summary of the participants' characteristics, arranged according to trial site.

Table 7-3 Characteristics of the MonAMI participants

	Stockholm	Zaragoza	Kosice	Total
N participants	30	14	18	62
Location of residence	Own apartments in dedicated buildings for people 65 years +	Residential care facility	Own homes in the community	
Mean age	79.2	81.5	76.7	79.0
% women	77.4	64.3	72.0	72.9

Source: Damant et al. (2013)

A second series of interviews were held between June 2012 and February 2013, focused on the stakeholders' involvement in promoting and supporting the e-inclusion of older people. These were a combination of face-to-face interviews with eight older people, a focus group attended by six older people, and experts in the field of e-inclusion and the delivery of services for older people.

Table 7-4 Description of participants of Series 2 individual interviews and focus group

	Total Number of participants	Number of women	Age group
Individual Interviews	8	5	Age range: 68- 88 years mean: 77.8 years
Focus group	6	4	Approximate age range: mid 50s to 80s mean: n/a

The individual older people were recruited through an Age UK centre in Oxfordshire, which offered one-to-one ICT training sessions. The focus group participants were recruited through word of mouth from PSSRU colleagues. Experts were identified through reading the grey literature, PSSRU colleagues and other experts. These interviews were held between June

2012 and February 2013. See Appendix C for information sheets, consent form and topic guides for interviews with individuals, focus group and technical experts.

A summary of the organisations from which the experts participating in the second series of interviews were drawn is provided in Table 7-5 below. This was funded by SSCR and was part of the scoping exercise on e-inclusion and access to ICT-based care.

Table 7-5 Series 2 interviews by Sector, organisation and number of Interviewees

Sector	Name of Organisation	Number of interviewees
Think Tank	International Longevity Centre-UK (ILC-UK)	2
Registered Charities	Social Care Institute for Excellence (SCIE)	2
	Age UK	4
University	King's College London	1
Social Enterprise	Digital Unite	1
Consultancy	(Freelance)	1

2.2. Data analysis

The interviews for the MonAMI trial evaluation used a structured schedule based on several internationally recognised questionnaires focused on demographic data and use of health and social care services (CSSRI), activities of daily living (Lawton Brody), health status (EQ5D), wellbeing and social networking (WEMWBS) and accessibility (CEN/CENLEC Guide 6). Additional questionnaires addressing the use of ICT and e-inclusion were designed specifically for the project. Details of the questionnaire schedules are provided in Chapter 3.

The standardised instruments were mostly quantitative, but participants were also asked some open-ended questions, giving them an opportunity to expand on their experiences with mainstream ICT as well as on the MonAMI services, thereby providing a source of qualitative data. Answers to questions were recorded in writing by local interviewers and were then scanned and sent electronically to the LSE for analysis. Swedish and Slovakian interviewers provided English translations of the responses. I translated the Spanish interviews into English.

As discussed in chapter 3, the interview data was analysed according to the seven-step process of the Framework Method described in Gale et al (2013), using a combination of both deductive and inductive approaches. For the first step, the transcription phase, the interviews were recorded using a digital audio recorder. Twenty-three people were interviewed in 20 interview sessions in series one. I transcribed 17 interviews. Three interviews from series one

were transcribed by a professional transcription service. Series two consisted of 8 interviews with 11 expert participants. I transcribed one interview; the remaining interviews were transcribed by a professional service.

Series two also included interviews with members of the public. The focus group interview consisted of six participants, which I transcribed myself. I also interviewed eight older members of the public, which were all transcribed by a professional transcription service.

The second step, the familiarisation stage, consisted of reading through the transcripts and making broad comments about the major topics raised in each interview. Initial notes were also made about how the interview generally related to the dimensions of the 6C or quality of life framework.

The third step consisted of coding each line of the transcripts. Each interview was reread and each line was coded as to whether it related to one the 6 dimensions of the 6C framework as well as the six dimensions of the combined QOL framework. At the same time, I applied an “open coding” approach (Gale et al., 2013) in order to identify any themes or subthemes which appeared initially to be independent topics of the two pre-defined frameworks.

The fourth and fifth steps entailed developing and applying an analytical framework. All codes were compared and similar topics grouped into one of the dimensions of the pre-defined frameworks or as separate overarching themes. Table 7-6 describes the organisation of the identified topics into the pre-defined frameworks or as new emerging themes. There were few emerging subthemes related to quality of life. This could be due to the comprehensiveness of the pre-defined WHOQOL and ASCOT frameworks, which have clearly defined domains and facets. Thus, there is less room for refining and drawing new inferences about the content of the QOL framework.

Table 7-6 Development of analytic framework

6C framework	Pre-defined topics	Additional emerging topics from interviews
Connectivity	<ul style="list-style-type: none"> - Access to ICT - Devices used - Reliability 	<ul style="list-style-type: none"> - Stakeholder enabling access - Proxy use
Content	<ul style="list-style-type: none"> - Motivation - Acceptability - Accessibility 	<ul style="list-style-type: none"> - Improving acceptance - Methods for motivating - Promoting use of familiar ICT, rather than inventing new interfaces
Capability	<ul style="list-style-type: none"> - Skills - Education 	<ul style="list-style-type: none"> - Prior exposure and experience (cohort effect)
Confidence	<ul style="list-style-type: none"> - Attitudes 	

	- Self-efficacy	
Cost	- Affordability - Income	- Relative price of ICT - Funding
Continuity	- Support	- Integrating care - Costing model - Business case - Role of family members
QOL framework		
Control over daily life	- Independence - ADL	
Personal security and safety	- Security - Safety - Privacy	- Ethics
Social interaction and participation	- Social networking - Loneliness - Isolation	
Occupation	- Work - Passtime, hobbies - Volunteer work	
Psychological wellbeing	- Dignity - Positive/negative attitudes	-
Physical capability	- Health behaviours, lifestyle choices - Physical exercise - Mobility	
Emerging themes		
Technological change		- Bridging the gap between technology and care - Interoperability - Standardisation of platforms and technology
Changing the care culture		- Changing the care culture - Future of caring for older people - Engaging with professionals

The sixth step entailed charting the relevant transcript excerpts into a matrix. Each theme and dimension occupied a column of a spreadsheet, and the rows were named after each of the interviewees. Table 7-7 displays a simplified example of the matrix used to chart the interview data.

Table 7-7 Framework Matrix

	Connectivity	Content	Capability	Confidence	Cost	Continuity	Emerging theme: Technological change	Emerging theme: Changing culture of care
Worcestershire telecare commissioner	Quote 1			Quote 2		Quote 3		
						Quote 4		
Westminster Telecare commissioner		Quote 1						
		Quote 2						

The final step entailed interpreting the data, where the opinions and views of the interviewees were compared and grouped in order to gain a deeper perspective on the issues of older people's e-inclusion and access to ICT-based care.

In adherence to the Data Protection Act (1998), the identity of the participants was kept anonymous. The interview participants are referred to by a code, which indicates only whether they are male (M) or a female (W) and they were part of the one-to-one interviews or the focus group (indicated by an F). For instance, participant M3 was an older man who was interviewed one-to-one. Participant W1F was an older woman who participated in the focus group. MonAMI participants are referred to by their site (e.g. Slovakia, Spain, or Sweden) and whether they were a male or female. In the case of quotations, the age of the older participants are given, when possible. Expert interviewees are referred to by the name of the organisation they worked for and the type of role they had in the organisation.

3. Results: interviews with older people

As noted above, the interviews were structured around the a priori theoretical framework of the 6Cs of e-inclusion. The dimensions of the 6C are described in more detail elsewhere. Briefly, the 6Cs consist of connectivity, content, capability, confidence, cost, and continuity.

3.1. Connectivity

The connectivity dimension refers to access to ICT and the internet. From the literature, the most common topic here was the nature of the ICT – both mainstream and care-related – used by older people. Other themes included the quality of the connection to which people have access and the obsolescence and reliability of their ICT equipment.

3.1.1. Access to mainstream ICT

One of the opening questions to participants of the one-to-one interviews (OTO) and the focus group (FG) was the nature of the ICT devices and services the participants used. Apart from one participant, everyone claimed to use either a desktop or laptop computer, and to use the internet. The lone "non-user" explained that he had used a computer and the internet in the past, and he was currently on a waiting list to receive a computer from a charity. Most OTO and FG participants indicated that they possessed a mobile telephone; only one participant expressly stated that they did not own a mobile phone. Satellite navigation systems and e-readers (e.g. Kindle) were also mentioned by some older interviewees. Three participants said they owned a digital camera.

In the pre-trial interview, MonAMI participants were asked about whether they used ICT from a predetermined list (see questionnaire in Appendix A). Table 7-8 below displays the percentage of participants in each site who used each of the ICT devices and services in the questionnaire.

Table 7-8 Percentage of MonAMI participants who used each type of ICT, by trial site

ICT device/service	Slovakia	Spain	Sweden
N=	18	14	30
Computer	44.0	0.0	40.0
TV*	100	71.4	100
Mobile telephone	72.0	57.1	76.7
Internet	33.3	0.0	33.3
Email	33.3	0.0	30.0
Skype	28.0	0.0	13.3
Speech Recognition	0.0	0.0	0.03
PDA [‡]	0.0	0.0	0.1
Notes:			
*Any type: There was no distinction made between analogue and digital television			
[‡] PDA: Personal digital assistant			

A television was used by the vast majority (94.3%) of participants across the three sites. The next most commonly used ICT was the mobile telephone, used by 72.9% of the participants.

Computers were used by both Slovakian and Swedish participants in almost equal measure (44% and 40% respectively). Similarly, the use of the internet was comparable in both Slovakia and Sweden (32.0% and 32.3% respectively). Skype was used by more Slovakian participants (28.0%) than those in Sweden (12.9%).

Spanish participants used very little ICT, apart from the television and mobile telephone. This could be attributed to living in a residential care setting, where access to computers and the internet in their rooms may have been limited.

3.1.2. Engaging with ICT-based care services

Participants of the OTO and FG were also asked whether they used any ICT-based care devices or services. Only two FG participants received any formal ICT-based care services: one received the *Keysafe* service, which allows a formal carer (e.g. from the council or housing association) to enter their accommodation if an alarm is raised and a client is unable to answer the door.

The other lived in sheltered accommodation which included a pendant alarm system. Two other FG participants spoke about being the first point of call in an emergency for family members who used a specialised mobile phone which had an S.O.S. button.

In the pre-trial interview, MonAMI participants were asked about their use of telecare or telehealth services from their local care authority, using the Client Social Services Receipt Inventory (Chisolm et al., 2000). Table 7-9 provides the frequencies of MonAMI participants' use of telecare and telehealth, which were outside of the MonAMI services evaluated in the trial. The results demonstrate that only Swedish participants used telecare or telehealth services.

Table 7-9 Number of participants using ICT-based care services at baseline, by trial site

	Sweden	Slovakia	Spain
<i>Total n=</i>	<i>30</i>	<i>18</i>	<i>14</i>
Telecare	5	0	0
Telehealth	4	0	0

These results could reflect of the availability of ICT-based care in different countries at the time. Sweden, along with the UK, was one of the leading countries in terms of the development and deployment of ICT-based care services (Kubitschke and Cullen, 2010). In contrast, according to project partners, telecare and telecare services were not available in Slovakia at the time of the trial. Also, the Spanish participants lived in a residential care setting with 24-hour care and would therefore not have required community alarm or monitoring systems. These reasons could explain why Swedish participants had experience with telecare and telehealth services, unlike their Spanish and Slovakia counterparts.

3.1.3. Quality of Internet connection

FG participants spoke briefly about the poor connection they often received on their mobile phones, which left them unable to hear voicemail messages. An OTO participant mentioned using a dongle to access the internet, allowing him to work from his boat. Other participants discussed having old equipment, which was too “slow” for what they wanted to do, which could also be related to their internet connection.

3.1.4. Reliability of mainstream ICT

Several older participants confessed to using older ICT equipment and operating systems, such as *Windows Vista*, which interfered with their ability to engage with ICT to the extent they wished. A MonAMI participant similarly illustrates:

“It is difficult [to use a computer] when the computer is stuck or when the program doesn’t work while downloading.”

Sweden, man, 82 years

3.1.5. Reliability in ICT-based care

The threshold for reliability of ICT for care-related services is much higher than for mainstream services, as they are often used for emergency and alarm purposes. One expert noted that while current levels of unreliability may be acceptable for mainstream use, they are wholly inadequate in a system for delivering care services (University researcher, LSE). This was echoed in the experience of one MonAMI participant after a false alarm:

“If [the Gas and smoke alarm] was reliable, it would increase safety. Since the false alarm, we don’t trust it anymore.”

Slovakia, woman, 77 years

At the mid-point of the MonAMI trial, participants were asked about the aspects of the user Interface that they especially liked and disliked. Several participants complained about the reliability of the battery of the mobile phone used to access the ICT-based care services. One participant said that the phone needed recharging too often (Sweden, man, 68 years), or it was difficult to take it on and off the charger itself (Sweden, woman, 80 years).

3.2. Content

3.2.1. Motivation

Motivation relates to level of interest or perceived relevance or need to use ICT. As noted above, participants of the OTO were recruited at an Age UK centre, all of whom attended one-to-one ICT training sessions, suggesting that they were already motivated to some degree to use ICT. Their motivation to use ICT was examined by a consideration of how they felt ICT to be useful and relevant to them.

Most participants stated they used email and Skype. Other recurring internet activities included genealogy searches, online banking, online shopping, and searching for health information. Most commonly, participants found ICT useful for keeping in touch with relatives who live abroad:

“It’s invaluable in being able to contact my relatives.”

M2, 83 years

Other frequently cited aspects of ICT included having access to medical information online or using a specific application related to a hobby (e.g. photography). Three participants also said they used their computer to play games.

Some participants suggested that learning ICT was a useful intervention, because they hoped it would help maintaining their mental agility:

“[I want to learn to use ICT] because I don’t want to die mentally.”

M3, 77 years

In the pre-trial interviews, MonAMI participants were asked to rate their level of interest in acquiring new ICT on a 4-point Likert scale.

Table 7-10 Level of interest of MonAMI Participants in acquiring new technologies, by MonAMI trial site

	Slovakia	Spain	Sweden	Total
N=	18	13	30	61
No interest in new ICT	12.5%	61.5%	20%	27.1%
Mild to extreme interest in new ICT	87.5%	38.5%	80%	72.9%

Note:
“Not stated” responses were omitted.
A binary variable “interest in new ICT” was created; responses “mildly interest”, “quite interested”, and “extremely interested” were coded together as “1” to indicate interest. Responses of “not interested at all” were coded as “0” to indicate no interest.

According to the results (Table 7-10), there was an inter-country difference in the numbers of participants who expressed some degree of interest. Overall, the majority of participants showed a moderate degree of interest (73%), but, the majority of Spanish participants (61.5%) expressed a lack of interest.

Similarly, older interview participants were not always motivated to use ICT. For many, their level of motivation was offset by an expressed lack of interest in ICT in general. Similar to evidence presented by Hill et al. (2008) and Weaver et al. (2010), participants explained that

their lack of motivation to engage with ICT in general was a lack of perceived need to incorporate ICT into their daily routine:

“I think sitting at a computer, unless it’s for work, is a waste of time. I’d rather be doing things. I find I’m not really that interested to be quite honest with you”

W2, 75 years

The pre-trial interview of the MonAMI evaluation also probed into non-users’ level of interest in owning – and using – various ICT devices and services in the future Table 7-11 displays the results of *non-users* level of interest in acquiring different ICT.

Table 7-11 Responses from non-users of different ICT, by MonAMI trial site

	Want a PC			Want a mobile			Want the Internet			Want Skype		
	Yes	No	Not stated	Yes	No	Not stated	Yes	No	Not stated	Yes	No	Not stated
Slovakia	0	5	0	1	4	0	2	4	0	1	3	1
Spain	1	3	1	1	3	3	1	3	4	1	3	4
Sweden	2	4	0	3	3	0	2	4	0	0	5	1
<i>Total N=</i>	<i>3</i>	<i>12</i>	<i>1</i>	<i>5</i>	<i>10</i>	<i>3</i>	<i>4</i>	<i>11</i>	<i>4</i>	<i>2</i>	<i>11</i>	<i>6</i>

Unlike the results in Table 7-10, which measures the attitudes of user *and* non-users and shows an overall tendency towards “interested”, Table 7-11 shows that when considering non-users only, a negative attitude towards ICT prevails. The overwhelming majority of non-users stated they were not interested in acquiring ICT. As most participants of the Spanish site were non-users of mainstream ICT, this could explain their responses in Table 7-10.

3.2.2. Acceptability of mainstream ICT

In general, older participants expressed high levels of satisfaction and enthusiasm for the internet and computers, as one participant typifies:

“I found [the computer] very useful”

M1, 78 years

Participants also noted aspects of ICT which they found dissatisfying. Some complained about the ease with which their privacy could be violated and how easily personal details can be

obtained on the internet. Many older participants also expressed similar levels of ambivalence towards mobile telephones. Several interviewees said that they owned one, but were quick to mention that it was used infrequently:

“I do have a mobile phone but I only use it for emergencies.”

W3, 88 years

Across the three sites of the MonAMI trial, several participants stated that they did not use a computer because of a lack of perceived need:

“I don’t want to use [a computer]. I don’t think I need [a computer].”

Slovakia, man, 85 years

3.2.3. Acceptability of ICT-based care

As mentioned in section 3.1.2, only a few participants of the OTO and FG had experience with ICT-based care. One participant who was a recipient of a social alarm service (telecare) expressed a high level of satisfaction:

“I have a ‘key safe’ outside my door. It is £4 a week which is worth it.”

M1F

Another participant thought that ICT-based care services could be relevant to them in the future, if they had increased needs:

“If I was getting frail, I didn’t have family around me, and I was living in my house on my own I would definitely have one of the necklaces or bracelets.”

W2, 75 years

However, FG participants postulated that ICT-based care services could be unacceptable to many older people, as they are perceived as stigmatising, and this could lead older people to abandon the services:

“My mum ties her cords up [for the care alarm]. She won’t touch them. She probably doesn’t think that she is old”

W3F

In the post-trial interview, MonAMI participants were asked to rate (on a 4-point Likert Scale) the overall usefulness of MonAMI services in their day-to-day lives. The 'usefulness' variable was transformed into a binary variable by combining the "slightly", "moderately" and "very" responses into a single response of "useful" and retaining the response of "not useful". Of the 54 participants who completed the post-trial questionnaire, 48 (89%) found the MonAMI services useful. For example, participants at the Swedish site appreciated the "DoorVUE" service, which allowed them to see who was at the front door of the building on their mobile phone:

"The DoorVue [service is useful] because it provides safety."

Swedish, woman, 67 years

Some participants at the Slovakian site appreciated the community alarm service to keep in touch with their family:

"[I] use the panic button to call my daughter when I feel sick and I don't want to be alone, even if I don't need help."

Slovakia, woman, 66 years

In general, comments from participants at the Spanish site suggested that they found the MonAMI services only slightly useful. But several said that they appreciated the shutter control service:

"[I like the shutter control service] for the convenience."

Spain, woman, 83

3.2.4. Accessibility of mainstream ICT

Most of the OTO and FG participants did not have difficulties in navigating the operating system on a computer, browsing the internet or configuring their digital television. Some participants also discovered how to adapt ICT devices and interfaces to make them more accessible, such as increasing the font size on their e-reader.

However, older participants suffering from physical impairments commonly encountered problems with the accessibility of mainstream ICT. This was particularly true for those with visual impairment:

“I’ve got Glaucoma. I found sitting at a computer for half an hour is long enough because then my eyes get sore.”

W2, 75 years

In the pre-trial interviews, MonAMI participants had similar complaints about computers, which often led them to stop using them:

“[I] don’t like the small letters on the screen. [I] don’t use [a computer] because of cataracts. [I] don’t want my eyesight to get worse.”

Slovakia, man, 82 years

Mobile telephones were particularly criticised in terms of accessibility being complicated, inaccessible in some form, or “an intrusion”. The small size of buttons and the confusing layout of the menus were common complaints:

“I found it very, very difficult to text, because of the buttons. It’s an old phone so you’ve to press several buttons before you can actually start texting. There are several steps to take before you can actually get to what you want to do.”

W2, 75 years

3.2.5. Accessibility of ICT-based care

At the mid-point of the MonAMI trial, participants were asked about the accessibility of the devices and services which were installed in their homes. The user interfaces which participants employed to access the services were mainstream smartphones (Sweden) or touch-screen computers (Slovakia, Spain). These were used in the context of accessing ICT-based care and are therefore included in this section.

In general, the MonAMI participants found the design of the user interface easy to use. However there were some recurring complaints, including finding the font size too small, the lighting of the UI too bright, the touchscreen too sensitive, and the on/off switch too difficult to manipulate. A few participants also did not appreciate the size and shape of the smartphone, which made it difficult to hold and to use.

MonAMI participants also claimed that navigating through menus of the MonAMI services could be confusing and complicated, leaving them unable to access the service:

“Sometimes the person [at the door] had left by the time I saw the picture on the mobile [phone]. It should be faster to view the picture of my outside door when using the [DoorVue] service, like just one press of a button.”

Sweden, woman, 77 years

Comments from the MonAMI participants emphasised the importance of a logical process in the menu of an ICT service, and the problems that could result from making a mistake. For instance, users found that if they got lost in the menu, it was often a “hit and miss” exercise to regain their original position (Sweden, man, 82). They also felt if they pressed the “wrong buttons” that it could lead to “problems” (Sweden, man, 85). One participant explained that pushing the wrong button caused her to inadvertently set off an alarm (Sweden, woman, 87 years).

3.3. Capability

Within the context of the capability dimension, participants spoke about ICT-related skills as well as the specific learning style and needs that influenced their use of ICT.

3.3.1. ICT-related skills

ICT-skills denote a range of abilities from ICT-literacy (the specific language and jargon used to describe equipment, applications and functions), to browsing and programming (Bradbrook and Fisher, 2004). On the whole, participants said that they did not feel that their skill level prevented them from using ICT. In fact when they found a motivation to use ICT, some participants demonstrated a keen interest in acquiring new skills, for instance for configuring their digital television, or for using a mobile telephone. However, the OTO and FG interviews revealed that many older people initially struggled with ICT due to a deficit in ICT-skills. For instance, the language used in an ICT context was often not familiar:

“It might have been foreign language first of all because I didn’t know anything about it.”

M2, 83 years

Others mentioned a lack of skills needed to operate their ICT devices, which impaired their usage:

“I wasn’t going to continue [emailing] because I found that I wasn’t keyboard literate...”

W5, 80 years

3.3.2. Cognitive Ability

Another theme around capability was participants' cognitive abilities. Some interview participants and participants of the MonAMI project spoke of memory loss and of difficulties in concentration, due to a stroke for instance, and that they needed a "long time", or to be shown repeatedly how to use ICT applications. One of the focus group participants noted:

"You have got to take [older people's] well-being [into account]. I need services that give me time to concentrate because I am very focused on my illness."

M1F

The evaluation of the MonAMI services also revealed similar difficulties for older people with some memory loss when learning how to use the ICT-based care services; as one trial participant explained:

"It is easy for me to forget the [menu] sequence if I haven't used the MonAMI services for a while."

Sweden, man, 77 years

3.3.3. Learning style and needs

One expert commented that a major barrier to use of ICT by older people is the fact that they have never learned to use it (London School of Economics, lecturer). It has been suggested that the process of learning to use today's ICT applications requires an intuitive and experimental approach, which may be unfamiliar to today's cohort of older people who are used to a more methodical, step-by-step approach to learning (Paul and Stegbauer, 2005). Comments from the older and expert interviewees showed some support for this theory. For example:

"When [television] went digital I could do all that myself. I follow the instructions and I can fix my television and anything like that. But electronic things as far as [mobile] telephones go and that I'm not very good with"

W2, 75 years

Similar trends in learning style were found in MonAMI participants. When providing feedback about how to improve the MonAMI services, they suggested including a small set of clear "instructions" (Slovakia, woman, 66 years).

The need for appropriate and responsive training to accommodate the specific learning challenges facing some older people was raised regularly in the interviews. OTO and FG participants underlined the essential qualities required of training. For instance, lessons should

be set at a slow pace and trainers should be personable and able to communicate clearly. Most of all, trainers were expected to have “patience” (M1F):

“I think the older you get it’s definitely more difficult to learn these things. [Older people have] got to have a lot of patience, and people teaching you have got to have the patience, and that doesn’t always work”

W2, 75 years

Experts spoke of the “success” of intergenerational initiatives which encouraged young and older people to share their skills and experiences in community-building efforts:

“Older people are even better with younger people, [when they] work together. So that they have an excuse of getting their stories down on the computer, or whatever it is”

ILC-UK, executive

However, the intergenerational model was not always well received by older people:

“They had sixth formers – they knew what they were doing, obviously, but they couldn’t teach. They couldn’t put it over.”

M2, 83 years

3.4. Confidence

The confidence dimension refers to a persons’ psychological disposition towards ICT; it is also apparent in a person’s self-assessment of their ICT-skills. The confidence dimension is identified through descriptions of attitudes, and level of interest in ICT.

Older interview participants expressed a range of attitudes towards ICT. Some participants were very positive about ICT:

“I think the Internet is marvellous.”

M1F

However, others expressed negative attitudes towards technology:

“When I retired, my daughter got me a computer as a surprise. I had to pretend that I was pleased.”

W1, 73 years

But interview participants also expressed ambivalence towards ICT, which was encapsulated by one woman's comments:

"There are things that are fantastic, such all my research for ancestry. It is also good for emergencies. I am not totally against it but I wouldn't say I enjoy [using the internet]."

W1, 73 years

There were also comments which demonstrated a lack of self-confidence in their own abilities to use ICT:

"Most people that I speak to who are my contemporaries feel the same. We can only cope with very basic things and new technologies come along. What I'm saying is I'm not naturally technology minded."

W5, 80 years

In the pre-trial interviews, MonAMI participants also demonstrated a lack of self-belief in their abilities which prevented them from using mainstream ICT:

"[I don't use a computer because] I don't believe I am capable."

Spain, woman, 85 years

The MonAMI participants were also asked to expand on the reasons for not using a computer and the internet. Some responses were overtly related to participants' confidence such as that they "couldn't manage it", or that they felt they were "too old":

"I am too old and I would not understand it."

Slovakia, woman, 91 years

3.5. Cost

Hill et al. (2008) argued that older people's perception of the affordability of ICT was a contributing factor towards their ICT engagement. Indeed, the topic of access to ICT equipment and services in relation to their cost was consistently raised during the one-to-one interviews and the focus group. Participants had a range of perceptions of the affordability of ICT:

“Well it is £400 for a laptop and a printer and software. Who can find £400 in a hurry? I can’t.”

M1F

“It isn’t an issue for a friend of mine. If she wanted it, she could buy it.”

W1F

Older participants and experts also pointed out that acquiring ICT also assumed an ongoing financial commitment. Interviewees discussed the continued need to purchase peripheral “add-on” devices, software and upgrades, as well as to pay for maintenance and support services:

“You can pick up a computer for £50, but then you need someone to connect it up for you, and that costs a bit of money. [Older people] then need someone to show them how to use it bit by bit. You can see how this is going to ratchet up the cost.”

W4F

Others commented on the ICT-industry building “obsolescence” into ICT, forcing consumers to continually acquire updates to support ever more sophisticated applications:

“Computers and [smartphones]: it’s a money making thing. You buy your phone and then a year later they’ll update it and sometimes you can’t get into [your files].”

W1, 73 years

The discussions about cost also unearthed attitudes towards spending in general and, implicitly, the value that older participants placed on ICT. For instance, many participants said that they hesitated before they purchased ICT as they contemplated whether it was something they really needed:

“When I go to buy something, I still think in the back of my mind, even though I can afford it: “Do I really need it? Can I justify spending that amount of money on that?” I do have that reservation still. I don’t think the younger generation have that reservation.”

M2F, 68 years

“I’m one of these people who do not buy easily. I want to know what I am buying and what I can do with the equipment.”

M3, 77 years

Cost of mainstream ICT was not a topic in any of the MonAMI interviews.

3.6. Continuity

The continuity dimension refers to the supportive infrastructure that encourages older people's engagement with ICT. This includes the roles of different stakeholder groups in supporting older people for e-inclusion. Such groups include older people's informal networks, third sector organisations, local government, policy makers at national level, formal care agencies, and corporations in the commercial sector.

The interview data revealed that older people look to many different sources for support. The analysis also highlighted some of failings of the existing infrastructure and areas which need improvement. The MonAMI project did not explore the topic of ICT support. Therefore in this section, I focus on the supportive infrastructure in England and the MonAMI interviews are not included in the analysis.

3.6.1. Informal networks

Results from all series of interviews stressed the crucial role that informal networks play in supporting almost every aspect of older people's engagement with ICT. Almost all one-to-one interview participants spoke about how their family, friends, neighbours and peers acted as "intermediaries" in their decision to acquire ICT equipment or to use various ICT services.

Family members were most influential in convincing older participants to use ICT:

"I was persuaded to by my granddaughters [to use ICT]. Mostly because then I could use Skype to contact the grandchildren in Australia."

M3, 77 years

Family members could also be key players in financing older participants' ICT equipment and services:

"I've got a [mobile] phone that my family bought me."

W1, 73 years

Participants discussed how they turned to their informal networks for support for ICT training and ICT maintenance:

"My daughter taught me actually."

W2, 75 years

Another way in which informal networks played a role in ICT-engagement was by acting as proxy users, as one OTO interviewee explained:

“I wasn’t interested in the more advanced stuff, like photographs and downloading stuff. My family do that for me”

W2, 75 years

3.6.2. Third sector

Given that OTO participants were recruited in an Age UK centre, it is not surprising that this group of participants heralded the invaluable support that the third sector provided to them in their continued ICT training. One OTO participant indicated that volunteers helped to motivate her to acquire ICT:

“And [the Age UK tutor] enthused me then to go online, and we created a name for my email address and then I didn’t have a computer”

W3, 88 years

This service was considered vital to older people, especially to those who did not have family or friends living in the vicinity. In that respect, the community and voluntary sector has a similar role to the family for older people who are more isolated. At the same time, there was recognition by older and expert interview participants that many community services were closing down due to lack of funds.

3.6.3. Local government care agencies

Focus groups participants discussed their expectations of local government in providing equipment to older people. For instance, one participant suggested that more could be done for older people specifically:

“If [social services] can give laptops to children, they can bring out a version for older people. I phoned up and asked if you could rent a laptop and I was told that it wasn’t possible. Well, why not? Why can’t local authorities do more?”

M1F

Another focus group participant suggested that local government could be involved in training:

“I think that local authorities could have a part to play [in training].”

W4F

3.6.4. Commercial sector

FG participants highlighted what they saw as the fact that there is an assumption throughout the commercial sector that everyone is able to access online information and services, which they noted was particularly discriminating against older people:

“What I would like to get on to now is if you haven’t got a computer, and people say: “Look online”. Now that is a very big problem.”

M1F

FG members suggested that private corporations could make more direct charitable contributions towards older people’s e-inclusion by offering free training:

“There is plenty of IT support companies out there. You could have a few people doing a couple hours a week as a charity for older people.”

M2F, 68 years

3.7. Emerging themes from older interviewees

A few additional themes emerged through the analysis of the interview data. These included the effects of what was seen as the dominant techno-centric culture and older people finding their voice amidst this cultural shift.

3.7.1. The effects of the domineering techno-centric culture

The first emerging theme, discussed mainly by OTO participants, entailed the need to recognise the significant changes occurring in British society, largely attributed to the ubiquity of ICT. Older participants discussed changes in relating to people as well as in accessing services. They also spoke about changes in social norms, which they described as increasingly dehumanising. For instance, ICT replaces some of the physical - or tactile - features of daily life:

“I would find it extremely difficult to get rid of my books because they are like a bunch of old friends. I just cannot imagine kicking out my old friends and having everything on a Kindle. I’m one of these people that wants the tactile contact with [books].”

M3, 77 years

Older participants also observed that there appeared to be new social norms around human relationships, where there is a preference for relating to devices, rather than face-to-face with other people:

“[My grandchildren] are more in touch with their mobiles now than the real world.”

W3, 88 years

Other comments show participants’ concern that the techno-centric culture has caused a breakdown in the social and commercial fabric of our communities:

“You buy it cheaper [online] but then look at the shops that are closing because people aren’t going out now. Isn’t it sad that the only thing you have to do is sit on a computer, you can’t go out and meet people and chat to people while you’re shopping.”

W1, 73 years

Experts concurred that as our society becomes more centred on technology, older people risk become further isolated. For instance, one expert noted that the government identified ICT as a tool to help ease loneliness in the *Campaign to End Loneliness* (Freelance consultant). Another expert criticised the emphasis put on investing in technical solutions to social problems (London School of Economics, researcher).

It was argued by experts that there is an assumption in mainstream society that everyone has access to – and uses – ICT. However, this is not the case for millions of older people. Furthermore, telecommunications providers have been slow to provide a technical infrastructure which could help (older) people to improve their communication networks. At the same time, under the assumption that everyone has access to digital resources, other public services such as transport links and libraries are being reduced or discontinued in the very areas which have limited broadband coverage. This leaves older people in poorly serviced areas as subject to a “double hit”, which isolates them further (Digital Unite, analyst).

3.7.2. Managing their role and voice in society

The second major emerging theme concerned maintaining older people’s independence amidst the dramatic societal changes. In many ways, interview participants demonstrated they were ready to embrace these changes:

“I think you have to look ahead – you can’t look back!”

W3, 88 years

A couple lamented their losses brought on by ICT, such as the disappearance of their pastimes and old way of life (e.g. writing letters long hand and calligraphy). Other participants expressed concern for the loss of face-to-face services:

“A lot of times now, if you want to book something it says: “Go on Facebook, go on the Internet.” [There are] often things that you can only do online, even hospital appointments, now. I’m thinking there are people [who can’t use the internet].”

W1, 73 years

Others spoke about being “forced” into using ICT, where they would have to engage in society under someone else’s terms:

“As usual [ICT] is been forced on us. I don’t want it and its being forced on us, like Big Brother isn’t?”

W1, 73 years

Indeed, one FG participant spoke about voluntary e-exclusion, suggesting that older people should be able to “opt-out” of the techno-centric culture without discrimination:

“Who doesn’t want to be online? [They are] not happy to be on-line and that is it, end of story. A lot of [older people] have a resistance. They don’t see any advantage to them and they are not interested in bothering with it.”

W1F

On the other hand, participants also provided examples of how they used ICT to re-establish their position and voice in society. For instance, one older participant explained how ICT provided a new medium for him to express his views:

“You can comment [online] and I think it’s your duty to do so. If you haven’t received good service it’s good to stand up and speak out.”

M3, 77 years

Experts acknowledged that the new social norms could be alienating for many older people, especially with the emergence of behaviours and practices which are tolerated today, but which were once considered insolent and impermissible, such as lack of punctuality and public sharing of one’s personal life (University researcher, LSE). This same sentiment was shared by an OTO participant.

However, experts also warned against mindlessly using common stereotypes which portray older people as either obstinate in keeping to their old ways or resigned that they are “too old” for ICT (Policy Analyst, Department of Communities and Local Government). Rather, the experts suggested that older people are resilient and resourceful, and many are increasingly using ICT to assert their independence and voice:

“Older people will now be guerrilla consumers, saying: “I looked on there – this is unacceptable”. Instead of seeing them as passive: “Come on dear, you can go on the internet”, they’ll be saying: ‘I’m on the internet!’”

King’s College London, academic

4. Results: interviews with experts

4.1. Connectivity

4.1.1. Access to mainstream ICT

The discussions with expert about access to mainstream ICT centred on internet access. A few experts alluded that generally, older people had poor levels of home access to the internet:

“According to the demographics of our county, [very few people in] our population over 65 have got broadband in their house.”

Worcestershire County Council, telecare commissioner

Experts also discussed internet access in different settings. In chapter 6, I explained the poor levels of internet access for older people living in residential settings. One expert also noted that internet connections in care settings are not the norm:

“It could be a very attractive [selling point] if extra care facilities said that they provided internet support.”

King’s College London, senior researcher

One expert also talked about issues around connectivity for older people who live in rural areas:

“Good internet access in rural areas is still an issue. When it comes to older people, it’s a double issue because they have often also been hit by the reduction in transport services. So they end up being disproportionately affected. The super-fast [broadband is being] rolled out, but it’s just too expensive for [telecommunications companies] to deliver good broadband for everyone [in remote areas].”

4.1.2. Stakeholder involvement in older people’s connectivity

Experts gave examples of the involvement of other stakeholders in enabling older people’s connectivity. Several experts commented on the involvement of older people’s family members who often give them ICT equipment or pay for their service subscriptions:

“[In a focus group that I run, older people] have all got mobile phones. Most of them have been given it to them by their family.”

Westminster Local Authority, telecare commissioner

“[Older people] sometimes inherit a new mobile phone at Christmas [from their grandchildren] and they just don’t know what to do with it.”

Age UK London, programme manager

Two experts discussed the role of library access for older people who do not have home access. One expert suggested that older people rely on library access:

“What is happening to libraries is disastrous. A lot of [older] people without access to a computer at home that would typically go to the library and use the computers there.”

Independent consultant

However as mentioned previously in chapter 6, the other expert suggested that libraries do not offer adequate access which suits older people’s needs:

“Libraries have reduced opening hours, which [older people] may not be able to get to, the technology tends to be fairly basic, and they are often occupied by young people doing their homework. This is not good enough for citizen access”

SCIE, programme manager

4.1.3. Access to ICT-based care

Discussions with ICT-based care commissioners revealed some of the types of ICT-based care services deployed across England. Fall-detection alarms, localisation services, automatic pill dispensers, bed sensors were all mentioned as examples of the types of telecare devices and services offered to clients. Telehealth commissioners also discussed the vital signs monitoring equipment used by clients in their homes to monitor blood pressure, weight and blood glucose levels. However one telecare commissioner noted that the most common form of telecare used by older people is the basic care alarm, which consists of a pendant or bracelet connected to a base unit:

“Care alarms services have been in existence for many years in the Borough. They have always used a pendent and base units set up. Several years on and you still find that’s probably the most beneficial piece of equipment that we use.”

Tower Hamlets Council, telecare commissioner

4.1.4. Reliability of mainstream ICT

Experts provided examples of older people using second hand or refurbished equipment which had pre-existing problems, such as viruses or obsolete operating systems. They also commented on the effect that using older and unreliable equipment had on older people’s ICT engagement:

“[My clients] have to fight against their machines to get what they want out of it particularly if they’ve got a reconditioned one or they are using an outdated version of Windows. Sometimes it is the equipment that can become the barrier to actually achieving their [e-inclusion] goals.”

Age UK Oxfordshire, ICT tutor

Two experts also pointed out that many older people were unaware of the dangers of using the internet, making them particular vulnerable to cybercrime:

“Financial abuse used to be about being mugged or having nasty friends: It was inter-personal. It is moving it into cyberspace, in which people are targeted, people’s names are sold, and people’s details are circulated. The police have developed a much more sophisticated understanding of what is happening, and are seeing it as huge organisational crime. Financial abuse is a big area for vulnerable people.”

King’s College London, senior researcher

4.1.5. Reliability of ICT-based care

As discussed in the analysis of the connectivity dimension in chapter 6, several experts also expressed concern about the reliability of the ICT infrastructure for ICT-based care services.

The threshold for reliability of ICT for care-related services is much higher than for mainstream services, as they are often used for emergency and alarm purposes. One expert noted that while current levels of unreliability may be acceptable for mainstream use, they are wholly inadequate in a system for delivering care services:

“Cheap Internet service providers customise [services] to a mass market, which will tolerate occasional breakdowns. Cheaper offerings have made [the internet] both less robust and reliable. This is bad news if you want to provide health or emergency services, which have to be 99.9% reliable.”

London School of Economics, researcher

Experts also noted that some ICT-based care devices rely on battery power, but they said the battery life in the devices was not adequate for the purposes of ICT-based care:

“With a lot of this equipment batteries are the biggest issues. The battery life for the “safer walking” service was only 5 hours. If somebody is out for 2 [hours] and they get lost and we are trying to find them, we need more than 5 hours of battery life.”

Westminster Local Authority, telecare commissioner

Another issue raised by the same expert was the unreliability of mobile phone signals for running a telecare service in an urban setting:

“There is a mobile unit for the Tunstall system, for people who don’t have landlines. The main issue is that the mobile equipment doesn’t have the same reliability for out-going calls, particularly at peak times when everybody starts using their mobile phone. There is also an issue for the “safer walking” service, we found that the mobile liability of network was weather dependent.”

Westminster Local Authority, telecare commissioner

A few experts mentioned that there can be interference at the exchange, where cable network services can compromise the reliability of ICT-based care services:

“If customers upgrade their Sky or Virgin broadband packages, they put a new device into the exchange. That presents a problem. Customers then get a letter which effectively says: “If you have got any telecare devices, these won’t work in the future.” This means that your house could be on fire and it is not alerting the control centre.”

King’s Fund, senior researcher

Several experts also noted that many older people live in older properties, which have an inadequate infrastructure to support the installation of ICT-based monitoring equipment:

“In some homes you will have problems with wireless interference because there will be dead spots. You couldn’t rely on this [monitoring service] for an alarm.”

Foundation for Assistive Technology, programme manager

4.2. Content

4.2.1. Motivation to use mainstream ICT

Four experts acknowledged that motivation was an essential aspect to older people’s e-inclusion, which was summarised in the statement:

“It is often the motivation that is the one factor that is different. It is not that they are richer necessarily or that they are more confident. It is often that they have a motivation; not an interest in the technology, but a motivation”

London School of Economics, senior researcher

Several experts commented that some older people had low levels of motivation to use ICT. Three experts hypothesised that poor levels of motivation were due to older people’s lack of perceived relevance of ICT, as one expert explained:

“There is a significant number of [older] people who say: “Well, it is too late. What do I need to do this for now? I have lived all of my life so far. I have managed all right until now. Not interested. Don’t see the benefits.”

UK Online, analyst

Indeed, several experts observed that many older people are motivated to use ICT when they perceive a benefit. The most commonly perceived benefit mentioned by experts was to keep in contact with family members. Other uses mentioned included uploading photographs, health-related content, researching genealogy and doing online shopping:

“[Motivation] comes together with having children, for example. One of the things that you often hear from older people: “My children moved to Australia and then they had a grandchild”. And then they started using Skype.”

London School of Economics, senior researcher

“There are many hooks that help older people [become motivated to use the internet]. For instance, on-line shopping enables older people not to have to come back with these heavy bags. Family history, social networking, health applications, social care applications help older people’s health and social wellbeing.”

Department of Communities and Local Government, policy analyst

Expert interviewees discussed that older people need to be shown how ICT use can personally benefit them, in order for them to become motivated to use ICT:

“A computer is like any other tool. You’ve got to have a purpose for [using a computer] and so I try to determine what that purpose is, what is relevant to their lives. It could be all sorts of things.”

Age UK Oxfordshire, ICT tutor

4.2.2. Motivation to use ICT-based care

Three experts discussed how older people have strong motivations to use ICT-based care when they have a perceived need for care:

“The motivation [to use telehealth] is very strong. If someone has got a life threatening illness, or a chronic illness that they are living with, then the motivation to learn the process of interacting with very specific equipment [is high]. Most people, if they are sufficiently motivated, will learn to do it regardless of whether they are ICT savvy or not.”

Advanced Digital Institute, analyst

4.2.3. Acceptability of mainstream ICT

According to several ICT experts, it was essential for ICT to be perceived as relevant and useful in order for older people to engage with it. However, only a small number of comments were made by experts on older people’s level of acceptability of ICT. One expert suggested that once online, older people showed high levels of acceptability of the internet:

“We know older people are quite committed when they get online, they enjoy it and stay online.”

Citizens Online, analyst

Another expert suggested that the acceptability of ICT is subject to a cohort effect and noted differences in the acceptability of ICT between younger -older and older – older people:

“There is a mixture of acceptance of the technology [amongst the older population]. The “older” older people currently are less receptive of technology than the “younger” older people. In 5 years-time, you are going to have far more people who are technologically aware, who are reaching the 65 threshold. The expectation is that the acceptance of technology will be greater [in the future].”

Worcestershire County Council, telecare commissioner

Two experts suggested that mainstream ICT is not acceptable to many older people because of its lack of specific purpose:

“[One] barrier stems from the fact that desktops and laptops tend to be general purpose [machines]. People end up fighting with the machine and not really getting to what they want to do, which turns a lot of people off.”

Age UK Oxfordshire, ICT tutor

Several experts suggested that older people’s acceptability of ICT could be improved if ICT services were delivered on familiar devices and interfaces:

“Someone to who has been doing something the same way for several decades isn’t going to want the new-fangled devices in their home which they don’t understand. If you adapt [the technology] to something that they are using, like the TV, or the phone, then you would be reaching the older market with something that they are comfortable with.”

Insight Social Research, researcher

Experts also discussed the risk of stigmatising older people when ICT devices and applications were marketed as a “product for older people”, which they also observed led to rejection of the ICT. Universal design was often emphasised as the way to entice older people to adopt ICT:

“If you make it universal design, then it is much more acceptable to everyone, because whatever anybody says, there is still a stigma attached to being old – particularly to being old and frail and disabled. So universal application is marvellous.”

International Longevity Society-UK, executive

4.2.4. Acceptability of ICT-based care

Only a few comments were made by experts around older people’s acceptance of ICT-based care. One expert explained that there are high levels of acceptability of the services amongst older service users:

“People are just reassured by the fact that they can press that pendant or alarm and get through to somebody and that seems to outweigh any concerns around being embarrassed that it is visible.”

Tower Hamlets Council, telecare commissioner

On the other hand, several experts discussed that ICT-based care can be stigmatising, causing older people not to accept the services. The issue of the stigma of ICT-based care is explored in chapter 8. However, five experts suggested older people’s acceptance of ICT-based care could improve if the services were promoted as a benefit to users’ quality of life, rather than as a consequence of illness or frailty:

“People don’t want to be labelled disabled and vulnerable. Some boroughs have changed [their advertising campaigns] from: “If you fall, get one of these” to “If you want to feel safer at home, get one of these”. They have had a massive intake because people are [responding to the notion of] the safety in the home.”

Westminster Local Authority, telecare commissioner

“To get buy-in from particular stakeholders you have to think very carefully about the terminology around [telecare]. People just didn’t want to be associated with the term “care” because they think that the next step was that they were going into a home and it has all sorts of those connotations.”

King’s Fund, analyst

Similarly, a few experts also made suggestions about using mainstream media to normalise the use of ICT-based care in order to improve older people’s acceptance of the services:

“It could be a mainstream service if it was mentioned in TV programmes, if it was advertised in newspapers, if you could buy [the equipment] in pharmacies, DIY stores, other High Street places, and if every LA offered a service at a reasonable, economic price.”

King’s Fund, analyst

4.2.5. Accessibility of mainstream ICT

Expert interviewees discussed some of the difficulties many older people experience with manipulating mainstream ICT. Five interviewees mentioned common impairments such as arthritis, deteriorating vision, and changes in cognitive abilities, which prevent older people from accessing mainstream ICT. For example, experts commented that the design of ICT, in relation to cognitive abilities, plays an important role in their e-inclusion:

“It is not just a matter of dealing with IT during your working life during your earlier years. It is also a question of just how the interfaces are designed. [ICT needs to be designed to be] fairly simple and understandable.”

Insight Social Research, senior analyst

Three other experts discussed that some ICT devices and services are - and should be - designed specifically for older people’s needs and preferences to improve their accessibility:

“Digital Outreach [for the digital switchover] provided very large handsets, with very large buttons, for people who had arthritis. For people who were partially sighted, they could get equipment with large displays on them.”

Royal Volunteer Service, service manager

However in chapter 6, I presented experts’ views on the market implications of designing ICT especially for older people, which suggested that many people do not appreciate this form of targeted marketing.

Finally, three experts commented on the potential of touchscreen technologies for improving the accessibility of ICT for older people:

“It is frustrating to watch the special mice with the large balls in the middle wandering across the screen as [older people are] trying to guide it to a particular area. The iPad [tablet] is far more user friendly for older people. It is a lot more intuitive and causes far less problems in terms of spurious error messages coming up and things like that. They don’t really need the Microsoft suite of office programmes. They’re not going to be building spreadsheets.”

Age UK Oxfordshire, ICT tutor

4.2.6. Accessibility of ICT-based care

Four expert interviewees commented on some of the accessibility issues that some older people experience when using ICT-based care services:

“Taking blood pressure is easy and sending the reading electronically is terribly easy. It is not a technological challenge. The challenge is exactly what people put their finger on. It is making [the service] seem very easy to somebody who may not be used to using technology in their daily life.”

University College London, senior researcher

Several experts pondered on future possibilities for delivery of ICT-based care, which use simple ICT devices and familiar interfaces, such as a television or mobile phone. One expert explained the benefits of using a TV screen both as a way to improve the accessibility of the devices, as well as minimising the stigma associations with having ICT-based care in the home:

“The TV is great because it is set up in a room such that [users] are in a comfortable position. Also because it has a big display, [users] are able to see it. If you wanted to put a [telehealth] hub in, you can drop it behind it and nobody is going to see it.”

Kent County Council, telehealth commissioner

Experts’ opinions on the use of touch screen for ICT-based care was mixed. One expert suggested that touch screens were an accessible way for delivering ICT-based care:

“People got on with the touch screen better than they did with keypads.”

Kent County Council, telehealth commissioner

However a few other experts suggested that touch screen devices were not always considered as accessible for older people with care needs:

“I have heard some people say that some of the touch screen devices, older people are finding really accessible. On the other hand, one of our user panels of the WSD sites didn’t find the touch screen technology helpful; they wanted to push buttons.”

King’s Fund, analyst

4.3. Capability

4.3.1. Skills for mainstream ICT

Several experts argued that many mainstream devices and services are complex and require advanced skills to use, and inferred that many older people who lack such skills face a significant barrier to engagement with ICT:

“There is a skills gap, both for computers and mobile phones. Many older people have got [a mobile], but very classically they have them switched off. There is a lack of understanding. So to an extent it is a lack of skill about how you use something.”

Citizens Online, analyst

“The internet doesn’t ask you questions, you have to ask it questions. You have to almost be an expert in what you want to find to be able to find it.”

London School of Economics, senior researcher

In particular, some experts discussed that many older people lack skills related to the language of ICT. Three experts described aspects of the language around ICT that can be alienating for older people who are not familiar with the terms:

“And the problem is the terminology. It puts [older] people off and reduces their confidence. They don’t want to look like a fool.”

Royal Volunteer Service, service manager

However, some experts found that many older people had good ICT skills. One expert discussed findings which demonstrated that once older people acquired ICT skills, they had similar level of e-inclusion as younger people:

“Once older people are on line, once they are engaged, and they have a certain amount of skill, there is actually not that much difference anymore between younger and older people.”

London School of Economics, senior researcher

4.3.2. Prior exposure: a cohort effect

Some experts commented on older people’s level of education and prior exposure to ICT, suggesting that older people’s levels of ICT skill are due to a cohort effect:

“Skills are both related to physical skills, motor ability, but also social skills in terms of networking and in terms of creative or critical understanding of material. That is problematic because [older people] have either not learned it or have come from a background where it is part of their lives. All these [statistical] relationships that we find in the general population are even stronger in this older population.”

London School of Economics, senior researcher

4.3.3. Skills for ICT-based care

The expert interview data included a few comments about the types of skills older people need to access some ICT-based care services. For instance one expert noted that some telehealth services need a certain level of ICT-literacy:

“[Older people] have to be computer literate and they have to be willing to plug [the peripheral devices]. They come as a USB. They have to be willing to plug it into their computer so the results are downloaded to us.”

Southampton Primary Care Trust, telehealth commissioner

Another interviewee inferred that a certain level of cognitive skill is needed for ICT-based care:

“Telecare users go around pick up sensors and put them away, put them in a cupboard or through them away because they forget they are there. A flood detector is no good if it is in the kitchen cupboard.”

Kent County Council, telehealth commissioner

4.3.4. Learning style and needs

Topics around ICT training for older people were widely discussed by experts. In particular, several experts expressed their views on the methods for training. In a similar vein to the comments that experts made about demonstrating the relevance of ICT to improve older people’s motivation to use it, several suggested that ICT training should focus on what older people want to achieve through ICT, rather than on simply teaching them to use an ICT device:

“Why would anybody just want to ‘do ICT’? It’s only a means to achieving what people actually want to do. You’ve got to know what people want to do and have an approach to helping them realise it. It is not ‘would you like to do computers now?’”

SCIE, programme manager

“[Training] should be emotional and personal, because that is when you really get a convert. There’s no point just spouting stuff off generically. You need to listen to that individual, work out their needs, think about the things they’re not telling you, be sensitive to the issues they may have around adoption: “I’m going to look stupid”; “I feel too old”. Whatever those other things are that influence that person’s experience.”

Digital Unite, analyst

Three experts noted that older people's learning styles were more conducive to a methodical, step-by-step approach to learning, rather than a trial-and-error, experimental approach which is more common amongst younger generations (Paul and Stegbauer, 2005):

"The sheer range of things that you can do with a computer connected to the Internet is a problem. It is so big and [users] have to make lots of decisions. There is no stepped process that you go through. It is an exploration. Older people are looking for a simple process that they can learn and just do every time."

Advanced Digital Institute, analyst

ICT experts also had strong views on the necessary qualities of training resources for older people. For instance, it was also suggested by four different experts that training courses should to be given at a slow, gentle pace, and that trainers need to have patience:

"People [who come to the centre] often say that in [the Adult Learning] courses the pace is too fast, they feel stupid asking questions, and the subject is irrelevant to them."

Age UK Oxfordshire, programme manager

It was further mentioned by two experts that older people prefer one-to-one, personalised tutorials:

"A lot of [older] people said that was really important that they got one-to-one with someone who would patiently explain [ICT]. They said they preferred this to courses where they are one of ten people and they go at a set pace, covering set topics."

Age UK London, programme manager

Three experts explained the positive effects of training conducted in an informal, friendly manner on older people's acceptance of ICT and their ICT-skill levels:

"Older people understand that the web holds a lot of information. Older people are also hearing about this thing that they don't feel a part of. So, you need to reach people informally, in informal settings for people to develop their skills."

Citizens Online, analyst

Two experts also referred to the peer-training model, based on the notion that older people learn more readily from someone to whom they can relate, and who has similar experiences. The peer training model also looks to build up older people's confidence with respect to ICT, so that they can then pass on their knowledge and skills to others:

"We were proposing a model of peer support. Working with people until they got confident enough to pass on their skills to others. So you were you were helping people progress in their sort of knowledge and confidence."

Independent consultant

4.4. Confidence

4.4.1. Attitudes towards mainstream ICT

Experts commonly noted that attitudes varied widely across the older population. Some experts discussed that there has been a recent shift in older people's attitudes towards ICT, where many older people are positive, aware of the benefits and keen to learn – and to use – ICT:

“Not very long ago, older people's attitudes towards mobile phones were: “Oh, no. I don't want one of those. How inconvenient!” Now, when we go to install equipment and find that they don't have a landline, because they have a mobile phone. Something has happened in the minds of older people that have gone from not wanting it because it is “technology”, to having to have it because it is really useful.”

Kent County Council, telehealth commissioner

“All our evidence suggests that if you sit down and gently introduce older people to internet over a period of time to help them use it, they don't look back. They absolutely embrace it.”

Department of Communities and Local Government, policy analyst

On the other hand, four experts observed that some older people held more negative and defeatist attitudes. In particular, experts noted differences in attitudes between “younger” and “older” cohorts of older people:

“There is an enthusiastic minority of people that are in their 70s, 80s and older who are actively interested in computers and in the Web. But most people in that age-range believe that it is not for them and have got a great fear of computing and technology.”

Advance Digital Institute, analyst

4.4.2. Attitudes about ICT-based care

The topic of older people's attitudes towards ICT-based care was touched on briefly by a few experts. One expert commented that older people had positive attitudes towards using the ICT-based care services as part of the *Whole Systems Demonstrator* trial:

“After people learned how to use [the ICT-based care services], we didn't have any problems. [Participants of the Whole Systems Demonstrator trial] just took it on as part of their living and enjoyed it a lot.”

Newham Primary Care trust, programme manager

On the other hand, two experts suggested that some older people had negative attitudes toward ICT-based care:

“Giving them a medicine dispenser takes a lot of persuading for them because they see it as complicated. Usually [older people] say: “Don’t need it. Too much, too complicated. I will stay with what I have got”. It scares them. It is the change thing.”

Westminster Local Authority, telecare commissioner

As with mainstream ICT, one expert noted differences in attitudes between younger – and older – older people towards ICT-based care:

“The younger older person is potentially more up for using technology. It becomes more problematic for people who are 85 years and older. For instance, they may be less keen about having a GP consultation on Skype.”

Independent consultant

Another expert commented that the level of stigma associated with ICT-based care influences older people’s attitudes towards adopting the services:

“The health services are less stigmatising in that way than the social care services. People love the telehealth. Social care however, sometimes there is a stigma that is attached to social care which can inhibit [older people’s adoption of it].”

Kent County Council, telehealth commissioner

4.4.3. Self-efficacy about mainstream ICT

Several experts discussed older people’s level of self-efficacy of ICT. One expert suggested that many older people have high levels of self-efficacy:

“I found 85% of the over 60s were extremely able and confident when it came to digital switchover technology and any telecare items that they might have used. They took it on board and sometimes they are streets ahead of the rest of us. Once people have got the confidence to do those few basic steps, they love it.”

Royal Volunteer Service, service manager

However three experts suggested that ICT self-efficacy among the older population was generally low; as one expert stated:

“For an older person, it is totally about confidence. I think there is a significant role in confidence building and barrier debunking, so that people can understand what it means and whether their fears are really founded or not.”

UK Online, analyst

4.4.4. Self-efficacy of ICT-based care

There was little discussion about self-efficacy in the context of ICT-based care. However, one expert suggested that some “older-old” people do not have the confidence to operate ICT-based care:

“The “older” older people might not be able to [access telehealth services through a television]. “Oh. I can’t. I don’t know how to do that. My 5 year-old grandson can tune it.” That sums up how older people [of that age] address technology.”

Worcestershire County Council, telecare commissioner

4.5. Cost

4.5.1. Affordability – Mainstream ICT

Cost is the 6th dimension of the 6C framework and is not a dimension in its own right in the original 5C model of digital inclusion. When asked about the impact of cost as a barrier to older people’s e-inclusion, two experts commented that it is not as significant a dimension as it once was:

“Cost [as an issue] has definitely diminished [in importance] over the years. Lack of interest, apprehension and lack of understanding of context remain the biggest worries for older people. Cost is still on the list but it’s further down the list.”

Digital Unite, analyst

The same expert, along with a few others, also suggested it was because the relative price of ICT equipment has fallen:

“Sixteen years ago getting a computer and all the things that went with it to get on the internet was more expensive. The cost of equipment and the cost of connectivity has come down without a doubt. I don’t think it’s the significant outlay that it once was.”

Digital Unite, analyst

However, experts did not all agree that the cost dimension was diminishing in importance with respect to older people’s e-inclusion. One expert noted that although the relative price of ICT equipment may have come down, the ongoing subscription costs for broadband services are often perceived as unaffordable by older people:

“The hardware is getting cheaper and most of it comes with as much software as you need. But on top of that, what people have to factor in is that they will need on top of their phone line, they will need to pay the broadband fee, and that’s the bit that is an ongoing revenue cost. So even if somebody has bought you a laptop you’ve still got to pay those recurring charges for the connectivity.”

SCIE, programme manager

Another expert also concurred that the ongoing costs could be perceived as unaffordable, and suggested that government benefits could be used to overcome these challenges:

“It is a capital expense and also a commitment expense in other ways. Social care personal budgets would be one way to say that we would fulfil [the subsidising of ICT].”

King’s College London, senior researchers

Another expert suggested that most people cannot afford the latest technology, and implied that cost is still an important barrier for many older people. She further suggested that there is a public responsibility to improve ICT access:

“It needs at least another 10 years for the iPhone to become old news to be affordable. People cannot afford the latest technology. That is the reality. The latest technologies are for the elite in our society. If we are still thinking about having a public sector, we need to make things affordable to the public. Otherwise, we are pushing towards privatising everything.”

Imperial College, researcher

4.5.2. Income and perceived affordability

Several experts made comments about older people on lower incomes and suggested that for this group, costs plays an important role in their e-exclusion:

“The bigger issue is income and resources, not age per se. I am concerned about the exclusion of poorer older people. Older people with resources and who are interested [in ICT], can buy equipment that’s appropriate to them and pay for the support that they need. As a result, they are not stressed or frightened of it.”

Independent consultant

“There are a group of people who are in the lower-to-middle income bracket who will be making choices: Do I have a computer or do I have a bit of extra heat? The older generation say: “We pay our bills. That is our first priority. Then we have a luxury like heating.” The Government is saying that it is going to be everybody’s right to have broadband. Well it is everybody’s right to be able to afford heat and water and electric.”

Royal Volunteer Service, service manager

4.5.3. Affordability- ICT-based care

The influence of the cost of ICT-based care on older people’s adoption of the services was briefly discussed by telecare and telehealth commissioners. As noted in chapter 6, one expert indirectly explained that cost plays a role in accessing ICT-based care when they do not meet the needs eligibility criteria which would qualify them for free (or low-cost) services provided by the council (Telecare commissioner, Worcestershire). Indeed, two other experts confirmed that older people’s adoption of telecare was influenced by the perceived cost of the service:

“The reason that our [telecare] service has been very successful over the last couple of years is because it is free.”

Tower Hamlets Council, telecare commissioner

“A [telecare] project gauged people’s willingness to pay for telecare. Respondents said that after £5 a week that it would really start to turn people off.”

King’s Fund, analyst

4.6. Continuity

In chapter 6, I described the involvement of various stakeholders in enabling older people’s e-inclusion. Also in chapter 6, I explored experts’ views on the effects of this involvement on older people’s continued e-inclusion. In this section, I discuss other topics raised by experts in relation to continuity. These include older people’s need for continuity and the barriers to continuity.

4.6.1. Older people need continuity

An important topic emerging from expert discussions was around the support mechanisms which enable older people to adopt - and to continue to use - both mainstream ICT and ICT-based care. Seven experts discussed, in general terms, the crucial role that appropriate support mechanisms play in older people’s continued e-inclusion:

“The biggest barrier of all is not procuring technologies. It is about how you pave the way for somebody to take the steps in and use it and continue to use it.”

Age UK Oxfordshire, executive

“[Older] people don’t have ongoing support to help them when they get stuck. So there’s an issue about community support. It’s not just getting older people online, it’s supporting them to stay online.”

Independent consultant

One expert suggested that older-older people in particular needed a lot of continued support:

“People aged 80 years and older need a lot of support. Putting the equipment in, however smart it is, is pointless without the support. In our experience, they need a lot of support to be able to use the services. You also need to follow through. Everyone gets very excited that 90 year-olds are on the internet. But after 6 months, you discover that things stopped working 3 months ago.”

Advanced Digital Institute, analyst

Experts also suggested that some older people need support to use ICT-based care services.

One expert discussed the support needed in the form of a response for older people with alarm services:

“You need a response service for telecare. It is all well and good to have the equipment in somebody’s house and have it monitored somewhere, but if that person doesn’t

have a network or somebody who can go out in response to the alarms, [then it is useless]. So the [remote care] infrastructure is really important. You have to look at how you are going to provide that service [before you start installing the services]."

Kent County Council, telecare commissioner

Other experts discussed how older people need forms of psycho-social support when adapting to ICT-based care services in their homes:

"To bring ambient devices into people's homes, they are going to need a lot of trust building. They are going to need to understand. They are going to need to have somebody spend some time showing them, probably showing them again, and again."

UK Online, analyst

"If you just put the equipment in and said: "Use it every day. Here are the instructions," people wouldn't know what to do. They would get concerned about their readings because they wouldn't understand them. They would phone up their doctors and nurses more [often than before]. It is important to manage their expectation from the onset."

Kent County Council, telehealth commissioner

4.6.2. Barriers to continuity

Evidence presented in the previous section demonstrated the necessity of continued support for older people to remain e-included and to use ICT-based care. This section considers experts' views on the barriers to providing support to older people, including lack of consistent service provision, high costs of services, and low levels of commitment by local and national policy makers.

The first barrier noted by experts was lack of consistency across the country. Two experts acknowledged the examples of community-level services which support older people's e-inclusion. However, these services are often isolated pockets of good practice and are not consistently available across the country:

"There are little islands of good practice by enthusiastic people either in charities, or in local authorities who have driven [e-inclusion] through. There is no coherence across all of the local authority or the third sector."

Department of Communities and Local Government, policy analyst

"Periodically there are local projects that are about getting people online, including getting older people online. But what people don't have is the ongoing support to help them when they get stuck, you know, and so there's an issue about community support."

Independent consultant

A second barrier discussed by experts was the high costs of delivering support services. One expert discussed the cost of support for providing internet access to older people:

“It is not just about provisioning the technology. If you want people to actually use broadband, you have got to also to provide this intensive support to get it working and to tailor it [to their needs]. The older population right now who have not grown up with computers, never learned to use a computer, then there is a level of support that is required that is expensive. The support cost shouldn’t be underestimated.”

Advanced Digital Institute, analyst

Two ICT-based care experts made similar comments about the cost of supporting people to use telehealth services:

“Continuity is absolutely key. Once people get into the habit of doing it, then they do it and it becomes easy. But if they do it once in a blue moon it’s difficult. They forget to do it and they don’t want to do it. Continuity of service is problematic because it takes more work and costs more than you think it is going to.”

Newham Primary Care Trust, programme manager

Related to the cost of providing services, experts observed that there has been a reduction of funding for public services which support older people’s e-inclusion. One expert noted:

“Libraries are closing down [as well as] access to computers. Age UK is losing the funding for their computer course as it’s not seen as a priority.”

Age UK London, programme manager

The third barrier suggested by experts was the lack of commitment by national and local government to address the issues around supporting older people’s e-inclusion. Experts discussed the role of policy makers in creating policies which would both enable the e-inclusion of older people and improve the take-up of ICT-based care services. They also stressed the need for the national government to increase its provision of ICT support services for vulnerable groups. One expert suggested that local government had a responsibility to support older people to use their local e-government services, which were increasingly being put online:

“Local authorities need to take much more of a proactive approach because their services are increasingly going online and they need to be supporting access to their services. A lot of people are saving money by putting things online but they are forgetting about older people who are the ones that often need those services.”

Age UK London, programme manager

One policy expert suggested that the national government could do more to incentivise the private sector to create ICT products that would be more enticing for older people, and suggested that government policies should increase pressure on the commercial sector to take some responsibility for older people's e-inclusion:

"The role of the public sector is to try to break some of the [market failures]. They can help challenge industry to come up with services that appeal to older people. The [commercial sector] will make profit out of it in the end. [The public sector] needs to persuade [the commercial sector] not to ignore older people and assume that they don't want to use ICT."

Department of Communities and Local Government, policy analyst

4.7. Emerging themes from expert interviewees

Experts also discussed several issues which lie outside the dimensions of the 6C framework. Two dominant themes emerged from the interview data. The first entailed the effects of the rapidly changing nature of technology on older people's continued access to (and use of) ICT. The second consisted of the role of ICT in changing the culture of care.

4.7.1. Technology is continually evolving

One recurring theme in the expert interviews was the continually changing nature of technology and how this affects older people's access to (and use of) ICT:

"[Being online] is normalised. However, there is always something that adds on to it that you are going to have to be able to do in 5 years-time to be able to be part of this community. That is the difficult thing. It is not just learning how to turn on the TV or the radio, or how to use a mobile phone. This is why there are so many people who are doing life-long learning, are busy with the internet or other ICTs, because this is one of those specialty areas where you can't just learn a skill and then you are okay for the rest of your life."

London School of Economics, senior researcher

However, one expert suggested that changes in technology will not alter older people's level of ICT-engagement, as their priorities will always differ from those of "mainstream" society:

"There is something about being older which cause people to disengage or to move away from using technology. I don't see much evidence of that changing. Often people say to us that they have become much more active in retirement now. It is a chance to go and spend more time with their family, to do hobbies that they had before and things that do not involve work or technology. Not using technology is probably really liberating [for many older people]."

The Knowledge Lab, analyst

Experts also discussed changes in the technology for ICT-based care. Two experts commented on the compatibility of current technologies in the future and how this would affect the deployment of ICT-based care services:

“We discovered for instance, that all the telephone networks will be going digital within the next 5 years. None of the equipment that we are currently buying now is digitally enabled. So I am buying alarms that will have to be replaced in 5 years-time.”

Westminster Local Authority, telecare commissioner

Some experts speculated that future ICT-based care services would be shaped by older people’s abilities and uses of mainstream ICT, and that the next generation of ICT-based care services will be shaped by consumers’ demands:

“They are watching far more television. They are watching pay-as-you-go television. They are choosing channels. They are using the computer to link into the television, so much more. People in their 40s and 50s in 10 years-time may need assistance. What [ICT] are they going to be most familiar with?”

Worcestershire County Council, telecare commissioner

“If you make [telehealth] trendy for the generation of 45 to 55 now, it can become a lifestyle choice. It will become a trendy thing to be able to monitor your blood pressure and your blood sugars and everything else at home.”

Imperial College, senior researcher

4.7.2. Changing the culture of care

A second theme emerging from the expert interview data concerned changes to the care system brought on by incorporating ICT into the delivery of care. Experts noted that the changes to the care system are potentially fundamental:

“It is about changing the whole [care] culture.”

Kent County Council, telecare commissioner

“If you are going to go with this technology in the UK, you need changes in the system: changes in policy, changes in funding, changes in budget structure, changes in money for training. You need to address the system-level issues for example like incentivising GPs, working out the responsibilities, working out the governance, working out standards that are acceptable across organisations. You also need to sort out a level of communication between social care and health care. These are system-level things that need to be pushed forward by government and government policy.”

Imperial College, senior researcher

One change discussed by experts was related to the institutional ageism around older people's need for e-inclusion. Experts implied that changes in professionals' perceptions of older people's ICT needs and abilities are necessary in order to modernise the delivery of care:

"There is a bit of ageism rising to the surface: "Older people don't want it. They can't use it anyway and it is too complicated." In all of our experiences, that it is absolute nonsense. What you need is somebody actually sitting down with the patience to go through how to use it."

Department of Communities and Local Government, policy analyst

One expert commented on prevailing attitudes within the care sector which downplay the importance of older people's e-inclusion. She noted that residential care providers often operate under "patronising and disabling" policies, with "prejudice about older people's interest and ability." The expert further noted that the formal care sector often assumed that:

"[Older people] are not used to [ICT] so why would they expect it."

SCIE, programme manager

Another change discussed by experts involved how care professionals' work practices would be altered by incorporating ICT into the delivery of care. Two telehealth experts noted the changes to community nursing practices, which would involve more targeted visits to clients based on need, rather than visiting according to a set schedule:

"When I did my community nurse training my tutor said your prime role is visit, visit, visit. If I was doing that teaching now I would say your prime role is not visit. It's install telehealth, monitor telehealth, and use telehealth."

Southampton Primary Care Trust, telehealth commissioner

On the other hand, experts also emphasised the need for a new formal care agenda, which includes managing older people's e-inclusion as a central part of maintaining their quality of life. Experts noted that this would challenge long-held traditions around what comprises care. For instance, two experts discussed the need for health care professionals and allied staff to acquire appropriate ICT skills:

"You need to introduce [ICT-based care] into training, so colleges and Universities train nurses and social workers that this is part of the way that we provide services now. It is about ensuring that they are part of all of the care pathways that you build, so your end-of-life pathway, your COPD pathway, your dementia pathway, so that is all part of everything that you are thinking about."

Kent County Council, telecare commissioner

"In policy terms, we will need to ensure that new modelling of existing facilities and care homes are more inclusive of digital arrangements. Are you expecting

everybody working in extra care to be able to assist? Or do you say that's a hotel service from our technology support team?"

King's College London, academic

Finally, experts discussed the benefits of taking an integrated approach to care, such as cross-sector partnerships. However, two experts commented on the "silo" working practices, which needed to be broken down such that patients could fully benefit from the ICT-based care:

"There is a lot more that social care workers can do to support the broader well-being agenda, which includes health care. Yet, clinicians and health care workers are extremely defensive of their territory. Therefore, they are acting in ways which preclude the harnessing of telehealth technologies and services in ways that will best meet the interests of users. They are still trying to maintain the boundaries and they refuse the fact that the technology actually cross the boundaries and can meet user needs in many ways."

Insight Social Research, senior analyst

5. Discussion

Weaver et al. (2010) presented the notion of a 'master narrative' that ICT is universally beneficial for older people, but older people resist using ICT. On some levels, e-inclusion paradigms, including the 6C framework, stem from this view and attempt to identify the barriers which cause people to "resist", preventing them from benefiting from ICT. But by using the 6C framework to analyse the interviews, it is possible to obtain a better understanding of how older people themselves define e-inclusion and access to ICT-based care. The following discussion triangulates the user and expert interview data with findings from the literature and quantitative analysis.

5.1. Mainstream ICT

It can be seen that the majority of older people had access to some form of mainstream ICT, especially to ICT with familiar interfaces such as television and mobile telephones. Many also embraced ICT, especially those applications which were most meaningful and useful in their daily lives. However, the MonAMI data (Table 7-10 and Table 7-11) suggest that there may be slightly polarised attitudes between those who used ICT and those who did not.

The expert perspective on older people's access to ICT was less positive than that of the sample of older interviewees in England, which emphasised the digital inequalities that many older people suffer. The MonAMI data, as well as results of the analysis of OxIS 2011 data (see chapter 4, section 4) also suggested that a large proportion of the older population did not access the internet. Also, ONS and Eurostat data (Chapter 6) demonstrated that a large

minority of older people have never used various forms of ICT. The exception is perhaps the rate of mobile phone ownership amongst the older population, which was high across all datasets. The divergence between the testimonies of older people in England and other data sources is due to not having interviewed older people in England who lacked access to ICT, leading to an unrepresentative sample of the general population.

Similar findings were uncovered, however, between older interviewees in England and expert interviewees with respect to the strong association between identifying the motivating “hook” and older people’s adopting of ICT. This finding is also corroborated by a growing body of literature which demonstrates a robust link between perceived relevance and ICT use (see chapter 5, section 3.1.1). Both samples of interviewees also suggested that design of ICT heavily influences e-inclusion, especially when the technology is developed according to what older people were accustomed to, such as a television or mobile phone.

There was also congruence between older and expert interview data, as well as with the literature (chapter 5), on the topic of accessibility. Furthermore the results from chapter 4 demonstrated a significantly negative association between older people having a disability or limited health problem and their level of e-inclusion. All sources implied that despite positive attitudes, clear motivations, ample connectivity, and adequate skills, older people’s e-inclusion becomes compromised by poorly designed ICT which does not account for the physical and cognitive impairments often experienced in old age.

Older interviewees also demonstrated that they were both motivated and able to learn ICT, especially when they had appropriate support and training that suited their ICT needs and abilities, which was congruent with the findings in the expert and literature analyses. Suitable training and support was heavily emphasised in the expert interview data as well as in the literature (see chapter 5).

Older people also demonstrated that they were both motivated - and able - to learn ICT, especially when they had appropriate support and training that suited their ICT needs and abilities, which was congruent with the findings in the expert and literature analyses. Suitable training and support was heavily emphasised in the expert interview data as well as in the literature (see chapter 5).

Older and expert interviewees also expressed similar views about the older population’s ICT skill set. Overall the older people I interviewed believed they had adequate skill levels to extract what they wanted from ICT. Nevertheless, several older interviewees also mentioned

the challenges they had with the cognitive and language aspects of ICT. Expert interviewees also made these observations. While some experts acknowledged that many older people are as skilled as the general population, they also commented that using ICT is intrinsically challenging, especially in terms of cognitive skills, and that the language is unfamiliar to many older people.

A concern voiced mainly by experts was the quality of internet connectivity, as well as the reliability of equipment to which older people had access. Unreliable equipment, experts pointed out, put older people at risk of internet crime, but more importantly could present a barrier to their adoption – and continued use – of ICT. In addition, some older participants noted their own inherent thriftiness, which could explain the value they placed on ICT, but also perhaps their willingness to continue to use old, slow and often cumbersome equipment, which younger people would discard. However as some experts noted, this frugality could counteract efforts towards ICT engagement as older equipment became increasingly unusable.

An important theme raised by older participants was their general ambivalence towards ICT-engagement if it encroached on their day-to-day lives. However, they were willing to accept it as a peripheral instrument for entertainment, communication with their families and for emergencies. In other words, these older people were conscious of the benefits of certain ICT, but it was not perceived as universally and unquestionably beneficial. This ambivalence in the older population was confirmed by findings in the literature (Helsper, 2008; Hernandez-Encuentra et al., 2009; Selwyn, 2004; Weaver et al., 2010; Xie, 2003). This issue was also raised by one expert (The Knowledge Lab, analyst, section 4.7.1).

On the other hand, the need to constantly invest in equipment upgrades was construed as form of profiteering by large telecommunications companies, and some interviewees actively resisted buying new equipment. Several experts also expressed similar views on the barriers presented by ongoing costs related to ICT, especially for older people on low incomes. While Chapter 6 section 4.3.1 offers some insight into the broadband connection “inequalities” that may affect some older people, I did not identify any literature that contemplates older people’s use of unreliable equipment and how that affects their overall e-inclusion. There was some quantitative evidence (chapter 4) in support of this resistance towards “keeping up” with digital trends. The results showed that less than 2% of the older sample was part of the “New Generation” group of internet users, a group characterised by their access to several of the latest internet-enabled devices. The regression analysis also showed that income was significantly associated with access to ICT devices at $p < 0.1$. These findings could indicate that

some older people voluntarily withdraw from the continual expense of updating equipment. However results from the analyses of interview data from both experts and older people conveyed that the role of the cost barrier in older people's e-inclusion is not obvious.

Indeed, the interviews across both series demonstrated that older people's engagement with ICT, including the "latest" devices, is more complex and that there are often several factors leading to older people using old, outdated equipment.

5.2. ICT-based care

The MonAMI participants generally perceived the ICT-based care services applications to be relevant and useful, which shows promise for the future development and distribution of ICT-based care services which are adaptable and personalised to older people's specific needs.

Apart from the MonAMI participants during the trial, only a small number of older participants had come into contact with ICT-based care services, either for themselves or for someone they cared for. The FG members who had used forms of telecare were generally pleased with the ICT-based care services. Furthermore, those who did not have prior experiences with ICT-based care services recognised that it could be relevant to them in the future, if they had increased needs.

Support for these findings is found in literature, where the perceived relevance of ICT-based care was closely linked to older users' perceived need for care (see chapter 5). A few experts also made similar observations, inferring that older people who perceived a need for care were highly motivated to use ICT-based care equipment and services regardless of their levels of skill and confidence.

Most participants pointed to flaws in the physical design of mainstream devices. MonAMI participants, especially, found that mainstream ICT presented problems when they were used to access care services. There was general agreement across all series of interviews that the design of devices and services was critical to older people's engagement with ICT, as poorly designed equipment necessarily creates barriers to engagement. This was especially emphasised in the context of ICT-based care services and devices which were often perceived as obtrusive and stigmatising. However, the findings from the interviews with MonAMI participants highlighted the complexities of designing services for a wide range of needs. During the trial, the services were delivered on mainstream devices, such as touchscreens and smart phones, which many participants found difficult to use. At the same time, several

complaints were expressed with respect to the accessibility of the devices, which were similar to the general grievances made by older people about mainstream ICT. The issue of the accessibility of touchscreen devices in the context of ICT-based care was equally divided in the expert interviews, as well as in the literature (see chapter 5).

Several experts gave considerable thought to the design of ICT-based care services, suggesting relying more on familiar devices and interfaces. Similar ideas were not exchanged in the interviews with MonAMI participants, which may point to a shortcoming in the interview topic guides, where user opinions on ICT design was not solicited. Mason et al (2012) recommended that the ICT industry should adopt more participatory co-design research practices which involve older people in the design process. Involving older people in the development of the ICT that they might want to use was considered vital to their ICT engagement. Co-design approaches could also help improve the accessibility of ICT-based care services (Karunanithi, 2008), especially as the delivery of care rely increasingly on mainstream devices.

Experts also expressed concern about the quality of telecommunications' networks in the transmission of data from ICT-based care services. In particular, unreliable internet signals were perceived to be tolerable for mainstream uses, but completely unacceptable in health or social care contexts. The battery life of devices and challenges with older properties also diminished the reliability of the ICT care systems. The short battery life was a topic raised by MonAMI participants, however overall the reliability of ICT-based care was not discussed by many older interviewees. As none of the older interviewees in England used ICT-based care, it was not likely a topic on which they could comment.

5.3. Outside the 6C framework

New themes which emerged from the interview data revolved around a need to recognise a cultural shift towards a dependence on ICT, and the need for older people to maintain their voice within that culture. Several older participants talked about the ways in which society was changing, with particular concern about an over-reliance on technology. Furthermore, for some technology was seen as the root cause of the deterioration of traditional values around human relationships and community cohesion. It was also suggested that the new social norms were in many ways dehumanising, and many participants struggled to come to terms with how to communicate and function (e.g. shopping, getting advice) in the "new" society. Experts also mentioned that there was too much emphasis on finding technical solutions to deep-rooted social problems, which some suggested contributed to their isolation and exclusion from society.

On the other hand, one interviewee noted that the cultural changes were used to his advantage. He had discovered the benefits of reading and writing online reviews, where he could empower other consumers in making informed decisions about services. In this sense ICT became his mouthpiece, one that he perhaps did not have in the past. Experts also suggested that older people are increasingly employing ICT to exercise their rights as consumers and as citizens, and inferred that the trend was set to continue, particularly with the next generation of older people.

The themes emerging from expert interview data were related to how technology was going to change in the future for both mainstream and ICT-based care. They noted the continual need for learning new skills in order to remain current in a digital society. However, there was some debate around whether the older population was prepared to take on this responsibility. Older interviewees suggested that the current state of the “digital society” conflicted with many of their values. One expert concurred and suggested that older people would always place other priorities above technology use.

However, the sample of older interviewees in England as well as the trend data on ICT use (see chapter 6 section 4.1) illustrated how today’s older people are adopting new perspectives towards ICT. Several experts speculated that the attitudes, skills and expectations with respect to technology of future generations of older people will continue to evolve and this will also have an impact on the design of ICT itself. In particular, experts deliberated that the nature of ICT-based care devices and services in the future would be shaped more by consumers’ demands than they are today. As ICT plays more of a central role in the daily lives of the next generation of older people, they will expect that to continue in all aspects of life including their care.

However, one expert expressed that it is arrogant to think that today’s technology is the pinnacle of ICT development. Technology will continue to change in the future in ways that we cannot fathom. Similar to views expressed in Xie (2003), the expert further suggested that the technology of the future may be as alienating to future generations of older people as is today’s ICT for the current older population (Age UK Oxfordshire, ICT tutor).

6. Limitations

There are some limitations in the interview data, which may perhaps have led to some overgeneralisations about older people’s e-inclusion.

First, the interviews represent a small convenience sample and therefore is not representative of the over 10 million people aged 65 years and older in Britain. The MonAMI participants, who resided in three cities across Europe, also consisted of convenience samples. Regional differences in ICT connectivity and participants' capabilities may have introduced too much variability within the overall sample for comparison purposes.

Second, the recruitment of focus group participants was by word-of-mouth from PSSRU colleagues. PSSRU colleagues were encouraged to invite families, friends and neighbours who met the age criteria. Invitations to the focus group were also extended to members of PSSRU's Service Users and Carers' Advisory Group (SUCAG). Membership of SUCAG is not based on age, and SUCAG meetings are open to all members. As such, one member of the focus group did not meet the age criteria. However the SUCAG member was a personal carer for two older people and offered invaluable insight into their perspectives of ICT. Furthermore, focus group participants were not asked to divulge their age. Therefore, at times it is difficult to put their quotes into context.

Finally, despite efforts to recruit non-users, the interviews with older people included only one person (in the focus group) who did not use the internet. The themes and sub-themes around non-use of ICT are therefore not adequately represented in the analyses.

Chapter 8 : Impact of the use of mainstream ICT and ICT-based care services on quality of life

1. Introduction

“As an 80 year old living on her own, life is pretty dull,” explained an interviewee as she gave her reasons for adopting ICT. Her statement implied that she used ICT in order to communicate with others and perhaps find new ways of occupying her time. For both of these endeavours, ICT was being used to enhance her quality of life, such as improving her social involvement and participation, and expanding her hobbies and leisure activities. In this chapter, I address the subsidiary research question of how older people’s use of ICT in various contexts affects their quality of life (QOL).

In chapters 4 through 7, I investigated the effects of the person-centred and environmental dimensions of the 6C framework on older people’s adoption - and use - of mainstream ICT and ICT-based care.

In this chapter, I address the subsidiary research question of how older people’s use of ICT in various contexts affects their quality of life (QOL). The results can contribute to the principal research question of how the use of ICT in various contexts enables older people to participate in their communities.

2. Methodology

2.1. Data collection

In this chapter, I draw on a number of sources of both quantitative and qualitative data on older people’s use of mainstream ICT and ICT-based care. The data sources include evidence from the relevant literature, ONS statistics and the MonAMI trial. I also perform secondary analyses of the 2011 OxIS dataset and primary data analyses of the two series of interviews I held with older people and technical experts. Details of the collection and sampling methods for each of the data sources are provided in chapter 3.

Ethical approval for the MonAMI trial was obtained from the relevant authorities at each of the trial sites in Stockholm, Sweden, Kosice, Slovakia, and Zaragoza, Spain. All MonAMI participants provided written informed consent before the start of the trial.

All interviewees of the series 1 and series 2 interviews provided written informed consent to participate in the interview as well as for the interview to be recorded using a digital recording

device. Recorded interviews were transcribed verbatim and are kept in a password-protected file on the London School of Economics and Political Science server.

2.2. Analytical framework

The analyses are organised according to the six domains of the combined QOL framework. Details on how the combined framework was developed and the contents of each of the six domains are provided in chapter 2. Briefly, for the purposes of this research I created a combined QOL framework based on both the Adult Social Care Outcomes Toolkit (ASCOT) (Netten et al., 2011) and the World Health Organisation Quality of Life (WHOQOL) (The WHOQOL Group, 1998) models of QOL. The combined framework consists of six domains of quality of life: control over daily life, personal safety and security, social involvement and participation, occupation, dignity and physical capability. For each domain, there are a number of related facets - or indicators – which are used to describe the overarching domain. A summary of how the ASCOT and WHOQOL QOL models were transposed into the combined model is provided in Box 8-1 below.

Box 8-1 Description of the combined, ASCOT and WHOQOL domains and facets

Domains of combined QOL model	Facets of combined QOL model	WHOQOL facets not considered in combined model
Control over one's life	-Independence -Personal Cleanliness and comfort -Food and Drink -Accommodation cleanliness and comfort/home environment -Activities of daily living	-Dependence on medicine and treatment -Financial resources
Personal safety and security	-Feeling safe, secure, free from abuse and harm -Freedom from crime -Privacy ²	-Availability of health and social care ¹ -Transport -Physical environment
Social involvement and participation	-Personal relationships with family, friends, -Feeling part of the community	-Sexual activity
Occupation	-Paid employment/work capacity ³ -Caring for others -Volunteer work	

	-Recreation and Leisure -Information seeking/opportunities for learning new skills ⁴	
Psychological wellbeing	-Dignity ⁵ -Sense of personal significance -Positive and negative feelings -Self-esteem -Obtrusiveness/bodily image and appearance ⁶	
Physical capability⁷	-Indicators of health status -Physical activity -Memory and cognition ⁸ -Health-related behaviour -Health-related awareness and knowledge	
<p>Notes:</p> <p>¹ Availability of health and social care services is a topic discussed in the market analysis in <i>Chapter 6</i></p> <p>² Privacy is an additional facet to the personal safety and security domain</p> <p>³ The “work capacity” facet of the independence domain of WHOQOL is discussed in the context of ability to carry out paid employment in the occupational domain of the combined QOL model</p> <p>⁴The Opportunities for learning new skills is a facet of the environmental domain of WHOQOL is introduced as the “information seeking” facet of the occupational domain in the combined model</p> <p>⁵The dignity domain of ASCOT is renamed the psychological wellbeing model after the WHOQOL psychological domain; dignity is a facet of the psychological domain in the combined model.</p> <p>⁶Obtrusiveness is related to the bodily image and appearance facet of the psychological domain of the WHOQOL model, and is introduced to the psychological wellbeing domain in the combined model</p> <p>⁷Physical is not an original ASCOT domain and is taken from the “physical” domain from WHOQOL</p> <p>⁸Memory and cognition are normally included in the psychological wellbeing domain of WHOQOL, but are considered to be part of the physical capability domain in the combined model</p> <p>⁹The spirituality and personal beliefs facet of the WHOQOL model is not included in the combined QOL model</p>		

2.3. Data analysis

Throughout this chapter, I draw on the evidence from each data source to assess the effects of older people’s ICT use on their quality of life. The literature and qualitative interview data from the MonAMI trial and interviews with older people and technical experts was analysed following a framework analysis approach described by Gale et al (2013). Details of the step-by-step approach is described in chapter 7. Briefly, the literature and interview transcripts were coded deductively according to the six dimensions of the combined quality of life model (described in Box 8-1).

Where applicable, frequency analyses were conducted of relevant variables in the 2011 OxIS dataset for respondents aged 65 years and older. Chi-squared analyses were also conducted, where I transformed the variable about personal use of the internet into a binary variable describing either internet use or non-use. Responses of “never used the internet” and “no, but used it in the past” were coded as “0”, and responses of “yes, current user” were coded as “1”. The 2011 OxIS dataset was analysed using SPSS Version 21 (IBM Corp., 2012).

3. Results

Evidence for the effects of older people’s use of mainstream ICT and ICT-based care on each of the six domains of QOL (as described in Box 8-1) is described in turn.

3.1. Control over one’s life

The control over one’s life domain includes indicators around individuals’ ability to manage their activities of daily living (ADLs) (e.g. personal hygiene, dressing and feeding) and instrumental activities of daily living (IADLs) (e.g. shopping, cleaning and preparing meals).

3.1.1. Mainstream ICT

The evidence from the literature suggests that using mainstream ICT, such as computers and the internet, gives older people a greater sense of independence and control over their daily lives (Morris et al., 2007; Selwyn, 2004). Mason et al (2012) discovered a significant association between older internet users and their perception of having control over what happens to them in their lives. Conversely, non-users more often agreed that what happens to them is outside of their control. Similarly, Slegers et al. (2008) reported that older adults who used their computers more often felt more in control of their lives, compared to older adults who did not use a computer often (based on Belief in Control scale (Andriessen, 1972)). Comments made by interview participants also suggested that ICT had positive effects on their sense of control of their daily lives:

“[By using ICT] I got independent and my life became so much better...It just made my life so much better. Yes, I managed beforehand, not nearly as well as I managed afterwards.”

M2F, aged 68

With respect to specific IADLs, Selwyn (2004) described anecdotal evidence of older people’s perceptions of how ICT helped them to keep their house in order and do shopping. Leppel & Donna (2011) found no significant differences in attitudes concerning the usefulness of online shopping between younger and older groups. The study also revealed that adults aged 50 to

69 years old made more online purchases than those in the 18 to 25 years – and 70 years and older – age groups. One interview participant confirmed that online shopping gave him more control over his daily life, particularly during a time of additional stress due to adverse life circumstances:

“I can do my shopping online and I can get it delivered by Sainsbury’s. It is spot on when I can’t get out [to the shop].”

M2, aged 78

Experts made similar observations about the use of ICT on older people’s ability to control aspects of daily life such as shopping and managing finances:

“Online shopping overcomes the risk of the big complaint of older people: “I don’t want to shop in the little shop. I want to shop in the supermarket because I get better value, it is cheaper and it is fresher.” But they don’t want to carry everything home. Online shopping deals with that.

ILC-UK, executive

The independence gained through using ICT was also described by older people as “keeping up” with younger generations. Hill et al. (2008) and Martinez-Pecino et al. (2012) described that older people’s drive for independence through ICT was often in the spirit of older people proving to themselves - as well as to others - that they can cope in the digital culture designed by the ideals of younger people. This theme also was raised by OTO and expert interviewees (SCIE, programme manager):

“[Using ICT] makes you feel a little bit more independent and understand what the youngsters are talking about.”

W5, aged 80

“[I came to Age UK to] find out more about Facebook, to actually be able to talk to students. [The alumni] need to be listening to what the students say, otherwise we are poles apart...”

M1, aged 78

Another emerging theme around independence and control entailed older people’s use of mainstream ICT to prepare for the future. Selwyn (2004) discovered that older people sometimes adopted mainstream ICT equipment and services pre-emptively, in other words in preparation for a future when they might have less control over their ADLs and IADLS as a

result of being less mobile or having more financial constraints. Interview participants also recognised the benefits of using mainstream ICT on their level of independence at a time when they would have more needs:

“If I were housebound, I think that I would use the computer more.”

W2, aged 75

However, other studies have suggested that a large proportion of older people do not use ICT to manage their IADLs, such as for shopping and managing their finances. McMurtrey et al. (2011) reported that 65% of their sample of older people did not shop online. Olsen et al. (2011) found that older people were significantly less likely than younger adults to use the internet for banking and shopping. Similar findings were reported by the ONS (2014a), which found that smaller proportions of people aged 65 years and older made purchases related to IADLs over the internet compared to people in other age groups (see Table 8-1).

Table 8-1 Purchases made over the internet 2014

	AGE GROUP						%
	16-24	25-34	35-44	45-54	55-64	65+	
CLOTHES	63	64	63	52	42	19	
HOUSEHOLD GOODS	28	59	55	49	40	21	
FOOD FOR GROCERIES	18	38	34	27	17	7	
SHARE PURCHASES, INSURANCE POLICIES	13	28	29	28	21	9	
TELECOMMUNICATION SERVICES	13	26	22	21	15	6	

Source: ONS, 2014

Harrod (2010) has suggested that older people’s drive to become independent through the use of ICT was a result of perceiving “dependence” as an intrusion on others, considered shameful and unacceptable. Furthermore, their evidence suggested that older people unable to use ICT to promote their independence were viewed with disdain. Viewed through this lens, valuing independence through ICT could have the effect of alienating many older people and increasing their risk of social isolation.

3.1.2. ICT-based care

Underpinning “ageing in place” policies (Sixsmith and Sixsmith, 2008) is the promotion of older people’s independence, enabling them to continue to live in their own homes as long as

possible through the use of ICT-based care (Frost et al., 2010; Macfarlane et al., 2012; Matthews et al., 2010; Milligan et al., 2011; Sixsmith and Sixsmith, 2008).

Brandt et al.'s (2011) review of telecare and smart home services revealed only a small number of studies which assessed the effect of ICT-based care on instrumental activities of daily living (IADLs). Overall, the ICT-based care interventions tended to have a positive effect on independence and ability to perform IADLs. The Age UK report *Technology and Older people* (2010a), Milligan et al. (2011) and Matthews (2010) also noted that ICT-based care services empowered (older) people with disabilities by compensating for some of their physical impairments, which otherwise prevented them from managing their ADLs. MonAMI participants also described how the project's telecare services provided them with new coping mechanisms to compensate for their disabilities:

"[Being able to see who is at the door with a smartphone] is good for me who is sitting in a wheelchair"

Sweden, female, aged 67

Quantitative evidence concerning the effects of older people's use of ICT-based care services on their ability to carry out ADLs and IADLs was found to be limited. Brownsell et al. (2008) noted that using telecare services had no significant effects on older people's ability to carry out their ADLs. Nijland et al. (2009) demonstrated that older people using an email consultation service to contact their GP appreciated being able to control when and where they used the service, more than younger adults in the sample. However, the association did not reach statistical significance.

The evaluation of the MonAMI trial also included measurements of the impact of MonAMI services on facets of control over daily life. Damant et al. (2013) noted that a significantly greater number of MonAMI participants perceived the telecare services to be helpful towards performing day-to-day tasks, shopping, and personal care, compared to those who found the services unhelpful. More people perceived the services to be helpful than unhelpful in the facets of meals and nutrition and maintaining their home environment, but these results did not reach significance (Table 8-2).

Table 8-2 Perceptions of helpfulness towards IADL of the MonAMI services

HELPFUL (N PARTICIPANTS)	UNHELPFUL (N PARTICIPANTS)	ONE SAMPLE (Z-TEST OF SIGNIFICANCE)
--------------------------------	----------------------------------	---

DAY-TO-DAY TASKS	23	7	***
SHOPPING	12	2	***
PERSONAL CARE	13	4	**
MEALS AND NUTRITION	9	5	NS
MAINTAINING YOUR HOME ENVIRONMENT	16	10	NS

NOTES:

* P<0.01; **P <0.05; *** P<0.001; NS: NOT REACHING SIGNIFICANCE AT P<0.01

Source: Damant et al. (2013)

However, similar to the concerns expressed by Harrod (2010) regarding older people's motivation to avoid becoming dependent on others, Sixsmith & Sixsmith (2008) noted that encouraging older people to remain independent in their own homes – almost at all costs through the use of ICT-based care – could negatively affect other aspects of their quality of life. Demetris et al (2008) also proposed that older people risked becoming too dependent on ICT services, to the point that they no longer took independent decisions about their health without the ICT application or device and subsequently became less vigilant about their care needs. Others were concerned that older people would fear leaving their home and being outside of their usual “monitored zone”. In the same vein, Sixsmith & Sixsmith (2008) and Sanders et al. (2012) reported qualitative evidence of telecare and telehealth users feeling less in control, due to continual reminders and pressures to use the services which disrupted their daily routines. ICT-based care experts also suggested that ICT-based care services could have a negative affect older people's level of independence:

“When you are [installing telecare services] to enable people, if the services do too much they are going to disable people. Your technological solution needs to be adaptable to that person's needs, promote their independence, and encourage them to carry on doing things. You don't want someone sitting there all day pressing a button. They need to keep mobile, to keep doing things, and to keep remembering to do things. Otherwise you are just going to make them more and more dependent.”

Kent County Council, telecare commissioner

3.2. Personal safety and security

Personal safety refers to protection from physical harm or falling ill. Personal security, in contrast, relates to safeguarding against (non-physical) crimes such as burglary or financial abuse. Related to issues of security is the topic of privacy.

3.2.1. Mainstream ICT

Several studies reported that a large proportions of older people in their samples owned a mobile phone for use in an emergency (Martinez-Pecino et al., 2012; Plaza et al., 2011; Walsh and Callan, 2011). Within the context of QOL, older people's mobile phone ownership – and usage – for these purposes can be interpreted as having a positive effect on their sense of personal safety. Similar findings were uncovered in the interview data; almost all of the participants claimed to own a mobile phone for emergency purposes:

"I've got a mobile phone, but I only use it for emergencies to be honest."

W4, aged 68

Conversely, several sources revealed that many older people perceived that using ICT had a negative effect on their sense of privacy and personal security (Leppel and McCloskey, 2011; Mason et al., 2012; Wright and Wadhwa, 2010). Interview participants discussed their uneasiness of ICT in terms of safeguarding their privacy:

"I find [mobile phones] are an intrusion."

M1F

"I have actually been quite worried about doing the wrong thing [on Facebook] because you can so easily start saying something to the whole world that you think is private."

M1, aged 78

Results of a frequency analysis of the respondents aged 65 years and older of the 2011 OxIS dataset also suggested that many older people are concerned about the negative impact of ICT-use on their privacy: 53.6% of the sample (n=467) either "agreed" or "strongly agreed" with the statement that the "present use of computers and the internet are a threat to privacy in this country" (Dutton and Blank, 2011).

Wright and Wadhwa (2010), Hill et al. (2008) and Gatto & Tak (2008) further exposed the fears that many older people have about becoming victims of abuse and crime when using ICT, and the subsequent negative effects on their personal sense of security. Expert interviewees also spoke of older people's heightened concerns about financial abuse through internet scams (King's College London, academic; Age UK, ICT trainer). Older interviewees also relayed their experiences with potentially unscrupulous online activities. Expert interviewees also spoke of older people's heightened concerns about financial abuse through internet scams (King's College London, senior researcher; Age UK, ICT trainer):

“Older people also hear stories about having their identity stolen, bank accounts taken, spam and phishing. Those are significant barriers that dent people’s confidence of willingness to take the risk.”

UK Online, analyst

One participant explained that her declining eyesight prevented her from reading the fine print on any website, which made her feel more susceptible to being exploited by data mining practices, where her personal details might be passed on to third party organisations. Another participant explained that she had fallen victim to internet crime:

“I have done it once or twice where people have wanted money, I gave them my bank number and my card number [over the internet]. I am dubious about it now. I am quite careful about giving my bank [details].”

W3, aged 88

Gatto & Tak (2008) further noted that the fear of identity theft had led many older people to stop using the internet for certain activities. Similar distrust and reluctance to use certain internet applications was described by interview participants:

“I broke my leg last year and I got phone calls from these people saying: ‘We heard you broke your leg last year, and if it wasn’t your fault you can claim’. Now my daughter orders [things] for me on her computer. I pay her and then she pays, so I’m not actually using my card.”

W2, aged 75

3.2.2. ICT-based care

Under the principles of “ageing in place”, providing older people with a sense of personal safety and security is one of the fundamental purposes of ICT-based care services (Mahony and Mahony, 2010; Milligan et al., 2011; Plaza et al., 2011; Tak et al., 2010; Williams et al., 2010). Several studies have described the positive effects of various forms of ICT-based care on older users’ perception of safety. Brownsell et al. (2008) found that the intervention group in receipt of fall detection and lifestyle monitoring services reported improved feelings of safety compared to the control group (based on a questionnaire specifically developed for the study). Participants in a study by Walsh & Callan (2011) said that they felt reassured by having pendant alarm services. Turgeon-Londei et al. (2009) found that 96% of their participants were favourable to video monitoring services that ensured their personal safety in their homes. Chou et al. (2013) reported high ratings for “feeling safe in daily life” amongst telehealth recipients (based on the WHOQOL-BREF (Yao, 2005)).

Results of the MonAMI trial evaluation (Damant et al., 2013) also showed that a significantly greater number of participants perceived the MonAMI services to be helpful for improving their sense of safety and security in terms of falling, intrusion in the home, protecting their belongings and maintaining their privacy, compared to the number of participants who found the services unhelpful (Table 8-3).

Table 8-3 Perceptions of helpfulness of MonAMI services to personal safety and security

	HELPFUL (N PARTICIPANTS)	UNHELPFUL (N PARTICIPANTS)	ONE SAMPLE (Z-TEST OF SIGNIFICANCE)
CONFIDENCE AROUND AVOIDING FALLS AND INJURIES IN YOUR HOME	29	9	***
CONFIDENCE AROUND KEEPING INTRUDERS FROM ENTERING YOUR HOME	35	10	*
CONFIDENCE AROUND SAFETY OF BELONGINGS WHEN YOU ARE AWAY FROM HOME	37	9	***
MAINTAINING YOUR PRIVACY	30	24	***
NOTES:			
* P<0.01; **P <0.05; *** P<0.001; NS: NOT REACHING SIGNIFICANCE AT P<0.01			

Source: Damant et al. (2013); based on adaptation of Falls Efficacy Scale (Tinetti et al., 1990)

The qualitative data from the MonAMI trial confirmed that the telecare services helped participants achieve a greater sense of safety:

“[DoorVue] appears to have frightened away two young males who used to frequent the building on weekends and at night.”

Sweden, female, aged 86

“[ZoneSURE (a person monitoring service)] increases safety for sure. It is useful service.”

Slovakia, female, aged 65

However, several sources discussed the intrusiveness of ICT-based care and the related effects on older people’s sense of privacy and personal security. Monitoring services, in particular,

raised suspicions amongst older people that “Big Brother was watching”, which could potentially impinge on their sense of personal freedom (Age UK, 2010a; Chan et al., 2009; Demeris et al., 2009; Lorenzen-huber et al., 2011; Mahony and Mahony, 2010; Matthews et al., 2010; Milligan et al., 2011; Wright and Wadhwa, 2010). Expert interviewees also observed similar levels of apprehension amongst older adults using ICT-based care regarding who had access to their personal health data and what it would be used for:

“For someone with a long-term condition, an application which just tells them that their heart is racing can be useful. But what do [care practitioners] do with [the vital sign information]?”

Southampton Primary Care Trust, telehealth commissioner

Issues regarding safeguarding their privacy when using ICT-based care was also reflected in older people’s anxieties. Williams et al. (2010) found that 63% of participants were either “very concerned” or “slightly concerned” about a lack of privacy from 24-hour monitoring services. A further 59% expressed a degree of concern about sending data to non-medical staff for fear of crime and maleficence. Turgeon-Londei et al. (2009) reported that 60% of their sample expressed a sense of intrusiveness into their private lives when considering the use of video-monitoring equipment. Results from Nijland et al. (2009) also showed that 53.7% of the total sample (including younger adults) had doubts about the level of privacy of the email consultation service. The study further suggested that older people tended to have more privacy concerns compared to younger adults, but this result did not reach significance.

3.3. Social involvement and participation

The social involvement and participation domain refers to the types and extent of personal relationships in which individuals engage, as well as to how they maintain these relationships. Policies related to the social isolation and loneliness of older people aim to improve their social networks.

There is considerable interest in studying older people’s social involvement stemming from concern about the large number of older people who experience chronic loneliness and social isolation; this can have detrimental effects on their mental and physical health (DH ref). Therefore, other search terms included “isolation” and “loneliness”.

3.3.1. Mainstream ICT

Within the literature, several sources noted that the primary benefit of older people’s use of ICT was their ability to maintain relationships with friends and family and thereby gain social

support (Age UK, 2010a; Blažun et al., 2012; Bobillier Chaumon et al., 2013; Choudrie et al., 2010; Independent Age, 2010; Mason et al., 2012; Plaza et al., 2011; Weaver et al., 2010; Wright and Wadhwa, 2010).

There was considerable evidence of the positive effects of a wide range of ICT on social involvement with friends and family. This included mobile phones (Hurme et al., 2010; Martinez-Pecino et al., 2012), Skype (Blažun et al., 2012; Woodward et al., 2011), email (Blažun et al., 2012; Gatto and Tak, 2008; Mason et al., 2012; Sayago and Blat, 2010) and the internet more generally (Adams et al., 2005; Hill et al., 2008; Independent Age, 2010; McMurtrey et al., 2011; Sum et al., 2008; Tak et al., 2010). Many interviewees also discussed using internet applications, such as email and Skype, to keep in touch with family members living abroad:

“I’ve got a lot of nephews and nieces who are scattered throughout the world. I know I can write to them but if I email them then it is done instantly. [Email] is invaluable in being able to contact my relatives.”

M2, aged 83

A secondary benefit of older people’s use of ICT to maintain their involvement with their families was described in terms of improving inter-generational relationships (Bailey and Ngwenyama, 2011; Sayago and Blat, 2010). Woodward et al. (2011) found an increase in perceived support from friends (based on the Multidimensional Scale of Perceived Social Support scale (Zimet et al., 1988)) from older people who took part in an ICT training programme. Experts noted that through forging inter-generational relationships, older people were able to widen their social networks:

“[The internet in residential care] has helped with inter-generational relationships. Family members have started coming with younger visitors, and during their visit with their grandparents, the [grandkids] can use the ICT. That broadens the social network for all [care home] residents, not just the person being visited. It is also a means of encouraging younger people to take more of interest in care and care settings.”

SCIE, programme manager

The effect of older people’s use of ICT on reducing loneliness was also a prominent theme in the literature. Mason et al. (2012) reported that older non-internet users were significantly more likely to say that they felt lonely compared to older internet users. Similarly, older internet users stated significantly more often that they hardly ever felt lonely, compared to older non-users (no specified scale). Tsai et al. (2010) found that older people living in

residential care significantly decreased their level of loneliness (based on UCLA Loneliness Scale (Russell et al., 1980)) from baseline to follow-up when using video-conferencing equipment. Similarly, Blazun et al. (2012) found that older people living in residential care who used email and online forums reduced their levels of loneliness (not based on a standardised tool).

However, not all studies found a resoundingly positive association between older people's use of ICT and their social involvement and participation. Weaver et al. (2010) found that only a small minority of older participants used a computer to keep in contact with family; and they often did so reluctantly as it was the only way to remain in contact with their grandchildren. Koopman-Boyden & Reid (2009) found no significant relationships between older adults' use of the internet and email and contact with family and other people (based on questionnaire developed for the study) . Similarly, Slegers et al. (2008) revealed no significant effects between computer and internet usage on the one hand, and loneliness (De Jong Gierveld and Van Tilburg, 2006) and meeting with friends (in general) on the other. And Woodward et al. (2011) found that there were no statistically significant improvements in loneliness (De Jong Gierveld and Van Tilburg, 2006) amongst older participants who took part in an ICT training programme.

There was also evidence showing some negative effects of the use of ICT on older people's social involvement and participation. For instance, Huang's (2010) meta-analysis (which was not restricted to studies exclusively of older people) found a negative association between high internet use and well-being. Slegers et al. (2008) found that older people who received computer training saw their intimate friends significantly less often at follow-up than at baseline. Similarly, Sum et al. (2008) demonstrated that social and family loneliness (based on the Social and Emotional Loneliness Scale (SELS) (Ditommaso et al., 2004) was positively correlated with the amount of time older people spent using the internet. Interview participants also commented on the isolating effect that ICT can have when used extensively:

"It could make you quite lonely and isolated. I know people who don't communicate with people in any other way. Face to face contact is very important."

W2, aged 75

"I think [using the Internet] is very antisocial. You can lock yourself [in]."

W1, aged 73

It can be seen that there were potentially both positive and negative outcomes for social networking for older people using ICT. At best, it could reinforce existing relationships, but there is no clear evidence of its impact on expanding social networks. For instance, Sayago & Blat (2010) found that older people did not use email to make new friends, but rather relied on traditional methods which were perceived to be “safer”. Sum et al. (2008) noted that using the internet to communicate with new people was associated with increased levels of loneliness (SELS).

Similar observations were made by expert interviewees, as they discussed their reservations about relying on technical solutions for solving social problems such as chronic loneliness (LSE, researcher):

“You don’t solve isolation through ICT. All [ICT] can do is facilitate the connections you have. If the connections are not there, then ICT isn’t necessarily going to revive them. Some [care home] residents were prepared to have a go with email, but they couldn’t find any family members or friends who wanted to respond.”

SCIE, programme manager

3.3.2. ICT-based care

In the literature, the topic of social involvement and participation in relation to ICT-based care services frequently centred on the face-to-face contact between (older) patients and care practitioners. Many reports discussed the reluctance amongst the older adult population to adopt ICT-based care services for fear of losing the “human touch” of traditional care services (Boonstra and van Offenbeek, 2010; Chou et al., 2013; Independent Age, 2010; Lorenzenhuber et al., 2011; Matthews et al., 2010; Milligan et al., 2011; Nijland et al., 2009; van Offenbeek and Boonstra, 2010; Sheaves et al., 2011; Turgeon-Londei et al., 2009; Walsh and Callan, 2011).

Following from the concern of diminished human contact when using ICT in the context of social care, Milligan et al. (2011) pointed out that some older people expressly made false alarms, in order to gain social contact with care practitioners. Some telecare commissioners interviewed also remarked on the occurrence of “conviviality calls” via telecare alarms:

“It becomes apparent that a number [of telecare clients] that are known to us very well, perhaps use the alarm as a means of having a conversation with you.

There is a tremendous amount of [anecdotal] evidence that [J. Doe] rings every Thursday night for a chat". There is a lot of that."

Tower Hamlets Council, telecare commissioner

However, one expert found the opposite effect on older people's social involvement when using telehealth services:

"We have discovered that people become less socially isolated because they're not waiting in for a nurse to come."

Southampton PCT, telehealth commissioner

Indeed, Lloyd (2010) has suggested that telecare may exacerbate isolation and loneliness amongst older people. Keeping older people in their own homes for the sake of their independence (and saving costs) might inhibit their pursuit of human contact and social involvement. In support of this view, Dickens et al.'s (2011) systematic review of those ICT-based interventions designed specifically to address loneliness amongst the older population found that only 38% of studies directly targeted older people who were defined as socially isolated. Of the studies identified, the aggregated evidence suggested that the interventions targeting older people's social isolation were no more likely to result in positive outcomes than less specific interventions. Demeris & Hensel (2008) also noted challenges in integrating social outcomes within ICT-based care services, as the primary aim of the latter is not to provide human care, but rather to complement existing face-to-face services. One expert interviewee noted:

"From the outset, you must be clear that the telecare doesn't actually provide any personal care to the individual. It is not going to replace any human contact care."

King's Fund, programme manager

There is only limited quantitative evidence of the effects of ICT-based care on the social involvement of older people. Kim et al. (2009) found that face-to-face meetings between (older) patients and care practitioners were improved with the use of electronic patient records. However, the results were based on a very small sample (n= 11). Brownsell et al. (2008) found a slight improvement in the social functioning (using the SF-36 scale (Brazier et al., 1992)) of older people using telecare at follow-up compared to baseline, but improvements waned between 6 and 12-month follow-up periods. Damant et al. (2013) found no significant

impact of remote alarm and monitoring services on older people’s social networking, although participants tended to perceive the services as helpful in terms of speaking to people and receiving visitors (see Table 8-4).

Table 8-4 Perceptions of helpfulness of the MonAMI services to social involvement and participation

	HELPFUL (N PARTICIPANTS)	UNHELPFUL (N PARTICIPANTS)	ONE SAMPLE (Z-TEST OF SIGNIFICANCE)
SPEAKING TO PEOPLE	19	15	NS
LEAVING YOUR HOME TO MEET PEOPLE	10	16	NS
RECEIVING VISITORS	10	7	NS
REDUCING FEELINGS OF LONELINESS	14	21	NS
NOTES:			
* P<0.01; **P <0.05; *** P<0.001; NS: NOT REACHING SIGNIFICANCE AT P<0.01			

Source: Damant et al. (2013); questionnaire developed specifically for the study

3.4. Occupation

The occupation domain includes all the many meaningful activities in which people engage, including work, information-seeking, hobbies and pastimes, leisure and entertainment.

3.4.1. Mainstream ICT

There was strong evidence in the literature and interview data to suggest that using ICT had a positive effect on older people’s ability to carry out work, leisure, hobbies and information seeking activities (Choudrie et al., 2010; Gatto and Tak, 2008; Independent Age, 2010; McMurtrey et al., 2011; Plaza et al., 2011; Selwyn, 2004; Slegers et al., 2008). Interview participants described the benefits of using ICT for their work, volunteer engagements, and pastimes such as photography. Several interview participants discussed their use of the Internet to conduct genealogy searches:

“Quite a few people [who come to the Age UK centre] use [the Internet] to look at their family history. It is quite a big thing.”

W4, aged 68

ICT use has had an impact on the active participation of older people in associations of all kinds including social, religious, political and tenant associations, clubs and organisations. Koopman-

Boyden & Reid (2009) noted that older internet users were significantly more likely to take up leadership roles in social and community clubs and organisations (based on questionnaire developed for the study). Harrod (2010) and Mukherjee (2011) found that many participants used email to coordinate their volunteering activities. Mason et al. (2012) found that older internet users were statistically significantly more likely to be members of political, religious, environmental, tenant and resident associations and groups. Conversely, there was a significant association between older adults who were not online and not being a member of any group, association or club. Cresci et al. (2010) found that older computer users were significantly more likely to join community organisations and do volunteer work than non-users. These findings were also reflected in the interview data, where participants discussed how their use of a computer and email facilitated their involvement in social groups, alumni committees, and other volunteer organisations:

"[I rely on my computer] to a certain extent because I belong to several groups and I need to contact people, so I need to check [my email] every day. It's almost like being at work!"

W4, aged 68

Yet other literature suggests that older people who participate in ICT-based activities are actually in the minority (Choudrie et al., 2010; Erickson and Johnson, 2011; Selwyn, 2004; Selwyn et al., 2003).

3.4.2. ICT-based care

The literature was searched for the extent to which older people used ICT-based care services and applications to carry out health information searches. Several studies indicated that seeking health and medical information was one of the most common uses of ICT amongst the older population (Chou et al., 2013; Harrod, 2010; Kim et al., 2009; Macfarlane et al., 2012; Mason et al., 2012; Olson et al., 2011; Robertson-Lang et al., 2011; Selwyn, 2004; Tak et al., 2010). One interview participant noted that he had consulted online sources about his wife's illness.

Gatto & Tak (2008) measured older people's perceptions of the helpfulness of online health information as a means of gaining knowledge about illness, treatments and therapies and approximately 50% of respondents found the Internet a helpful tool in acquiring information. In contrast, Sheaves et al. (2011) found that their participants were disappointed with a pilot email consultation service, as they wanted to receive more information about their particular illness and more assistance in researching about their condition.

Aside from the above, the literature on ICT and health information focuses on the barriers faced by older people when conducting health-related online searches, such as their level of health and ICT-related literacy and accessibility of websites.

Only one study reported on the effects ICT-based care on the occupation domain. Garceau et al. (2007) noted that two out of four participants mentioned that the services had a positive effect on their ability to carry out leisure activities.

3.5. Psychological wellbeing

The psychological wellbeing domain of the combined QOL model includes dignity, self-esteem and self-worth, and positive and negative feelings.

3.5.1. Mainstream ICT

Several qualitative studies described the direct positive effects of using ICT on older people's wellbeing. For instance, Sayago & Blat (2010) recounted the enjoyment and sense of purpose older people experienced when using email to communicate with loved ones. Sayago & Blat (2010), Hill et al. (2008), Gatto & Tak (2008) and the Independent Age report *Older people, technology and community* (2010) also provided data about older people experiencing a "sense of accomplishment", feelings of empowerment and increased self-esteem from using email and the internet. Likewise, interview participants described positive effects on their self-esteem from using ICT:

"[It is] a bit of a boost to your morale too...You get to 80 years old, you've done a lot in your life that you've been pleased with and then you can't do it anymore. So even a little thing that is a bit of a challenge and you've overcome it: that's quite a big boost."

W5, aged 80

In addition, the *Sus-IT* project (2011) reported that older people felt mentally alert and challenged, and subsequently more youthful as a result of going online (Independent Age, 2010). Similar suggestions were found in the interview data:

"I've got to keep my mind ticking over. It was reasons like that persuaded into thinking; 'Yes, it would be a good idea.'"

W5, aged 80

"[I am learning to use the internet] because I don't want to die mentally."

M3, aged 77

The effects of older people's use of ICT has also been measured quantitatively. Koopman-Boyden & Reid (2009) reported a significantly positive relationship between older people using the internet and email and their overall wellbeing (using World Values Survey and WHOQOL scales). Tsai et al (2010) reported a significant drop in depressive status (based on Geriatric Depressive Scale (Yesavage et al., 1982)) for older people in residential care using a video-conferencing service at three-month follow-up. Erickson & Johnson's (2011) correlation analyses suggested a significant link between older adults' use of the internet and wellbeing. Slegers et al. (2008) found that older people who were interested in - and used - a computer and the internet had lower levels of anxiety (based on the 90-item Symptom Check List (Arrindell and Ettema, 1986)) than older people who were not interested in using ICT. Finally, Cresci et al. (2010) found significantly higher levels of "senior optimism" in older computer users compared to non-users.

Some less positive effects were also reported. Mason et al. (2012) found a weak association between anxiety and internet use, where older people who experienced anxiety were more likely to be non-internet users, and older people who did not express anxiety were more likely to use the internet. Woodward et al. (2011) found no improvements in depression levels (on the Geriatric Loneliness Scale (Yesavage et al., 1982)) in older adults using ICT, although their participants started with low depression levels.

3.5.2. ICT-based care

Only a few small-scale qualitative studies have explored the effects of older people's use of ICT-based care services on their sense of dignity. The Age UK report *Technology and older people: evidence review* (2010a) and Boonstra & van Offenbeek (2010) reported that telecare users perceived an increase in their psychological wellbeing from using the services. Matthews et al. (2010), Cardozo & Steinberg (2010), and Walsh & Callan (2011) discussed the reassurance older people – as well as their carers – felt they obtained through using ICT-based care.

Quantitative studies showed mixed effects with respect to older people's psychological wellbeing. Damant et al. (2013) reported that significantly more participants of the *MonAMI* trial felt that remote monitoring and alert services were helpful in enabling them to feel optimistic about their future and reducing their anxiety (based on instrumentation specifically developed for the study) (

Table 8-5). Results from the *Whole Systems Demonstrator* (WSD) trial reported that telehealth services had no significant effect on anxiety (on the Brief STAI scale (Marteau and Bekker, 1992)) or depression symptoms (on the CESD10 scale (Andressen et al., 1994)) from baseline

to 12-month follow-up (Cartwright et al., 2013). Further findings of the WSD trial suggested that telecare services had a small, significant effect on reducing the rate of decline of mental health-related quality of life (based on SF-12 (Ware et al., 2002)) and depressive symptoms (based on CESD10) (Hirani et al., 2014). Chou et al. (2013) suggested that telecare enabled participants to experience less anxiety about their illness and experience less negative feelings more generally (using the WHOQOL BREF scale (Yao, 2005)), but no tests of significance were reported.

On the other hand, both Brownsell et al. (2008) and Bowes et al. (2009) found no significant effects on older people’s mental health scores, using the SF-36 scale (Brazier et al., 1992) and Patient Health Questionnaire (Kroenke et al., 2001) respectively, from using telecare and telemonitoring services respectively at the 12-month follow-up. Furthermore, findings from the WSD trial showed that the use of telecare services had no effect on levels of anxiety symptoms (using the Brief-STAI instrument (Marteau and Bekker, 1992)) (Hirani et al., 2014).

Table 8-5 Perceptions of helpfulness of the MonAMI services on psychological wellbeing

	HELPFUL (N PARTICIPANTS)	UNHELPFUL (N PARTICIPANTS)	ONE SAMPLE (Z-TEST OF SIGNIFICANCE)
FEELING OPTIMISTIC ABOUT THE FUTURE	32	14	***
REDUCING ANXIETY	27	16	*

NOTES:

* P<0.01; **P <0.05; *** P<0.001; NS: NOT REACHING SIGNIFICANCE AT P<0.01

Source: Damant et al. (2013)

3.5.3. Obtrusiveness

Closely related to dignity are the feelings associated with the obtrusiveness and subsequent stigmatising effects of using ICT-based care. Zweijssen et al. (2011) broadly defined obtrusiveness of ICT-based care as care which is disruptive or invasive of users’ physical space, leading users to feel stigmatised or experience a loss of dignity (Age UK, 2010a; Karunanithi, 2008). In particular, several sources discussed how some monitoring services and wearable devices implied to older users that they were becoming increasingly frail, disabled and dependent (Ding et al., 2011; Lloyd, 2010; Roberts, 2009; Sanders et al., 2012; Sixsmith and Sixsmith, 2008; Wagner et al., 2012; Zweijssen et al., 2011). For instance, Walsh & Callan (2011)

and Milligan et al. (2011) reported that older participants were reluctant to wear their pendent alarms because they felt stigmatised as needing care and assistance. Turgeon-Londei et al. (2009) reported that 8% of participants would not want to use home security services because they would feel stigmatised as disabled. Similarly, Sanders et al. (2012) found that many of the people who withdrew from the WSD trial associated telecare and telehealth with being dependent and in poor health, and they wanted to distance themselves from negative inferences of old age and illness. Interview participants described a similar loss of dignity in relation to ICT-based care:

“My mum ties her cords [for the care alarm] up. She won’t touch them. She doesn’t think that she is old”

W3F, aged 60 years or older

Most comments made by experts relating to the psychological wellbeing domain related to the obtrusiveness and intrusiveness of ICT-based care. Some experts linked the perceived obtrusiveness of the equipment to older people’s sense of independence:

“Most people who are given an alarm system leave it on the dressing table and never use it. The stigma of having an alarm is huge. A lot of people say: “I won’t be seen like that. It makes me look old.”

ILC-UK, executive

“We find that an awful lot that people are independent [to a fault] and that we can’t help them to maintain that independence. [They see the services as] intrusive.”

Worcestershire County Council, telecare

The obtrusiveness of ICT also spurred discussions concerning the disappearing boundaries between the home and institutionalised care (Milligan et al., 2011). Palm (2013) noted that a growing number of older people with care needs lived at home because they use of ICT. However, as their needs grew and became more complicated, the “home” space become occupied by more equipment, aids and, indeed, care staff. Milligan et al. (2011) and Sixsmith & Sixsmith (2008) suggested that there is a risk that the home can shift from being an individuals’ personal sanctuary to an impersonal place of hurried activity. One expert interviewee confirmed that older people did not want their home to “look like a hospital” (Age UK, development manager). Indeed, a MonAMI participant commented on the obtrusiveness of telecare services, likening the constant flashing lights of the equipment to being in a space ship (Slovakia, female, 77 years).

3.6. Physical capability

Physical capability is the sixth domain of the combined QOL model. In this research, the physical capability domain explores how the use of ICT affects individuals' physical abilities to carry out their daily activities. The domain also investigates how the ICT services effect health-related behaviour, and levels of knowledge and awareness of health issues that directly affect their physical capabilities. Therefore, the physical capability domain assesses health-related indicators which determine whether people can physically lead the life they choose.

3.6.1. Mainstream ICT

Very few associations have been made between older people's use of mainstream ICT and their physical capabilities. Gatto & Tak (2008) noted that most of their respondents found the information on the internet of little or no help as a resource for diet and exercise. Slegers et al. (2008) found no consistent impact from older people's use of ICT on their participation in physically active sports. In addition, the interview data suggest only a tenuous link between ICT-use and physical health, where participants raised concerns about too much use of ICT leading to a decrease in physical exercise:

"I know people who sit at a computer for hours on end."

W2, aged 75

On the other hand, there were several cross-cultural observations concerning how older people's self-rated health correlated with their use of mainstream ICT. For instance, Garcia & Herrero (2009) found that older people living in Spain who use the internet had significantly better self-rated health than non-users (no scale specified). Results from a New Zealand study by Koopman-Boyden & Reid (2009) found a significant positive relationship between internet and email usage and self-rated health (based on a questionnaire developed for the study). An American study by Cresci et al. (2010) showed that computers users were significantly healthier than computer non-users (based on the SF-12 (Ware et al., 2002)). Heart's (2013) Israeli-American study also indicated a major effect of good health on computer use when interacting with age. Finally, results in Table 8-6 of a cross-tabulation analysis of the 2011 OxIS dataset show that older non-users (of the Internet) are significantly more likely than older Internet users to have a health problem of disability ($\chi^2 = 45.59, p=0.000$).

Table 8-6 Cross-tabulation of Internet usage and health problem of people aged 65 year and older

NO HEALTH PROBLEM	HEALTH PROBLEM OR	TOTAL
-------------------	-------------------	-------

	ORDISABILITY	DISABILITY	
NON-USER	218 (55.6%)	174 (44.4%)	392
USER	139 (85.8%)	23 (14.2%)	162

3.6.2. ICT-based care

In the *Care Act 2014* (Department of Health, 2014), the government renewed its commitment to promoting self-managed care, resulting in an increase in the availability of ICT-based care systems. By design, ICT-based care devices, services and systems compensate - at some level - for physical, sensory and cognitive limitations (Age UK, 2010a; Matthews et al., 2010). Moreover, several ICT-based care services provide health-related information or include behaviour modification applications which are intended to assist people in the self-management of their illness and care (van den Berg et al., 2012). However, evidence of the effects of ICT-based care on behaviour, knowledge and control over health issues was limited and at times contradictory.

Van den Berg et al. (2012) and Aalbers et al. (2011) conducted comprehensive systematic reviews of ICT-based home care services and internet-mediated interventions respectively. They concluded that there was a trend towards an improvement in health-related behaviour such as medication compliance, weight and disease management for ICT-based care users compared to control groups, but no significant correlation. Bowes (2009) found that telehealth users had slightly but not significantly lower levels of adherence to their medication compared to the control group who received more face-to-face nurse visits.

Chou et al. (2013) showed that older people felt that they had improved knowledge about – and more control over – their health by using telecare services (on the Technology Acceptance Model (Davis, 1989)). Their findings also showed that participants highly rated the services in terms of “distraction due to pain” (on the WHOQOL-BREF scale (Yao, 2005)). Bowes et al. (2009) also observed improvements in medication knowledge amongst users of telehealth services who also received frequent nurse visits. Experts also noted that telehealth systems made service recipients both more aware of their illness and more in control of their medication regime:

“When clients say: ‘I am coughing more at night,’ what they are really saying is: ‘I think I need to start my antibiotics or start my steroids.’ The clinical staff are now leaving prescriptions such that clients can choose when to get the prescription made up when they feel they are starting to exacerbate.”

In terms of self-rated health, Brownsell et al. (2008) and Hirani et al. (2014) reported no significant improvements for older people using telecare over a 12 month period (using SF-36 (Brazier et al., 1992) and SF-12 scales (Ware et al., 2002) respectively). Similarly, Bowes et al. (2009) and Cartwright et al. (2013) did not find and significant effects on self-rated health for people using telehealth services over 12 months (using study-specific questionnaire and SF-12 scale (Ware et al., 2002) respectively). Likewise, results of the evaluation of the MonAMI trial (see Table 8-7) showed that significantly more participants found the telecare services to be “unhelpful” than “helpful” in terms of feeling energetic, managing their medication and memory. A similar trend was observed for participants’ perception of the services’ lack of helpfulness for managing their pain (based on questionnaire developed for the study) (Damant et al., 2013).

Table 8-7 Perceived helpfulness of MonAMI services on physical capabilities domain

	HELPFUL (N PARTICIPANTS)	UNHELPFUL (N PARTICIPANTS)	ONE SAMPLE (Z-TEST OF SIGNIFICANCE)
MANAGING MEDICATION	1	9	***
MANAGING PAIN	13	21	NS
MEMORY	1	11	***
FEELING ENERGETIC	11	27	***
NOTES:			
* P<0.01; **P <0.05; *** P<0.001; NS: NOT REACHING SIGNIFICANCE AT P<0.01			

Source: Damant et al. (2013)

4. Discussion

To consider whether older people’s use of ICT affects the various domains of quality of life, I searched for evidence in the literature and examined the interview data I had collected. The search was framed around a quality of life model, designed by combining the domains and underlying concepts of the ASCOT and WHOQOL instruments. Overall, the analyses across all sources of data suggest that older people’s use of ICT in various contexts brings many benefits to their quality of life. In particular, some older people attested to achieving a sense of control and independence over their daily lives, reinforcing their social networks, gaining a sense of

safety, pursuing pastimes and other meaningful activities, and improving their overall psychological wellbeing.

Yet it should be stressed that the benefits were not universal. Rather, the evidence suggested that the benefits of using ICT were often offset by the negative effects of ICT use on quality of life. For instance, several studies reported in the literature suggested that older people's use of mainstream ICT had positive impacts on inter-generational relationships between families and some studies also reported significant positive effects on reducing loneliness. However, some of the evidence presented in the literature revealed only weak or no links between older people's ICT use and their social networks. Furthermore, only weak associations were reported with respect to the effects of ICT-based care on social involvement, and some evidence pointed to the negative impact in terms of exacerbating feelings of loneliness.

The contrasting results in the literature around the benefits of ICT use on older people's social networking in the literature corresponded to the findings in the interviews with older people as well as with experts. Interviewees from both datasets discussed the benefits of ICT to bring together families and friends that are scattered across the world. One expert also discussed observations of the effects on intergenerational relationships from ICT use in care settings. However as in the literature findings, comments from interviewees suggested that ICT use could potentially exacerbate older people's isolation and loneliness. Indeed, a few experts also pointed out the error in assuming that there is a technology solution to every social problem.

All in all, the associations between ICT and social involvement are generally weak. The evidence could be said to imply that older people's use of ICT positively reinforced existing social networks, but generally had a null effect on building new ones.

Similarly, some qualitative studies reported on the positive effects of older people's use of ICT-based care on their psychological wellbeing in terms of general wellbeing, reassurance, optimism about the future, and a decrease in anxiety and depression. Correspondingly, some older interviewees reported that ICT use has a positive effect on their psychological wellbeing. But the sum of quantitative evidence in the literature described the overall effects as either minimal or not statistically significant. Similarly conflicting results were found in the literature on the association between the use of ICT-based care and depression and anxiety. On the other hand, there was convergence between the literature and interview analyses on topics related to the obtrusiveness of ICT-based care. Several sources discussed the stigmatising effects of ICT-based care and the effects of the gradual 'institutionalisation' of the (domestic) home.

The analyses for other domains of QOL confirmed this recurring pattern in the overall evidence base. Again, several sources claimed that ICT use – in different contexts – enhances older people’s perception of their personal safety and security. However these claims are not completely substantiated upon closer investigation of the data in both the literature and in the interviews, as there were several issues around privacy and data protection that many older people are uncomfortable with.

Dickinson and Gregor (2006) also found similar dissent between empirical findings and the claims made elsewhere about the benefits of ICT use on quality of life. The differences in results between the qualitative and quantitative studies highlight the methodological challenges with measuring the relationships between technology use and psychological state. Both device use and psychological wellbeing are affected by a number of extraneous factors which cannot be easily isolated or explained using strict research protocols typically associated with quantitative research (Robson, 2011, p. 21). Indeed, Hirani et al (2014) suggested the mixed quantitative findings for psychological wellbeing could reflect the complexity of emotions that many older people experience when managing an illness or long-term care need. Rather, unpicking the context of these complex human experiences may provide more insight to the broader understanding of the effects of ICT use than looking at the causal relationship, which is more suited to exploratory approaches used in qualitative research (Creswell, 2014, p. 4).

The complicated nature of the relationship between ICT use and quality of life has led scholars to deliberate the notion of “trade-offs”. Several studies discussed the issues of “trade-offs”, where older people weigh the benefits of using ICT in one domain against the disadvantages ICT brings to another domain. For instance, Wright (2010) discussed the possibility that older people’s use of the internet provided them with independence and control over their lives, but also presented security hazards and threats to their privacy. Wright & Wadhwa (2010) and Harrod (2010) also highlighted that some older people used the internet to gain control over daily activities, such as shopping and banking, but this then reduced the amount of face-to-face contact they had with other people. Trade-offs were not explicitly discussed in the interview data. Nevertheless, there was some validation of this perspective in the interview data with older people, where interviewees implied they reluctantly used ICT in order to improve one aspect of their quality of life at the expense of another. For instance, several older interviewees stated they appreciated the increased sense of security they had by carrying a mobile phone. However, one participant also acknowledged that this sense of security was at the cost of her privacy:

“I don’t like people interfering with me when I’m out. I just want to be left alone. [The mobile phone] is good for emergencies though.”

W1, aged 73

Older people were also found to make similar trade-offs when using ICT-based care. Several reports discussed the concessions some people are willing to make in terms of their privacy and security in order to live independently in their own homes with the use of monitoring services (Blaschke et al., 2009; González-Vega et al., 2011; Kubitschke and Cullen, 2010; Sixsmith and Sixsmith, 2008; Turgeon-Londei et al., 2009; Wagner et al., 2012; Zweijssen et al., 2011). Blaschke et al. (2009) and Lloyd (2010) further suggested that gaining a level of independence and sense of security might be achieved at the expense of face-to-face contact with care practitioners. Gonzalez-Vega et al. (2011) and Lorenzen-Huber et al. (2011) suggested that continuous surveillance and monitoring services which offer security and independence could force older people to sacrifice their personal autonomy as they lose the ability to choose when to use the services and what personal information is shared with others. Mahoney & Mahoney (2010) commented on the trade-off between the reliability of wearable monitoring services and the stigmatising effects of the services for people suffering from dementia. One expert also commented on the trade-off between dignity and independence that some devices require of people with cognitive impairment:

“We were considering the stigma of tagging devices for people who are confused. However, it is better than the alternative. The alternative is that they can’t go out because they have to go out with a carer all the time. Whereas if they have got a tagging device, people can go out while someone is monitoring them [remotely].”

ILC-UK, executive

Given that on balance the results on the effects of ICT use on a singular domain of QOL are inconclusive, introducing the concept of trade-offs offers an alternative for understanding quality of life in the context of ICT.

Overall, the combined QOL model proved to be useful for indicating the effects of ICT use in several domains, including control over daily living, security, social networking, occupation and psychological wellbeing. However, the model was less useful for detecting the effects of ICT use on the physical capabilities domain. There was a general lack of evidence across all data sources that ICT effected physical capabilities, according to how they were defined in the combined QOL framework. This could be related to findings that it is older people in relatively good health who are more likely to use ICT than older people in poorer health. Similarly, the sample of older interviewees were also free of limiting illnesses or disabilities. This suggests a

ceiling effect; ICT-users are in a good state of health and there is limited room for improving their physical capabilities.

There was also a lack of significant evidence of the effects of older people's use of ICT-based care on their physical capabilities. A pilot study by Agree & Freedman (2011), which tested the validity of the Assistive Technology Quality of Life Scale, yielded similarly ambiguous results on the role of assistive technologies in reducing pain, fatigue and ability to carry out day-to-day activities. The findings may be attributable to the difficulties of directly attributing physical symptoms to the use of an ICT-based device or service. It also suggests that existing instrumentation lacks both the sensitivity and specificity to assess the impact of ICT use on physical capabilities.

All in all, the evidence suggests that older people's ICT use has both positive and negative effects on their quality of life; and when it is used prudently, ICT can facilitate older people's participation in their networks and communities. However, the large number of older people who do not use ICT are not often captured in research studies in this area, and it is therefore difficult to ascertain how their quality of life – and ability to participate in their communities - is comparatively improved or compromised by not using ICT. This points to the need for further investigation into the quality of life of older non-users within the context of the digital society.

However, the analysis presented here highlights the methodological challenges in assessing the influence of older people's use of ICT – both in mainstream and care contexts – on their quality of life. In particular, the effects on older people's quality of life is only explicitly examined in a handful of studies, many with small samples (with the one exception being the *Whole Systems Demonstrator* trials with 6000 participants). In addition, numerous different QOL instruments were used across the studies. These issues probably compromised the overall generalizability of the effects. This supports findings from other studies which identified a lack of robust evidence around ICT use and its effects on quality of life (Chou et al., 2013; Martin et al., 2009; Matthews et al., 2010; Vergara-Rojas and Gagnon, 2008).

Chapter 9 : Conclusion

1. Introduction

Information communication technology (ICT) is embedded in every aspect of British society. At the same time, approximately 4.8 million people aged 65 years and older in Britain do not use the internet, thereby limiting their access to this dimension of modern life. By some standards this suggests they are experiencing a form of social exclusion which denies them equal access to society's resources (Helsper, 2008). In addition ICT continues to evolve, which causes constant shifts in societal norms and expectations around how to remain included in the digital society.

These challenges led to a number of sweeping generalisations about older people's position in the digital society. Yet, the population of people aged 65 years and older is highly heterogeneous: many older people are resourceful and self-sufficient, others are isolated and disenfranchised. The extent to which the digital environment affects older people's way of life is unclear. Therefore, to shed light on the topic of older people's e-inclusion and access to ICT-based care, this study addressed the overarching research questions *"What is older people's level of engagement with mainstream – and care-related – ICT?"* and *"How does older people's engagement with mainstream – and care-related – ICT affect their ability to participate in their communities?"*

In this concluding chapter, I triangulate the results from the various data sources and analyses presented earlier in order to summarise and discuss the principal findings of the research. I also offer some reflection on the main strengths and limitations, as well as some on some aspects of the study that could have been improved. Finally, I consider some of the implications of the results for policy, practice and future research.

2. Triangulating the results

This research was based on the 6C framework of e-inclusion. The 6C framework stems from a definition of e-inclusion which moves away from the "on" or "off" paradigm of the digital divide and describes ICT engagement as a continuum which changes over time in response to advances in technologies or changes in life circumstances (Almuwil et al., 2011; Ferro et al., 2011). The dimensions of the 6C framework are care content, capability, confidence, cost, connectivity and continuity.

The evidence clearly demonstrates that a large number of adults aged 65 year and older do not use ICT. The most recent statistics released by the Office for National Statistics state that

approximately 28% of the population aged 65 years and older in Great Britain do not use the internet and a further 12% have not used it in the past three months, which is equivalent to almost 4.8 million people who do not use the internet (2014a). Accordingly, these people are at risk of social isolation from an increasingly digital society.

However, the estimates indicate that the 60% of the population age 65 years and older who used the internet in some capacity represent a highly diverse group. When taking a digital divide approach, there is no reason for concern for the population who are online as they are on the “right side” of the divide. In contrast, the 6C framework approach delves into the factors influencing ICT adoption and use, and uncovers a wide range of engagement, highlighting the heterogeneity of older users’ perceptions, attitudes, skills, confidence, and ability to use ICT. The 6C framework also emphasises that ICT-use does not preclude someone from e-exclusion.

Furthermore, the digital landscape is continually changing and consequently the parameters of e-inclusion are shifting. There appears to be no roadmap to guide people on to how to achieve - and to sustain - a level of e-inclusion which would enable them to fully participate in an evolving digital society. The lack of a consistent measure of e-inclusion, which might seem to be a solely academic issue, in fact impedes the discovery of ways to help people according to their specific needs.

To address the overarching research questions I answered the following subsidiary questions:

- k) What is the level of e-inclusion of the older population?
- l) What is older people’s level of access to ICT-based care services?
- m) In what ways do personal and environmental factors influence older people’s access to mainstream ICT and ICT-based care?
- n) How does the use of ICT – both for mainstream and care-related purposes – affect older people’s quality of life?
- o) Do contemporary indicators of e-inclusion reflect older people’s level of participation in their communities?

In the following sections, I discuss how each of the subsidiary questions was addressed by triangulating the results of the qualitative and quantitative analyses and the review of the relevant literature.

2.1. What is the level of e-inclusion of older people?

The analyses of various data sources generated three main findings on the level of e-inclusion of the older population in Great Britain.

Firstly, the level of e-inclusion of the population of people aged 65 years and older has steadily increased over time. Analysis of the OxIS dataset demonstrated a decrease in the proportion of people aged 65 years and older who were at the “never-user” level of e-inclusion between 2005 and 2011. These results were confirmed by estimates from a number of other sources of quantitative evidence which demonstrated an overall increase in older people’s usage rates of the internet and computers between 2005 and 2014 (Eurostat, 2014e, 2014f). Furthermore, the evidence also demonstrates that older people’s usage of “new generation” ICT such as smart phones, tablets computers and mobile internet networks has also increase since 2012 (Ofcom, 2014). Part of the increase in usage can be attributed to the ‘cohort effect’ – the migration of younger ICT users into older age categories. Older interviewees also confirmed that ICT use amongst older generations has increased. For instance, several interviewees suggested that they started using – or increased their use of - ICT use especially to keep in touch with their family members who lived far away. Other interviewees suggested they adopted ICT because as they became less mobile and had more time to “sit” in front of a screen.

Secondly, the results demonstrated marked differences in the level of e-inclusion between “younger” older people and “older” older people, suggesting a further cohort effect. The analysis of the 2011 OxIS data demonstrated that over 80% of people aged 75 were at the “never-user” level of e-inclusion, compared to 50% of people aged 65 years and older. Several other sources confirmed that, compared to people aged 75 years and older, younger older adults had substantially higher usage rates across a variety of ICT including the internet, computers, mobile phones and tablet computers. The evidence from the literature review also demonstrated marked differences in perceptions and attitudes towards ICT; younger older people perceived ICT to be more relevant and had more positive attitudes compared to older people of a more advanced age (Feist et al., 2010; Marquié et al., 2002; Xie, 2003).

These findings were supported by Cjaza et al.’s (2006) observation that people who left the workforce as ICT became mainstream (who are now over 75 years and older) had less employment-linked formal experience with ICT. This consequently affected their attitudes and abilities to adopt new technologies. In contrast, younger people (including people aged 65

years to 74 years) had more ICT exposure, which almost compelled them to adopt different attitudes towards technologies and to and develop different learning patterns to use ICT.

Thirdly, the “moderate” level of e-inclusion is representative of the majority of older people’s digital needs and priorities. The quantitative analyses demonstrated that the proportion of 65 to 74 year olds at the moderate level of e-inclusion more than doubled between 2005 and 2011, whereas only slight changes were recorded at other levels of e-inclusion for that age group. These results reflected the role ICT has in the lives of older people, particularly as they move from employment to retirement, which was described by several sources in the literature: many older people appreciated ICT for certain functions, but generally did not want ICT to interfere every aspect of their lives (Hernandez-Encuentra et al., 2009; Hill et al., 2008; Selwyn, 2004; Weaver et al., 2010). This was also confirmed in the interview data, as participants discussed that ICT was useful for emergencies and for pursuing their hobbies, but they also viewed ICT as an intrusion into their active, busy lives.

2.2. What is older people’s level of access to ICT-based care?

The evidence on older people’s access to ICT-based care services is limited and vague.

The *3 Million Lives* campaign estimates that 3 million people (of all ages) could benefit from ICT-based care. However, the evidence suggests there is a large discrepancy between the number of (older) people who could potentially benefit from ICT-based care and the number of (older) people who receive remote care services. The “official” figures on the number of ICT-based care recipients in the UK range from between 250,000 (Corbett-Nolan and Bullivant, 2012) to 1.8 million (Taylor, 2012). According to market analysts, a majority of ICT-based care recipients are aged 65 years and older (Kubitschke and Cullen, 2010; Taylor, 2012).

There is a great variety of ICT-based care services and services available on the market (Technology Services Association, 2013). Yet, there is little information on the types of ICT-based care services that local authorities (and clinical commissioning groups) provide. Most reports found that the vast majority of ICT-based care services deployed in the UK are “first generation” community pendent alarms (Kubitschke and Cullen, 2010; Sethi et al., 2011), although recent evidence suggested that the use of more advanced forms of telecare and telehealth is growing (Healthcare UK, 2013).

The review of the evidence also demonstrated that older people’s access to ICT-based care is subject to local social care policies, leading to an unequal distribution of services across the country (Corbett-Nolan and Bullivant, 2012).

There was also consistency between findings in the literature and expert interview data around the “disconnect” between the different stakeholder groups in the ICT-based care market. Both inferred an overall “supply-push” of ICT-based care by technology developers and policy makers, rather than a demand-pull by potential care recipients.

2.3. What personal and environmental factors affect older people’s e-inclusion and their access to ICT-based care?

The evidence on older people’s e-inclusion and access to ICT-based care has been reviewed through the lens of the four person-centred and two environmental dimensions of the 6C framework. It was found that the use of ICT – both for mainstream and care-related purposes – by older people is affected by a number of interrelated factors.

2.3.1. Person-centred factors

The regression analyses of data from the 2011 OxIS estimated that older people’s perceptions of the benefits of ICT had a significantly positive effect on their level of e-inclusion. Several studies from the body of literature reported that older people’s perceived relevance of the content available through ICT affected their decisions whether to use it (see chapter 5 for references). A similar theme emerged from the interviews with technical experts. Similarly, older people’s adoption of ICT-based care was affected by their perception of their need for the services (Boonstra and van Offenbeek, 2010; Botsis and Hartvigsen, 2008).

The quantitative analyses demonstrated a significant inverse relationship between poor health or disability and level of e-inclusion. These effects were corroborated by numerous publications concerning the accessibility issues older people face when experiencing age-related changes in their physical, sensory and cognitive abilities. There were also many reports on the poor accessibility of ICT-based care devices, which affected their adoption – and use – of the services (see chapter 5 for references).

The evidence found in the literature on the acceptability and usability of touchscreen devices was divided. There was some speculation that touchscreen devices, such as smart phones and tablet computers, are more age-friendly than earlier ICT devices (Stroud, 2012). Other sources suggested that touchscreen ICT was not accessible, especially for older people with cognitive impairment (Alvseike and Brønnick, 2012; Sadri, 2011). A similar division was found in the evidence from the expert interview data. Overall, there is little empirical evidence to support either claim. More research is needed to explore the usability of new generation devices for older people with physical, sensory and cognitive impairment.

The evidence from both the quantitative analyses and the literature review demonstrated a strong, significant association between older people's attained level of education and their level of e-inclusion (Mason et al., 2012; Wagner et al., 2010). Several studies linked level of education to exposure and skills, which affected older people's ICT use. At the same time, several reports discussed that older people's low levels of skill can be overcome by a motivation to use ICT, and a conducive learning environment (see chapter 5).

There was limited evidence suggesting that ICT skills affected older people's access to ICT-based care.

In the regression models, nervousness around breaking ICT equipment was significantly inversely related to level of e-inclusion. Several studies also described the powerful effect of older people's attitudes and self-efficacy on ICT use. One expert interviewee suggested that older people's attitudes towards ICT is one of the biggest barriers to their e-inclusion. The body of literature generally paints a negative picture of older people's level of self-efficacy of their ICT skills (Magnusson et al., 2004; Selwyn et al., 2003). However when considering individual ICT tasks, the evidence showed that older people's self-efficacy varied; older people had high levels of self-efficacy of ICT tasks they found relevant such as using a mobile to make calls, and using the internet for information searches.

A small number of studies demonstrated the effects of older people's level of confidence on their on their adoption and use of ICT-based care (Cheek et al., 2005; Magnusson et al., 2004; Sanders et al., 2012), particularly when mainstream devices are used to access the services (Harjumaa and Isomursu, 2012; Nijland et al., 2009).

The quantitative analyses demonstrated that the impact of income on older people's level of e-inclusion varies according to how e-inclusion is defined. Income reached borderline significance in the regression model where the dependent variable was defined solely by access to ICT devices. Some analysts suggest that as technology prices continually fall, mainstream ICT becomes more affordable to a wider client base (Almuwil et al., 2011; Tak et al., 2010), and thus income becomes a less significant barrier to e-inclusion.

However, this position was refuted by several studies which found a strong, significant relationship between income and use of ICT (Atkinson et al., 2008; Carpenter and Buday, 2007; Mason et al., 2012). Furthermore, income had a significant effect on e-inclusion when it was defined as a combination of access to ICT devices, frequency of use, and skills. Like education, income may reflect the level of exposure older people had to ICT while in the workforce, which

consequently affects their perceptions and attitudes, and ultimately their use of ICT. The body of literature described the effect of older people's perceptions of affordability on their perceptions of the benefits of ICT, and consequently their use of ICT (Czaja et al., 2006; Hill et al., 2008; Wagner et al., 2010).

Studies of ICT-based care systems also demonstrated the effects of perceived affordability on older people's access to ICT-based care (see chapter 5 for references). The evidence suggested that this was due to the lack of clarity around the reimbursement for certain components of ICT-based care.

2.3.2. Environmental factors

There are several environmental factors relating to connectivity and continuity which contribute to older people's lack of access to mainstream ICT and ICT-based care. Firstly, the statistical evidence from ONS, Eurostat and OxIS demonstrated that, over time, the proportion of the older population accessing the internet and mainstream devices is growing. However, findings from the grey literature and interviews with experts from the third sector showed that there are disparities in access to both mainstream ICT and ICT-based care depending on where (older) people live. The literature and expert evidence also highlighted that these discrepancies were – at least in part - resulting from government policies. The UK national government encouraged a market-led approach to the roll-out of the NGA internet infrastructure, which resulted in poor broadband services in areas where the older population is larger than the national average. This may also suggest that the areas do not have sufficient income to purchase and maintain the NGA infrastructure.

Secondly, the evidence from the interview data and some sources of literature demonstrated a poor level of understanding of older people by the commercial sector, and by national and local government. Several reports commented that ICT suppliers focus their development and marketing resources on younger markets, which can alienate older people and in turn interfere with their access to both mainstream and care-related technologies. This is complicated by the government's interests in positioning the UK as an innovative and competitive digital economy in order to protect commercial sector interests.

Third, the evidence from expert interview data demonstrated older people's connectivity and continuity are influenced by the decisions taken by local governments and care providers. Local authorities have developed their online services, yet many older people prefer not to use digital channels to access government services. There are also questions about whether offline alternatives could put older people at further risk of exclusion (Lewis, 2012; Mason et al.,

2012). Furthermore, few local authorities are directly involved in providing services to help older people acquire access to the internet and to skills they to use their online services. Finally, analyses of the OxIS 2011 data, expert interviews and the body of literature also implied that the impact of public and third sector ICT programmes is limited, as the majority of the older population access ICT in their homes, and with the help from family and friends. It should also be noted that past initiatives that provided nation-wide public access to the internet had little effect on older people's level of e-inclusion.

The grey literature described that most e-inclusion initiatives are driven by local digital champions and grass-roots organisations, which offer a range of skills training and support services that enable older people to adopt – and to continue to use – ICT. This was confirmed in the interviews with older people and third-sector experts. However, the online search of the evidence around third sector e-inclusion activities demonstrated that there is regional variation in the availability of support services from the third sector. ONS estimates demonstrated that older people who live alone were less likely to have an internet connection than older people who lived with other people.

Similarly, decisions on how to distribute ICT-based care are taken at the local level, which has resulted in uneven access to services across the country. The evidence from the various sources in the literature also showed that older people's adoption of ICT-based care was affected by care practitioners' endorsement of the services.

Finally, the findings highlighted that the connectivity and continuity dimensions of older people's e-inclusion are linked to their personal networks. Several sources of evidence confirmed that many older people acquire ICT as gifts, and some non-users rely on family and friends as proxy-users. The OxIS data demonstrated that older people's family and friends provide encouragement and support to adopt ICT. These findings were corroborated by expert interview data.

However, there was some conflicting evidence around the degree to which older people's personal networks supported their continued engagement. Results of the quantitative analyses demonstrated that the number of people living in the household was significantly positively associated with older people's level of e-inclusion when defined as access to ICT devices ($p < 0.05$). The significance of the effect of the number of people living in the household on older people's level of e-inclusion, when defined as access to devices, skills and frequency of use, was $p < 0.10$, demonstrating that the effects were more random compared to the other model. In addition some evidence from the literature as well as from analysis of OxIS data

suggested that many older people are self-reliant, and do not use any support to use the internet (Adams et al., 2005; Eastman and Iyer, 2004; Selwyn et al., 2003). Furthermore, the interviews with older people and experts confirmed the instrumental role that third sector programmes play in providing ICT support, especially for older people who do not have support from close family members or friends. These findings imply that older people's personal networks are instrumental in improving older people's level of connectivity (material access to ICT), but may have less influence on their level of continuity (sustained use of ICT).

In contrast, the evidence demonstrated that older people's networks of family, friends and unpaid carers played an important role in the delivery of ICT-based care. Family members, friends and unpaid carers often respond to alarms and have a role in financing services. However, the extent of the role of unpaid carers is unclear and is an area needing further research.

2.4. How does the use of ICT – for both mainstream and care-related purposes – affect older people's quality of life?

The evidence demonstrated that using ICT – for both mainstream and care-related purposes - can have both positive and negative effects on older people's quality of life. The qualitative analysis of the interview data showed that mainstream ICT enables them to maintain their social involvement with family and friends, to pursue their hobbies and work interests, and to feel reassured they can contact someone in an emergency. These findings were supported by several sources in the literatures (see chapter 8 for references).

There was little evidence demonstrating that older people's use of ICT-based care had any effect on the social involvement and occupation domains. Expert interviewees suggested that ICT-based care is not designed to replace social contact, but rather a tool to improve the delivery of care.

Interview participants also discussed that ICT was at times an intrusion of their privacy, and some expressed their fears of cybercrime. Focus group participants and technical experts also discussed the effects of ICT-based care on older services users' sense of dignity and independence. These themes were also common in the literature (see chapter 8).

Literature reports found that many older people reconciled the conflicting effects of ICT on their quality of life through a series of trade-offs, by weighing the perceived benefits against the potential harms of ICT use (Blaschke et al., 2009; Zweijssen et al., 2011). Overall, the

evidence showed that when employed judiciously, ICT enabled older people to have greater involvement with their existing personal networks and communities.

Triangulating the literature findings and interview data highlighted several methodological challenges to assessing the effects of ICT use on quality of life. Most of the evidence is based on small samples and there is little consistency in the assessment tools used across studies. Furthermore, the quantitative results for the physical capabilities domain raised questions about the overall usefulness of the measurements and the accuracy of the instrumentation for that domain.

The triangulation also emphasised the importance of choosing appropriate research methods to answer specific research questions. The quantitative and qualitative evidence around the effects of ICT use on quality of life often led to different conclusions. On balance, the quantitative results showed little to no effect of ICT use in most domains of quality of life. The qualitative findings from the literature and interview data on the other hand uncovered detailed relationships between ICT use and quality of life. The combined findings demonstrated the difficulties in conducting quantitative research for understanding complex human experiences, which is more suited to qualitative methods.

2.5. Do contemporary measures of e-inclusion reflect older people's level of participation in their communities?

Contemporary e-inclusion models, including the 6C framework and the e-inclusion scale, are developed on techno-centric principles that e-inclusion is both beneficial and necessary to be included in today's digital society (Weaver et al., 2010). The results of analyses demonstrated that the cultural values represented by current definitions of e-inclusion set questionable standards for the types of devices and level of access people need in order to be part of the digital society.

The e-inclusion scale was partly based on Dutton & Blank's (2011) typology of new generation and first generation users, which places a high value on the use of "smart ICT" and mobile internet. Using these same parameters to describe the highest level on the e-inclusion scale (the new generation level) demonstrated that almost the entire sample of older adults was excluded from this mainstream digital culture. This alienation of older people from the digital society was also evident in the literature and interview data. Studies demonstrated older people's unfamiliarity with the language (Hill et al., 2008; Sanders et al., 2012), and many older interviewees explained they were unaccustomed to the social norms of interpersonal communication. Reports also described a general lack of self-confidence and self-efficacy,

suggesting that older people did not feel they were meeting the prescribed set of “digital standards” (Feist et al., 2010; McMurtrey et al., 2011).

The results of the quantitative analysis also demonstrated that many older people are moderate users, who access the internet daily for a small set of functions, on a small number of devices. This implies that older people do not necessarily have a battery of the latest devices, but incorporate ICT into their daily routines to some degree. The evidence from the literature review and interview data also suggested that “moderate use” of ICT suited older people’s needs and lifestyle: many were able to maintain contact their family and friends both home and abroad, to participate in clubs and societies, and to pursue their hobbies.

The results from the analysis according to the e-inclusion scale also pointed to a small proportion of older people who were ex-users. The topic of disengagement was explored by the Sus-IT project (2011), which provided insight into some of the reasons that cause people to end their ICT use, such as poor health, lack of financial means or loss of (spousal) support (Hardhill and Olphert, 2012; Olphert and Damodaran, 2013; Sus-IT project, 2011). Indeed, one focus group member described similar circumstances which prevented his current lack of ICT. Moreover, several findings pointed to the difficulties older people have with using ICT devices, which could lead to users at any level of e-inclusion to abandon ICT (see chapter 5); underlying the impact of an ICT industry focused on a youth market (Age UK, 2010b).

The e-inclusion scale was less useful in describing older non-users’ ability to participate in the digital society, or in their own personal networks. The underlying assumptions of the e-inclusion framework, and the e-inclusion scale, are that non-users are excluded from the digital society, and are consequently at risk of having a poor quality of life. These assumptions may be appropriate for younger generations who build their personal communities around access to the internet. However as discussed, older people have different priorities and needs. Non-use does not equate necessarily to exclusion, nor does it indicate a poor quality of life.

Rather, there is a small amount of evidence to suggest that some non-users do participate in the digital society, and are fully active in their communities. For instance, the findings on proxy-use showed that some non-users access internet services through friends and family. One focus group participant described a friend who had the means to acquire ICT, but had no interest and was very “happy not to use it” (W4F). This was echoed by a number of studies which recorded high levels of non-users (of all ages) who declared they had “no need” for the internet (Communications Consumer Panel, 2012; Morris et al., 2007; Office for National Statistics, 2014a; Selwyn et al., 2003). Also, a study by Helpser (2008) investigated the

characteristics of people who were “unexpectedly” e-excluded; those who were socially advantaged, but did not use the internet. The results showed that the “unexpected excluded” tended to be older, living in rural rather than urban areas, unemployed and lived in households without children. The results also showed that the “unexpected excluded” had more negative and ambivalent attitudes towards the internet. These findings highlighted that some older people who choose not to engage with the digital society still enjoy a good quality of life.

Helsper (2008) also noted that other barriers, such as a lack of skill or poor access to adequate broadband services, could influence one’s choice of whether to engage with ICT. Similarly, Selwyn (2004) and the OfCom *Consumer Market Report* (2012) suggested that it is highly likely that a proportion of those who dismiss ICT-use are experiencing forms of social exclusion. Nevertheless, the e-inclusion scale does not effectively distinguish between voluntary non-use from exclusion. Nor is there adequate evidence demonstrating the effects of non-use on quality of life.

All in all, the results demonstrated that older people are engaged with ICT to different degrees and that their engagement is affected by several interrelated personal and environmental factors. The analyses also showed the challenges in quantifying level of e-inclusion. In particular, while the parameters of the e-inclusion scale were set against a set of social values that places ICT at the centre of daily life, the results do not reveal whether older people cannot meet these expectations or whether they do not want to meet them. For this reason it is essential to complement the findings with qualitative research.

3. Strengths and limitations

3.1. Strengths

3.2.4. Mixed method design

The subject of older people’s e-inclusion and access to ICT-based care covers topics that are relevant to several disciplines including psychology, engineering, social care, health and policy. Therefore to address the key research questions of this thesis I adopted a pragmatic approach, drawing on both qualitative and quantitative research methods and data drawn from a number of sources.

One of the strengths of this research was the use of numerous data sources from different sectors which were triangulated in order to describe older people’s use of different ICT, across different contexts. For instance, the study presented quantitative data from three national surveys including the Office of National Statistics Opinions and Lifestyle Survey, the Oxford

internet Institute Oxford internet Survey, UK estimates from Eurostat, and annual OfCom Consumer Market Reports. The Oxford Internet Surveys (OxIS) are arguably the most comprehensive datasets related to e-inclusion. However, the survey utilizes a representative sample of the general population and is almost entirely focused on internet use. The use of mainstream ICT devices, which provide access to the internet, are considered to some degree, but not to the same degree as internet access itself; nor are issues specific to older people's ICT engagement. Therefore, by drawing on other data sources, including OfCom, ONS and Eurostat, older people's use of a broad range of mainstream ICT could be examined. Also, collecting statistics from several different surveys was useful for identifying general trends in ICT use in the older population. Similar findings across multiple sources were particularly useful.

The qualitative data was also collected from various sources including technical experts with knowledge from a range of disciplines and expertise from across different sectors; and older people from different care settings in four countries: England, Slovakia, Spain and Sweden. The analysis of the expert interview data revealed themes around the design of ICT-based care, the use of familiar devices, and the concept of co-design. Topics around design were not raised in the interviews with older people. Experts also commented on some of the challenges related to the ICT infrastructure. ICT infrastructure issues were not raised by older interviewees, probably because it was not a topic on which they could comment. These examples highlight one of the strengths of collecting qualitative data from several sources, as it can unearth complementary perspectives and knowledge that are important to the broader research question around reasons for use and non-use, of both mainstream ICT and ICT-based care across several contexts.

A second strength was in the convergent parallel mixed method design, which allowed for the triangulation of the secondary analyses of quantitative data, the content review of the relevant literature, and the analysis of the qualitative interview data with older people and technical experts (Creswell, 2014). This proved to be important in understanding the nuances of older people's e-inclusion. In particular, the results of the quantitative analyses demonstrated the significance of the relationships between the dimensions of the 6C framework and the level of e-inclusion. These findings were qualified by the interview data and findings from the literature. For instance, the quantitative analysis of the OxIS data showed that the majority of older adults who use the internet are at a moderate level of e-inclusion. Alone, a moderate level of e-inclusion simply demonstrates the use of email or internet searches on a daily basis from a stationary internet-enabled device. However, the literature and qualitative data

provide a context for these findings by suggesting that moderate use is a result of older people's appreciation of ICT for a limited set of functions, and their simultaneous general resistance against ICT encroaching every aspect of their daily lives (Hernandez-Encuentra et al., 2009; Hill et al., 2008; Selwyn, 2004; Weaver et al., 2010).

Similarly the regression analyses showed a strong negative association between having a health problem and/or a disability and level of e-inclusion, which could be explained by reference to the literature and interview reports on the poor accessibility of many ICT devices, especially for older people with visual impairment (Leora, 2008; Olphert and Damodaran, 2013; Williams et al., 2010).

The review of the literature covered peer-reviewed publications from several countries across Europe, the United States, Canada, Australia, New Zealand, Japan and Taiwan. Examining data from across several sources and national contexts also improved the overall generalizability of the results. For instance, the interviews with 14 older people in England provided rich anecdotal evidence on their attitudes towards ICT, as well as how ICT benefited their lives. But a study sample of this size is not representative of older people more generally. However, pooling the findings from the interviews with older people from the MonAMI project, findings from the interviews with technical experts, results from the quantitative analyses and results from studies from the international literature, suggested that some of the older interviewees' (in England) experiences could be applied to a wider population. For instance, some older people I interviewed discussed their concerns about their privacy when using the internet. This topic was also frequently raised in the international literature (see chapter 8 for references), as well as by technical experts, suggesting that the problem is indeed widespread.

Finally, one of the strengths of triangulating the results generated from research conducted using single methods is the ability to identify some of the methodological weakness in the collection and analysis of the different data sources. For instance, findings from the expert interview data exposed important topics around ICT-design which had not been explored during the interviews with older people, indicating a shortcoming of the interview schedules for older people.

3.2.5.6C framework

Using the 6C framework was useful for examining the factors which likely influence older people's e-inclusion and for understanding how older people's e-inclusion affected their access to ICT-based care. For instance, the results demonstrated that the design of mainstream devices influenced both older people's level of e-inclusion, as well as their access to ICT-based

care. As such, it is important that ICT developers consider the potential uses of devices and services. Another issue highlighted in the 6C framework analysis is how older people's connectivity to high speed broadband networks affects their access to newer generations of telecare and telehealth services.

The addition of the sixth "C" also proved to be a valuable contribution to the overall e-inclusion framework, as well as a useful indicator of access to ICT-based care. Indeed, older people's perceptions of the affordability of ICT was found to affect not only their adoption of mainstream ICT, but also their willingness to adopt ICT-based care services.

Also, basing the analysis of the qualitative data on framework analysis approach helped identify new themes which lay outside of the 6C framework of e-inclusion, such as older people's position in today's digital society and how they negotiate their roles within that society. Assembling new themes on older people's e-inclusion also prompted questions about the appropriateness of the current e-inclusion paradigms to assess older people's level of ICT-engagement. The emerging themes also challenged widespread beliefs about the overall benefits of ICT and older people's perceptions and attitudes towards ICT (Selwyn et al., 2003; Weaver et al., 2010).

3.2.6. Moving away from the digital divide

Digital divide models are based on a dichotomous definition of e-inclusion, where people are either "on-line" or "off-line"; determining whether "e-included" or "e-excluded". For instance, incorporating Dutton and Blank's (2011) typology of "new generation" vs. "first generation" users into the e-inclusion scale proved to be useful for demonstrating the extent to which the older population is adapting to the latest trends in modern British society, an important consideration for sustaining the level of e-inclusion in an ever changing digital environment.

However as discussed in chapter 4, Dutton and Blank's approach is effectively an extension of early digital divide paradigms, which focused solely on material access to ICT to define inclusion. Several sources have discussed the limitations of measuring e-inclusion solely by one access to ICT devices (Mancinelli, 2007; Stellefson et al., 2008). Indeed, basing the analyses of this study on the multifactorial 6C framework confirmed that the notion of e-inclusion goes beyond material access to ICT, and includes access to support, skills and perceptions of relevance and self-efficacy (Berry, 2011a; van Dijk, 2005).

3.2. Limitations

There are also a number of limitations to the study, mainly stemming from the challenges in defining and measuring e-inclusion and a lack of systematic data.

3.2.1. Survey data: reporting inconsistencies

The use of several secondary data sources was valuable for gaining access to a wider pool of data on different ICT devices and perspectives on ICT use. However, the data across the several sources also presented different results which were sometimes difficult to reconcile.

In the first instance, the analysis of the 2005 and 2011 OxIS datasets demonstrated a small increase in the proportion of people aged 75 years and older who had never used the internet. However the Eurostat estimates (presented in chapter 6), showed that proportion of people aged 75 years and older who had never used the internet had decreased slightly over the same time period. In both cases the data were collected using rigorous sampling methods in order to ensure a representative sample (see chapter 3). The decision was taken to rely on Eurostat data because it came from a larger sample.

Another challenge of using several sources of secondary survey data was the inconsistency in the populations the sample represented. For example, Eurostat presents data for the UK. ONS provides UK data until 2011, and then Great Britain (GB) thereafter. Both OfCom consumer market reports and OxIS provide figures for GB. The general assumption taken was that the inclusion of data from Northern Ireland would not alter the overall trends describing older people's access to ICT.

In order to characterise the older population as much as possible, I searched for the most recent data that broke down the adult population aged 65 years and older into more than one age group. In most cases data on ICT use were presented in 10-year age bands for younger adults, however the older population was presented as one aggregate age group of people 65 years and older. Arguably, this practice fosters ageism as it homogenises older people and assumes that the differences between people within the groups are negligible. It also systematically ignores the needs of people who are most at risk of exclusion from the digital society.

The older population was divided into 65 to 74 years and 75 years and older categories in some instances in the OfCom Consumer market report and some ONS and Eurostat estimates. However, the reporting of separate age categories was not consistent from one year to the next. This led to several trade-offs between how recent the data were, the amount of

historical data available, and whether the data was presented according to different age groups.

It also needs to be acknowledged that the quantitative analysis was based on data from the 2011 OxIS. Given the rapid advances in technologies and access to internet networks, it is likely that estimates from 2011 do not fully represent older people's level of e-inclusion in the current day. It should also be noted that e-inclusion policies began placing an emphasis on demand-side issues in 2011, after the data from the OxIS data used in the current analyses were collected. For instance programmes such as *Race On Line 2012* and *Go ON UK* had not yet been fully operationalised in 2011. In consequence, the links between policy and improvements in older people's level of e-inclusion discovered in the analyses reported here must be considered tentative and will need to be updated through future studies examining more recent e-inclusion initiatives. Rather, the results in the study reinforce the need for policies which address the specific needs of the oldest age-groups.

3.2.2. Interview data: issues with recruitment

The interviews with older people and technical experts consisted of small convenience samples. Older people were recruited to participate in a one-to-one interview from an Age UK centre which offers ICT training. The centre also had a small café which was frequented by the general public, regardless of whether or not they were attending training sessions. Despite attempts to approach centre visitors with a range of ICT experiences (or no experience), people with little – or no - ICT experience declined to be interviewed. Therefore little insight was gained into the experiences, attitudes and perspectives of older non-users from England.

The recruitment of the focus group was done in collaboration with colleagues from PSSRU as part of the Services Users and Carers' Advisory Group (SUCAG). SUCAG is an established group of users of adult social care services and carers of recipients of adult social care services.

In order to capture a broad range of ICT use and non-use amongst older people, invitations to participate in the focus group were extended to family members and friends of PSSRU colleagues who were aged 65 years or older. The invitation was also opened to all SUCAG members, regardless of age. The resulting focus group consisted of five older people and one younger adult who was a personal (unpaid) carer for two older people. Although the younger person did not meet the age criteria for the study, the participant provided interesting insights on the ICT use of the older people she cared for.

A further deficit of the focus group data is the lack of precision on the age of the participants. Participants were not asked explicitly to reveal their chronological age. Some participants described their life circumstances such as being “and older person” or “retired for a number of years”, which implied they met the inclusion criteria. The lack of precision of the ages of the older people made it difficult to compare their responses to findings from other sources.

The MonAMI participants were also recruited as convenience samples. One of my roles in the project was to design the questionnaires and the inclusion criteria protocols. Participant recruitment and data collection were planned and organised by each of the three local site coordinators in Stockholm, Sweden, Kosice, Slovakia and Zaragoza, Spain. This resulted in great variability in the profiles of the participants across the three sites as well as in the quality of the data collected. For instance, Swedish participants were people aged 65 years and older living independently in buildings designed for older people. Spanish participants were residents of a care home which provided 24-hour care. The variability in participants across the sites created challenges in evaluating the usefulness of the telecare services as many Swedish participants were relatively “healthy” and didn’t find the services useful. On the other hand, many Spanish participants had several co-morbidities that prevented them from completing the questionnaires. There were also differences in levels of connectivity between the regions. At the time of the trial, Slovakia had a relatively under-developed ICT and internet infrastructure, whereas Sweden, like the UK, had one of the most advanced networks in Europe. This affected older people’s access to ICT in each country. Therefore, difference in connectivity levels and health status may have affected the generalizability of the results across the three MonAMI trial sites.

3.2.3. Shortfalls of analytical frameworks

The 6C framework was a good starting point for discussing the issues of e-inclusion for older people and their access to ICT-based care. However, the research presented in this thesis highlighted some of the shortfalls of the model. The main disadvantage of the 6C framework was the underlying deficit model approach, which focused on what people cannot accomplish rather than on what they can. This was apparent in the analyses of the capability and confidence dimensions. The evidence from the review of the literature described older people’s lack of physical and cognitive abilities to use ICT, often in comparison to younger people. Similarly, several studies focused on older people negative attitudes and poor self-efficacy. These findings highlighted a failure of the 6C framework to capture older people’s strengths such as determination, self-reliance, and resourcefulness. These attributes were discussed by some analysts (Independent Age, 2010; Selwyn et al., 2003; Woodward et al.,

2011; Wright and Wadhwa, 2010), but only as a warning to avoid the unfavourable stereotyping of older people in light of the consistent over-reporting on their deficits, rather than as an integral part of understanding older people's e-inclusion.

The e-inclusion scale did not always accurately detect older people's level of e-inclusion. The scale was partly developed using Dutton & Blank's typology of new generation and first generation users. This typology was developed to describe the trends in the use of mobile internet networks and "smart devices" (2011). To define the typology Dutton and Blank measured personal use of ICT devices according to household ownership of the devices. However, this assumption leads to an overestimation of people who are "new generation" (NG) users. My initial analysis revealed three cases in the 2011 dataset where people aged 65 years and older lived in households with the requisite ICT equipment to qualify them as a NG user, but the individuals claimed to have never used the internet. (These cases were filtered out of the final NG user-group for subsequent analyses.) This emphasises that solely using material access to ICT and the internet does not adequately describe older people's ability to engage with ICT.

The results of the analysis also demonstrated several inconsistencies at the advanced level of e-inclusion. This could be a result of lack of appropriate variables in the dataset needed to distinguish advanced users. It could also suggest the parameters defining this level of e-inclusion need some refinement.

Matthews et al. (2010) and Chou et al. (2013) acknowledged the lack of robust evidence on the effects of ICT-based care solutions on quality of life. This issue was also evident in the present study. Only a few studies used an explicit measure of quality of life to assess the effects of mainstream ICT (Choudrie et al., 2010; Koopman-Boyden and Reid, 2009). In addition, different QOL measurements were used. The remaining evidence on the effects of ICT use on quality of life was extracted by making inferences about the benefits older people perceived when using ICT in terms of the QOL domains they belonged to.

The quality of life scale used was a combined model from ASCOT and WHOQOL, which was designed to give more flexibility for interpreting the literature. It proved to be useful for indicating effects in many domains such as control over daily living, security, social networking, occupation and psychological wellbeing. However, it was less useful for indicating effects on this occupation and physical capabilities domains. This could be that there is no genuine link between ICT use and ability to carry out physical activities. It could also indicate that these

topics have not been carefully investigated or that the instrumentation is ineffective in detecting the subtleties of the effects.

3.2.4. Problems with the literature

There were some inconsistencies between the chosen methodology for conducting the literature search and the principle research questions of the study. The original search began as a conventional systematic review, with well-defined search strategies and inclusion criteria. However as the search unfolded, it became clear that observing stringent systematic review traditions would not garner the breadth of evidence needed to understand the intricacies of the context (C), mechanisms

(M) and outcomes (O) of older people's use of ICT and their involvement in their communities. A realist approach to the literature search was subsequently adopted to broaden the evidence based around the "CMO" relationships of older people's ICT use. This included searching for a mix of qualitative and quantitative evidence, snowballing from reference lists, a strong reliance on alternative sources of evidence to the academic literature, such as the grey literature and the (online) news, and implementing more lenient quality criteria to the various sources of empirical evidence (Pawson et al. 2005).

One of the limitations to adopting a realist approach is the lack of specificity to which each dimension of e-inclusion was reviewed. For example, the topic of accessibility is vast, covering several disciplines from engineering and computer science to occupational and nursing therapies, and arguably warrants a separate study in its own right. For the purposes of this research, however, accessibility is not used as a principle topic, but rather one of several themes around e-inclusion; search terms were deliberately neither specific, nor sensitive, to accessibility per se and therefore, a large amount of the accessibility literature has likely gone undetected.

A second limitation related to using realist methods for reviewing the literature is that the evidence is gathered from a broad array of sources, including from studies from outside of the UK. Comparing results from the international literature can improve the generalizability of findings across older populations, particularly on issues around accessibility, ICT-specific skills and quality of life. However it also important to consider that e-inclusion is affected by geographical, political and cultural factors which are unique to a specific region or nation. Therefore there were caveats to aggregating the international findings, as not all international evidence was relevant to older people in the UK. For instance, in the Americas and Australasia, which have massive land mass, the geographical inequalities in connectivity may be more

severe, affecting more people. Furthermore, the older cohorts of certain regions of the world may differ greatly from the British cohort, in terms of levels of basic literacy or absolute poverty for instance. For example Lopez et al. (2011) discussed the usability and acceptability of video-consultation services by older people in rural Columbia, where illiteracy rates are high. These circumstances are not reflective of life for most older people in Britain.

Similarly, the funding structure of the health and social care systems across different countries can effect older people's perceptions of the affordability of the services and their expectations around reimbursement. The evidence in the literature also demonstrated that this affects older people's perceptions of the benefits of ICT-based care services. Studies from The Netherlands (Boonstra and van Offenbeek, 2010; Nijland et al., 2009) and Taiwan (Chou et al., 2013) demonstrated that uncertainty about reimbursement had a profound effect on older services users' acceptance of the services; there was no UK evidence that suggested that the cost of services influences older people's acceptance of the services. These results reflect the broader differences in the role of the private care market across different countries, and highlight the importance of controlling for regional differences when drawing conclusions from the international body of literature.

Finally, while snowballing reference lists led to identifying prominent studies, some of these dated back as far as 2002 (Marquié et al., 2002). This raised a concern about referring to evidence generated from samples of older populations from many years ago. The timing of each study has implications for how the samples of older people are characterised in those studies in terms of their levels of e-inclusion. Many studies in literature involved people who were 65 years and older at that time, who are now 75 years and older. Therefore conclusions presented in the studies about the total older population may not represent what is happening today.

In particular, as the results of the current study demonstrate, the levels of e-inclusion of people aged 65 to 74 has risen considerably in the past decade. Therefore older studies will demonstrate higher levels of e-exclusion in samples of people aged 65 years and older, and may not reflect the issues older people face in today's digital society. However, the older studies can be used to validate some of the results found in analyses of today's population of older people. For instance Xie (2003) describes the inverse relationship between attitudes and age, which was also found in the analyses of the 2011 OxIS dataset.

3.2.5. Lack of data on older people's access to ICT-based care

This study would have been strengthened by individual-level data on older people's use of ICT-based care in the UK. Some evidence was drawn from the interviews with MonAMI participants. However as discussed, due to the inconsistencies in recruitment and data collection, as well as to the differences in the political and cultural context of each trial site, it is difficult to generalise the findings to older populations in the UK.

In addition, two focus group members discussed their experiences as unpaid carers of ICT-based care service users. Their insights were valuable, but they can only be regarded as interpretations of service-users' behaviours. Collecting primary interview data from ICT-based care service users (and users who were denied ICT-based care) in the UK would have provided an opportunity to explore each of the dimensions of the 6C framework in more depth. The interview data could also help inform how access to ICT-based care is affected by the current market.

4. Implications for policy, practice and research

The research presented in the thesis demonstrated some important findings around older people's access to ICT in several contexts. In particular, the results highlighted that many older people face challenges which are the result of the interplay of personal and environmental circumstances that limit their choice about e-inclusion, which is generally considered to be a desirable goal. Some of these challenges could be addressed by a redirection of policy and practice.

4.1. Policy and practice: e-inclusion

Warschauer (2004) suggested that given the degree to which ICT is embedded in our society, the concept e-inclusion should become integrated within new conceptualisations of social inclusion. He argued that access to ICT, particularly for marginalised groups of society, is necessary to overcome the barriers which cause exclusion in a "digitised" society (p.29), and that people without access to ICT are "shut out of opportunities to practice full citizenship" (p.28). His logic suggests that nowadays the concepts of digital inclusion and social inclusion are becoming very closely intertwined; where the causal relationship between digital and social exclusion is increasingly blurred.

In chapter 2, I presented the social inequalities that many older people experience, which are often a result of the cumulative effects of biological and socio-economic factors over the course of a lifetime (Walker, 2009). The findings of this research demonstrated that older people's e-exclusion is associated with the social inequalities often associated with old age,

such as disability, living alone, low income, and low levels of formal education. Xie (2011) also discussed the compounded effect of the social inequalities of old age on older people's access to eHealth, an increasingly prominent medium for accessing health information. By extension, according to Warschauer's (2004) reasoning, older people who are e-excluded are also at risk of exclusion from the social institutions which can help neutralise inequalities experienced in areas such as healthcare, education and civic participation.

Contributors to Joyce and Loe's book *Technogenerians: Studying Health and Illness Through and Ageing, Science and Technology Lens* (2010) suggested that older people's e-exclusion is also a result of the inherently ageist design and implementation of ICT (p.157). They noted that ICT is not culturally neutral and that both mainstream and care-related ICT are products of the negative social construct of old age held by society. Preconceptions and stereotypes about older people's needs, abilities and attitudes have become embedded into ICT design, particularly ICT which is specifically aimed at older people (p.97). Indeed, the discourse around older people's use of technology is often framed around the concept of "ageing in place", which has negative connotations around the vulnerability and isolation of older people living at home (Loe, 2010, p. 143), and minimising the financial "burden" of care. This was exemplified in the *Riga Ministerial Declaration* (European Commission, 2006), which discussed older people's use of ICT primarily in terms of the impact on their health, independent living and mitigating against frailty. Overall, older people are described as passive recipients of ICT services; less attention is paid to how older people use - and attribute meaning to - technology use in their daily lives or to their active participation in the digital age more generally (Loe, 2010, p. 142). The ageist undercurrent in the depiction of older people's engagement with ICT is both alienating and disempowering (Neven, 2010, p. 157), and can lead to older people disassociating from ICT – and particularly from the ICT designed to enable their e-inclusion and social inclusion more generally (p.165).

Recent government policies, such as the *Digital Inclusion Charter* (2014), have emphasised the need to strengthen the skills base of non-users by lending support to e-inclusion initiatives, such as the *Go ON UK* partnership. However, advocate organisations such as *Age UK* and the *International Longevity Centre* have noted that e-inclusion policies are not sensitive to the specific ICT needs and interests of the older population (Lewis, 2012; Mason et al., 2012). In order to overcome the negative effects of past policies and practice the government therefore needs to further commit to addressing the social inequalities and ageism that lie at the heart of the e-exclusion of older people. Loe (2010) suggested that this is achieved by putting emphasis on empowering older people's engagement with ICT through building awareness of

existing technologies and how they can be employed to promote independence and autonomy (p.154).

The government needs to invest more into stimulating older people's demand for ICT services. The government has committed to invest over £1 billion into the private sector to redress some of the geographical inequalities in the supply of superfast broadband networks. Without similar investments in older people's access to ICT services, there is risk that inequalities in connectivity and access will deepen and older non-users will be further excluded. According to the Policy Exchange, it would cost approximately £141 per excluded older person to ensure that they had the basic digital skills by 2020. This corresponds to an investment of £676.8 million to ensure that the 4.8 million older non-users have a minimal level of e-inclusion. It is expected that this investment could be offset by the savings achieved through an increase in digital transactions. Increased use of ICT by older people could also stimulate more innovation and competition within the online services industry, and in turn could lead to further investment by the private sector into products which are more responsive to older people's needs (Copeland et al., 2014).

Experts' opinions underlined the need for the government to elicit more direct cooperation from the private sector. Several of the barriers to older people's e-inclusion - including perceptions of a lack of relevant content, poor accessibility, uneven broadband connectivity, and unfavourable cost structures - are largely the consequence of both the commercial interests which are focused on younger markets and the institutional ageism embedded in ICT design and implementation. To date commercial stakeholders have failed to formulate viable business models for developing inclusive ICT products which do not compromise older people's dignity, which partly contributes to why existing accessibility standards are systematically ignored (Communications Consumer Panel, 2011; Roberts, 2009). There is therefore a need for government policies to build appropriate and explicit market incentives which inspire the development of affordable, attractive ICT that is usable across a range of abilities, and which also foster innovation and competitiveness. For instance, the government could invest in recycled ICT schemes, which aim to customise rebuilt equipment by incorporating personalised, age-friendly features.

UK e-inclusion policies also need to consider issues around ICT content in relation to social inequalities of old age. There was some disagreement between the literature findings and expert interview data about the benefits of instituting nation-wide ICT training courses for older people. However government bodies, at both national and local levels, should evaluate

the accessibility of their digital services against the skill-set of their populations and think carefully about how to improve the accessibility of their services to older people with low levels of e-inclusion. The findings discussed in chapter 6 suggested that social inequalities experienced by older people and people with disabilities could deepen without formal assistance to use online government services. Governments then need to take a constructive approach to minimise the skills gap. The *Digital Switchover scheme* serves as a good example of how a specific ICT need (gaining access to digital broadcasting) was addressed through funding, personalised training and support services for older people. Governments might adopt a similar strategy which entails funding and designing a set of specific tools and training programmes in order to help older people who are most at risk of isolation (e.g. older people living alone, older people 75 years and older) gain digital access to e-government services. The spill-over effects of such a scheme could be significant since skills learned for specific tasks could also help older people access a wider set of ICT services. For example, a “second phase” of the digital switchover initiative could be introduced to assist older people to use their televisions to access government services, which might provide them with the skills they need to explore other online services in their own.

3.3. Policy and Practice: ICT-based care

Recent policies such as the Department of Health’s *Concordat* (Department of Health, 2012b) with the telecare and telehealth industry demonstrate that the government is committed to removing some of the market barriers which prevent the national roll-out of ICT-based care. Unquestionably, there are several complex issues to address in order to fully incorporate ICT-based care within mainstream health and social care services. Nevertheless, some initial steps could be taken in order to improve older people’s access to ICT-based care.

The recent *Care Act 2014* emphasised the shift towards more service user self-determination over the outcomes of their care as part of the modernisation of the social care system. Adopting these principles approach requires all stakeholders, including service users, to reassign their roles within the care system. ICT-based care solutions are well positioned to facilitate more flexible, responsive care services, and to facilitate users to take more control over their care. For example, ICT-based care services can help users manage their “health-related behaviours” (van den Berg et al., 2012).

This means that policy makers should consider the entire client base, not simply those with a specific type or severity of illness. This also entails reviewing the extent of the benefits of using ICT-based care services for different client groups. Currently many local authorities prioritise

the distribution of telecare services to clients with substantial and critical-level needs, who would otherwise be admitted to more intensive care settings (Corbett-Nolan and Bullivant, 2012). The WSD trial demonstrated that this client group benefit the health care system as a whole by reducing mortality, hospitalisations and lengths of hospital stays (Steventon et al., 2012). But clients with lower-level need may also gain benefits from ICT-based care services through delaying the deterioration of illness and enjoying a longer period of wellbeing. This could prove to lead to larger costs savings over the longer term.

The *Care Act 2014* instituted new legislation for carers where they are entitled to an assessment of their needs, and if they are eligible, they have a legal right to receive support for those needs. Under these reforms, local authorities and ICT-service providers should consider and promote the benefits of ICT-based care for unpaid carers. Local authorities should offer ICT-based care offer to family members, friends and other unpaid carers of older people with care needs as part of respite service or as an initiative to encourage them to increase their participation in the workforce. This could also help improve their wellbeing and avoid some of the long-term mental and physical health problems that many carers experience from taking on unpaid caring roles.

All in all, the development and deployment of ICT-based care should be nurtured for a wider client base such that all stakeholders of the care system can adopt self-managed care principles.

Next, the government needs to standardise certain elements of the ICT-based care market. This includes more clarity around reimbursement protocols for the different components of ICT-based care, as well as more consistency on eligibility criteria across local authorities. There is also a need to collect consistent and comprehensive data on ICT-based care use to gain a better understanding of the demands of the market, as well as how to improve services to better suit older people's needs. Together, these policies could lead to an overall improvement in older people's perceptions of the benefits of ICT-based care and increase their demand for services.

Finally, concerns around privacy and access to personal data remain one of the biggest threats to older people's quality of life with respect to ICT-based care (see chapter 8 for references). Across the International literature, several sources have identified the need for national governments to draft concise codes of ethics and set out clear data management responsibilities as ICT are introduced into the care system (Demeris and Hensel, 2008; Finn and Wright, 2011; Hill et al., 2010; Sinclair, 2010; Wadhwa, 2011). Without clear guidelines around

data protection the acceptance of ICT-based care systems by older people, as well as many care professionals, will be low. This will continue to create a barrier to integration of ICT-based care into the mainstream health and social care system.

3.4. Future research

The findings of this research highlighted areas around older people's e-inclusion and access to ICT-based care which require further exploration. In particular, e-inclusion policies and third sector support initiatives have changed considerably in recent years. Similarly, older people's digital needs have also changed. Therefore, there is a growing need to collect high quality data which monitor older people's level of e-inclusion such that policies and support services can be designed to meet their specific needs.

Generally, there is poor level of understanding of older non-users' experiences and perspectives of ICT. National-level data from the OII, ONS and OfCom offer finite lists of reasons why non-users do not have access to the internet. However, they often reduce the complexities related to non-use and limit our understanding of non-use to the options of the questionnaire. The e-inclusion scale developed for this research also did not distinguish differences in the sample of older non-users. Furthermore, there is inadequate understanding of the impact of low levels of e-inclusion (and e-exclusion) on quality of life. The evidence presented here described the positive and negative effects of ICT *use*; the experiences and perspectives of *non-use* were not appropriately represented.

These approaches to assess e-exclusion tend to homogenise older non-users and to mask the varied underlying reasons for non-use (OfCom, 2012). Like e-inclusion, e-exclusion should be defined as a continuum of digital needs in order to distinguish between voluntary non-users and people who are denied access to ICT. As part of its *Government Digital Inclusion Strategy*, the Government's Digital Services recently developed a nine-point *Digital Inclusion Scale* (DIS) based on skills and attitudes towards ICT, which includes three subdivisions of non-use: never have used and never will use, ex-user, and willing – but unable – to use. As the DIS becomes more widely used in practice, it may be possible to categorise older non-users more accurately. However as demonstrated in this research, assigning purely quantitative values to e-inclusion risks oversimplifying older people's digital needs, and can lead to unsympathetic assumptions about older people's abilities needs and interest. Therefore there is a need for more inductive qualitative research which delves deeper into what prevents older people's ICT engagement and how e-exclusion affects their daily lives. A more granulated characterisation

of older non-users can help to develop personalised support mechanisms which facilitate their inclusion in the digital society.

The evidence pointed to the changes in the digital landscape brought on by the widespread use of “new generation ICT” such as tablet computers, smart phones, and mobile internet networks. The evidence also suggested that older people are using new generation ICT at an increasing rate, albeit their adoption is less pronounced than that of the population as a whole. There is a lot of speculation about the potential for the new devices to improve older people’s level of ICT engagement (Stroud, 2012). However very little is known about the acceptability, accessibility and affordability of new generation devices and internet networks, particularly in the context of care. Therefore, there is a need for more empirical evidence on the experiences with - and perceptions of - these technologies by older people with a range of needs to understand how they affect their level of e-inclusion and access to ICT-based care.

The cost dimension highlighted the varied effects of older people’s perceptions of affordability and consumerist values on their level of e-inclusion and access to ICT based care. In particular, the evidence demonstrated that there are several uncertainties around the reimbursement of ICT-based care, which cause many older people to doubt the benefits – and affordability - of the services. As such, there is a need to clarify which stakeholders are potentially paying for different components of the ICT-based care systems and to identify what older people and their families are willing to pay. A combination of qualitative and quantitative research could potentially help characterise older people who are denied publicly funded ICT-based care by local authorities, and the older people are willing, but unable to acquire private services. Also, modelling commissioning structures and funding streams for ICT-based care in the UK could shed light on the role of private financing for social care in the long term.

Overall, there is a need to reconsider the e-inclusion scale such that it can describe older people’s ability to meet their digital needs and interests, not those of other generations. Some changes to the contemporary digital culture are needed in order to make it more assessable and more meaningful for older people. To do so, we have to put older people’s digital interest, attitudes and capabilities into context. Also, we have to dispel the false assumptions around older people’s willingness to participate in the digital society. There is no blanket rejection of the digital society by older adults (Plaza et al., 2011; Selwyn et al., 2003; Weaver et al., 2010). Rather many older people embrace e-inclusion and the benefits it brings, as iterated by an 88 year-old internet user:

“You have to look ahead – you can’t look back!”

References

- Aalbers, T., Baars, M.A.E. and Olde Rikkert, M.G.M. (2011), "Characteristics of effective internet-mediated interventions to change lifestyle in people aged 50 and older: A systematic review", *Ageing Research Reviews*, Vol. 10 No. 4, pp. 487–497.
- AALIANCE. (2010), "Ambient Assisted Living Roadmap", VDI/VDE-IT, Berlin.
- Abbott, P. and Sapsford, R. (2005), "Living on the margins: older people, place and social exclusion", *Policy Studies*, Vol. 26 No. 1, pp. 29–46.
- Acer Inc. (2014), "No Title", available at: <http://www.acer.co.uk/ac/en/GB/content/home> (accessed 26 September 2014).
- Adams, N., Stubbs, D. and Woods, V. (2005), "Psychological barriers to internet usage among older adults in the UK", *Medical Informatics and the Internet in Medicine*, Vol. 30 No. 1, pp. 3–17.
- advanced digital institute. (2014), "Home", available at: <http://www.adi-uk.com/> (accessed 13 February 2014).
- Age UK. (2010a), "Technology and older people: evidence review", Age UK, London.
- Age UK. (2010b), "The Golden Economy", Age UK, London.
- Age UK. (2013a), "Home", available at: http://www.ageuk.org.uk/?gclid=Cj0KEQjwveufBRDIsNb3kb-twMIBeiQASNH0xu_M1GHPtCtXnwghvwrZtwbnCZNRruUMk3tkmGGI7BEaAq1E8P8HAQ (accessed 25 September 2014).
- Age UK. (2013b), "Default retirement age: frequently asked questions", available at: <http://www.ageuk.org.uk/work-and-learning/discrimination-and-rights/default-retirement-age---frequently-asked-questions/> (accessed 4 August 2014).
- Age UK. (2013c), "Changes to state pension age", available at: <http://www.ageuk.org.uk/money-matters/pensions/changes-to-state-pension-age/> (accessed 4 August 2014).
- Age UK. (2013d), "Engage business network", available at: <http://www.ageuk.org.uk/professional-resources-home/engage-network/research-and-business-insight/> (accessed 6 September 2014).
- Age UK. (2014a), "Over a million older people in the UK regularly feel lonely", available at: <http://www.ageuk.org.uk/latest-press/over-1-million-older-people-in-uk-feel-lonely/> (accessed 18 June 2014).
- Age UK. (2014b), "Techy Tea Party", available at: <http://www.ageuk.org.uk/work-and-learning/technology-and-internet/techy-tea-party/> (accessed 12 September 2014).
- Age UK London. (2012), "Age UK London wins Green IT award", available at: <http://www.ageuk.org.uk/london/news--campaigns/archive/age-uk-london-wins-a-green-it-award/> (accessed 26 September 2014).

- Agnew, I. and Ripper, L. (2011), "Using embedded outreach to bridge the digital divide", *Working with Older People*, Vol. 15 No. 3, pp. 127–134.
- Agree, E.M. and Freedman, V.A. (2011), "A quality-of-life scale for assistive technology: results of a pilot study of ageing and technology", *Physical Therapy*, Vol. 91 No. 12, pp. 1780–1788.
- Almuwil, A., Vishanth, W. and El-Haddadeh, R. (2011), "A conceptual study of the factors influencing", *European, Mediterranean & Middle Eastern Conference on Information Systems 2011*, pp. 198–209.
- Alvseike, H. and Brønnick, K. (2012), "Feasibility of the iPad as a hub for smart house technology in the elderly; effects of cognition, self-efficacy, and technology experience.", *Journal of Multidisciplinary Healthcare*, Vol. 5, pp. 299–306.
- Andressen, E.M., Malmgren, J.A., Carter, W.B. and Patrick, D.L. (1994), "Screening for depression in well older adults: evaluation of a short-form of the CES-D", *American Journal of Preventative Medicine*, Vol. 10, pp. 77–84.
- Andriessen, J.H.T.H. (1972), "Interne of externe beheersing [Internal or external control]", *Nederlands Tijdschrift voor Psychologie*, Vol. 27, pp. 173–178.
- Apple Inc. (2014a), "No Title", available at: <https://www.apple.com/uk/> (accessed 26 September 2014).
- Apple Inc. (2014b), "iOS8", available at: <https://www.apple.com/uk/ios/> (accessed 26 September 2014).
- Aragon Housing Association. (2014), "Welcome to the Aragon Housing Association", available at: <http://www.aragon-housing.co.uk/> (accessed 26 September 2014).
- Arrindell, W.A. and Ettema, J.H.M. (1986), *SCL-90. Een multidimensionele psychopathologie indicator [The SCL-90. A multidimensional instrument for the assessment of psychopathology]*, Swets & Zeitlinger, Lisse, The Netherlands.
- Atkinson, J., Black, R. and Curtis, A. (2008), "Exploring the digital divide in an Australian regional city: a case study of Albury", *Australian Geographer*, Vol. 39 No. 4, pp. 479–493.
- Bailey, A. and Ngwenyama, O. (2011), "The challenge of e-participation in the digital city: exploring generational influences among community telecentre users", *Telematics and Informatics*, Vol. 28, pp. 204–214.
- Balka, E., Green, E. and Henwood, F. (Eds.). (2009), *Gender, Health and Information Technology in Context*, Palgrave Macmillan, Basingstoke, Hampshire.
- Bandwidth Pool. (2014), "What is Bandwidth Pool?", available at: <http://bandwidthpool.com/> (accessed 27 March 2014).
- Banerjee, S. (2012), "DEMQOL a patient reported outcome measure for use in dementia: development to address the need for evaluations of cost effectiveness as well as clinical effectiveness", *Journal of Mental Health Policy and Economics*, Vol. 15 No. 1, p. S1.

- Barlow, J., Curry, R., Hendy, J. and Taher, N. (2012), *Developing the capacity of the remote care industry to supply Britain's future needs*, London.
- BBC. (2014a), "Web training 'would help lonely elderly feel included'", available at: <http://www.bbc.co.uk/news/uk-27587364> (accessed 27 May 2014).
- BBC. (2014b), "The Switchover Help Scheme", available at: http://www.bbc.co.uk/aboutthebbc/insidethebbc/howwework/accountability/helpscheme.html?source_url=/aboutthebbc/insidethebbc/howwework/accountability/helpscheme/ (accessed 18 July 2014).
- BBC. (2014c), "About BBC Learning", available at: <http://www.bbc.co.uk/learning/overview/research.shtml> (accessed 18 June 2014).
- Bella, L. (2009), "Geeks who care: Gender, caring and community", in Balka, E., Green, E. and Henwood, F. (Eds.), *Gender, Health and Information Technology in Context*, Palgrave Macmillan, Basingtoke, Hampshire, pp. 53–71.
- Bentivegna, S., Guerrieri, P. and College of Europe. (2010), "Analysis of e-inclusion impact resulting from advanced R&D based on economic modelling in relation to innovation capacity, capital formation, productivity, and empowerment", European Commission, Brussels.
- Van den Berg, N., Schumann, M., Kraft, K. and Hoffmann, W. (2012), "Telemedicine and telecare for older patients : a systematic review", *Maturitas*, Elsevier Ireland Ltd, Vol. 73 No. 2, pp. 94–114.
- Bernard, H.R. and Ryan, G.W. (2010), *Analysing Qualitative Data*, Sage Publications, Inc., Thousand Oaks.
- Berry, J., van Glabbeek, G., Luherne, M., Aquilino, M., Obach, M. and Roelker-Denker, L. (2013), "AALIANCE2 Project: D3.1 Summary Market Review for AAL", European Commission, Brussels.
- Berry, R. (2011a), *Older people and the internet: Towards a "system map" of digital exclusion*, London: International Longevity Centre- UK.
- Berry, R. (2011b), "Towards a „ system map “ of digital exclusion", No. June.
- Blackman, T., Broadhurst, S. and Convery, J. (Eds.). (2001), *Social care and Social exclusion: A comparative study of older people's care in Europe*, New York, Palgrave.
- Blaschke, C.M., Freddolino, P.P. and Mullen, E.E. (2009), "Ageing and technology: a review of the research literature", *British Journal of Social Work*, Vol. 39 No. 4, pp. 641–656.
- Blažun, H., Saranto, K. and Rissanen, S. (2012), "Impact of computer training courses on reduction of loneliness of older people in Finland and Slovenia", *Computers in Human Behavior*, Vol. 28 No. 4, pp. 1202–1212.
- Bobillier Chaumon, M.-E., Michel, C., Tarpin Bernard, F. and Croisile, B. (2013), "Can ICT improve the quality of life of elderly adults living in residential home care units? From actual impacts to hidden artefacts", *Behaviour & Information Technology*, Vol. 33 No. 6, pp. 574–590.

- Bond, J. and Corner, L. (2004), *Quality of life and older people*, Open University Press, Maidenhead.
- Boonstra, A. and van Offenbeek, M.A.G. (2010), "Towards consistent modes of e-health implementation: structural analysis of a telecare programme's limited success", *Information Systems Journal*, Vol. 20, pp. 537–561.
- Bostock, N. (2013), "GP pilots Skype consultation with patients", *GP*, available at: <http://www.gponline.com/gp-pilots-skype-consultations-patients/article/1174766> (accessed 7 July 2014).
- Botsis, T. and Hartvigsen, G. (2008), "Current status and future perspective in telecare for elderly people suffering from chronic diseases", *Journal of Telemedicine and Telecare*, Vol. 14 No. 4, pp. 195–203.
- Bowes, K.H., Holland, D.E. and Horowitz, D.A. (2009), "A comparison of in-person home care, home care with telephone contact and home care with telemonitoring for disease management", *Journal of Telemedicine and Telecare*, Vol. 15 No. 7, pp. 344–350.
- Bowling, A. (2014), *Research methods in health: Investigating health and health services*, Open University Press, McGraw Hill Education, Maidenhead, 4th ed.
- Bradbrook, G. and Fisher, J. (2004), *Digital Equality*, available at: http://www.citizenonline.org.uk/wp-content/uploads/939_DigitalEquality1.pdf.
- Brandt, A., Samuelsson, K., Toytari, O. and Salminen, A.-L. (2011), "Activity and participation, quality of life and user satisfaction outcomes of environmental control systems and smart home technology: a systematic review", *Disability and Rehabilitation: Assistive Technology*, Vol. 6 No. 3, pp. 189–206.
- Brazier, J.E., Harper, R. and Jones, N.M. (1992), "Validating the SF-36 health survey questionnaire: new outcome measure for primary care", *BMJ*, Vol. 305, pp. 160–164.
- Brignell, M., Wooton, R. and Gray, L. (2007), "The application of telemedicine to geriatric medicine", *Age and Ageing*, Vol. 36 No. 4, pp. 369–374.
- Brownsell, S., Blackburn, S. and Hawley, M.S. (2008), "An evaluation of second and third generation telecare services in older people's housing", *Journal of Telemedicine and Telecare*, Vol. 14 No. 1, pp. 8–12.
- Burchardt, T., Le Grand, J. and Piachaud, D. (1999), "Social exclusion in Britain 1991-1995", *Social Policy and Administration*, Vol. 33 No. 3, pp. 227–244.
- Burmeister, O.K. (2010), "Websites for Seniors: cognitive accessibility", *International Journal of Emerging Technologies and Society*, Vol. 8 No. 2, pp. 99–113.
- Cabinet Office. (2007), "Transformational Government: enabled by technology. Annual Report 2006", The Stationary Office, London, available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/228602/6970.pdf.

- Cabinet Office. (2011), "100,000 'digital champions' to get Britain online", *Gov.UK*, available at: <https://www.gov.uk/government/news/100-000-digital-champions-to-get-britain-online> (accessed 26 September 2014).
- Cabinet Office. (2014a), "Government digital inclusion strategy", *Gov.UK*, available at: <https://www.gov.uk/government/publications/government-digital-inclusion-strategy/government-digital-inclusion-strategy> (accessed 14 July 2014).
- Cabinet Office. (2014b), "UK Digital Inclusion Charter", *Gov.UK*, available at: <https://www.gov.uk/government/publications/government-digital-inclusion-strategy/uk-digital-inclusion-charter> (accessed 20 September 2014).
- Cabinet Office. (2014c), "Government Digital Service", *Gov.UK*, available at: <https://gds.blog.gov.uk/> (accessed 22 September 2014).
- Cable.co.uk. (2014), "DSL Deals", available at: <http://www.cable.co.uk/compare/dsl-deals/> (accessed 18 July 2014).
- CACI Ltd. (2013), "ACORN", available at: <http://acorn.caci.co.uk/> (accessed 11 April 2015).
- Campaign to End Loneliness. (2014), "Campaign to End Loneliness: Connections in Older Age", *Calouste Gulbenkian Foundation*, available at: <http://www.campaigntoendloneliness.org/> (accessed 23 June 2014).
- Capgemini Consulting. (2012), "Evaluating the work of the UK Digital Champion and Race Online 2012", Capgemini Consulting, London, available at: <http://ukdigitalchampionmodel.com/wp-content/uploads/2012/04/Evaluation-of-UK-Digital-Champion-and-Race-Online-2012-vFINAL.pdf>.
- Cardozo, L. and Steinberg, J. (2010), "Telemedicine for recently discharged older patients", *Telemedicine and e-Health*, Vol. 16 No. 1, pp. 49–54.
- Carehome.co.uk. (2014), "Care homes/nursing homes with internet access in the UK", available at: http://www.carehome.co.uk/care_search_results.cfm/searchcountry/uk/searchchtype/internet-access (accessed 22 July 2014).
- Carpenter, B. and Buday, S. (2007), "Computer use among older adults in a naturally occurring retirement community", *Computers in Human Behavior*, Vol. 23 No. 6, pp. 3012–3024.
- Cartwright, M., Hirani, S.P., Rixon, L., Beynon, M., Doll, H., Bower, P., Bardsley, M., et al. (2013), "Effect of telehealth on quality of life and psychological outcomes over 12 months (Whole Systems Demonstrator telehealth questionnaire study): nested study of patient reported outcomes in a pragmatic, cluster randomised controlled trial.", *BMJ (Clinical research ed.)*, Vol. 653 No. February, p. f653.
- CEN and CENELEC. (2002), *CEN/CENELEC Guide 6*, Brussels: European Committee for Standardisation, European Committee for Electrotechnical Standardisation.
- Chan, M., Campo, E., Esteve, D. and Fourniols, J.-Y. (2009), "Smart homes: current features and future perspectives", *Maturitas*, Vol. 64 No. 2, pp. 90–97.

- Chandola, T., Ferrie, J., Sacker, A. and Marmot, M. (2007), "Social inequalities in self-reported health in early old age: Follow-up of prospective cohort study", *British Medical Journal*, Vol. doi:10.113.
- Chau, J.P.-C., Lee, D.T.-F., Yu, D.S.-F., Chow, A.Y.-M., Yu, W.-C., Chair, S.-Y., Lui, A.S.F., et al. (2012), "A feasibility study to investigate the acceptability and potential effectiveness of telecare services for older people with chronic obstructive pulmonary disease", *International Journal of Medical Informatics*, Vol. 81 No. 10, pp. 674–682.
- Cheek, P., Nikpour, L. and Nowlin, H. (2005), "Ageing well with smart technology", *Nursing Administration Quarterly*, Vol. 29 No. 4, pp. 329–338.
- Chisolm, D., Knapp, M.R.J., Knudsen, H.C., Amaddeo, F., Gaitte, L. and Wijngaarden, B.V. (2000), "Client socio-demographic and service receipt inventory. European version: development of an instrument for international research. EPSILON Study 5", *The British Journal of Psychiatry*, Vol. 177, pp. S28–S33.
- Chou, C.-C., Chang, C.-P., Lee, T.-T., Chou, H.-F. and Mills, M.E. (2013), "Technology acceptance and quality of life of the elderly in a telecare program", *Computers, informatics, nursing*, Vol. 31 No. 6, pp. 251–258.
- Choudrie, J., Grey, S. and Tsitsianis, N. (2010), "Evaluating the digital divide: the silver surfer's perspective", *Electronic Government: an international journal*, Vol. 7 No. 2, pp. 148–167.
- Cipriani, A. and Geddes, J. (2003), "Comparison of systematic and narrative reviews: the example of the atypical antipsychotics", *Epidemiologia e Psichiatria Sociale*, Vol. 12 No. 3, pp. 146–154.
- Citizens Online. (2014), "Welcome to Citizens Online | Digital Inclusion | Citizens Online", available at: <http://www.citizensonline.org.uk/> (accessed 25 January 2014).
- Clark, M. and Goodwin, N. (2010), "Sustaining innovation in telehealth and telecare: WSDAN briefing paper", The King's Fund, London.
- Communications Consumer Panel. (2011), *Making phones easier to use: views from consumers*, London.
- Communications Consumer Panel. (2012), *Bridging the gap: sustaining online engagement*, London: Futuresight, available at: [http://www.communicationsconsumerpanel.org.uk/downloads/what-we-do/previous-projects/internet/bridging-the-gap-sustaining-online-engagement/Bridging the gap and cover.pdf](http://www.communicationsconsumerpanel.org.uk/downloads/what-we-do/previous-projects/internet/bridging-the-gap-sustaining-online-engagement/Bridging%20the%20gap%20and%20cover.pdf).
- CommunityUK. (2014), "It's all about CommunityUK!", available at: <http://communityuk.net/information?4b3403665fea6=4b3403665fea6> (accessed 10 September 2014).
- Copeland, E., Fink, S. and Scott, C. (2014), *Technology Manifesto*, London: Policy Exchange, available at: <http://www.policyexchange.org.uk/images/publications/technology-manifesto.pdf>.
- Corbett-Nolan, A. and Bullivant, J. (2012), "Care and support at home: an audit of telecare services in England", Good Governance Institute, Sedlescombe, East Sussex.

- Courtin, E. and Knapp, M. (2015), *Health and wellbeing consequences of social isolation and loneliness in old age: scoping review*, NIHR School for Social Care Research.
- Cresci, K., Yarandi, H. and Morrell, R. (2010), "The Digital Divide and Urban Older Adults", *Computers, informatics, nursing*, Vol. 28 No. 2, pp. 88–94.
- Creswell, J.W. (2009), *Research design: qualitative, quantitative, and mixed methods approaches*, Sage Publications, Inc., Thousand Oaks, California, 3rd Editio.
- Creswell, J.W. (2014), *Research Design: Qualitative, quantitative and meixed methods approaches*, Sage Publications, Inc., Thousand Oaks, California, 4thed.
- Crossen-Sills, J., Toomey, I. and Doherty, M.E. (2009), "Technology and home care: implementing systems to enhance aging in place", *Nursing Clinics of North America*, Vol. 44 No. 2, pp. 239–246.
- Curran, K., Walters, N. and Robinson, D. (2007), "Investigating the problems faced by older adults and people with disabilities in online environments", *Behaviour and Information Technology*, Vol. 26 No. 6, pp. 447–453.
- Czaja, S.J., Charness, N., Fisk, A.D., Hertzog, C., Nair, S.N., Rogers, W.A. and Sharit, J. (2006), "Factors predicting the use of technology: findings from the Centre for Research and Education on Ageing and Technology Enhancement (CREATE)", *Psychology and Aging*, Vol. 21 No. 2, pp. 333–352.
- Damant, J., Knapp, M., Buescher, A., Kung, A. and Ellis, M. (2011), "MonAMI project: D34.4v3 Models and long-term impact study", European Commission, Brussels, available at: <http://www.monami.info/>.
- Damant, J., Knapp, M., Ellis, M., Lundberg, S., Simsik, D. and Falco, J. (2010), "MonAMI project: D34.3v1 Living scale field trial evaluation", European Commission, Brussels, available at: <http://www.monami.info/>.
- Damant, J., Knapp, M., Watters, S., Freddolino, P. and Ellis, M. (2013), "The impact of ICT services on perceptions of the quality of life of older people", Vol. 7 No. 1, pp. 5–21.
- Davis, F.D. (1989), "Perceived usefulness, perceived ease of use, and user acceptance of information technology", *MIS Quarterly*, Vol. 13 No. 3, pp. 319–340.
- Dean, M. (2009), "How social age trumped social class?", in Cann, P. and Dean, M. (Eds.), *Unequal ageing: The untold story of exclusion in old age*, The Policy Press, Bristol, pp. 1–24.
- Dell Inc. (2015), "Dell World 2015."
- Demeris, G., Doorenbos, A. and Towle, C. (2009), "Ethical considerations regarding the use of technology for older adults", *Research in Gerontological Nursing*, Vol. 2 No. 2, pp. 128–136.
- Demeris, G. and Hensel, B.K. (2008), "Technologies for an aging society: a systematic review of 'smart home' applications", *IMIA Yearbook of Medical Informatics*, pp. 33–40.

- Demers, L., Weiss-Lambrou, R. and Ska, B. (2000), "Item analysis of the Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST)", *Assistive Technology*, Vol. 12 No. 2, pp. 96–105.
- Demiris, G., Oliver, P. and Wittenberg-Lyles, E. (2011), "Technology to support end-of-life care", *Seminars in Oncology Nursing*, Vol. 27 No. 3, pp. 211–217.
- Department for Business Innovation and skills and Department for Culture Media and Sport. (2009), "Digital Britain: final report", The London Stationary Office, London, available at: http://books.google.com/books?hl=en&lr=&id=vo4pfi0D5Q4C&oi=fnd&pg=PA10&dq=Digital+Britain:+Final+Report&ots=6BUY4rpj0U&sig=LNWbHvV9JzotFmNI_607_cZR8NE (accessed 9 September 2014).
- Department for Culture Media and Sport. (2013), "Stimulating private sector investment to achieve a transformation in broadband in the UK by 2015", available at: <https://www.gov.uk/government/policies/transforming-uk-broadband> (accessed 19 June 2014).
- Department for Work and Pensions. (2014), "Retirement age", *Gov.uk*, available at: <https://www.gov.uk/retirement-age> (accessed 4 August 2014).
- Department of Constitutional Affairs. (1998), *Data protection Act*, available at: <https://www.gov.uk/data-protection/the-data-protection-act> (accessed 19 September 2014).
- Department of Health. (2001), "National Service Framework for Older People", Department of Health.
- Department of Health. (2005a), "Building telecare in England", Department of Health, London.
- Department of Health. (2005b), "Independence, well-being and choice: Our vision for the future of social care for adults in England", The Stationary Office, London.
- Department of Health. (2006), "Our health, our care, our say: a new direction for community services", The Stationary Office, London.
- Department of Health. (2010a), "A vision for adult social care: capable communities and active citizens", Department of Health, London.
- Department of Health. (2010b), "Building the national care service", available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/238441/7854.pdf.
- Department of Health. (2011a), "Whole system demonstrator programme: headline findings. December 2011", Department of Health, available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/215264/dh_131689.pdf (accessed 22 September 2014).
- Department of Health. (2011b), "Supporting informed NHS customers for information technology", *Gov.uk*, available at: <https://www.gov.uk/government/news/supporting-informed-nhs-customers-for-information-technology> (accessed 8 August 2014).

- Department of Health. (2012a), *Care for our future: reforming care and support*, London: The Stationary Office, available at:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/136422/White-Paper-Caring-for-our-future-reforming-care-and-support-PDF-1580K.pdf.
- Department of Health. (2012b), "A concordat between the Department of Health and the telehealth and telecare industry", Department of Health, available at:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/216757/Concordat-3-million-lives.pdf.
- Department of Health. (2014), *Care and support statutory guidance: issued under the Care Act 2014*, United Kingdom: Department of Health, available at:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/315993/Care-Act-Guidance.pdf.
- Department of Work and Pensions and Department for Communities and Local Government. (2013), "Digital Deal: 12 projects to help social tenants get online", *Gov.uk*, available at:
<https://www.gov.uk/government/news/digital-deal-12-projects-to-help-social-tenants-get-online> (accessed 26 September 2014).
- Van Deursen, A.J.A. and van Dijk, J.A.G.M. (2011), "Internet skills and the digital divide.", *New Media and Society*, Vol. 13 No. 6, pp. 893–911.
- DG Information Society and Media. (2007), "Measuring progress in e-inclusion: Riga Dashboard 2007", European Commission, Brussels.
- Dickens, A.P., Richards, S.H., Greaves, C.J. and Campbell, J.L. (2011), "Interventions targeting social isolation in older people: a systematic review", *BMC: Public Health*, Vol. 11 No. August, p. 647–.
- Dickinson, A. and Gregor, P. (2006), "Computer use has no demonstrated impact on the well-being of older adults", *International Journal of Computer Studies*, Vol. 64, pp. 744–753.
- digital housing hub. (2014), "Digital Deal Challenge Fund", available at:
<http://digitalhousinghub.ning.com/page/digital-deal> (accessed 24 July 2014).
- Digital Outreach and Convey. (2014), "No Title", available at:
<http://www.digitaloutreach.org.uk/> (accessed 26 September 2014).
- Digital Unite. (2014a), "Digital Unite", available at: <http://digitalunite.com/> (accessed 25 August 2014).
- Digital Unite. (2014b), "About Spring Online", available at: <http://digitalunite.com/spring-online/about-spring-online> (accessed 22 July 2014).
- Van Dijk, J.A.G.M. (2005), *The deepening divide: inequality in the Information Society*, Sage Publications, Inc., Thousand Oaks, California.
- Ding, D., Cooper, R.A., Pasquina, P.F. and Fici-Pasquina, L. (2011), "Sensor technology for smart homes", *Maturitas*, Vol. 69 No. 2, pp. 131–136.

- Ditommaso, E., Brannen, C. and Best, L. (2004), "Measurement and validity characteristics of the short version of the social and emotional loneliness scale for adults", *Educational and Psychological Measurement*, Vol. 64, pp. 99–119.
- Docobo Ltd. (2014), "DocoboAPP", available at:
<http://www.docobo.co.uk/ArticlePage.aspx?articleId=32&topParentId=7> (accessed 26 September 2014).
- Doro AB. (2014), "Enabling seniors to live at home with dignity, confidence and security."
- Dutton, W.H. and Blank, G. (2011), *Next Generation Users: The Internet in Britain: the Oxford Internet Survey 2011 Report*, Oxford, UK.
- Dutton, W.H. and Blank, G. (2013), *Cultures of the internet: the internet in Britain: Oxford Internet Survey 2013 Report*.
- Eastman, J.K. and Iyer, R. (2004), "The elderly's uses and attitudes towards the internet", *Journal of Consumer Marketing*, Vol. 21 No. 3, pp. 208–220.
- Edmond, R. (2014), "Top 10 best-selling tablet brands of 2013", *CRN*, available at:
<http://www.crn.com/slide-shows/mobility/300072670/top-10-best-selling-tablet-brands-of-2013.htm> (accessed 21 July 2014).
- EE Limited. (2014), "EE", available at:
http://shop.ee.co.uk/?WT.MC_ID=ON_MEC_S_GoogleAdWords_G_BrandEEOnly&WT.src=h=1&gclid=Cj0KEQjwnZShBRDfxqzr55rcyMEBEiQA1iRNP8FoTybEHw_ZmGNS2oHSP5u6zvYUsfaM5GM8nMhXOPwaAqP38P8HAQ (accessed 26 September 2014).
- Empirica GmbH, Work Research Centre and Institute "Integrated study" Vienna University of Technology. (2010), "Preventative Technology Grant: centrally-funded grant to kick-start mainstream telecare services", *ICT & Ageing – European Study on Users, Markets and Technologies*, available at: http://www.ict-ageing.eu/?page_id=1617 (accessed 22 September 2014).
- Erickson, J. and Johnson, G.M. (2011), "Internet use and psychological wellness during late adulthood", *Canadian Journal on Ageing*, Vol. 30 No. 2, pp. 197–209.
- Essen, A. (2009), "The emergence of technology-based service systems: a case study of a telehealth project in Sweden", *Journal of Service Management*, Vol. 20 No. 1, pp. 98–121.
- European Commission. (2006), "Riga Ministerial Declaration", European Commission, Riga, available at:
http://ec.europa.eu/information_society/activities/ict_psp/documents/declaration_riga.pdf.
- European Commission. (2007a), "Measuring progress in e-inclusion: Riga Dashboard", European Commission, Brussels.
- European Commission. (2007b), "com (2007) 332 Final. Ageing well in the Information society. An i2010 initiative. Action plan on information and communication technologies and ageing", European Commission, Brussels, available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52007DC0332&from=EN>.

- European Commission. (2009), "i2010: Information Society and the media working towards growth and jobs", available at: http://europa.eu/legislation_summaries/information_society/strategies/c11328_en.htm (accessed 22 September 2014).
- European Commission. (2013a), "Digital agenda for Europe: a Europe 2020 initiative", available at: <http://ec.europa.eu/digital-agenda/node/151> (accessed 14 November 2013).
- European Commission. (2013b), "eEurope 2002", available at: http://europa.eu/legislation_summaries/information_society/strategies/l24226a_en.htm (accessed 16 July 2014).
- European Commission. (2014a), "Accessibility and EU policy", available at: http://ec.europa.eu/justice/discrimination/disabilities/award/about-award/accessibility_en.htm (accessed 2 August 2014).
- European Commission. (2014b), "Web accessibility", available at: http://ec.europa.eu/ipg/standards/accessibility/index_en.htm (accessed 2 August 2014).
- European Commission. (2014c), "European eGovernment Action Plan 2011-2015", available at: <http://ec.europa.eu/digital-agenda/en/european-egovernment-action-plan-2011-2015> (accessed 22 September 2014).
- European Commission. (2014d), "Information Providers Guide: The EU Internet Handbook", available at: http://ec.europa.eu/ipg/standards/accessibility/eu_policy/index_en.htm (accessed 16 July 2014).
- European Commission. (2014e), "Europe 2020 - Europe 2020 in a nutshell", available at: http://ec.europa.eu/europe2020/europe-2020-in-a-nutshell/index_en.htm (accessed 10 September 2014).
- European Commission. (2014f), "Digital agenda for Europe: Pillar IV: Fast and ultra-fast internet access", available at: <http://ec.europa.eu/digital-agenda/en/our-goals/pillar-iv-fast-and-ultra-fast-internet-access> (accessed 13 April 2014).
- European Commission and Economic Policy Committee. (2009), "2009 Ageing report: economic and budgetary projections for the EU-27 Member States (2008-2060)", European Communities, Luxembourg.
- EuroQOL Group. (1990), "EuroQOL: a new facility for the measure of health-related quality of life", *Health Policy*, Vol. 16, pp. 199–208.
- Eurostat. (2014a), "Methodological Manual for statistics on the information society. Study year 2014, version 1.0", Eurostat, Luxembourg, available at: <https://circabc.europa.eu/faces/jsp/extension/wai/navigation/container.jsp>.
- Eurostat. (2014b), "Eurostat statistics: what we do", available at: http://epp.eurostat.ec.europa.eu/portal/page/portal/about_eurostat/introduction/what_we_do (accessed 24 September 2014).
- Eurostat. (2014c), "Table [isoc_sk_cskl_i]: Individuals' level of computer skills", European Commission, Luxembourg, available at: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=isoc_sk_cskl_i&lang=en.

- Eurostat. (2014d), "Table [isoc_sk_iskl_i]: Individuals' level of internet skills", European Commission, Luxembourg, available at:
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=isoc_sk_iskl_i&lang=en.
- Eurostat. (2014e), "Table [isoc_bdek_di] Digital inclusion: individuals", European Commission, Luxembourg, available at:
<http://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do>.
- Eurostat. (2014f), "Table [isoc_ci_cfp_cu] Individuals: computer use", European Commission, Luxembourg, available at:
<http://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do>.
- Falco, J., Vaquerizo, E., Lain, L., Ibarz, A. and Garrido, B. (2011), "MonAMI Project: D21.1 Living scale field trial in Spain", European Commission, Brussels, available at:
www.monami.info/.
- Feist, H., Parker, K., Howard, N. and Hugo, G. (2010), "New technologies: their potential role in linking rural older people to community new technologies", *International Journal of Emerging Technologies and Society*, Vol. 8 No. 2, pp. 68–84.
- Ferro, E., Helbig, N.C. and Gil-Garcia, J.R. (2011), "The role of IT literacy in defining digital divide policy needs", *Government Information Quarterly*, Vol. 28 No. 1, pp. 3–10.
- Festervand, T.A. and Meinert, D.B. (1994), "Older adults' attitudes toward and adoption of personal computers and computer-based lifestyle assistance", *Journal of Applied Business Research*, Vol. 10 No. 2, pp. 13–22.
- Finn, R. and Wright, D. (2011), "Mechnisms for stakeholder co-ordination in ICT and ageing", *Journal of Information, Communication and Ethics in Society*, Vol. 9 No. 4, pp. 265–286.
- Foley, P., Alfonso, X. and Ghani, S. (2002), *The digital divide in a world city*, London, available at: legacy.london.gov.uk/gla/publications/e-london/digital_divide.rtf.
- Folstein, M.F., Folstein, S.E. and McHugh, P.R. (1975), "Mini-mental state: a practical method for grading the cognitive state of patients for the clinician", *Journal of Psychiatric Research*, Vol. 12, pp. 189–98.
- Freddolino, P.P., Lee, W.W.P., Law, C.K. and Ho, C. (2010), "An exploratory study of peer tutors teaching older adults about technology", *Journal of Technology in Human Services*, Vol. 28 No. 4, pp. 217–239.
- Freeman, R.E. (1984), *Strategic management: a stakeholder approach*, Pitman/Ballinger, Boston.
- Frost, H., Haw, S. and Frank, J. (2010), *Promoting health and wellbeing in later life: interventions in primary care and community settings*, Edinburgh: Scottish Collaboration for Public Health Research and Policy.
- Fujitsu. (2011), *Online government services and the offline older generation*, London: Fujitsu.
- Gale, N.K., Heath, G., Cameron, E., Rashid, S. and Redwood, S. (2013), "Using the framework method for the analysis of qualitative data in multi-disciplinary health research", *BMC Medical Reseach Methodology*, Vol. 13, p. 117.

- Garceau, M., Vincent, C. and Robichaud, L. (2007), "Note de recherche: la télésurveillance comme outil favorisant la participation sociale des personnes âgées à domicile", *Canadian Journal on Ageing*, Vol. 26 No. 1, pp. 59–72.
- Gatto, S.L. and Tak, S.H. (2008), "Computer, internet and e-mail use among older adults: benefits and barriers", *Educational Gerontology*, Vol. 34 No. 9, pp. 800–811.
- Go ON UK. (2014a), "Go ON UK: the UK's digital skills alliance", available at: <http://www.go-on.co.uk/> (accessed 22 September 2014).
- Go ON UK. (2014b), "We're helping every person, small business and charity get connected. Can you?", available at: <http://www.go-on.co.uk/get-involved/> (accessed 26 September 2014).
- González-Vega, N., Kämäräinen, A. and Kalla, O. (2011), "Ethically inspired care information technology can enable freedom of choice of older users", *Sociology Study*, Vol. 1 No. 6, pp. 452–459.
- Google. (2014), "android", available at: <http://www.android.com/> (accessed 26 September 2014).
- Gough, D. (2013), "Meta-narrative and realist reviews: guidance, rules, publication standards and quality appraisal", *BMC Medicine*, Vol. 11, p. 22.
- Government Digital Service. (2014), "Assisted digital: a guide to assisted digital", available at: <https://www.gov.uk/service-manual/assisted-digital#what-assisted-digital-is> (accessed 10 August 2014).
- Gracia, E. and Herrero, J. (2009), "Internet use and self-rated health among older people: a national survey", *Journal of Medical Internet Research*, Vol. 11 No. 4, p. e40.
- Green, B.N., Johnson, C.D. and Adams, A. (2006), "Writing narrative literature reviews for peer-reviewed journals: secrets of the trade", *Journal of Chiropractic Medicine*, Vol. 5 No. 3, pp. 101–117.
- Griseri, P. and Seppala, N. (2010), *Business ethics and corporate social responsibility*, Cengage Learning EMEA, Andover.
- Haddon, L. (2000), "Social exclusion and information and communication technologies: lessons from studies of single parents and the young elderly", *New Media and Society*, Vol. 2 No. 4, pp. 387–406.
- Hardhill, I. and Olphert, C.W. (2012), "Staying connected: Exploring mobile phone use amongst older adults in the UK", *Geoforum*, Elsevier Ltd, Vol. 43 No. 6, pp. 1306–1312.
- Harjumaa, M. and Isomursu, M. (2012), "Field Work With older users: challenges in design and evaluation of information systems", *The Electronic Journal Information Systems Evaluation*, Vol. 15 No. 1, pp. 50–62.
- Harrod, M. (2010), "'I Have to Keep Going': Why some older adults are using the internet for health information", *Ageing International*, Vol. 36 No. 2, pp. 283–294.

- Hawthorn, D. (2000), "Possible implications of aging for interface designers", *Interacting with Computers*, Vol. 12 No. 5, pp. 507–528.
- Healthcare UK. (2013), *Digital health: working in partnership*, London: UK Trade and Investment.
- Heart, T. and Kalderon, E. (2013), "Older adults: are they ready to adopt health-related ICT?", *International Journal of Medical Informatics*, Elsevier Ireland Ltd, Vol. 82 No. 11, pp. e209–e231.
- Helsper, E. (2008), "Digital Inclusion: an analysis of social disadvantage and the Information Society", Department for Communities and Local Government, London.
- Hemingway, P. and Brereton, N. (2009), "What is a systematic review?", *What is...? Series. Second Edition*, available at: <http://www.medicine.ox.ac.uk/bandolier/painres/download/whatis/syst-review.pdf> (accessed 22 March 2015).
- Henderson, C., Knapp, M., Fernandez, J.-L., Beechan, J., Hirani, S.P., Cartwright, M., Beynon, M., et al. (2013), "Cost effectiveness of telehealth for patients with long term conditions (Whole Systems Demonstrator telehealth questionnaire study): nested economic evaluation in a pragmatic, cluster randomised controlled trial", *BMJ*, Vol. 346, p. f1035.
- Henwood, F. and Wyatt, S. (2009), "All change? Gender, health and the internet", in Balka, E., Green, E. and Henwood, F. (Eds.), *Gender, Health and Information Technology in Context*, Basingtoke, Hampshire, pp. 17–33.
- Hernandez-Encuentra, E., Pousada, M. and Gomez-Zuniga, B. (2009), "ICT and older people: beyond usability", *Educational Gerontology*, Vol. 35 No. 3, pp. 226–245.
- Hill, R., Beyon-Davies, P. and Williams, M.D. (2008), "Older people and internet engagement", *Information Technology and People*, Vol. 21 No. 3, pp. 244–266.
- Hill, R.D., Luptak, M.K., Rupper, R.W., Bair, B., Peterson, C., Dailey, N. and Hicken, B.L. (2010), "Review of Veterans Health Administration Telemedicine interventions", *The American Journal of Managed Care*, Vol. 16 No. 12, pp. e302–e310.
- Hirani, S., Beynon, M., Cartwright, M., Rixon, L., Doll, H., Henderson, C., Bardsley, M., et al. (2014), "The effect of telecare on the quality of life and psychological well-being of elderly recipients of social care over a 12-month period: the Whole Systems Demonstrator cluster randomised trial", *Age and Ageing*, Vol. 43 No. 3, pp. 334–341.
- HM Government. (2005), *Disability Discrimination Act 2005, Chapter 13*, available at: <http://www.legislation.gov.uk/ukpga/2005/13/contents> on September 21, 2014.
- Horsman, J., Furlong, W., Feeny, D. and Torrance, G. (2003), "The Health Utilities Index (HUI): concepts, measurement properties and applications", *Health and Quality of Life Outcomes*, Vol. 1, p. 54.
- Huang, C. (2010), "Internet use and psychological well-being: a meta analysis", *Cyberpsychology Behavior and Social Networking*, Vol. 13 No. 3, pp. 241–249.

- Hurme, H., Westerback, S. and Quadrello, T. (2010), "Traditional and new forms of contact between grandparents and grandchildren", *Journal of Intergenerational Relationships*, Vol. 8 No. 3, pp. 264–280.
- Hutchison 3G UK Limited. (2014), "No Title", available at: http://www.three.co.uk/?id=1523&gclid=CJHOyoDR_sACFUZSfAodDxsAtg&gclsrc=ds&aidset=1 (accessed 26 September 2014).
- IBM Corp. (2012), "IBM Statistics for Windows", IBM Corp., Armonk, NY.
- Independent Age. (2010), *Older people, technology and community*, London: Calouste Gulbenkian Foundation, available at: <http://www.gulbenkian.org.uk/pdf/older-people-technology-and-community.pdf>.
- Innovate UK. (2014), "dallas - delivering assisted living lifestyles at scale - innovateuk", available at: <https://connect.innovateuk.org/web/dallas/who-we-are1> (accessed 10 September 2014).
- Insight Social Research LTD. (2006), "Insight Social Research - Services", available at: <http://www.researchatinsight.org/services.html> (accessed 27 January 2014).
- Van Isacker, K., Goranova-Valkova, M., Leuteritz, J.-P. and Melcher, V. (2010), "Assessing the accessibility of UI for all ages", in Cunningham, P. and Cunningham, M. (Eds.), *IST-Africa*, International Information Management Corporation, Durban, South Africa.
- Johnston, B. (2011), "UK telehealth initiatives in palliative care: a review", *International Journal of Palliative Nursing*, Vol. 17 No. 6, pp. 301–308.
- De Jong Gierveld, J. and Van Tilburg, T. (2006), "A 6-item scale for overall, emotional, and social loneliness: confirmatory tests on survey data", *Research on Aging*, Vol. 28 No. 5, pp. 582–598.
- Joyce, K. and Loe, M. (Eds.). (2010), *Technogenerians: Studying health and illness through an ageing, science and technology lens*, Wiley-Blackwell, Oxford.
- Jung, Y., Peng, W., Moran, M., Jin, S.-A.A., McLaughlin, M., Cody, M., Jordan-Marsh, M., et al. (2010), "Low-income minority seniors' enrollment in a cybercafé: psychological barriers to crossing the digital divide", *Educational Gerontology*, Vol. 36 No. 3, pp. 193–212.
- Jutai, J. and Day, H. (2002), "Psychological Impact of Assistive Devices Scale (PIADS)", *Technology and Disability*, Vol. 14 No. 3, pp. 107–111.
- Kamel Boulos, M.N., Rocha, A., Martins, A., Eschriche Vicente, M., Bolz, A., Feld, R., Tchoudovski, I., et al. (2007), "Caalyx: a new generation of location-based services in health care", *International Journal of Health Geographics*, Vol. 6 No. 9, pp. 1–6.
- Karunanithi, M. (2008), "Expert review of medical devices", *Future Drugs*, Vol. 4 No. 2, pp. 267–277.
- Kidd, L., Cayless, S., Johnston, B. and Wengstrom, Y. (2010), "Telehealth in palliative care in the UK: a review of the evidence", *Journal of Telemedicine and Telecare*, Vol. 16 No. 7, pp. 394–402.

- Kim, E.-H., Stolyar, A., Lobar, W.B., Herbaugh, A., Shinstrom, S.E., Zierler, B.K., Soh, C.B., et al. (2009), "Challenges to using an electronic personal health record by a low-income elderly population", *Journal of Medical Internet research*, Vol. 11 No. 4, p. e44.
- Koch, S. and Hägglund, M. (2009), "Health informatics and the delivery of care to older people", *Maturitas*, Vol. 63 No. 3, pp. 195–199.
- Kolsaker, A. and Lee-Kelley, L. (2008), "Citizens' attitudes towards e-government and e-governance: a UK study", *International Journal of Public Sector Management*, Vol. 21 No. 7, pp. 723–738.
- Koninklijke Philips Electronics N.V. (2012), "Vital Sign Measurements", available at: http://www.telehealth.philips.com/solution_devices.html (accessed 9 July 2014).
- Koopman-Boyden, P.G. and Reid, S.L. (2009), "Internet/e-mail usage and well-being among 65-84 year olds in New Zealand: policy implications", *Educational Gerontology*, Vol. 35 No. 11, pp. 990–1007.
- Kroenke, K., Spitzer, R.L. and Williams, J.B. (2001), "The PHQ-9: validity of a brief depression severity measure", *Journal of General Internal Medicine*, Vol. 16, pp. 606–613.
- Kubitschke, L. and Cullen, K. (2010), *ICT & ageing: European study on users, markets and technologies. Final Report*, Brussels: European Commission.
- Laguna, K. and Babock, R.L. (1997), "Computer anxiety in young and older adults: implications for human-computer interactions in older populations", *Computers in Human Behavior*, Vol. 13 No. 3, pp. 317–326.
- Lai, C.K.Y., Chung, J.C.C., Leung, N.K.L., Wong, J.C.T. and Mak, D.P.S. (2010), "A survey of older Hong Kong people's perceptions of telecommunication technologies and telecare devices", *Journal of Telemedicine and Telecare*, Vol. 16 No. 8, pp. 441–446.
- Lauriks, S., Reinersmann, A., van der Roest, H.G., Meiland, F.J.M., Davies, R.J., Moelaert, F., Mulvenna, M.D., et al. (2007), "Review of ICT-based services for identified unmet needs in people with dementia", *Ageing Research Reviews*, Vol. 6 No. 3, pp. 223–246.
- Lawton, M.P. and Brody, E.M. (1969), "Assessment of older people: self-maintaining and instrumental activities of daily living", *The Gerontologist*, Vol. 9, pp. 179–186.
- Lenovo. (2014), "No Title", available at: http://shop.lenovo.com/gb/en/laptops/?cid=gb:sem|se|google|2261436942|uk_brand_misspellings_en|UK+IIP_Lenovo_Brand_Direct|109958327&ef_id=VAXW@gAAAMH1PolP:20140926102323:s (accessed 26 September 2014).
- Leora, J.A. (2008), "Generational differences in acceptance of technology", *Telemedicine and e-Health*, Vol. 14 No. 10, pp. 1087–1090.
- Leppel, K. and McCloskey, D.W. (2011), "A cross-generational examination of electronic commerce adoption", *Journal of Consumer Marketing*, Vol. 28 No. 4, pp. 261–268.
- Levitas, R. (2005), *The Inclusive Society? Social exclusion and New Labour*, Palgrave Macmillan, Basingtoke, Hampshire, 2nded.

- Lewin, D., Adshead, S., Glennon, B., Williamson, B. and Moore, T. (2010), *Assisted living technologies for older and disabled people in 2030*, London.
- Lewis, G. (2012), *Digital inclusion* (No. Paper 1), Policy Review, London: Age UK, available at: <http://www.kopv.org.uk/wp-content/uploads/2013/11/Digital-Inclusion-Review.pdf>.
- Liddy, C., Dusseault, J.J., Bahrouge, S., Hogg, W., LEmelin, J. and Humbert, J. (2008), "Telehomecare for patients with multiple chronic illness", *Canadian Family Physician*, Vol. 54, pp. 58–65.
- Lloyd, J. (2011), "Telecare ready: creating a universal entitlement to telecare", The Strategic Society Centre, London.
- Lloyd, L. (2010), "The Individual in social care: the ethics of care and the 'personalisation agenda' in services for older people in England", *Ethics and Social Welfare*, Vol. 4 No. 2, pp. 188–200.
- Loe, M. (2010), "Doing it my way: old women, technology and wellbeing", in Joyce, K. and Loe, M. (Eds.), *Technogenerians: Studying health and illness through an ageing, science and technology lens*, Wiley-Blackwell, Oxford, pp. 142–156.
- London Borough of Camden. (2011), "Tyze Personal Networks", available at: <http://camdencarechoices.camden.gov.uk/i-need-help-with/living-at-home/staying-independent-at-home/tyze-personal-networks.aspx> (accessed 26 September 2014).
- London Knowledge Lab. (2014), "Travel Information", available at: http://www.lkl.ac.uk/cms/index.php?option=com_content&task=view&id=42&Itemid=114 (accessed 25 September 2014).
- London School of Economics Research Division. (2014), "Research policy and ethics", available at: <http://www.lse.ac.uk/intranet/researchAndDevelopment/researchDivision/policyAndEthics/home.aspx> (accessed 25 August 2014).
- Longworth, L., Yang, Y., Young, T., Mulhern, B., Hernandez-Alava, M., Mukuria, C., Rowen, D., et al. (2014), "Use of generic and condition-specific measures of health-related quality of life in NICE decision-making a systematic review, statistical modelling and survey", *Health Technology Assessment*, Vol. 18 No. 9.
- Looking Local. (2014), "Looking Local", available at: <https://lookinglocal.gov.uk/> (accessed 7 September 2014).
- Lopez, C., Valenzuela, J.I., Calderon, J.E., Valasco, A.F. and Fajardo, R. (2011), "A telephone survey of patient satisfaction with realtime telemedicine in a rural community in Columbia", *Journal of Telemedicine and Telecare*, Vol. 17 No. 2, pp. 83–87.
- Lorenzen-huber, L., Boutain, M. and Connelly, K.H. (2011), "Privacy, technology, and aging: a proposed framework", *Ageing International*, pp. 232–252.
- Ludwig, W., Wolf, K.-H., Duwenkamp, C., Gusew, N., Hellrun, N., Marschollek, M., Wagner, M., et al. (2012), "Health-enabling technologies for the elderly: an overview of services based on a literature review", *Computer Methods and Programs in Biomedicine*, Vol. 106 No. 2, pp. 70–78.

- Lundberg, S. (2011), "MonAMI Project. D19.1 Living scale field trial in Sweden", European Commission, Brussels, available at: www.monami.info/.
- Macfarlane, H., Kinirons, M.T. and Bultitude, M.F. (2012), "WWW. Do not forget older people.", *Age and ageing*, Vol. 41 No. 6, pp. 807–10.
- MacNeill, V., Sanders, C., Fitzpatrick, R., Hendy, J., Barlow, J., Knapp, M., Rogers, A., et al. (2014), "Experiences of front-line health professionals in the delivery of telehealth: a qualitative study.", *The British journal of general practice : the journal of the Royal College of General Practitioners*, British Journal of General Practice, Vol. 64 No. 624, pp. e401–7.
- Magnusson, L., Hanson, E. and Borg, M. (2004), "A literature review study of information and communication technology as a support for frail older people living at home and their family carers", *Technology and Disability*, Vol. 16, pp. 223–235.
- Mahony, E.L. and Mahony, D.F. (2010), "Acceptance of wearable technology by people with Alzheimer's Disease: issues and accommodations", *American Journal of Alzheimer's Disease and Other Dementias*, Vol. 25 No. 6, pp. 527–531.
- Mancinelli, E. (2007), "e-Inclusion in the Information Society", European Commission: Directorate General for Education and Culture, Budapest, available at: http://www.ittk.hu/netis/doc/ISCB_eng/10_Mancinelli_final.pdf.
- Mann, W.C., Belchoir, P., Tomita, M.R. and Kemp, B.J. (2005), "Computer use by middle-aged and older adults with disabilities", *Technology and Disability*, Vol. 17 No. 1, pp. 1–9.
- Marquié, J.C., Jourdan-Boddaert, L. and Huet, N. (2002), "Do older adults underestimate their actual computer knowledge", *Behaviour and Information Technology*, Vol. 21 No. 4, pp. 273–280.
- Marteau, T.M. and Bekker, H. (1992), "The development of a 6-item short form of the state scale of the Spielberger state trait anxiety inventory", *British Journal of Clinical Psychology*, Vol. 31, pp. 301–306.
- Martin, S., Kelly, G., Kernohan, W.G., McCreight, B. and Nugent, C. (2009), *Smart home technologies for health and social care support*, *The Cochrane Database of Systematic Reviews*, Chichester: John Wiley and Sons, Ltd.
- Martinez-Pecino, R., Lera, M.J. and Martinez-Pecino, M. (2012), "Active seniors and mobile phone interaction", *Social Behaviour and Personality*, Vol. 40 No. 5, pp. 875–880.
- Marziali, E. and Donahue, P. (2006), "Caring for others: internet video-conferencing group intervention for family caregivers of older adults with neurodegenerative disease", *The Gerontologist*, Vol. 46 No. 3, pp. 398–403.
- Mason, M., Sinclair, D. and Berry, C. (2012), "Nudge or Compel? Can behavioural economics tackle the digital exclusion of older people?", International Longevity Centre- UK, London.
- Matthews, J.T., Beach, S.R., Downs, J., Bruine de Bruin, W. and Mecca, L.P. (2010), "Preferences and concerns for quality of life technology among older adults and persons with disabilities: National survey results", *Technology and Disability*, Vol. 22, pp. 5–15.

- McAndrew, F.T. and Jeong, H.S. (2012), "Who does what on Facebook? Age, sex, and relationship status as predictors of Facebook use", *Computers in Human Behavior*, Vol. 28, pp. 2359–2365.
- McMurtrey, M.E., Downey, J.P., Zeltmann, S.M. and McGaughey, R.E. (2011), "Seniors and technology: results from a field Study", *The Journal of Computer Information Systems*, Vol. 51 No. 4, pp. 22–30.
- Mertens, A., Hurtmanns, J., Wacharamanotham, C., Kronenbueger, M., Borchers, J. and Schliek, C.M. (2012), "Swabbing: touchscreen-based input technique for people with hand tremor", *Work*, Vol. 41 No. Supplement 1, pp. 2405–2411.
- Microsoft. (2014), "Microsoft", available at: <https://www.microsoft.com/en-gb/> (accessed 26 September 2014).
- Milligan, C., Roberts, C. and Mort, M. (2011), "Telecare and older people: who cares where?", *Social science & medicine (1982)*, Elsevier Ltd, Vol. 72 No. 3, pp. 347–54.
- Molnar, S. (2003), *The explanation frame of the digital divide: proceedings of the summer school "Risks and challenges of the Network Society"*, Sweden: Karlstad University.
- Morris, A., Goodman, J. and Brading, H. (2007), "Internet use and non-use: views of older users", *Universal Access In the Information Society*, Vol. 6 No. 1, pp. 43–57.
- Moss, G.A., Wulf, C. and Mullen, H. (2013), "Internet Marketing to 50+ generations in the UK and France", *Journal of International Consumer Marketing*, Vol. 25 No. 1, pp. 45–58.
- Mukherjee, D. (2011), "Participation of older adults in virtual volunteering: a qualitative analysis", *Ageing International*, Vol. 36, pp. 253–266.
- Nations, D. (2014), "iPad History 101", *about technology*, available at: http://ipad.about.com/od/ipad_details/a/The-History-Of-The-iPad.htm (accessed 27 September 2014).
- Netten, A., Brown, J.B., Caiels, J., Forder, J., Malley, J., Smith, N., Towers, A.M., et al. (2011), "Adult Social Care Outcomes Toolkit (ASCOT): main guidance v2.1", PSSRU.
- Neven, L. (2010), "'But obviously not for me': robots, laboratories and the defiant identity of elder test users", in Joyce, K. and Loe, M. (Eds.), *Technogenerians: Studying health and illness through an ageing, science and technology lens*, Wiley-Blackwell, Oxford, pp. 157–168.
- NHS England. (2012), "3 Million Lives", available at: <http://3millionlives.co.uk/about-3ml> (accessed 18 June 2014).
- Nijland, N., van Gemert-Pijnen, J.E.W.C., Boer, H., Steehouder, M.F. and Seydel, E.R. (2009), "Increasing the use of e-consultation in primary care: results of an online survey among non-users of e-consultation.", *International journal of medical informatics*, Vol. 78 No. 10, pp. 688–703.
- Norris, P. (2001), *Digital divide: civic engagement, information poverty, and Internet World wide*, (Bennett, W.L. and Entman, R.M., Eds.) *Digital divide: civic engagement, information poverty, and Internet World wide*, Cambridge University Press, New York, New York.

- Nussbaum, M.C. (2000), *Women and human development: The Capability Approach*, Cambridge University Press, Cambridge.
- Nussbaum, M.C. and Sen, A. (1993), *The Quality of Life*, Clarendon Press, Oxford.
- OECD. (2014), "Society at a glance 2014: OECD social indicators. The crisis and its aftermath", OECD Publishing, Paris, available at: <http://www.oecd.org/social/societyataglance.htm>.
- OfCom. (2011), *Communications Market Report: UK*, London: OfCom.
- OfCom. (2012), *Communications Market Report 2012*, London: OfCom.
- OfCom. (2013a), *Communications Market Report 2013*, London: OfCom.
- OfCom. (2013b), "Fixed Broadband Map 2013", available at: <http://maps.ofcom.org.uk/broadband/> (accessed 10 September 2014).
- Ofcom. (2014), *Adults' media use and attitudes report 2014*, London: OfCom, available at: http://stakeholders.ofcom.org.uk/binaries/research/media-literacy/adults-2014/2014_Adults_report.pdf.
- OfCom. (2014), *Adults' media use and attitudes report*, London: OfCom.
- Van Offenbeek, M.A.G. and Boonstra, A. (2010), "Does telehomeconsultation lead to substitution of home visits? Analysis and implications of a telehomecare program", *Information Technology and Health Care: Socio-Technical Approaches*, Vol. 157, pp. 148–153.
- Office for National Statistics. (2013a), "2011 Census, Population Estimates by five-year age bands, and household estimates, for Local Authorities in the United Kingdom", available at: <http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-294273> (accessed 25 August 2014).
- Office for National Statistics. (2013b), "Internet Access: households and individuals 2013", *Statistical bulletin*, available at: http://www.ons.gov.uk/ons/dcp171778_322713.pdf.
- Office for National Statistics. (2013c), "Household satellite accounts, valuing informal adultcare in the UK", available at: <http://www.ons.gov.uk/ons/rel/wellbeing/household-satellite-accounts/valuing-informal-adultcare-in-the-uk/index.html> (accessed 26 September 2014).
- Office for National Statistics. (2014a), "Internet access: households and individuals 2014", *Statistical bulletin*, available at: <http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-322080> (accessed 13 September 2014).
- Office for National Statistics. (2014b), "About ONS", available at: <http://www.ons.gov.uk/ons/about-ons/index.html> (accessed 24 August 2014).
- Office for National Statistics. (2014c), "Opinions and Lifestyle (Opinions) Survey: Information for clients. 2014-2015", Office for National Statistics, available at: <http://www.statistics.gov.uk>.

- Office for National Statistics. (2014d), "Internet access quarterly update, Q1 2014", *Statistical bulletin*, available at: <http://www.ons.gov.uk/ons/rel/rdit2/internet-access-quarterly-update/q1-2014/stb-ia-q1-2014.html> (accessed 27 September 2014).
- Office for National Statistics. (2014e), "2011 Census analysis, households and household composition in England and Wales, 2001-2011", available at: <http://www.ons.gov.uk/ons/rel/census/2011-census-analysis/households-and-household-composition-in-england-and-wales-2001-2011/index.html> (accessed 25 July 2014).
- Office of the Deputy Prime Minister. (2004), *The English Indices of Deprivation 2004 (Revised)*, London, available at: <http://webarchive.nationalarchives.gov.uk/+http://www.communities.gov.uk/document/s/communities/pdf/131209.pdf>.
- Olphert, W. and Damodaran, L. (2013), "Older people and digital disengagement: a fourth digital divide", *Gerontology*, Vol. 59, pp. 564–570.
- Olson, K.E., Brien, M.A.O., Rogers, W.A. and Charness, N. (2011), "Diffusion of technology : frequency of use for younger and older adults", *Ageing International*, Vol. 36 No. 1, pp. 123–145.
- Opalinski, L. (2001), "Older adults and the digital divide: assessing results of a web-based survey", *Journal of Technology in Human Services*, Vol. 18 No. 3, pp. 203–221.
- Opinions and Lifestyle Team. (2013), "National statistics opinions and lifestyle survey: technical report", Office for National Statistics, Newport.
- Oxford Internet Institute. (2005), "Sampling Design Report: Oxford Internet Survey 2005", Oxford Internet Institute, Oxford, UK.
- Oxford Internet Institute. (2013a), "Oxford Internet Surveys: Dataset Request", available at: <http://oxis.oii.ox.ac.uk/research/forms/dataset-request> (accessed 22 August 2014).
- Oxford Internet Institute. (2013b), "Oxford Internet Surveys: About OxIS", available at: <http://oxis.oii.ox.ac.uk/about> (accessed 5 June 2014).
- Palm, E. (2013), "Who Cares? Moral obligations in formal and informal care provision in the light of ICT-based home care", *Health Care Analysis*, Vol. 21 No. 2, pp. 171–188.
- Parker Oliver, D.R., Demiris, G. and Porock, D. (2005), "The usability of videophons for seniors and hospices providers: a brief report of two studies", *Computers in Biology and Medicine*, Vol. 35 No. 9, pp. 782–790.
- Parr, A. and Down, K. (2014), "Research and development work relating to assistive technology 2013-2014", Department of Health, London, available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/336428/S22_Report_2013-14.pdf.
- Patsios, D. (2006), "Pensioners, poverty and social exclusion", in Pantazis, C., Gordon, D. and Levitas, R. (Eds.), *Poverty and social exclusion in Britain: The millennium survey*, The Policy Press, Bristol, pp. 431–458.

- Paul, G. and Stegbauer, C. (2005), "Is the digital divide between young and elderly people increasing?", *First Monday*, Vol. 10 No. 10.
- Pawson, R., Greenhalgh, T., Harvey, G. and Walshe, K. (2005), "Realist review - a new method of systematic review designed for complex policy interventions", *Journal of Health Services Research and Policy*, Vol. 10 No. Supplement 1, pp. S1:21– S1:34.
- Plaza, I., Martín, L., Martín, S. and Medrano, C. (2011), "Mobile applications in an aging society : Status and trends", *The Journal of Systems & Software*, Vol. 84 No. 11, pp. 1977–1988.
- plusnet. (2014), "plusnet", available at: http://www.plus.net/home-broadband/unlimited/?WT.mc_id=sem_013 (accessed 21 July 2014).
- Population, U.K., Service, N.H., Disease, H. and Matters, M. (2014), "Later life in the United Kingdom", No. May, pp. 1–34.
- Price, A. (2011), "Internet guide for older people and their physicians", *Geriatric Medicine*, Vol. 41 No. 7, pp. 356–359.
- Primus. (2014), "Primus", available at: <http://www.primussaver.co.uk/about.html> (accessed 21 July 2014).
- Ragoobar, T., Whalley, J. and Harle, D. (2011), "Public and private intervention for next-generation access deployment: Possibilities for three European countries", *Telecommunications Policy*, Elsevier, Vol. 35 No. 9-10, pp. 827–841.
- Randall, C. (2010), "Social trends 41: e-Society", Office for National Statistics, Newport.
- Recycle-pc. (2014), "Recycle-pc", available at: <http://www.recycle-pc.co.uk/> (accessed 26 September 2014).
- Reed, J. (2014), "Dramatic expansion for York free wi-fi scheme", *The Yorkshire Post*, available at: <http://www.yorkshirepost.co.uk/news/main-topics/politics/dramatic-expansion-for-york-free-wi-fi-scheme-1-6560960> (accessed 7 July 2014).
- Reisenwitz, T., Iyer, R., Kuhlmeier, D.B. and Eastman, J.K. (2007), "The elderly's internet usage: an updated look", *Journal of Consumer Marketing*, Vol. 24 No. 7, pp. 406–418.
- Roberts, S. (2009), *The fictions, facts and future of older people and technology*, London: International Longevity Centre-UK.
- Robertson-Lang, L., Major, S. and Hemming, H. (2011), "An exploration of search patterns and credibility issues among older adults seeing online health information", *Canadian Journal on Ageing*, Vol. 30 No. 4, pp. 631–645.
- Robson, C. (2011), *Real World Research*, John Wiley and Sons, Ltd., Chichester, West Sussex, 3rd ed.
- Royal Voluntary Service. (2014), "Site search results", available at: <http://www.royalvoluntaryservice.org.uk/site-search-results> (accessed 25 August 2014).

- Russell, D., Peplau, L.A. and Cutrona, C.E. (1980), "The revised UCLA loneliness scale: Concurrent and discriminate validity evidence", *Journal of Personality and Social Psychology*, Vol. 39, pp. 472–480.
- Sadri, F. (2011), "Ambient intelligence", *ACM Computing Surveys*, Vol. 43 No. 4, pp. 1–66.
- Sanders, C., Rogers, A., Bowen, R., Bower, P., Hirani, S., Cartwright, M., Fitzpatrick, R., et al. (2012), "Exploring barriers to participation and adoption of telehealth and telecare within the Whole Systems Demonstrator trial: a qualitative study", *BMC Health Services Research*, Vol. 12, pp. 220–231.
- Saunders, E.J. (2004), "Maximising computer use among the elderly in rural senior centers", *Educational Gerontology*, Vol. 30 No. 7, pp. 573–585.
- Sayago, S. and Blat, J. (2010), "Telling the story of older people e-mailing: an ethnographical study", *International Journal of Human-Computer Studies*, Elsevier, Vol. 68 No. 1-2, pp. 105–120.
- Scharf, T. (2009), "Too tight to mention: unequal income in older age", in Cann, P. and Dean, M. (Eds.), *Unequal ageing: The untold story of exclusion in old age*, The Policy Press, Bristol, pp. 25–52.
- Scharf, T., Phillipson, C., Smith, A.E. and Kingston, P. (2002), *Growing Older in Social Deprived Areas: Social Exclusion in later life*, London, available at: [http://vmserver14.nuigalway.ie/xmlui/bitstream/handle/10379/3196/Growing_Older_in_Socially_Deprived_Areas_\(2002\).pdf?sequence=1](http://vmserver14.nuigalway.ie/xmlui/bitstream/handle/10379/3196/Growing_Older_in_Socially_Deprived_Areas_(2002).pdf?sequence=1).
- Schmeida, M. and McNeal, R. (2007), "The telehealth divide: disparities in searching public health information online", *Journal of Health Care for the Poor and Underserved*, Vol. 18 No. 3, pp. 637–647.
- Seale, C., Ziebland, S. and Charteris-Black, J. (2006), "Gender, cancer experience and internet use: A comparative keyword analysis of interviews and online cancer support groups", *Social Science & Medicine*, Vol. 62, pp. 2577–2590.
- Selwyn, N. (2004), "The information aged: a qualitative study of older adults' use of information and communications technology", *Journal of Aging Studies*, Vol. 18 No. 4, pp. 369–384.
- Selwyn, N., Gorard, S., Furlong, J. and Madden, L. (2003), "Older adults' use of information and communications technology in everyday life", *Ageing and Society*, Vol. 23 No. 5, pp. 561–582.
- Sethi, R., Azzi, D. and Khusainov, R. (2011), "Trends and issues in community telecare in the United Kingdom", *2nd IET Conference on Assisted Living*, London, available at: http://eprints.port.ac.uk/8338/1/Sethi_et_al_Trends_and_Issues_IET.pdf.
- Sheaves, B., Jones, R.B., Williamson, G.R. and Chauhan, R. (2011), "Phase 1 pilot study of e-mail support for people with long term conditions using the Internet", *BMC: Medical Informatics and Decision Making*, Vol. 11 No. April, p. 20.

- Simsik, D., Galajdova, A., Andrasova, M., Novak, M., Siman, D., Bujnak, J. and Krajnak, S. (2011), "MonAMI Project: D22.1 Living scale field trial in Slovakia", European Commission, Brussels, available at: www.monami.info/.
- Sinclair, D. (2010), *Technology and care*, London: International Longevity Centre-UK.
- Singh, H., Fox, S.H., Petersen, N.J., Shethia, A. and Street, R.L. (2009), "Older patients' enthusiasm to use electronic mail to communicate with their physicians: cross-sectional survey", *Journal of Medical Internet Research*, Vol. 11 No. 2, p. e18.
- Sixsmith, A. and Sixsmith, J. (2008), "Ageing in place in the United Kingdom", *Ageing International*, Vol. 32 No. 3, pp. 219–235.
- Slegers, K., van Boxtel, M.P.J. and Jolles, J. (2008), "Effects of computer training and Internet usage on the well-being and quality of life of older adults: a randomized, controlled study.", *The journals of gerontology. Series B, Psychological sciences and social sciences*, Vol. 63 No. 3, pp. P176–84.
- Slevin, J. (2000), *The Internet and Society*, Polity Press, Cambridge.
- Social Care Institute for Excellence. (2014), "About the (SCIE)", available at: <http://www.scie.org.uk/about/index.asp> (accessed 25 August 2014).
- Sourbati, M. (2011), "The digital switchover as an information society initiative: the role of public policy in promoting access to digital ICTs", *Telematics and Informatics*, Vol. 28 No. 4, pp. 295–302.
- Srivastava, A. and Thomson, S.B. (2009), "Framework Analysis: A qualitative methodology for applied policy research", *Journal of Administration and Governance*, Vol. 4 No. 2, pp. 72–78.
- Statistics, O. for N. (2012), "Internet access: households and individuals, 2012 part 2", available at: <http://www.ons.gov.uk/ons/rel/rdit2/internet-access---households-and-individuals/2012-part-2/index.html>.
- Stellefson, M., Chaney, B. and Chaney, D. (2008), "The digital divide in health education: myth or reality?", *American Journal of Health Education*, Vol. 39 No. 2, pp. 106–112.
- Steventon, A., Bardsley, M. and Billings, J. (2012), "Effect of telehealth on use of secondary care and mortality: findings from the Whole System Demonstrator cluster randomised trial", *British Medical Journal*, Vol. 3874 No. June, pp. 1–15.
- Steventon, A., Bardsley, M., Billings, J., Dixon, J., Doll, H., Beynon, M., Hirani, S., et al. (2013), "Effect of telecare on use of health and social care services: findings from the Whole Systems Demonstrator cluster randomised trial.", *Age and ageing*, Vol. 42 No. 4, pp. 501–8.
- Stroud, D. (2011), "Connecting with older consumers", *Market Leader*, Vol. Quarter 1, pp. 42–46.
- Stroud, D. (2012), "The digitally excluded consumer: options for marketers", *Journal of Direct, Data and Digital Marketing Practice*, Vol. 14 No. 1, pp. 5–17.

- Such, M.J., Barbera, R., Poveda, R., Belda-Lois, J.-M., Gomez, A., Lopez, A., Cort, J.M., et al. (2006), "The use of emotional design techniques in user oriented design of interfaces within a smart house environment: case study", *Technology and Disability*, Vol. 18 No. 4, pp. 201–206.
- Sum, S., Mathews, M., Hughes, I. and Campbell, A. (2008), "Internet use and loneliness in older adults", *Cyberpsychology Behavior and Social Networking*, Vol. 11 No. 2, pp. 208–211.
- Sus-IT project. (2011), "Sus-IT: A New Dynamics of Ageing Project", available at: <http://sus-it.lboro.ac.uk/> (accessed 18 September 2014).
- Tabachnick, B.G. and Fidell, L.S. (2001), *Using multivariate statistics*, HarperCollins, New York, New York, 4th Ed.
- Tak, S.H., Benefield, L.E. and Mahoney, D.F. (2010), "Technology for long-term care", *Research in Gerontological Nursing*, Vol. 3 No. 1, pp. 61–72.
- Takahashi, Y., Ohura, T., Ishizaki, T., Okamoto, S., Miki, K., Naito, M., Akamatsu, R., et al. (2011), "Internet use for health-related information via personal computers and cell phones in Japan: a cross-sectional population-based survey.", *Journal of medical Internet research*, *Journal of Medical Internet Research*, Vol. 13 No. 4, p. e110.
- Talbot, H. (2006), *The provision of public internet access points by community centres*, Series No.8, Newcastle-upon-Tyne: Centre for Rural Economy, University of Newcastle-upon-Tyne.
- Taylor, K. (2012), *Primary care: Working differently telecare and telehealth – a game changer for health and social care contents*, London.
- Technology Services Association. (2013), "Telecare and telehealth", available at: <http://www.telecare.org.uk/consumer-services/telecare-and-telehealth> (accessed 10 September 2014).
- Technology Strategy Board. (2008), "Information and communication technology: key technology area 2008-2011", The Technology Strategy Board, Swindon.
- Telecare Services Association. (2013a), "Whole System Demonstrator Project", available at: <http://www.telecare.org.uk/industry/whole-system-demonstrator-project> (accessed 9 July 2014).
- Telecare Services Association. (2013b), "What is telecare?", available at: <http://www.telecare.org.uk/consumer-services/what-is-telecare> (accessed 30 July 2014).
- Telecare Services Association. (2013c), "What is telehealth?", available at: <http://www.telecare.org.uk/consumer-services/what-is-telehealth> (accessed 30 July 2014).
- Telecare Services Association. (2013d), "What is mCare?", available at: <http://www.telecare.org.uk/consumer-services/what-is-mcare> (accessed 9 July 2014).
- Tennant, R., Hiller, L., Fishwick, R., Platt, S., Joseph, S., Weich, S., Parkins, J., et al. (2007), "The Warwick-Edinburgh Mental Well-Being Scale (WEMWBS): development and UK validation", *Health and Quality of Life Outcomes*, Vol. 19, pp. 5–63.

- The Rt Hon Norman Lamb. (2014), "Care Bill becomes Care Act 2014", *Department of Health*, available at: <https://www.gov.uk/government/speeches/care-bill-becomes-care-act-2014> (accessed 25 September 2014).
- The WHOQOL Group. (1998), "The World Health Organization Quality of Life Assessment (WHOQOL): development and general psychometric properties.", *Social science & medicine (1982)*, Vol. 46 No. 12, pp. 1569–85.
- Timmers, P. (2008), "EU e-inclusion policy in context", *info*, Vol. 10 No. 5, pp. 12–19.
- Tinder Foundation. (2014), "No Title", available at: <http://www.tinderfoundation.org/> (accessed 26 September 2014).
- Tinetti, M., Richman, D. and Powell, L. (1990), "Falls efficacy as a measure of fear of falling", *Gerontology*, Vol. 19, pp. 239–245.
- Townsend, P. (1981), "The structured dependency of the elderly: A creation of social policy in the Twentieth Century", *Ageing and Society*, Vol. 1 No. 1, pp. 5–28.
- Tsai, H., Tsai, Y., Wang, H., Chang, Y. and Hua, H. (2010), "Videoconference program enhances social support, loneliness, and depressive status of elderly nursing home residents", *Ageing and Mental Health*, Vol. 14 No. 8, pp. 947–954.
- Tse, M.M.Y., Choi, K.C.Y. and Leung, R.S.W. (2008), "E-health for older people: the use of technology in health promotion", *Cyberpsychology Behavior and Social Networking*, Vol. 11 No. 4, pp. 475–479.
- Tunstall. (2014a), "Tunstall", available at: <http://www.tunstall.co.uk/> (accessed 26 September 2014).
- Tunstall. (2014b), "Telehealth peripherals", available at: <http://www.tunstall.co.uk/solutions/telehealth-peripherals> (accessed 7 July 2014).
- Tunstall. (2014c), "Monitoring", available at: <http://www.tunstall.co.uk/what-we-do/monitoring> (accessed 6 September 2014).
- Turgeon-Londei, S., Rousseau, J., Ducharmel, F., St-Arnaud, A., Meunier, J., Saint-Arnaud, J. and Giroux, F. (2009), "An intelligent videomonitoring system for fall detection at home: perceptions of elderly people", *Journal of Telemedicine and Telecare*, Vol. 15 No. 8, pp. 383–390.
- Tyze Personal Networks. (2013), "TyzeTM: Connecting Care", available at: <http://tyze.co.uk/> (accessed 18 July 2014).
- UK Online Centres. (2014a), "UK Online Centres: Home", available at: <http://ukonlinecentres.com/about-us/who-we-work-with> (accessed 14 July 2014).
- UK Online Centres. (2014b), "Who we work with", available at: <http://ukonlinecentres.com/about-us/who-we-work-with> (accessed 14 July 2014).
- UK Online Centres. (2014c), "Training and development", available at: <http://www.ukonlinecentres.com/training> (accessed 21 July 2014).

- UK Online Centres. (2014d), "Older people specialist network", available at: <http://www.ukonlinecentres.com/about-us/our-network/older-people-specialist-network> (accessed 11 September 2014).
- United Nations. (2012), "World Population Prospects: the 2012 revision", available at: <http://esa.un.org/wpp/Excel-Data/population.htm>.
- Verdegem, P. and Verhoest, P. (2008), "The 'relative utility' approach for stimulating ICT acceptance: profiling the non-user", *European Journal of ePractice*, Vol. 3, pp. 36–46.
- Vergara-Rojas, S. and Gagnon, M.-P. (2008), "A systematic review of the key indicators for assessing telehomecare cost-effectiveness", *Telemedicine and e-Health*, Vol. 14 No. 9, pp. 878–904.
- Vicente, M.R. and Lopez, A.J. (2011), "Assessing the regional digital divide across the European Union-27", *Telecommunications Policy*, Vol. 35 No. 3, pp. 220–237.
- Vodafone Limited. (2014), "Want to chat?", available at: <http://www.vodafone.co.uk/shop/index.htm?cid=ps-car-auto/h/lzy/uvtoqto//dvynfvvtq/lznty/oqzcs> (accessed 26 September 2014).
- Wadhwa, K. (2011), "BRAID: D1.3 Technology & Market Baseline & Trends", European Commission, Brussels.
- Wagner, F., Basran, J. and Dal Bello-Haas, V. (2012), "A review of monitoring technology for use with older adults", *Journal of Geriatric Physical Therapy*, Vol. 35 No. 1, pp. 28–34.
- Wagner, N., Hassanein, K. and Head, M. (2010), "Computer use by older adults: A multi-disciplinary review", *Computers in Human Behavior*, Vol. 26, pp. 870–882.
- Walker, A. (2009), "Why is ageing so unequal?", in Cann, P. and Dean, M. (Eds.), *Unequal ageing: The untold story of exclusion in old age*, The Policy Press, Bristol, pp. 141–158.
- Walsh, K. and Callan, A. (2011), "Perceptions, preferences and acceptance of information and communication technologies in older-adult community care settings in Ireland: a care-study and ranked-care program analysis", *Ageing International*, Vol. 36 No. 1, pp. 102–122.
- Ware, J.E., Kosinski, M., Turner-Bowker, D.M. and Gandek, B. (2002), "User's manual for the SF-12v2 health survey with a supplement documenting SF-12 health survey", Quality Metric Incorporated, Lincoln, RI.
- Warschauer, M. (2004), *Technology and Social Inclusion: Rethinking the Digital Divide*, The Massachusetts Institute of Technology Press, Cambridge, Massachusetts.
- Watters, S., Knapp, M., Damant, J., King, D. and Ellis, M. (2011), "MonAMI project: D34.3v2 Living scale field trial evaluation", European Commission, Brussels.
- Weaver, C.K., Zorn, T. and Richardson, M. (2010), "Goods not wanted", *Information, communication & society*, Vol. 13 No. 5, pp. 696–721.
- White, J. and Weatherall, A. (2000), "A grounded theory analysis of older adults and information technology", *Educational Gerontology*, Vol. 26, pp. 371–386.

- Williams, V., McCrindle, R. and Victor, C. (2010), "Older people's perceptions of assistive technology: an exploratory pan-European study", *Journal of Integrated Care*, Vol. 18 No. 1, pp. 38–44.
- Wong, A.M.K., Chang, W.-H., Ke, P.-C., Huang, C.-K., Tsai, T.-H., Chang, H.-T., Shieh, W.-Y., et al. (2012), "Technology acceptance for an Intelligent Comprehensive Interactive Care (ICIC) System for Care of the elderly: a survey- questionnaire study", *PLoS One*, Vol. 7 No. 8, p. e40591.
- Wong, G., Greenhalgh, T., Westhorp, G., Buckingham, J. and Pawson, R. (2013), "RAMESES publication standards: meta-narrative reviews", *BMC Medicine*, Vol. 11, p. 20.
- Wong, Y.C., Law, C.K., Fung, J.Y.C. and Lam, J.C.Y. (2009), "Perpetuating old exclusions and producing new ones: digital exclusion in an information society", *Journal of Technology in Human Services*, Vol. 27, pp. 57–78.
- Woodward, A.T., Freddolino, P.P., Blaschke-Thompson, C.M., Wishart, D.J., Bakk, L., Kobayashi, R. and Caitlin, T. (2011), "Technology and aging project: training outcomes and efficacy from a randomized field trial", *Ageing International*, Vol. 36 No. 1, pp. 46–65.
- Woollaston, V. (2013), "Samsung becomes the world's largest smartphone maker as Apple's market share hits a three-year low", *Mail Online*, available at: <http://www.dailymail.co.uk/sciencetech/article-2378789/Samsung-worlds-largest-smartphone-maker-Apples-market-share-hits-year-low.html> (accessed 26 September 2014).
- World Health Organisation. (2014), "Health statistics and information systems", available at: <http://www.who.int/healthinfo/survey/ageingdefnolder/en/> (accessed 4 August 2014).
- Wright, D. and Wadhwa, K. (2010), "Mainstreaming the e-excluded in Europe: strategies, good practices and some ethical issues", *Ethics and Information Technology*, Vol. 12, pp. 139–156.
- Xie, B. (2003), "Older adults, computers, and the internet: future directions", *Gerontechnology*, Vol. 2 No. 4, pp. 289–305.
- Xie, B. (2011), "Effects of an eHealth literacy intervention for older adults", *Journal of Medical Internet Research*, Vol. 13 No. 4, p. e90.
- Yao, K.P. (2005), *Development and instruction of the WHOQOL-BREF Taiwanese version interview version*, World Health Organisation Life Quality Questionnaire Taiwan Version Questionnaire Development Group, Taipei, Taiwan, 2nd Ed.
- Yesavage, J.A., Brink, T.L., Rose, T.L., Lum, O., Huang, V. and Adey, M. (1982), "Development and validation of a geriatric depression screening scale: a preliminary report", *Journal of Psychiatric Research*, Vol. 17 No. 1, pp. 37–49.
- Zimet, G.D., Dahlem, N.W., Zimet, S.G. and Farley, G.K. (1988), "The multidimensional scale of perceived social support", *Journal of Personality Assessment*, Vol. 52 No. 1, pp. 30–41.
- Zweijssen, S.A., Niemeijer, A.R. and Hertogh, C.M.P.. (2011), "Ethics of using assistive technology in the care for community-dwelling elderly people: An overview of the literature", *Ageing and Mental Health*, Vol. 15 No. 4, pp. 419–427.

Appendix A: MonAMI questionnaires

1. Baseline questionnaire: Service users



Date of interview: / /
dd mm yyyy

Centre number:

User ID:

Assessment stage: *(tick one)* Baseline 6-month follow-up

How is this form being completed?

Directly by the user

-OR-

Filled in by proxy (carer, spouse, etc) on behalf of the user

If the form is filled in by proxy:

Are answers exactly what the user tells the proxy to write?

-OR-

Are answers what the proxy assumes of the user?
 (e.g. user is unable to answer for themselves)

Age on day of

interview _____ years

Gender Female.....

Male.....

Marital Status Married.....

Separated.....

Divorced.....

Single.....

Cohabiting.....

Widowed.....

Not known.....

Do you have a disability connected with (including arthritis and rheumatism):

Please tick [v] all which apply to you

- | | |
|--|--------------------------|
| Arms..... | <input type="checkbox"/> |
| Wrists..... | <input type="checkbox"/> |
| Hands..... | <input type="checkbox"/> |
| Legs..... | <input type="checkbox"/> |
| Hips..... | <input type="checkbox"/> |
| Knees..... | <input type="checkbox"/> |
| Neck..... | <input type="checkbox"/> |
| Back..... | <input type="checkbox"/> |
| Difficulty in seeing (other than needing glasses to read
normal sized print)..... | <input type="checkbox"/> |
| Difficulty in hearing..... | <input type="checkbox"/> |
| Difficulty with remembering things..... | <input type="checkbox"/> |

Who do you live with at the moment?

- | | |
|--|--------------------------|
| I live alone | <input type="checkbox"/> |
| I live with my spouse/partner only | <input type="checkbox"/> |
| I live with my spouse/partner and children | <input type="checkbox"/> |
| I live with my children, without a spouse/partner | <input type="checkbox"/> |
| I live with my parents | <input type="checkbox"/> |
| I live with other relatives | <input type="checkbox"/> |
| I live with others who are not my relatives | <input type="checkbox"/> |
| Total number of adults I live with (excluding myself) | _____ |
| Total number of children (under the age of 18) I live with | _____ |

What type of accommodation do you live in?

1. Domestic/family house or flat Yes No → go to question 3

2. If yes, is the house or flat:

Owner occupied

Rented privately

Rented from local authority

3. Residential/sheltered housing

(non-hospital) Yes No → go to question 5

4. If yes, is the residence or sheltered housing:

Staffed 24 hours

Partially Staffed (not-24 hours)

Un-staffed at all times

5. Long-term hospital

accommodation Yes No → go to question 7

6. If yes, please write type:

7. Other, please write:

Have you used any of the following services in the last 3 months?			
	Yes	No	
Visited your primary care doctor?	<input type="checkbox"/>	<input type="checkbox"/>	If yes, how often? _____
Visited your district nurse?	<input type="checkbox"/>	<input type="checkbox"/>	If yes, how often? _____
Hospital as inpatient?	<input type="checkbox"/>	<input type="checkbox"/>	If yes, how many days in total? _____
Hospital as outpatient?	<input type="checkbox"/>	<input type="checkbox"/>	If yes, how often? _____
Hospital Emergency unit/department?	<input type="checkbox"/>	<input type="checkbox"/>	If yes, how often? _____
Mental health services?	<input type="checkbox"/>	<input type="checkbox"/>	If yes, how often? _____
Psychologist/Psychiatrist?	<input type="checkbox"/>	<input type="checkbox"/>	If yes, how often? _____
Social worker?	<input type="checkbox"/>	<input type="checkbox"/>	If yes, how often? _____
Home care?	<input type="checkbox"/>	<input type="checkbox"/>	If yes, how often? _____
Community nurse?	<input type="checkbox"/>	<input type="checkbox"/>	If yes, how often? _____
Adult day centre?	<input type="checkbox"/>	<input type="checkbox"/>	If yes, how often? _____
Occupational Therapist?	<input type="checkbox"/>	<input type="checkbox"/>	If yes, how often? _____
Physical therapist?	<input type="checkbox"/>	<input type="checkbox"/>	If yes, how often? _____
Self-help group?	<input type="checkbox"/>	<input type="checkbox"/>	If yes, how often? _____
Telephone help-line?	<input type="checkbox"/>	<input type="checkbox"/>	If yes, how often? _____
*Telecare service? (e.g. fall alarm- not MonAMI)	<input type="checkbox"/>	<input type="checkbox"/>	If yes, how long have you had it? _____
*Telehealth service?	<input type="checkbox"/>	<input type="checkbox"/>	If yes, how long have you had it? _____
Have you used any health or social services which are not listed above? If so, please tell us which services and how often you use them: <hr/> <hr/>			

*Interviewers: please provide further examples and explanations of these types of services if necessary

By placing a tick [✓] in one box in each group below, please indicate which statements best describe your own health state today.

Mobility

I have no problems in walking about

I have some problems in walking about

I am confined to bed

Self-Care

I have no problems with self-care

I have some problems washing and dressing myself

I am unable to wash or dress myself

Usual Activities (e.g. work, study, housework, family or leisure activities)

I have no problems with performing my usual activities

I have some problems with performing my usual activities

I am unable to perform my usual activities

Pain/discomfort

I have no pain or discomfort

I have moderate pain or discomfort

I have extreme pain or discomfort

Anxiety/depression

I am not anxious or depressed

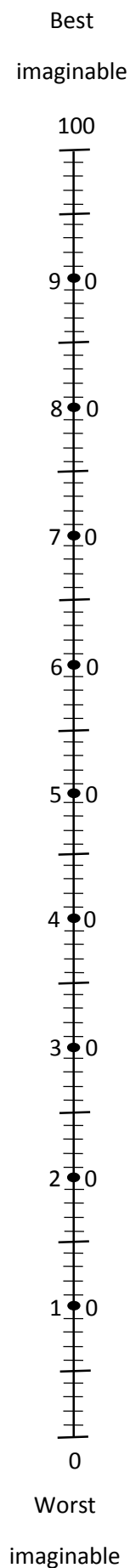
I am moderately anxious or depressed

I am extremely anxious or depressed

To help people say how good or bad a health state is, we have drawn a scale (rather like a thermometer) on which the best state you can imagine is marked 100 and the worst state you can imagine is marked 0.

We would like you to indicate on this scale how good or bad your own health is today, in your opinion. Please do this by drawing a line from the box below to whichever point on the scale indicates how good or bad your health state is today.

**Your own
health state
today**



By placing a tick [✓] in one box in each group below, please indicate which statements best describe your own ability today.

Ability to use a telephone

I operate the telephone on my own initiative: looks up and dials number, etc <input type="checkbox"/>	I Dial a few well-known numbers <input type="checkbox"/>	I answer the telephone but I do not dial <input type="checkbox"/>	I do not use telephone at all <input type="checkbox"/>
--	---	--	---

Shopping

I take care of all shopping needs independently <input type="checkbox"/>	I shop independently for small purchases <input type="checkbox"/>	I needs to be accompanied on any shopping trip <input type="checkbox"/>	I am completely unable to shop <input type="checkbox"/>
---	--	--	--

Food preparation

I plan, prepare and serve adequate meals independently <input type="checkbox"/>	I prepare adequate meals if supplied with the ingredients <input type="checkbox"/>	I heat, serve and prepare meals, but I do not maintain an adequate diet <input type="checkbox"/>	I need to have meals prepared and served <input type="checkbox"/>
--	---	---	--

Housekeeping

I maintain the house alone or with occasional assistance <input type="checkbox"/>	I perform light daily tasks such as dish washing, bed making <input type="checkbox"/>	I perform light daily tasks but cannot maintain acceptable level of cleanliness <input type="checkbox"/>	I need help with all home maintenance tasks <input type="checkbox"/>	I do not participate in any housekeeping tasks <input type="checkbox"/>
--	--	---	---	--

Laundry

I do personal laundry completely <input type="checkbox"/>	I launder small items- rinse stocking, etc <input type="checkbox"/>	All laundry must be done by others <input type="checkbox"/>
--	--	--

Mode of transportation

I travel independently on public transportation or I drive my own car <input type="checkbox"/>	I arrange my own travel via taxi, but I do not otherwise use public transportation <input type="checkbox"/>	I travel on public transportation when accompanied by another <input type="checkbox"/>	My travel is limited to taxi or automobile with assistance of another <input type="checkbox"/>	I do not travel at all <input type="checkbox"/>
---	--	---	---	--

Responsibility for own medications

I am responsible for taking medication in correct dosages at the correct times <input type="checkbox"/>	I take responsibility if medication is prepared in advance in separate dosage <input type="checkbox"/>	I am not capable of dispensing my own medication <input type="checkbox"/>
--	---	--

Ability to handle finances

I manage financial matters independently (budget, write checks, pay rent, bills, go to bank) <input type="checkbox"/>	I manage day-t0-day purchases, but I need help with banking, major purchases, etc. <input type="checkbox"/>	I am incapable of handling money <input type="checkbox"/>
--	--	--

Below are some statements about feelings and thoughts.

Please tick the box that best describes (✓) your experience of each over the last 2 weeks.

STATEMENTS	Never	Rarely	Some of the time	Often	All of the time
I've been feeling optimistic about the future					
I've been feeling useful					
I've been feeling relaxed					
I've been feeling interested in other people					
I've had energy to spare					
I've been dealing with problems well					
I've been thinking clearly					
I've been feeling good about myself					
I've been feeling close to other people					
I've been feeling confident					
I've been able to make up my own mind about things					
I've been feeling loved					
I've been interested in new things					
I've been feeling cheerful					

In the past three months:																															
1. Have you fallen, slipped or tripped?	<input type="checkbox"/> Yes → Go to question 2 <input type="checkbox"/> No → Go to question 7																														
2. How often did you fall, slip or trip in the past 3 months?	_____ times																														
3. When you fell, slipped or tripped were you able to call for help?	<input type="checkbox"/> Yes <input type="checkbox"/> Sometimes <input type="checkbox"/> No																														
4. How often did you injure yourself from falling, slipping or tripping (including bruising, headaches, etc)?	_____ times																														
5. Did you ever need to see a doctor (at home, in a clinic, or in a hospital) after you fell, slipped or tripped?	<input type="checkbox"/> Yes → Go to question 6 <input type="checkbox"/> No → Go to question 7																														
6. How many times did you need to see a doctor after a fall, slip or trip?	_____ times																														
7. On a scale from 1 to 10 (see guide below),																															
<table border="1" style="width: 100%; text-align: center;"> <tr> <td colspan="2">Not at all</td> <td colspan="4">Moderately</td> <td colspan="4">Extremely</td> </tr> <tr> <td colspan="2">Confident</td> <td colspan="4">confident</td> <td colspan="4">confident</td> </tr> <tr> <td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td> </tr> </table>		Not at all		Moderately				Extremely				Confident		confident				confident				1	2	3	4	5	6	7	8	9	10
Not at all		Moderately				Extremely																									
Confident		confident				confident																									
1	2	3	4	5	6	7	8	9	10																						
How confident do you feel about doing the following activities without falling or hurting yourself?																															
Please write a number from 1 to 10, which reflects your confidence level																															
a. Walking around your home	_____																														
b. Answering the door or the telephone	_____																														
c. Reaching into cabinets and closets	_____																														
d. Preparing meals	_____																														
8. On a scale from 1 to 10 (see guide below),																															
<table border="1" style="width: 100%; text-align: center;"> <tr> <td colspan="2">Not at all</td> <td colspan="4">Moderately</td> <td colspan="4">Extremely</td> </tr> <tr> <td colspan="2">Confident</td> <td colspan="4">confident</td> <td colspan="4">confident</td> </tr> <tr> <td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td> </tr> </table>		Not at all		Moderately				Extremely				Confident		confident				confident				1	2	3	4	5	6	7	8	9	10
Not at all		Moderately				Extremely																									
Confident		confident				confident																									
1	2	3	4	5	6	7	8	9	10																						

How confident do you feel about the following things when you leave your home?

Please write a number from 1 to 10, which reflects your confidence level

a. Knowing that the doors and windows are properly shut

b. Knowing that strangers cannot enter my home while you are gone

c. Knowing that the items in my home are safe

9. On a scale from 1 to 10 (see guide below),

Not at all Confident					Moderately confident					Extremely confident
1	2	3	4	5	6	7	8	9	10	

How confident do you feel about remembering to do the following activities?

Please write a number from 1 to 10, which reflects your confidence level

a. Closing your door when you leave the house

b. Closing your windows when you leave the house

c. Turning off appliances (e.g. oven, iron, coffee machine, etc) when you finish using them

d. Taking your medication

e. Your social engagements

f. Your medical appointments

1. We would like to understand what previous experience you have with using a computer.

Please answer all the questions by placing a tick [✓] in the boxes which apply to you.

	Yes	No
a. Do you have a computer in your home?	<input type="checkbox"/> → go to c	<input type="checkbox"/>
b. <u>If you do not</u> have a computer in your home, would you like to have one?	<input type="checkbox"/>	<input type="checkbox"/>
c. Have you ever learned to use a computer?	<input type="checkbox"/>	<input type="checkbox"/>
d. Can you use a computer without help?	<input type="checkbox"/>	<input type="checkbox"/>
e. When you use the computer, are there things you are not comfortable with?	<input type="checkbox"/>	<input type="checkbox"/> → go to 2
f. If there are things which are difficult for you, can you please explain:		
g. If you <u>do not</u> use a computer, what stops you?		

What experience do you have with using other information and communication technologies?

Please answer all the questions by placing a tick [✓] in the boxes which apply to you.

2. Television

	Yes	No
a. Do you have a television in your home?	<input type="checkbox"/>	<input type="checkbox"/>
b. Can you use a television without help?	<input type="checkbox"/>	<input type="checkbox"/>
c. If you don't have a television in your home, would you like one?	<input type="checkbox"/>	<input type="checkbox"/>

3. Mobile telephone

	Yes	No
a. Do you own a mobile telephone?	<input type="checkbox"/>	<input type="checkbox"/>
b. Can you use a mobile telephone without help?	<input type="checkbox"/>	<input type="checkbox"/>

c. If you do not own a mobile telephone, would you like to have one?	<input type="checkbox"/>	<input type="checkbox"/>	
4. Internet	Yes	No	I don't know
a. Do you have the Internet in your home?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Can you use the Internet without help?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. If you do not have the Internet in your home, would you like to have it?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. If there are things, which are difficult for you about the internet, can you please explain?			
e. If you <u>do not</u> use the internet, what stops you?			
5. Email	Yes	No	I don't know
a. Do you have Email in your home?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Can you use Email without help?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. If you don't have Email in your home, would you like to have it?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Skype	Yes	No	I don't know
a. Do you have Skype in your home?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Can you use Skype without help?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. If you don't have Skype in your home, would you like to have it?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Voice-to-Text or Text-to-Speech	Yes	No	I don't know
a. Do you have computer speech recognition in your home?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Can you use computer speech recognition without help?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. If you do not have computer speech recognition, would you like to have it?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Personal Digital Assistant (PDA)	Yes	No	I don't know
a. Do you own a PDA?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Can you use a PDA without help?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. If you do not own a PDA, would you like to have one?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How interested are you in acquiring and using new technologies?			
(e.g. the latest computer equipment, mobile phones, personal digital assistants, MP3 players)			

Please tick [√] in the column which best describes how you feel?			
Not at all interested	Mildly interested	Quite interested	Extremely interested
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank you for taking the time to answer the questions.

2. Configuration and personalisation template

To use at configuration interview (interviewer + technician)

It is recommended that this interview is done within one week of installation.

User ID:		Configuration and personalisation	
Service	User desires service	Parameter	Notes on changes to make to default setting
AMiSURE	Tick (✓) if user wants service enabled		
AppSURE	<input type="checkbox"/>	Language	
		Service status	
		Plogg device	
		Power threshold	
		Time threshold	
		Cut power consumption	
		Description	
ConnectSURE	<input type="checkbox"/>	None	
DoorSURE	<input type="checkbox"/>	ID	
		Alert message	
		Help message	
		Start/end date	
		Start/end time	
		Status	
		Time delay	
GasSURE	<input type="checkbox"/>	Enable	
		Alarm type	
		Language	
LightSURE	<input type="checkbox"/>	Language	
		High light threshold	
		Low light threshold	
		Time period	
		StopInstall	
		AddDevice	

		Devicelist
		Erasealldevices
		Irregular Communication period
		Battery level
SmokeSURE	<input type="checkbox"/>	Alarm type
		CareIP
		Language
		Enable
TempSURE	<input type="checkbox"/>	Language
		1 st high temperature period
		2 nd high temperature period
		High temperature threshold
		1 st low temperature period
		2 nd low temperature period
		Low temperature threshold
		StopInstall
		AddDevice
		Devicelist
		Erasealldevices
		Irregular Communication period
		Battery level
WindowSURE	<input type="checkbox"/>	ID
		Alert message
		Help message
		Start/end date
		Start/end time
		Status
		Time delay
SureZONE	<input type="checkbox"/>	Location (Room)
		Weekday
		Time start
		Time End

Surveillance type	
AMiCASA	
Door	<input type="checkbox"/> Room
Light	
Window	
AMiCASA Auto	<input type="checkbox"/> Light threshold
AMiCASA Auto Scene management	<input type="checkbox"/> Devices registered as OSGi4AMI
AMiPAL	
WeatherPAL	<input type="checkbox"/> No Configuration
MedPAL ⁺	<input type="checkbox"/> Date
TimePAL ⁺	<input type="checkbox"/> Time
	Subject
	Repetition
	Confirmation
	Phone
	Email
	Image
AMiVUE No configuration	
DoorVue	<input type="checkbox"/>
LightVue	<input type="checkbox"/>
WindowVue	<input type="checkbox"/>
PresenceVue	<input type="checkbox"/>
HumiVue	<input type="checkbox"/>
TempVue	<input type="checkbox"/>
PanVue	<input type="checkbox"/>
AMiPLAY No configuration	
Social games	<input type="checkbox"/>
Therapeutic games	<input type="checkbox"/>
Kinetic remote	<input type="checkbox"/>
Games on IP-	<input type="checkbox"/>

TV
Other mainstream PC UIs <input type="checkbox"/>

3. Midterm questionnaires

Mid term services acceptability check-up	
User ID: <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	-or- Carer ID: <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
Date: <input type="text"/> <input type="text"/> / <input type="text"/> <input type="text"/> / <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> (dd/mm/yyyy)	
Interviewers: Please fill in one template PER MonAMI service, which is installed and enabled in a user's home. Also, it is important to hear informal carers' perspectives on the services, please fill in separate templates for each beneficiary AND informal carer. For example, if there are 5 services which are enabled at the time of the interview, please complete this template 5 times for beneficiaries and 5 times for informal carers.	
Service name:	Notes
[AMiXXX]	
1. Are you happy with AMiXXX?	
2. What do you like about AMiXXX?	
3. What do you dislike about AMiXXX?	
4. Are there any changes you want to make to AMiXXX?	Note to interviewers: you may need to give an example of what needs to be changed to inform users of what is possible. For example, ask if the timing of the light level is too high/too low. Use the log of service use for each client to guide you on the services, which might need some attention.
5. Are there any other comments you would like to make about the service?	
* Please inform users that some changes won't be possible as they consist more of more complex reworking than a change in configuration. Also, even if the changes are not possible, it is still important to record what users want changed.	

Mid-term UI acceptability check-up

User ID:

-or-

Carer ID:

Date: / / (dd/mm/yyyy)

Interviewers: Please fill in one template PER MonAMI UI which is installed and enabled in a user's home. Also, it is important to hear informal carers' perspectives on the services, please fill in separate templates for each beneficiary AND informal carer. For example, if users are employing both the Asus touch screen AND a mobile phone, please complete this template 2 times for the beneficiary and 2 times for the informal carer.

User **Interviewers: please indicate which UI is used at this time**

Interface

Notes

1. Are you happy with the touch screen (and/or mobile phone)?

2. What do you like about the touch screen (and/or mobile phone)?

3. What do you dislike about the touch screen (and/or mobile phone)?

4. Are there any other comments you would like to make about the touch screen (and/or mobile phone)?

* Please inform users that, unlike the services, changes to the UI may not necessarily be possible. Also, even if the changes are not possible, it is still important to record what users want changed.

User Interface Usability Form

Interviewers: Please observe and make note of users' experience with the User Interface of each of the topics (in grey). If the users need prompting, below each topic are some sample questions the interviewers could ask to obtain users' views. There are no obligations or restrictions to specific questions, interviewers are to use their discretion to determine when the each topic has been answered to the best of users' ability.

While the first interviewer is conversing with the user, the second interview make notes of the following:

- How easily or difficult the task is for the users?
- Any comments the user makes while using it
(e.g. "when I touch this button, nothing happens"; or "this is so simple, all I have to do is this [describe]!")
- Any gestures which suggest that the service is difficult to use
(e.g. does the user appear confused as to what button to press next?)

User ID: **(or) Carer ID:**

Interface used:

MonAMI UI (old one)	Qi	TUIKE interface	iPhone interface	Other
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Layout of controls

Positioning of icons, buttons and keys: any adjustments needed?

Strength needed to use them: can they keep their balance while using the controls?

Are the controls visible?

Size/Style of font

Size and style of lettering on screen

Need to make any adjustments to default setting?

Colour

Can you tell the different colours apart?

Symbols/drawings

Are the icons visible?

Are they distinguishable?

Is it easy to understand what they mean?

Lighting/glare

Quality of the screen

Conditions under which they can read the screen

User Interface Usability Form

Language

Clarity of instructions: do they make sense? Do the users understand what the instructions are?

Is it in the right language?

Slow pace

Pace of instructions.

Does the screen change too quickly after a command?

Distinctive form

How easy is it to identify the different icons, buttons or keys by their shape (visual or touch)?

Does the user make errors because of mistaking one button (icon or key) for another?

Surface Temperature

Is the touch screen (or mobile phone) a comfortable temperature to touch? Too cold? Too hot? When it has been on for __ time?

Logical Process

Does the order of the instructions make sense to the user or are they confused by them?

Surface Finish

Does the user like the way the touch screen (or mobile phone) feels?

Acoustics

Is there background noise when the service is running?

Loudness of Pitch (if applicable)

Are the auditory instructions loud enough? Too loud?

Recovery route from error

Do you understand what the error message means?

When an error occurs, do you understand what to do?

How easy is it to return to the main menu to resume what you were doing before the error occurred?

4. Post-trial questionnaires

USERS											
<p>Interviewers: <i>These questions relate to all of the MonAMI services.</i></p> <p><i>The questions below relate to the evaluation criteria (functionality, independence, health and well-being, social networking, safety/security, acceptability/usefulness and e-inclusion).</i></p> <p><i>We are initially asking the users to rate their experience on a (quantitative) scale. Subsequently, you are encouraged to allow the users to discuss their experience with the specific services around each of these topics. Please take notes on the discussion, particularly highlighting anything that is said with regards to the evaluation criteria. For example, it would be important to take note of a user saying something similar to "Now that I have the DoorSURE service, I don't feel anxious about answering my door! (criteria: safety and security)".</i></p>											
FUNCTIONALITY											
<p>1a) Do you understand how the MonAMI services are supposed to help you?</p> <table style="width: 100%; text-align: center;"> <tr> <td>Not at All</td> <td>Partly</td> <td>Mostly</td> <td>Completely</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>				Not at All	Partly	Mostly	Completely	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Not at All	Partly	Mostly	Completely								
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
<p>b) Are there any MonAMI services for which you do not understand their purpose or their function? Please explain.</p> <p>Interviewers: <i>Ask about the <u>specific</u> MonAMI services and allow the users to elaborate on their understanding of how these services help them.</i></p>											
INDEPENDENCE											
<p>2. Do you feel that with the services have increased your ability to complete day-to-day tasks yourself, without the help of others?</p> <p><i>These tasks may include:</i></p> <ul style="list-style-type: none"> - household maintenance (e.g. cleaning, laundry) - personal care activities - meal preparation <p><i>** (These activities may be influenced if the user feels more at ease performing them knowing that they have ZoneSURE, for example, in case an accident occurs)</i></p>											
<p>Overall, how do you feel the services have influenced your ability to carry out day-to-day tasks independently?</p> <table style="width: 100%; text-align: center;"> <tr> <td>Not at All</td> <td>Slightly</td> <td>Moderately</td> <td>Very Much</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>				Not at All	Slightly	Moderately	Very Much	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Not at All	Slightly	Moderately	Very Much								
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								

f) Do you have any other comments about how the MonAMI services affect your activities of daily living?

Interviewers: Please take notes on any comments users' make around each of these dimensions.

HEALTH and WELL-BEING

Interviewers: Please encourage users to explain more about how the MonAMI services affect their health. For example, users may express that TimePAL was very useful for their memory. Door control may be very useful for their pain management, as they can open/close their door without getting out of their chair.

3. How have the MonAMI services helped you with the following aspects of your health and well-being?

	Very Unhelpful	Only Slightly Helpful	Moderately Helpful	Very Helpful	Not Applicable
a) Managing your pain <i>e.g. using LightControl or DoorVue instead of needing to stand up</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Anxiety <i>e.g. related to performing certain tasks around the house, or, general safety in the home</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Feeling energetic <i>e.g. confidence in abilities to perform day-to-day tasks</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Feeling optimistic about the future	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

e) Do you have any other comments about the MonAMI services in relation to your health, overall well-being or happiness?

Interviewers: Please take notes on comments users make about how the MonAMI services affect their health, well-being or happiness.

SOCIAL NETWORKING

Interviewers: Please encourage users to make about how the individual MonAMI services affected their social networking. For example, users may say that the alarm services are very unhelpful because now their daughter/son don't visit as often. Or the social games are very helpful because they can play games with their friends.

4. How have the MonAMI services helped you with the following aspects of your social life?

	Very Unhelpful	Only Slightly Helpful	Moderately Helpful	Very	Not Applicable

				Helpful	
a) Speaking to people <i>e.g. changes in number of interactions</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Leaving your home to meet people <i>e.g. less worried about leaving windows/doors open or appliances on.</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Receiving visitors into your home <i>e.g. influence of DoorVue</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Reducing feelings of loneliness <i>e.g. going out more (due to confidence in leaving home) or inviting more people to their own home</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Do you have any other comments about the MonAMI services in relation to your social life? Interviewers: Please take notes on the comments users make about how the individual MonAMI services affected their social networking.					
SAFETY/SECURITY					
Interviewers: Please encourage users to make additional comments how the MonAMI services affect their perception of personal and home security and safety. For example, users may comment that the WindowSURE service gives them more confidence to leave their home because they know that an alert will go off if the windows have been left open.					
5. How have the MonAMI services helped you with your personal and home security?					
	Very Unhelpful	Only Slightly Helpful	Moderately Helpful	Very Helpful	Not Applicable
a) Confidence around falling or injuring yourself in your home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Confidence around keeping intruders from entering your home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Confidence around your belongings being safe while you are out of your home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

d) Confidence that your privacy is kept intact	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p>e) Do you have any other comments about the MonAMI services in relation to your personal and home security?</p> <p>Interviewers: Please take note of any additional comments users make on the topic of security and safety, particularly when they refer to any specific MonAMI services.</p>					
ACCEPTABILITY/USEFULNESS					
6a) Overall, how useful do you find the MonAMI services to your daily life?					
Very Unhelpful	Only Slightly Helpful	Moderately Helpful	Very Helpful		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
b) Please explain what services you found the most useful and why.					
<p>Interviewers: For example, encourage users to speak about the <u>specific</u> services they liked the best, or the features they appreciated the most.</p>					
c) Please explain what services you found the least useful and why.					
<p>Interviewers: For example, encourage users to speak about the <u>specific</u> services they liked the least, or the features they found the least helpful (or unhelpful).</p>					
d) What would you change about the MonAMI services? Is there another type of service you would like to have?					
<p>Interviewers: Encourage users to speak about the features of the services they would change if they could to make their lives easier.</p>					
e) i. Would you recommend the MonAMI services to others (e.g. friends or relatives)?					
ii. Who do you think would be an ideal candidate for the MonAMI services?					
<p>Interviewers: Encourage users to speak about the characteristics of someone who would benefit significantly from obtaining the services, e.g. a particular age or health condition.</p>					
E-INCLUSION					
7. Now that you have used the MonAMI services in your day-to-day living, have your feelings towards technology changed?					
Not At All	Only Slightly	Moderately	Very Much		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

8. Has being part of the MonAMI study increased your comfort or ability in operating a mobile phone?

Not at All

Slightly

Moderately

Very Much

e) Would you prefer a different technology, such as a computer monitor, instead of the mobile interface?

Appendix B: Series one interviews with technical experts

Part of the *MonAMI* project, funded by the European Commission FP6 framework.

Ethical approval to conduct the interviews with experts from the London School of Economics and Political Science Research Committee on April 22, 2010.

1. Series one interviews: expert interviewee information sheet

(April 2010- September 2011)

E-Inclusion of older people in England

It is expected that there are enormous benefits to the quality of life of older people who are on the right side of the proverbial digital divide. Several sources cite not only the advantage, but rather the looming necessity of e-inclusion for older people to maintain their independence, social networks (Eastman, 2004), and civic voice (Selwyn, 2003). Despite the rhetoric, however, many older people remain apprehensive about- and unfamiliar with- ICT (Hill et al, 2008; Richardson et al, 2005).

With the emergence of telecare and telehealth services in the UK, there is formal recognition that ICT is potentially useful in delivering cost-effective services which are *relevant* to many older people. National and local government bodies regularly acknowledge the challenges ahead as a result of an ageing population, the shrinking pool of workers and the financial costs of delivering ever more sophisticated health and social care services. For care managers and budget holders, the discovery of the power and relevance of ICT for delivering care is seen as a potential answer to workforce shortages and spiralling costs. However the ICT solution in health and social care highlights the issue of e-inclusion of older people, which is complex.

As ICT touches every facet of daily life, it is difficult to identify who - at an institutional level - should take responsibility. Telehealth and telecare are cases in point. While the strategic responsibility for implementing these services fall to the Department of Health (DH), their development and deployment is nurtured between the Departments for Business, Innovation and Skills (DBIS) and Culture, Media and Sport (DCMS), and their regulation under the independent organisation, Ofcom. Moreover, lead governmental responsibility for the welfare of older people is held by the Department of Work and Pensions (DWP). The e-inclusion agenda risks being lost between government departments.

Given the intricacy and magnitude of the impact of participating in a "Digital Britain" on the lives of older people, there are surprisingly few age-specific, evidence-based reports which provide practical, technical solutions for how to improve their quality of life. Moreover, given the political and commercial interest around telehealth and telecare, the discourse in the literature around the acceptability of these services by older people remains primarily exploratory (Koch and Hägglund, 2009).

My thesis aims to investigate whether e-inclusion influences the quality of life of older people and whether ICT care services promote their well-being. Some basic questions need to be asked to order to disentangle the complexity that is the e-inclusion of older people. For instance, what is the level of e-inclusion of older people in England? What ambient health and social care services are delivered using ICT solutions? Some further questions I am attempting to answer include:

What barriers currently stop older people from being e-included?

- What needs to be put in place in order to facilitate the e-inclusion of older people?
- Are there ICT services available in England today, designed to meet older people's needs?
- What facilitates the commissioning, distribution, delivery and uptake of these services in different localities?
- What prevents the widespread use of ICT care services?

While ICT in health and social care is still in a nascent phase in England, it is important to map out how the commissioning, delivery and demand for these services is taking shape given current levels of need, funding and skills. This work will also identify the barriers in the current social and political landscape which prevent older people taking up ICT.

Part of my thesis will be to quantify e-inclusion of older people, using general population data. The other portion of my research involves getting a better understanding of the place of ICT in health and social care service delivery. To this end, I will interview key policy and commercial experts and practitioners to discover what should and could be done at local and national policy and practice levels to ensure that older people have the opportunity to lead fuller, productive and more satisfying lives within the information age.

References

Eastman, J. and Iyer, Rajesh (2004). The elderly's uses and attitudes towards the Internet. *Journal of Consumer Marketing*, 21(3), 208-220.

Hill, R.; Beynon-Davies, P. and Williams, M.D. (2008). Older people and internet engagement: Acknowledging social moderators of internet adoption, access and use. *Information, Technology and People*, 21(3), 244-266.

Richardson, M., Weaver, CK and Zorn, TE. (2005). Getting' on: older New Zealander's perceptions of computing. *New Media and Society*, 7(2), 219-245.

Selwyn, N. (2003). ICT for All and their regulation Access and Use of Public ICT sites in the UK. *Information, Communication and Society*, 6(3), 350-375.

Commission of the European Communities (2007). *Ageing Well in the Information Society: An i2010 Initiative*. Action Plan on Information and Communication Technologies and Ageing.

Koch, S and Hägglund, M. (2009). Health Informatics and the delivery of care to older people. *Maturitas*, 63, 195-199.

2. Series one interviews: expert interviewee consent form

(April 2010- September 2011)



E-Inclusion of older people

Part of the Mainstreaming of Ambient Intelligence Project (MonAMI)

Title of Research: E-inclusion of older people

Name of Researcher: Jacqueline Damant

CONSENT FORM

Please *initial* boxes

1. I confirm that I have read and understood the information sheet, dated May 13th 2010, for the MonAMI project and have had the opportunity to ask questions.
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my employment or legal rights being affected.
3. I understand that the information given will be treated in confidence and anonymised and that no information that could lead to my identification will be disclosed in any reports on the project, or to any other party.
4. I agree that the researchers can use any words I may say (verbatim) during the interview in the presentation of the research, understanding that they will preserve my anonymity as stated above.
5. I have read and understood the arrangements for storage and handling of information given as described in the information sheet.
6. I agree to take part in the above study.

Name (Please print)

Date

Signature

Name of Person taking consent (in the case that interviewee cannot give written consent)	Date	Signature

3. Series one interviews: topic guide

(April 2010- September 2011)

1. BROAD QUESTIONS

- What is the extent of e-inclusion of older people in England?

Motivation:

- Are older people motivated to be e-included (to use ICT)?
- If not, how do they become motivated to use ICT?
- Are there ICT services available in England today, designed to meet older people's needs? If so, what are they?

Systemic barriers: e-inclusion

- What barriers currently stop older people from being e-included?
 - a. Prompting questions?
 - b. Connectivity?
 - c. Content?
 - d. Capability?
 - e. Confidence?
 - f. Continuity?
- at needs to be put in place in order to facilitate the e-inclusion of older people?
- What government policies do you believe will facilitate the distribution and provision of ICT for older people?

ICT-based care

- What ICT services are currently being used for health and social care in England?
- What facilitates the commissioning, distribution, delivery and uptake of these services in different localities?
- What prevents the widespread use of ICT care services?
- What services are provided in your LA? Telecare? Telehealth?
- Given then Telehealth and Telecare are becoming more widespread, in your opinion, do you think that the current level of older people's ICT skills, knowledge and capabilities is enough to allow them to use it?

2. SOME SPECIFIC QUESTIONS FOR EXPERTS DEPENDENDING ON SECTOR

For social care service commissioners:

E-inclusion

- What is the approximate size of the older population in your local authority
- Can you describe the older population of this LA with respect to age, household composition, housing tenure
- Does the local older adult population have access to mainstream ICT (e.g. broadband, mobile)
- Do they access local e-government services?

ICT-based care

- Can you tell me about the ICT-based care services that older people use in your LA?
- Can you tell me about the level of acceptance of the ICT-based care by older service users?
- Can you tell me about any problems older people have had with using the services?
- Has anyone refused the services?
- In your opinion, what prevents the widespread use of these services in your community?
- What do you think would help motivate people to use ICT-based care?
- In your opinion, what is needed for ICT-based care services to become commonplace in your community (e.g. policy, financing)?

For non-commissioning experts:

- Can you describe the market for ICT-based care in terms of (based on Porter's Five Forces):
 - Level of competition
 - Demand
 - Supply
 - Cohesion between market players (e.g. technology developers and service users)
 - Government incentives to develop services for older people?
 - Substitute products and services
- What is the future for ICT-based care?

Appendix C: Series two interviews

Part of the *E-inclusion of older people and access to the "ICT-care sector" by older people in England* project, funded by the NIHR School for Social Care Research. Interviews were held between June 2012 and February 2013.

The project received official ethics approval from the (national) Social Care Research Ethics Committee on June 13, 2012.

1. Information sheets

1.1. Information sheet: One to one interviews with older adults

Information about the research project:

E-Inclusion and access to the 'ICT-care sector' for older people in England

June 15, 2012

I would like to invite you to take part in an interview, lasting about 45 minutes, for a research project on older people and technology. Before you decide whether or not you would like to participate, we would like to explain why we are doing this research and what it involves for you. Before the interview, I will go through the following information with you and answer any questions you might have.

Many people in today's society rely on modern 'digital' technologies (such as mobile telephones, Internet, email, etc.) in their everyday lives. However it is a common belief that many older people do not use these technologies and that they are at risk of not being able to obtain information which is important for daily life, have regular contact with friends and family, or access certain care services (for example, telecare).

I am doing this research in order to understand how much older people use (or don't use) modern-day technology and how this impacts on their daily lives. I would also like to know whether older people can access and use care services such as telecare. I have invited you for an interview because as an older person living in England, you can help answer some of these questions. Also, the ideas and topics you raise can help me as I search for more information in journals, newspapers and government reports.

During the interview, I will ask questions about different technologies and services and I would like to hear about your thoughts, views and experiences. In order to capture everything we discuss, I would like to record the interview using an audio digital recorder.

If you decide to have the interview, we will first choose somewhere to meet which is most convenient for you. If you like, the interview can take place in your home. If you prefer to meet elsewhere, you will be reimbursed for any reasonable travel expenses that you incur for attending the interview.

This research is being conducted in accordance with the *Data Protection Act*, which ensures:

1. Your participation is completely voluntary and you may withdraw your participation at any time throughout the study. If you choose to withdraw, any data you provide up to that point will not be used and will be destroyed. If you wish to withdraw, please contact Jacqueline Damant.
2. Everything you say will remain confidential unless you us something that indicates that you or someone else is at risk of harm. We will discuss this with you before telling anyone else.
3. We will keep any electronic data collected in a password-protected file. Paper copies of the data will be stored in a locked cabinet. Both electronic and hard copies of the data will be kept until January 1st, 2015. Only the researchers funded by this research project will have access to these files.
4. In the case where a quote is used from your interview, a pseudonym will be given so that quotations cannot be linked to you.

Kind regards,

Jacqueline Damant

E-Inclusion and access to the 'ICT-care sector' for older people in England

Information about the project

June 15, 2012

We would like to invite you to take part in a group discussion for our research project on Friday 15 June, 2012 at the London School of Economics and Political Science. Before you decide whether or not you would like to participate, we would like to explain why we are doing this research and what it involves for you. Before we begin the group discussion, we will go through the following information with you and answer any questions you might have.

Many people in today's society rely on modern 'digital' technologies (such as mobile telephones, Internet, email, etc.) in their everyday lives. However it is a common belief that many older people do not use these technologies and that they are at risk of not being able to obtain information which is important for daily life, have regular contact with friends and family, or access certain care services (such as telecare for instance).

We are doing this research in order to understand how much older people use (or don't use) modern-day technology and how this impacts on their daily lives. We would also like to know whether older people can access and use care services such as telecare. We have invited you to the focus group as your knowledge of social care services can help us answer some of these questions. Also, the ideas and topics you raise will help us in our related search through journals, newspapers and government reports.

During the group discussion, we will ask questions around the use of different technologies and services and we would like to hear your thoughts, views and experiences on this subject. In order to capture everything that is discussed in the group, we will record the discussion using an audio digital recorder. We expect the discussion will last approximately 2 hours.

Before the group discussion begins, we will provide a lunch. We will also reimburse you for any reasonable travel expenses.

This research is being conducted in accordance with the *Data Protection Act*, which ensures:

1. Your participation is completely voluntary and you may withdraw your participation at any time throughout the study. If you choose to withdraw, any data you provide up to that point will not be used and will be destroyed. If you wish to withdraw, please contact Jacqueline Damant.
2. Everything you say will remain confidential, unless you tell us something that indicates that you or someone else is at risk of harm. We would discuss this with you before telling anyone else.
3. We will keep any electronic data collected in a password-protected file. Paper copies of the data will be stored in a locked cabinet. Both electronic and hard copies of the data will be kept until January 1st, 2015. Only the researchers funded by this research project will have access to these files.
4. In the case where a citation is used from your interview, a pseudonym will be given so that quotations cannot be linked to you.

Kind regards,

Jacqueline Damant

1.3. Information sheet: technical experts

E-Inclusion and access to the 'ICT-care sector' for older people in England

Information sheet

June 15, 2012

As an expert in the fields of e-inclusion and/or the long-term care of older people, we invite you to take part in an interview for the above research project which is funded by the School for Social Care Research.

With the increasing reliance in Britain on information and communication technologies (ICT) such as mobile telephones and the Internet, there is some concern that some older people are at risk of being excluded from acquiring important information for their daily lives, from maintaining their social relationships and accessing certain social care services (e.g. telecare). This scoping study aims to identify the issues around the "e-inclusion" of older people in England, how it affects their quality of life and the implications this has for stakeholders in the social care sector.

In an interview lasting between 45 minutes and one hour, we will discuss issues around:

- Older people's access to and- engagement with- ICT and ICT-based care services
- Barriers/facilitators to the e-Inclusion of older people
- Issues around the commissioning and delivery of ICT-based care services
- Policy development around e-inclusion and ICT in long term care

In order to capture our discussion, which will serve to guide the accompanying literature search, the interview will be recorded using an audio digital recorder and transcribed verbatim.

The location of the interview will be agreed upon by yourself and the interviewer. The interview can be held at the London School of Economics and Political Science or at a location more convenient for you. Please note that you will be reimbursed for any reasonable travel expenses incurred from attending the interview.

This research is being conducted in accordance with the *Data Protection Act*, which ensures:

1. Your participation is completely voluntary and you may withdraw your participation at any time throughout the study. If you choose to withdraw, any data you provide up to that point will be destroyed.
2. Everything you say will remain confidential unless you indicate that you or someone else is at risk of harm. We would discuss this with you before notifying anyone else.
3. We will keep any electronic data in in password-protected files on a University computer. Paper copies of the transcribed data will be stored in a locked cabinet. Both electronic and hard copies of the data will be kept until January 1st, 2015. Only the researchers funded by this research project will have access to your interview data.
4. In the case where a citation is used from your interview, a pseudonym will be given so that quotations cannot be linked to you.

Kind regards,

Jacqueline Damant

2. Series two interviews: informed consent forms (all participants)

E-inclusion of older people

Full title of research: E-Inclusion and access to the 'ICT-care sector' for older people in England

Name of researcher: Jacqueline Damant

CONSENT FORM (Your copy)

Please *initial* boxes

- | | Yes | No |
|--|--------------------------|--------------------------|
| 1. I confirm that I have read and understood the information sheet, dated 13 September 2012, version 2.0, for the above study and have had the opportunity to ask questions. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my care or legal rights being affected | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. I understand that if I withdraw from the study, the data that I provide up to that point will be destroyed. | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. I understand that the information given will be treated in confidence and anonymised and that no information that could lead to my identification will be disclosed in any reports on the project, or to any other party. I also understand that should I indicate that I or someone else is at risk of harm, the researcher reserves the right to break confidentiality should this be deemed necessary. I understand that should this situation arise, the researcher will discuss it with me before notifying anyone else. | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. I agree that the researchers can use any words I may say during the interview in the presentation of the research, understanding that they will preserve my anonymity as stated above. | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. I have read and understood the arrangements for storage and handling of information given as described in the information sheet. | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. I agree to the interview being audio recorded so that my comments can be typed up and used as research data. | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. I agree to take part in the above study. | <input type="checkbox"/> | <input type="checkbox"/> |

Name (Please print)

Date

Signature

Name of Person taking consent

Date

Signature

3. Series two interviews: topic guides

3.1. Topic guide: Individual interviews

Broad interview topics

Note: The interview questions will be guided by previously identified frameworks of e-Inclusion (e.g. 6Cs) and quality of life (WHOQOL). Below is a description of the interview structure and the topics which will be discussed. The wording of the questions will be amended according to the individual participants.

1. Aims and objectives of research

- Introduction of researcher (Jacqueline Damant)
- Give a brief description of the research questions and the project.
- Give a brief explanation of how the interview will be run (e.g. duration, topics)

2. Introductions of interview participants

I am now going to ask a few personal questions. You do not have to answer these questions if you do not want to. Any of your personal details (name or address) will only be seen by me and my boss. I will **not look** for any other information about you from any other source including any health or social care organisations.

The personal information you give me will not be passed on to anyone or any other organisation. Also, any information which can be linked to you directly (name or address) will **never** be published in any report or article or any public document.

- Can you please give me your first name and family name?
- Can you please tell me how old you are today?
- Would you say that you have any health problems? If yes, can you explain them to me?
- Can you please tell me whether you use any care services? If yes, which ones?

3. e-Inclusion of older people

- To what extent do you use modern technologies?
 - a. What ICT do you use? (e.g. mobiles, Internet, Skype, etc.)
 - b. What do you use ICT for?
 - c. How often do you use it?
- How does using these technologies affect different aspects of your life? (Prompting questions):
 - a. ADL independence
 - b. Health
 - c. Psychological well-being
 - d. Social networking
 - e. Physical environment
 - f. Other?
- How does not using these technologies affect these same aspects of your life?

- In your opinion, how important is it that people are able to use modern technologies?
- What prevents you from using ICT? (*Prompting questions*):
 - a. Costs?
 - b. Connectivity?
 - c. Accessibility?
 - d. Skills?
 - e. Confidence?
 - f. Supportive infrastructure?
- What motivates you to use ICT?
- What would you need in order to use technology? (e.g. Policy? Funding? Training and education? Support?)

4. ICT-care services

- Have you ever heard of telecare? Telehealth?
 - a. If no one has heard of them: describe these services.
 - b. Do you use these services?
 - c. What other technologies do you use for your care needs?
- Do these services sound interesting to you?
 - a. If you needed this type of care, would you consider using modern technologies for your care?
 - b. Yes? No? Explain.
- If you had to pay for these services, would you still want to have them?

5. Recommendations

- Do you have any questions or comments about what we discussed today? (Take note of topics raised as items to look for in literature search)
- Have you read any books or articles, or seen a television programme or film which is related to the issues we discussed today?

6. Concluding remarks

Briefly go over major points discussed.

3.2. Topic guide: Focus group

Broad focus group topics

Note: The interview questions will be guided by previously identified frameworks of e-Inclusion (e.g. 6Cs) and quality of life (WHOQOL). Below is a description of the interview structure and the topics which will be discussed. The wording of the questions will be amended according to the group participants.

1. Aims and objectives of research

- Introduction of group facilitator, researcher (Jacqueline Damant)
- Give a brief description of the research questions and the project.
- Give a brief explanation of how the group will be run.

2. Introductions of SUCAG members

Although SUCAG members know each other, there may be new people on the day. Allow everyone to introduce themselves and to explain how they became a member of SUCAG.

3. e-Inclusion of older people

- To what extent do you use modern technologies?
 - a. What ICT do you use? (e.g. mobiles, Internet, Skype, etc.)
 - b. What do you use ICT for?
 - c. How often do you use it?
- How does using these technologies affect different aspects of your life? (Prompting questions):
 - a. ADL independence
 - b. Health
 - c. Psychological well-being
 - d. Social networking
 - e. Physical environment
 - f. **IADL**: Shopping, banking (finances), keeping environment safe
 - g. Other?
- How does not using these technologies affect these same aspects of your life?
- In your opinion, how important is it that people are able to use modern technologies?
- What motivates you to use ICT?
- What prevents you from using ICT? (*Prompting questions*):
 - a. Costs?
 - b. Connectivity?
 - c. Accessibility?
 - d. Skills?
 - e. Confidence?
 - f. Supportive infrastructure?
- What would you need in order to use technology? (e.g. Policy? Funding? Training and education? Support?)

4. ICT-care services

- Have you ever heard of telecare? Telehealth?
 - a. If no one has heard of them: describe these services.
 - b. Do you use these services?
 - c. What other technologies do you use for your care needs?

- Do these services sound interesting to you?
 - a. If you needed this type of care, would you consider using modern technologies for your care?
 - b. Yes? No? Explain.

- If you had to pay for these services, would you still want to have them?

5. Recommendations

- Do you have any questions or comments about what we discussed today? (Take note of topics raised as items to look for in literature search)

- Has anyone read any books or articles, or seen a television programme or film which is related to the issues we discussed today?

6. Concluding remarks

Briefly go over major points discussed.

3.3. Topic guide: technical experts

Broad expert interview topics

Note: Not all questions will necessarily be discussed with each expert. Some experts will have more expertise in certain topics and therefore each interview will be tailored accordingly.

1. Aims and objectives of research

Give a brief description of the research questions and the project.

2. Definitions

Give a brief overview of the meaning and context of some of the common terms.

- a. *e-Inclusion*: describing the 6Cs framework
- b. Information communication technologies (ICT): what is included in current definition?
- c. *ICT-care services*: telecare, telehealth
- d. *Older people*: people over the age of 65 years.

3. Introduction of expert

After referring to their biography, ask expert to describe their experience in these topic (e.g. describe relevant research projects).

4. e-Inclusion of older people

- In your opinion, how important is the issue of the e-Inclusion of older people?
- How did you come to your conclusion?
- What is the extent of e-inclusion of older people in England?
 - a. How much do older people use ICT?
 - b. The term "older people" refers to a very large group. Which older people use (or don't use) ICT?
 - c. What ICT do older people use? (e.g. mobiles, Internet, Skype, etc.)
 - d. What do they use ICT for?
- How does e-inclusion affect different aspects of their quality of life:
 - a. ADL independence
 - b. Health
 - c. Psychological well-being
 - d. Social networking
 - e. Physical environment
 - f. Other?
- What prevents them from using ICT?
 - a. Costs?
 - b. Connectivity?
 - c. Accessibility?
 - d. Skills?
 - e. Confidence?
 - f. Supportive infrastructure?
- What motivates older people to use ICT?

- What needs to be put in place in order to facilitate the e-inclusion of older people? (e.g. Policy? Funding? Training and education? Support?)

5. ICT-care services

- What ICT services available in England today, designed to meet older people's needs?
 - a. Mainstream devices and services
 - b. Long-term care devices and services
- What affects the demand of ICT care services amongst older people?
 - a. Raising awareness
 - b. Training for improving confidence
- What affects the supply of ICT care services?
 - a. Issues of design of more accessible devices
- What facilitates the commissioning, distribution, delivery of these services in England?
- Given that telehealth and telecare are becoming more widespread, in your opinion, do you think that older people's current level of e-inclusion is enough to for them to access and use it?

6. Recommendations

- Can you recommend any literature, reports or projects that would be relevant for this review?
- (Dependent on time left in project) Can you recommend anyone who might want to speak to me about these topics?

7. Concluding remarks

Briefly go over major points discussed.