KEEPING UP WITH TECHNOLOGIES: REVISITING THE MEANING AND ROLE OF INTERNET ACCESS IN DIGITAL INCLUSION

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ABSTRACT

The ways people go online have been transformed by the emergence of new mobile Internet technologies. As modes of Internet access are becoming increasingly diverse, this thesis sets out to examine how various forms of access shape engagement with online resources. Inequalities in Internet access have been neglected in the "second-level digital divide" research, which has focused on differences in skills and usage. Thus, I argue that inequalities of access have to be revisited and their role in digital inclusion reassessed.

To study individuals' arrangements of Internet-enabled devices and locations holistically and as a dynamic entity, access is conceptualised as infrastructure. Theoretically, I distinguish between material dimensions of access and social practices shaping access, and draw on existing models of digital inclusion to examine the role of these dimensions and practices in online engagement. Empirically, a mixed methods research design is employed, complementing longitudinal analyses of survey data representative of the British population with 29 qualitative interviews with British Internet users.

This study contributes to our understanding of material and social dimensions of access and their impact on Internet use patterns. First, the conceptualisation of Internet access as infrastructure is empirically validated. Second, quality, locality and ubiquity are established as material dimensions of access, where offline social and economic resources most strongly affect inclusion in high-quality, multi-local and ubiquitous Internet access. Third, three specific practices encompassing how users develop and maintain their access infrastructures are identified: spotlighting, distributing and being stranded. They reflect differences in roles Internet technologies play in individuals' daily lives as well as differences in availability of offline resources. Fourth, the results show that, controlling for a range of digital inclusion factors, the access inequalities have significant effects on a range of online engagement types, but are most strongly related to commercial and communication uses of the Internet.

In sum, this study provides a nuanced understanding of how different mechanisms underlie the development, maintenance and engagement with Internet access, depending on whether access arrangements are shaped by digital exclusion or choice. Specifically, by outlining critical differences among all-round, mobile-mostly, mobile-only and home-only Internet users, broader policy and research implications are also discussed.

Zastonj ste prejeli, zastonj dajajte.

Mt 10, 8

STARŠEMA

(to my parents)

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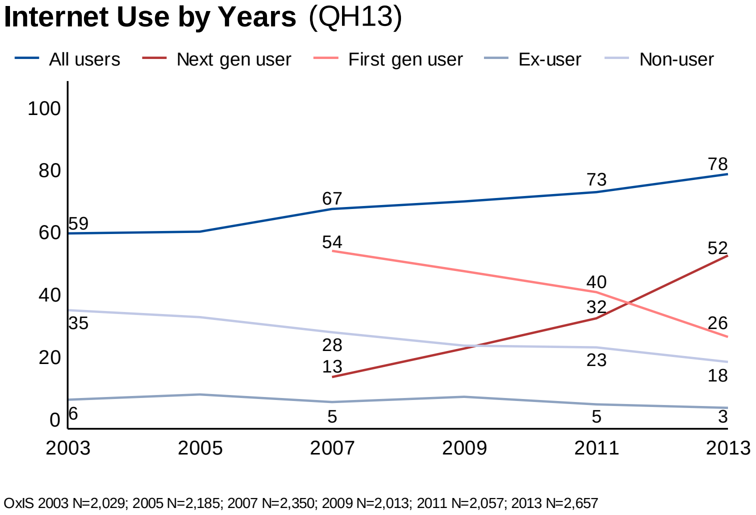
Chapter 1: Introduction

In less than a decade, the ways people go online have been considerably transformed. In a 10-year period from 2003 to 2013 the percentage of the population of Great Britain[1] using the Internet grew from 59% to 78%. In 2003, only 19% of wired British households had a broadband connection (Dutton, di Gennaro, & Hargrave, 2005), whereas in 2013 nearly all had broadband Internet connection (Dutton, Blank, & Groselj, 2013; Ofcom, 2014). Moreover, from 2007 to 2013 the proportion of people going online on their mobile phones *and* owning at least two other Internet-enabled devices, such as personal computers (PCs), tablets and e-readers (i.e. next generation users, see also Blank & Dutton, 2013) grew from 13% to 52%, whereas the proportion of non-mobile users dropped substantially from 54% to 26%. This shift in how people go online is illustrated in Figure 1.1.

Figure 1.1. Internet use in Great Britain (2003–2013)



Source: Dutton et al. (2013, p. 13)

[1] Oxford Internet Surveys (OxIS) are representative of the populations of Scotland, England and Wales, i.e. Great Britain. Throughout this thesis I use the terms Great Britain and Britain interchangeably.

Other sources of data on *how* British Internet users go online paint a similar picture. The UK communications regulator Ofcom (2015a) reports 86% of the population of the United Kingdom were Internet users in 2014 and that 67% of adults in the UK go online at home and elsewhere, compared to 17% going online at home only. In terms of use of devices, Ofcom shows that 81% of UK adults go online on a computer, 61% on a smartphone, 39% on a tablet and 14% on a games console. All these proportions increased substantially from 2009 to 2014 (Ofcom, 2015a, p. 56).

Taken together, these statistics provide strong evidence that the ways people access the Internet have changed profoundly. While Internet access was traditionally pictured as access at home on a desktop computer, nowadays Internet access takes many forms—people go online at home and elsewhere on various devices and in different contexts. This shift has been facilitated by higher connection speeds and falling costs; a wider range of Internet-enabled devices; a shifting geography of access; and the greater scope of services accessible online (Dutton, Gillett, McKnight, & Peltu, 2003; OECD, 2011; Sawyer, Allen, & Lee, 2003). Generally, this trend has been referred to as "the rise of the mobile Internet", facilitated by rapid adoption of mobile Internet-enabled technologies, such as smartphones, e-readers and tablets (Ofcom, 2012, p. 221, 2015a), and other new Internet technologies, such as smart TVs and wearable technologies.

Importantly, new Internet technologies may support different uses of online resources, reconfigure spatial and temporal dimensions of access, and encourage more personal and autonomous use. Therefore, the changing nature of Internet access and its implications for online engagement are at the heart of this research. As such, it is situated in the field of digital inclusion studies, focusing on how Internet users' disparate access to Internet technologies shape their opportunities for empowered and meaningful online engagement. It argues that in light of recent technological advancements, the role of Internet access in digital inclusion needs to be revisited. In the sections that follow I further discuss the central concepts of this research and conclude the chapter by outlining the aims and the structure of the thesis.

1.1 Why Access to Technologies Matters

Unprecedented changes in the adoption and use of information and communication technologies (ICTs) have led some scholars to talk about new social operating systems that are powered by technologies. For example, Castells (2010) developed a notion of a networked society where social structure is organised around networks powered by ICTs. Similarly, Rainie and Wellman (2012) argue that we live in an era of networked individualism. They attribute this development to a “triple revolution”—the social network, the Internet, and the mobile revolution—which arguably shifted people’s lives considerably. Rainie and Wellman (2012, p. 18) describe how networked individuals live in an environment where “the volume of information is growing; the velocity of news (personal and formal) is increasing; the places where people can encounter others and information are proliferating”, which results in new forms of participation in society.

If participation in society is in part conducted through use of ICTs, then it becomes important to study the gap between individuals who are advantaged and those who are relatively disadvantaged by Internet technologies (Rogers, 2001). The notion that unequal access to and engagement with ICTs may lead to unequal societal participation has been central to the research on digital inclusion (DiMaggio, Hargittai, Celeste, & Shafer, 2004; Selwyn & Facer, 2007; van Dijk, 2005). Mossberger and colleagues (2003) for example argue that *uses* of ICTs (p. 5; original emphasis) are what define Internet access as important public policy issue. Furthermore, they assert that “[c]omputers and the Internet are, among other things, tools for participation in the economy and the political arena”; therefore disparities in access as well as skills and use may have implications “for important normative issues such as equality of opportunity and democracy” (Mossberger et al., 2003, p. 5).

In a more recent review of the digital inclusion field, Robinson and colleagues (2015) argue that inequalities in how people access and use the Internet may have a broad range of implications for individuals’ life chances in domains spanning gender, race, class, health care, economic activity, politics and social capital. They outline substantive empirical evidence showing that “individuals’ digital engagements and digital capital play key roles in a range of outcomes, from academic performance to labour market success to entrepreneurship to health services uptake” (Robinson et al., 2015, p. 570). Thus, those who participate more fully in the digital realm are relatively advantaged as compared to individuals who cannot make an effective use of Internet technologies.

Taken together, the authors discussed above suggest that implications of lack of access to and engagement with technologies can be profound. However, there is a lack of evidence of how new Internet technologies contribute to the gap between those advantaged and those relatively disadvantaged by ICTs. Does access on multiple devices and locations enable fuller and more effective participation in the digital realm? Rainie and Wellman (2012) suggest that the relationship between access to ICTs and participation in society has been amplified with the rapid adoption of mobile Internet technologies. Thus, if individuals who do not have mobile Internet access cannot participate fully in the new social system or engage in capital-enhancing activities to the same extent that those with multifaceted access can, then new Internet technologies are potentially a source of emerging digital inequalities. Considering the unprecedented uptake of mobile Internet technologies, it is timely to study the role of anywhere, anytime Internet access in digital inclusion.

1.2 Digital Inclusion and Access Inequalities

Disparities in access to and use of ICTs have been at the centre of digital inclusion research. However, as the field became concerned with issues other than access impeding engagement with online resources, such as motivations and skills, the questions of inequalities in access were somewhat neglected. Thus, the most thorough insight into use of mobile Internet technologies comes from the field of mobile communication studies. This research, however, has not been well-connected with the study of digital inclusion.

Thus, this section argues that there is a gap in our understanding of how new technological developments shape digital inclusion. It first provides an overview of how the field of digital inclusion developed in order to explain the shift away from studying disparities in access. It then summarises how mobile Internet access may reconfigure engagement with online resources and discusses why mobile communication research offers limited understanding of the implications of mobile Internet access for digital inclusion. The section concludes by providing a preliminary definition of access and summarising challenges to studying access inequalities.

1.2.1 From the Digital Divide to Digital Inclusion

Since the 1990s, there has been a persistent concern about how unequal access to and use of ICTs may exacerbate existing inequalities between the "information rich" and "information poor" (Norris, 2001). These inequalities have been commonly referred to in the related research, policy discussions and agendas as the *digital divide* (Mossberger et al., 2003). The digital divide has been generally defined as "the gap between those who do and those who do not have access to computers and the Internet" (van Dijk, 2005, p. 1).

The early studies employed a dichotomous view of the digital divide and examined factors in the adoption of Internet technologies. They showed that physical access to the Internet was strongly related to socio-demographic factors such as age, income, education and gender (Bonfadelli, 2002; De Haan, 2003; Katz & Aspden, 1997; Ono & Zavodny, 2007; Rice, 2002; Wellman & Haythornthwaite, 2002). However, as Internet penetration increased, the binary distinction between haves and have-nots was recognised as unnecessarily limiting. Van Dijk (2005) pointed out four limitations of the binary view of digital divides: it suggested a simple division between two groups (haves and have-nots); it implied that the gap between them was unbridgeable; it conveyed the idea that the inequalities between the groups were absolute; and lastly, it gave a wrong impression that there was a single (i.e. physical) divide.

Some of the first scholars to move beyond the dichotomous approach introduced the term *digital inequality* as encompassing "not just differences in access, but also inequality *among* persons with formal access to the Internet" (DiMaggio & Hargittai, 2001, p. 1; original emphasis). DiMaggio and Hargittai proposed that more attention should be given to the "full range of *digital inequality* in equipment, autonomy, skill, support, and scope of use among people who are already on-line" (DiMaggio & Hargittai, 2001, p. 18; original emphasis). Other authors also argued that it was necessary to re-frame the issue of unequal access to ICTs in more nuanced ways. Mossberger and colleagues (2003) proposed a framework consisting of multiple divides, where disparities in access to computers and the Internet, as well as disparities in computer-related skills, resulted in disparities in economic opportunity and democratic participation. Similarly, Warschauer (2003) argued that focus on access to technologies alone was limiting, as it did not take into account other factors necessary for meaningful engagement with ICTs. He conceptualised these factors in terms of "resources" and highlighted the importance of physical, digital, human and social resources, involving access to physical artefacts, content, skills and social support. Warschauer's (2003, p. 46) assertion that "[a]ccess exists in gradations rather than in a bipolar opposition" is indeed one that has resonated with many scholars studying the use of ICTs and its implications. In this way, the field of digital divides has moved forward to discussing *gradations in digital inclusion* (Livingstone & Helsper, 2007). This concept speaks to the notion that access to computers and the Internet alone does not ensure equality of opportunity (Mossberger et al., 2003).

Current debates in the digital inclusion field suggest that a consensus has formed amongst scholars on the decreased importance of access in questions of inequality. Wei for example underlines that "the actual use of the Internet is a more prevalent source of inequality than the *plain access to the Internet*" (Wei, 2012, p. 304; emphasis added). Similarly, Hargittai (2011, p. 231) argues that even after people gain access to the Internet, "differences will remain in how they use the medium, namely, how skilled they are in it, how free they are to use it in different situations and toward what purposes they put it", which is where many researchers have shifted their attention. As indicated by Ragnedda and Muschert (2013, p. 2), "[t]oday the biggest concern is not always concerning access, but the divide among information 'haves' and 'have-nots', resulting from the ways in which people use the Internet".

Although research into the digital divide originated in concerns regarding unequal physical access to technologies, empirical investigations have somewhat neglected post-access inequalities in material access. Put differently, in studying what people do online, the questions of material access were moved to the background whereas other factors, such as online skills and attitudes, were brought to the fore.

1.2.2 New Internet Technologies

Many studies that focused on differences in how ICTs are used employ a very low threshold in determining who has and who does not have access to the Internet, but do not address how *inequalities in access* shape online engagement (e.g. Blank & Groselj, 2014, 2015; Livingstone & Helsper, 2007; van Deursen & Helsper, 2015; van Deursen, van Dijk, & ten Klooster, 2015; van Deursen & van Dijk, 2014b; White & Selwyn, 2013). Researchers tend to use the concept of Internet access to distinguish between Internet users and non-users and then focus on other factors related to online engagement. A reason for this may be historical. At the turn of the century, when research into digital inequalities started gaining prominence, the ways people connected to the Internet were not as diverse as they are today.

Personal Internet use was traditionally perceived as a largely static phenomenon confined to access on PCs at home or in public spaces such as at work and libraries. A static view of Internet access and use implies online engagement on devices and locations where users are not in motion. By contrast, mobile ICTs are commonly defined as “devices and services that supported mediated social connectivity while the user is in physical motion” (Campbell, 2013, p. 9). Importantly, new mobile Internet technologies are not necessarily used while on the go, but rather they make mobility of online engagement possible. For example, Ofcom defines a smartphone as “a phone on which you can easily access emails and download files as well as view websites and generally surf the Internet. Popular brands of Smartphone include BlackBerry, iPhone and HTC” (Ofcom, 2015a, p. 28). This definition of a smartphone is used in this research as well. Similarly, a tablet is understood as “a very thin, portable computer, usually battery-powered, having a touchscreen as the primary interface and input device”.[2] Both, smartphones and tables enable access to online resources in mobile situations.

Simplistic measures of access such as “Do you use the Internet, at least occasionally?” (Zickuhr, 2013, p. 17) or “Do you, yourself, personally use the Internet on whatever device at home, work, school, college or elsewhere?” (Dutton et al., 2013, p. 13) are likely to obscure complexities and nuances in the ways people go online. Thus, existing digital inclusion

[2] See http://dictionary.reference.com/browse/tablet, accessed 20 June 2015

research provides a lack of evidence of how new Internet technologies shape what people do online (notable recent exceptions: Lee, Park, & Hwang, 2015; Mossberger, Tolbert, & Hamilton, 2012; Pearce & Rice, 2013). By contrast, mobile communication studies provide considerable evidence of the distinct uses of mobile Internet-enabled devices. From the users' perspective, the most important factors are greater portability and convenience, which shape the location and times of access (Bouwman, Carlsson, Walden, & Molina-Castillo, 2009; Nielsen & Fjuk, 2010; Nylander, Lundquist, & Brännström, 2009; Taylor et al., 2008). For example, mobile users can access information "just in time" (Rainie & Fox, 2012; White, 2011), enhance ongoing conversations in social settings (Cui & Roto, 2008; Sohn, Li, Griswold, & Hollan, 2008), and use mobile Internet to kill time or make otherwise lost time useful (Taylor et al., 2008; Verkasalo, López-Nicolás, Molina-Castillo, & Bouwman, 2010).

This body of research presents many ideas regarding how new Internet technologies may shape Internet use, but its explanatory power is limited by two major weaknesses. First, most studies are qualitative and employ diary research or focus group interviews with active smartphone users. They are rich in describing specific mobile activities, but lack contextual information such as an individual's personal characteristics, attitudes, or levels of technical skills. Their generalisability is limited by focusing on population of active users. Second, the majority of studies examine exclusively mobile Internet use and ignore the fact that mobile use is complementary to Internet use on other devices (Dutton et al., 2013; Ofcom, 2015a). Similarly, in terms of locations of use, these studies are predominantly concerned with Internet use on the go. However, the mobile–stationary dichotomy has become increasingly blurred. Several authors show that the home is one of the most common locations of smartphone use (Gómez-Barroso et al., 2010; Heimonen, 2009; Sohn et al., 2008; Thompson & Chen, 2012) regardless of the availability of PC-based access (Nielsen & Fjuk, 2010; Nylander et al., 2009). Previous research also provides evidence that the mobile–stationary dichotomy does not correspond to the ways users think about various modes of access. The term "mobile Internet" is not meaningful to all Internet users, as some think there is "no need to differentiate between the Internet and the mobile Internet" (Humphreys, Von Pape, & Karnowski, 2013, p. 496). By thus limiting their focus, mobile communications literature cannot say much about the role of mobile Internet in the broader context of Internet access and use.

Mobile Internet-enabled devices are not used in isolation from other modes of access. In fact, the only thing that virtually all British mobile Internet users have in common is that they can also access the Internet on a PC. For example, of the 2,083 Internet users in the OxIS 2013 full sample, only 34 own a tablet but not a PC (OxIS, 2015). Similarly, only 51 smartphone users report not using a computer anywhere or not having a computer at home. Many users traverse between different modes of Internet access seamlessly and use various devices on various locations interchangeably, concurrently, or consecutively. However, the fact that adopters of new Internet technologies already access and use the Internet on computers at various locations has often been unacknowledged in previous research (the existing evidence supports this claim in the context of developed countries since characteristics of mobile Internet adoption and use in developing countries are notably different, see for example Gitau, Marsden, & Donner, 2010; Pearce & Rice, 2013; Pearce, 2013). Put differently, the study of mobile media has not been effectively situated into the larger realm of Internet research. In their review of mobile media communication studies from the digital divide perspective, Mascheroni and Olafsson conclude that:

> issues of digital inequalities have not been the primary concern of mobile communication studies, which have generally privileged other topics and approaches, such as the study of the domestication of mobile phones into individuals' and groups' everyday lives, the investigation of communication and social practices developed around mobile telephony and their social implications, the analysis of youth mobile cultures or the reconfiguration of private and public spaces (Mascheroni & Olafsson, 2015, p. 3).

A reason for the lack of connection between the two fields might be that there is no wider consensus in the literature about how new Internet-enabled devices, which are complementing more traditional means of access, should be conceptualised. A good example is research on smartphone use. Some authors conceive of smartphones simply as an extension of the stationary Internet (de Reuver, Ongena, & Bouwman, 2012; Nielsen & Fjuk, 2010); some compare it to PC-based Internet use (Ishii, 2004; Kamvar, Kellar, Patel, & Xu, 2009); but a vast majority of studies exclusively examine the use of smartphones (Dearman, Kellar, & Truong, 2008; Tossell, Kortum, Rahmati, Shepard, & Zhong, 2012).

However, as “the once independent research agendas of mobile communication studies and Internet studies have increasingly converged” (Mascheroni & Olafsson, 2015, p. 3), I argue that the study of new Internet technologies has to be approached holistically by considering implications of mobile Internet access in a wider context of other technologies people use to go online. In other words, to better understand how new Internet technologies shape everyday life Internet use, an ecological perspective (Humphreys et al., 2013; Jung, 2008) of their adoption and use is needed. Thus, this research examines the entirety of devices and locations people use to go online in order to better understand contemporary challenges relating to disparities in Internet access. These challenges are further discussed in the following section.

1.2.3 Challenges to Studying Access Inequalities

In digital inclusion research the word *access* has been used to mean various things. Some of the early research on digital divides employed it to refer to provision and use of ICTs (see DiMaggio et al., 2004) while van Dijk (2005) used it as an umbrella term to refer to four stages in the process of appropriation of ICTs. However, it has been predominantly used to mean physical access to ICTs (Helsper, 2012). This conceptualisation informs a preliminary definition of access employed in this thesis: the term *access* is used to refer to physical or material access to Internet-enabled devices and Internet connections. I consider access a necessary but not sufficient factor in engagement with online resources (van Dijk, 2005). Put differently, access is not viewed solely as a primary indicator of digital inclusion (Helsper, 2012) to distinguish between Internet users and non-users, but as a factor that can either facilitate or impede meaningful engagement with online resources.

Moving beyond a dichotomous and static notion of Internet access is, however, characterised by several challenges related to conceptualisations and operationalisations of access. I discuss the three most pressing issues. First, although the digital divide has been described as a dynamic phenomenon "in following the trends of evolving technology and its uses" (van Dijk & Hacker, 2003, p. 323), empirical research has not fully kept up with the dynamics of Internet access on an individual level. In the past, Internet access was often perceived as a static phenomenon. Once an individual obtained some kind of access, they were considered as being on the "right" side of the digital divide and their Internet access was no longer called into question (Davison & Cotten, 2009). However, recent trends show that the nature of access is changing and becoming more complex. As demonstrated in the sections above, new forms of access have emerged, changing the temporal, spatial and contextual aspects of how people connect to the Internet. These shifts highlight the dynamic nature of Internet access. Thus, one of the challenges in studying access is to account for complex changes in access arrangements on an individual level.

Second, as soon as we allow access to be dynamic and to materialise in various forms, questions regarding processes underlying these developments come to the fore. It becomes important to ask questions such as why, when and how people adopt new Internet-enabled devices; how new devices reconfigure relationships with existing points of access; and how availability of multiple points of access shapes engagement with online resources. Addressing the processes involved in developing and maintaining Internet access is crucial for obtaining a more nuanced understanding of its dynamic nature.

Third, it also becomes important to ask what technological developments mean to Internet users who cannot or do not want to keep up with them. For example, are people who cannot go online on multiple devices and in multiple locations disadvantaged or are they simply exercising an empowered digital choice? Maybe both groups of Internet users exist. To understand the differences between those disadvantaged due to lack of access to technologies and those who decide to restrict their access, factors other than socio-economic ones need to be considered. Indeed, many scholars have called for inclusion of socio-cultural factors in the study of digital inequalities (Selwyn, 2004; Tsatsou, 2011a, 2011b; van Dijk, 2005). Selwyn (2004) for example suggests that embeddedness into the larger techno-culture may shape how people engage with technologies. As ICTs become central to participation in society (Castells, 2010; Rainie & Wellman, 2012), a better understanding of why and how Internet technologies come or do not come to play a central role in an individual's daily life is needed. Hence, the third challenge in studying disparities in Internet access is accounting for a wide range of socio-economic as well as socio-cultural factors that may influence how people develop and relate to their arrangement of Internet access.

In summary, the study of Internet access in today's technological landscape has to move beyond the purely material view of access, which has been used to distinguish between Internet users and non-users. Instead, Internet access as a collection of material artefacts and social practices shaping them needs to be fully integrated into the study of digital inclusion.

1.3 Research Objectives and Design

This study begins from the premise that as the trend of Internet access with multiple devices and locations proliferates among certain strata of the online population, the role of material access in digital inclusion has to be revisited. It needs to be carefully examined in order to better understand contemporary challenges relating to digital inequalities of access. This research aims to contribute to the field of digital inclusion by shedding light on different kinds of Internet access and providing a new angle for understanding its role in online engagement. In essence, this research's main objective is to contribute to the question whether digital inequality is reproduced or mitigated through new technologies.

When referring to *digital inequalities,* I understand the term in a broad sense, defined in terms of four areas that previous research has identified as areas of digital exclusion: access; attitudes or motivations; skills; and types of engagement with ICTs (Livingstone & Helsper, 2007; Robinson et al., 2015; Selwyn, 2004; Witte & Mannon, 2010). Internet access, together with other forms of digital inequality, forms a complex field of digital inclusion/exclusion. In the context of this research, digital inclusion is understood, not simply in terms of some kind of engagement with ICTs, but as a matter of individuals being able:

> to make what could be referred to as 'smart' use of ICTs, i.e. using ICTs as and when appropriate. In this sense not making use of ICTs can be a positive outcome for some people in some situations, providing that the individual is exercising an empowered 'digital choice' not to do so (Selwyn & Facer, 2007, p. 14).

Thus, when discussing the role of technologies in individuals' everyday lives the term *engagement with ICTs* (or online engagement) is preferred over the term *use of ICTs* (or Internet use). Engagement with ICTs is understood as a broader concept encompassing empowered use of technologies when, where and for purposes meaningful to an individual. As such, meaningful engagement with technologies is perceived from an individual's point of view—it relates to online activities that are most satisfying and relevant to an individual's everyday life endeavours. Like Helsper (2012), I take the normative stance that types of online engagement should not be ranked in any way, "because [online] economic, social, cultural, and personal resources are all fundamental to well-being and full participation in society" (Helsper, 2012, p. 410).

I perceive disparity in access to the Internet as one form of digital inequality, which is inseparably related to disparity in meaningful engagement with online resources. Meaningful engagement with ICTs is "based around a complex mixture of social, psychological, economic and, above all, pragmatic reasons" (Selwyn, 2004, p. 349). Therefore, although the focus of this thesis is on physical access to technologies as a form of digital inequality, a substantial part of it also deals with antecedent factors and motivations for acquiring and using Internet technologies; this is in order to better understand what circumstances enable users to make empowered choices about their use of different Internet technologies. While the importance of digital skills for the meaningful use of technologies is acknowledged and is included in the analyses where possible, contributing to our understanding of online skills is outside the scope of this research.[3]

In their discussion of digital inclusion, Selwyn and Facer (2007) note that the digital divide should not be considered simply as a subset of social exclusion: although individuals who would be considered digitally excluded would most likely also be considered socially excluded, the two categories are not mutually inclusive. They point to the "substantial but 'hidden' digital exclusion [...] of 'ordinary' users of ICTs who nevertheless do not make best use of digital technology" (Selwyn & Facer, 2007, p. 12). This research is concerned with exactly that "ordinary user" of Internet technologies. I situate this research in the realm of

[3] Measuring online skills and their role in online engagement has been on the research agenda for over a decade. Significant contributions to the study of online skills have been made particularly by: Eynon & Geniets, 2015; Eynon & Helsper, 2010; Hargittai & Hsieh, 2011, 2013; Hargittai, 2002a, 2002b, 2008, 2010; Helsper & Eynon, 2013; van Deursen, Courtois, & van Dijk, 2014; van Deursen, Helsper, et al., 2014; van Deursen, van Dijk, & Peters, 2011; van Deursen & van Dijk, 2014a, 2010; van Dijk & van Deursen, 2014.

digital inclusion studies by focusing on inequalities in physical access among the population of Internet users and their implications for engagement with online resources. As such, this research is not concerned with complete non-users of Internet technologies, but with people who consider themselves users of the Internet.

Drawing on existing approaches to the study of digital inclusion, empirical evidence on access inequalities among Internet users, and the identified challenges and gaps in our understanding of Internet access, specific research questions guiding this research inquiry are developed in Chapter 2. This research has multiple objectives: to examine dynamics of Internet access and its role in online engagement, as well as to provide a nuanced understanding of the underlying process and motivations involved in access development and use. This combination calls for a mixed methods approach to research inquiry. This thesis is strongly empirically informed and aims to provide substantive evidence in addressing its central research question. To do so, I combine a longitudinal cross-sectional survey data representative of the population of Great Britain with in-depth qualitative interview data. I use a complementary approach to mixed methods research design, meaning that the two datasets complement one another (Creswell & Plano Clark, 2011; Greene, 2007).

By suggesting how current understandings of Internet access could be further developed with concepts taken from infrastructure and communication studies, and then by providing empirical evidence supporting the proposed approach, this thesis aims to make theoretical and empirical contributions to the study of Internet access inequalities. Theoretically, the main objective of this research is to develop and empirically justify a conceptualisation of Internet access that would account for its dynamic nature that is crucially shaped by background social processes. Empirically, the main objective of this study is to provide substantive insight into how Internet access, its determinants and implications for engagement with online resources developed over time and how these developments are experienced by ordinary Internet users.

1.4 Thesis Structure

This thesis is structured into nine chapters. Chapter 2 outlines the four core theoretical approaches to studying digital inclusion (DiMaggio et al., 2004; Helsper, 2012; Selwyn, 2004; van Dijk, 2005), focusing on how each author or set of authors understands and positions *Internet access*. Following from this review I identify gaps in our understanding of access and challenges to studying access in the contemporary technological and societal landscape. To inform analysis of access as a dynamic phenomenon that consists of material artefacts and supporting social practices, I propose conceptualising it as infrastructure (Sandvig, 2013). I draw on previous research to identify material dimensions of access. In terms of social practices shaping access, I propose to examine its underlying processes using the domestication framework (Haddon, 2011), and to examine its role in individuals' daily lives by drawing on the concept of media centrality originating in the media system dependency theory (Ball-Rokeach, 1985). I conclude the chapter by outlining specific research questions and a model for studying the role of access in digital inclusion. Chapter 3 justifies the selection of the mixed methods approach to research inquiry. It moreover explains quantitative and qualitative data collection and analysis methods.

Chapters 4 through 7 make up the empirical part of this thesis. They are organised around the four research questions outlined in Chapter 2. Chapter 4 uses qualitative data to examine Internet access through determinants of infrastructure. It provides empirical support for conceptualising Internet access as infrastructure where both material artefacts and social practices converge. Chapter 5 analyses the long-term dynamics of material dimensions of Internet access. To do so, it discusses experiences of quality, locality and ubiquity of access using qualitative data, and develops quantitative measures of locality and ubiquity. Then, factors shaping gradations of access inclusion are examined, with quantitative data tracing dynamics of access inclusion from 2005 to 2013. Chapter 6 engages solely with qualitative data. The first part of the chapter provides qualitative evidence of the processes underlying development and engagement with Internet access. It outlines three specific re-domestication practices resulting in distinctive experiences of access. In the second part, the chapter presents an inquiry into motivations for online engagement as expressed by users with different Internet access infrastructure. The analysis shows that access arrangements reflect the role of Internet technologies in individuals' daily lives as well as general perceptions about the Internet. Chapter 7 builds on these findings by first developing a measure of Internet centrality, which is included as a motivational factor in quantitative models of digital inclusion. These are presented in the second part of Chapter 7. Quantitative data are used to demonstrate the role of access in online engagement and its longitudinal dynamics. A comprehensive model of digital inclusion also includes measures of skills and Internet centrality to evaluate the impact of access on engagement vis-à-vis other central factors in digital inclusion.

Chapter 8 brings together the four empirical chapters by synthesising their key findings. The chapter critically discusses the results of the study by outlining its theoretical and empirical contributions to provide a more complete understanding of Internet access. I outline how the present findings relate to previous work presented in Chapter 2 and how they inform current discussions in the field of digital inclusion. Chapter 9 discusses some concrete recommendations for digital inclusion policy stemming from this research. The chapter also addresses the limitations of this research and concludes with directions for further research.

Chapter 2: Theory and Literature Review

2.1 Introduction

This chapter lays out the theoretical framework guiding this research. The first section reviews theoretical discussions and models of digital inclusion. Specifically, it focuses on reviewing and discussing conceptualisations of Internet access put forward by various authors. The review shows that existing conceptualisations of access are predominantly material, focusing on specific devices and locations of Internet access. In line with recent technological developments enabling access with multiple devices and locations (see Chapter 1), I argue that a better understanding of the dynamics of access is needed. These dynamics, however, are said to be shaped not only by new technological developments but also by social practices of gaining, maintaining and developing access, which are not addressed in the existing frameworks of digital inclusion.

To further develop our understanding of access, I draw on infrastructure studies and propose conceptualising Internet access as infrastructure to account for its material as well as social aspects. Section 2.4 develops a typology of material dimensions of access by drawing on existing conceptualisations of access and relevant empirical work. Section 2.5 focuses on social practices shaping access, which have been less commonly studied. Thus, I propose that inquiry into social dynamics of access could be informed by concepts of domestication and media centrality.

The concluding section of the chapter summarises these propositions in a framework for studying the role of access in digital inclusion, which informs this project's research questions and guides the subsequent empirical investigation.

2.2 Theoretical Approaches to the Study of Access in Digital Inclusion

With a shift to a more nuanced examination of gradations in digital inclusion, various approaches to studying them have been developed. In this section, four core models authored by DiMaggio and colleagues (2004), Selwyn (2004), Helsper (2012) and van Dijk (2005) are discussed. They all develop broad theories of digital inclusion, specifying an array of factors shaping digital inequalities. While other approaches to the study of digital inclusion also exist (e.g. Bonfadelli, 2002; Mossberger et al., 2003; Warschauer, 2003; Witte & Mannon, 2010), these four specific models are used because of their extended elaboration of Internet access and its role in digital inclusion. All four models have in common a move beyond the binary view of Internet access as an indicator of digital inclusion (Helsper, 2012). Instead, they perceive disparities in access as a form of digital inequality. As such, frameworks discussed below can theoretically inform the inquiry into the role of new digital technologies in digital inclusion.

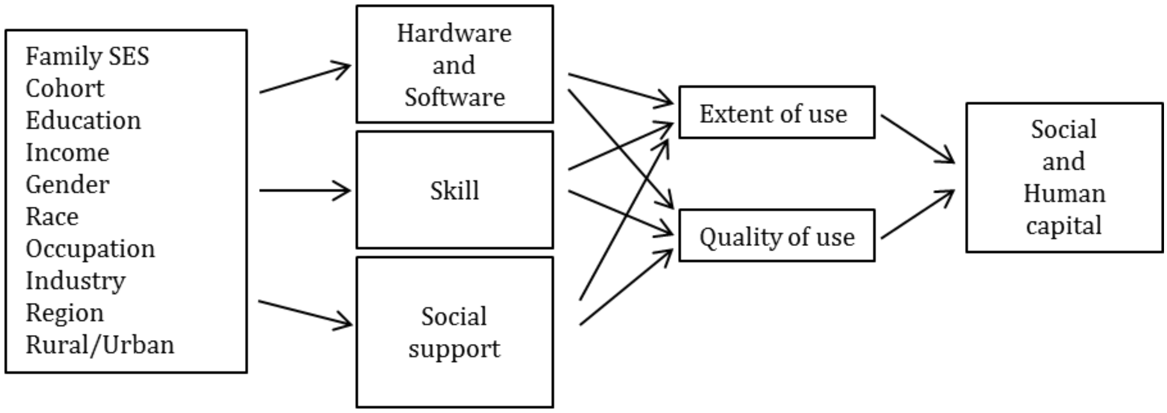
The discussion is organised according to the approach each model takes to studying digital inequalities. Concretely, DiMaggio and colleagues' (2004) approach draws on communication theory and the knowledge gap hypothesis, focusing on individual's characteristics that support engagement with ICTs. Selwyn (2004) and Helsper (2012) ground their work in sociological theories of social stratification and employ concepts of capital and resources to explain how an individual's position in society shapes their digital inclusion. Lastly, van Dijk (2005) takes a relational approach influenced by the theory of network society (van Dijk, 2012), where positions of individuals and relationships between them are considered as sources of inequalities. The focus of the below discussion, however, is on reviewing how different authors conceptualise Internet access, its characteristics and impact on online engagement. The section concludes with a summary of all four approaches and a discussion of gaps in our understanding of access.

2.2.1 The Knowledge Gap

In their early writings, DiMaggio and colleagues (DiMaggio et al., 2004; DiMaggio, Hargittai, Neuman, & Robinson, 2001; DiMaggio & Hargittai, 2001) called for a more theory-driven inquiry into the implications of Internet technologies. They developed an approach to studying digital inequalities that revolved around the *knowledge gap* hypothesis, which states that as the infusion of mass media information increases, segments of the population with higher socio-economic status tend to acquire this information at a faster rate than the lower-status segments (Tichenor, Donohue, & Olien, 1970). Put differently, the hypothesis suggests that people of high socio-economic status are advantaged in exploiting new sources of information.

DiMaggio and colleagues (2004, p. 376) argue that "access is never enough to ensure productive use", and that factors that were put forward by scholars of the knowledge gap, such as individual differences and social context of information consumption, are also likely to explain the extent to which different kinds of people benefit from the Internet. Grounded in this knowledge gap premise, DiMaggio and colleagues (2004) developed a model where individuals' socio-demographic characteristics affect attributes of access ("hardware and software", see Figure 2.1), levels of digital skills, and the extent of social support in technology use. These factors in turn shape the extent and quality of Internet use, which can lead to increased opportunities of economic welfare or political or social capital (see Figure 2.1).

Figure 2.1. The impact of Internet access on life chances



Source: DiMaggio et al. (2004, p. 382)

In their discussion of Internet access, DiMaggio and colleagues (2004, p. 361) challenge the then-common approach to understanding access as "being able to get online in some fashion at some location". They argue that a more pressing question is what people are able to do when online and how characteristics of access affect that. Thus, they place physical access (in their words "technical means (hardware, software and connections)"; DiMaggio et al., 2004, p. 376) as an intervening variable between an individual's characteristics and online engagement. In the words of the knowledge gap hypothesis, they assume that people of higher socio-economic status are able to establish better Internet access, which enables them to have more favourable online engagement.

Specifically, DiMaggio et al. (2004) identify two dimensions of physical access as sources of inequalities. First, the quality or adequacy of hardware, software and Internet connections matters for two reasons: users with broken devices and slow connections may not be able to access and use all of the available digital content; furthermore, a poor technical foundation can be a reason for less satisfying online experiences, resulting in less engagement and opportunity to develop Internet skills. Second, the authors argue that location of access is bounded, with autonomy of use defined as a level of control people can exercise over their Internet use. Autonomy of use encompasses users' flexibility in time, content and privacy when online. For example, access at home is considered more flexible than access in public and communal spaces such as at work or libraries. Thus, users are expected to develop more favourable online experiences at home as opposed to public spaces.

In summary, DiMaggio and colleagues (2004) propose that in terms of access, online engagement is shaped by its quality and location. Quality and location of access matter because they can impact the extent and favourableness of online engagement, opportunity for skills development and consequently outcomes of Internet use. In this way, DiMaggio and colleagues contribute to our understanding of quality and location of access and its role in online engagement. However, their conceptualisation of access is static and focused on its material and technical aspects. They do not discuss which specific socio-demographic factors shape quality and autonomy of access, nor do they elaborate on the multiplicity of Internet access points or, reflecting the time when the framework was developed, on mobile Internet technologies.

2.2.2 Forms of Capital and Social Stratification

Other critics of the early digital divide research argued that digital inclusion has to be looked at within a larger context of individuals' social and cultural factors (Helsper, 2012; Jung, Qiu, & Kim, 2001; Ragnedda & Muschert, 2013; Selwyn, 2004; Tsatsou, 2011a; Warschauer, 2003). These scholars turned to sociological theorists such as Max Weber and Pierre Bourdieu to explain mechanisms of differentiated engagement with Internet technologies (Wessels, 2013; Witte & Mannon, 2010). Below, I review works of Selwyn (2004) and Helsper (2012), who draw on sociological concepts of capital and social stratification.

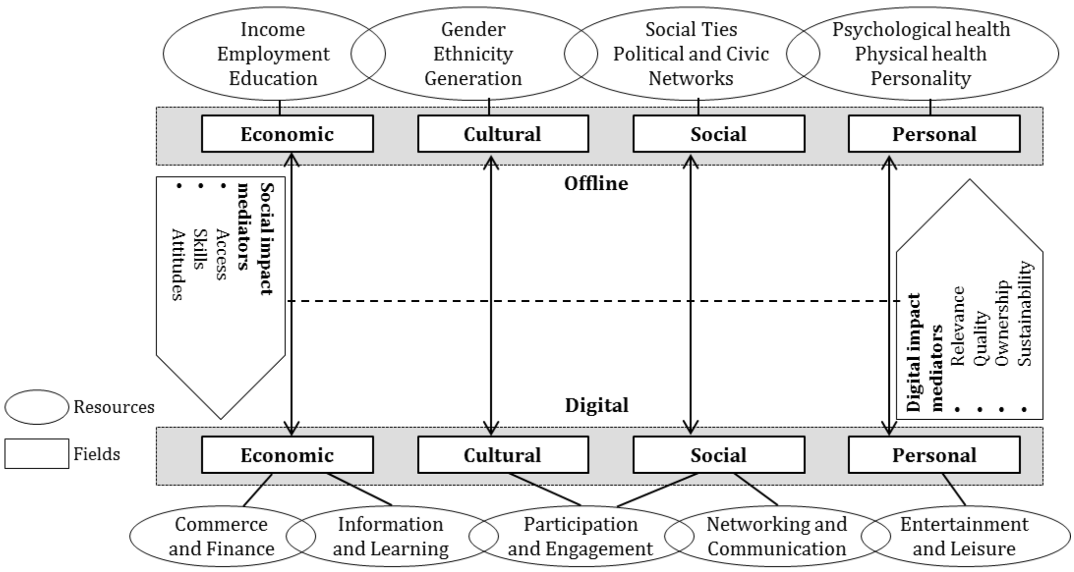
Selwyn (2004) outlined a model of digital inequalities based around conceptual stages of technology use. Access in stages spans from theoretical to effective access to ICTs, to use of technologies and their content, followed by meaningful engagement resulting in actual and perceived outcomes and consequences. In discussing "access to ICTs" Selwyn differentiates between theoretical and effective access, where theoretical access encompasses formal provision of access that is available to individuals in theory, and effective access refers to technologies that an individual feels able to use. He criticises a simplistic view of access as provision and availability of ICTs where access is conflated with use. Instead, Selwyn suggests that what matters are "disparities in the *context* of ICT access" (2004, p. 347; original emphasis), such as disparities in time, cost, quality of technology, environment in which technology is used, concerns over privacy and ease of use. Thus, "any realistic notion of access to ICT must be defined from the individual's perspective" (Selwyn, 2004, p. 347).

Selwyn draws on Bourdieu (1986) and proposes that economic, cultural and social capital can help explain engagement with technology. Economic capital in the forms of income and material resources is an ongoing factor determining whether and how people use technology. However, to account for full complexity of continuous engagement with technology, Selwyn proposes that cultural and social capital also need to be considered. In relation to the Internet, cultural capital can be conceptualised in terms of technical knowledge, skills, attitudes and socialisation into the techno-culture. Selwyn argues that such capital is essential in translation of mere access into meaningful use of technology. Social capital relevant to engagement with technologies manifests itself in the forms of an individual's personal networks, organisations and institutions that can be called upon for mobilisation of their own capital. These can offer technological expertise, material resources and emotional reinforcement and thus support meaningful engagement with ICTs.

In essence, Selwyn suggests that a move beyond the having/not-having conception of access should encompass a more complex notion of context of technology access. His approach is therefore novel in proposing that not only disparities in material characteristics of access, but also disparities in environment and perceptions, constitute access inequalities. In doing so, he moves beyond objective material notions of access (e.g. high-/low-quality access) and suggests that an individual's own perceptions of access as shaped by their cultural and social capital matter as well. As such, Selwyn's (2004) approach to Internet access is best suited for qualitative inquiry into engagement with technologies. Unfortunately, he does not further develop concepts such as "socialisation into techno-culture" in a way that could be applied to quantitative studies of digital inclusion.

Another model of digital inclusion informed by sociological theories was developed by Helsper (2012), who connects social stratification to the digital realm via links between social and digital exclusion. Helsper uses the terminology of "fields", which encompass various resources, to theorise how different types of social exclusion influence types of digital inclusion. Specifically, Helsper differentiates among economic, cultural, social, and personal fields of resources offline and online (see Figure 2.2).

Figure 2.2. The corresponding fields model



Source: Helsper (2012, p. 418)

The crucial premise of the model is that “the links between social and digital exclusion are strongest between corresponding fields of offline and digital resources” (Helsper, 2012, p. 404). For example, the model posits that individuals who are socially excluded in terms of income and employment status (offline economic field) are, when other factors are controlled for, more likely to also be digitally excluded in terms of commercial and informational activities (online economic field). Helsper argues that “economic, social, cultural, and personal resources are all fundamental to well-being and full participation in society” (Helsper, 2012, p. 410).

In the corresponding fields model, access is positioned as a “mediator” between social and digital fields of exclusion, together with skills and attitudes (see “social impact mediators” in Figure 2.2; the “digital impact mediators”—relevance, quality, ownership and sustainability of digital engagement—govern the reverse path from digital to social exclusion). In other words, access intervenes between the influence of offline resources and engagement with online resources. In this way Helsper’s (2012) positioning of access is similar to that of DiMaggio and colleagues (2004). In discussing access, Helsper does not offer its definition but suggests that researchers should move beyond binary operationalisations of access and examine its various dimensions. Specifically, she proposes that quality, mobility and ubiquity of access matter. Access at home, always-on, and broadband access are suggested as indicators of high-quality access, whereas the number of access platforms and their mobility are proposed as indicators of ubiquitous access. Both high-quality access and ubiquity of access are expected to lead to a better online experience. Helsper (2012, p. 411) concludes the discussion on dimensions of access by stating that:

> [i]t is important to include and look at the different types of platforms for access since in digital inclusion research access is often seen as either there or not, and no distinctions are made between different types of access.

Helsper’s (2012) approach is apt for studying digital inequalities among those who are using the Internet. She makes a strong case for positioning access, together with skills and attitudes, as factors mediating between social and digital exclusion. The model thus suggests that social exclusion from economic, cultural, social and personal resources leads to less favourable Internet access, skills and attitudes, resulting in less favourable engagement with digital resources. However, Helsper does not elaborate on whether the three mediators play the same role in all four corresponding links, or whether, for example, access is more strongly involved in the link between offline and online economic resources than skills and attitudes are. Helsper's discussion of access is useful insofar as she proposes that distinctions between different types of access are needed. However, her discussion of dimensions of access is limited and somewhat confused. For example, after proposing quality, mobility and ubiquity as relevant aspects of access, always-on access is put forward as an indicator of quality, and mobility as an indicator of ubiquity. While Helsper's recommendation of studying types of access is very helpful, more work is needed to establish a conceptually coherent typology of access.

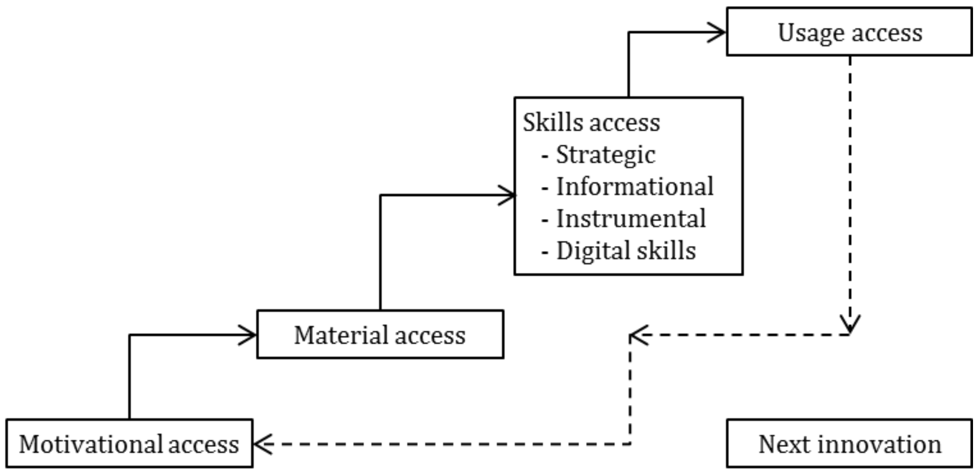
2.2.3 The Relational Approach

A network or relational approach to the study of digital inequalities has been promoted by van Dijk (2005, 2006b, 2013). Van Dijk (2013) argues that previous research predominantly provided individualistic accounts of inequality, based on properties of individuals, such as their age, education or income. In the relational approach the focus shifts away from individuals' characteristics. Instead the prime unit of analysis is "positions of individuals and the relationships between them" (van Dijk, 2005, p. 10), where inequalities are viewed as a matter of personal and positional relational categories (for example, male–female, high education–low education, employer–worker). However, van Dijk notes that one of the main problems of this approach is a lack of appropriate, relational data (for a further discussion of benefits and problems of relational approach see van Dijk, 2005, pp. 11–14).

Van Dijk developed a model of resources and appropriation theory, which describes relationships among four core elements involved in creating information and communication inequality. The starting point is (1) personal and positional inequalities, such as age, gender, or labour position. They produce an unequal (2) distribution of resources, which can be of a temporal, material, mental, social or cultural nature (Van Dijk notes that other scholars tend to conceive of resources as different forms of capital.). Unequal distribution of resources causes unequal (3) access to digital technologies. Lastly, disparate access to technologies results in unequal (4) participation in society, which in turn recursively reinforces categorical inequalities and uneven distribution of resources (see van Dijk, 2005, p. 15).

Van Dijk (2005) uses the term "access to ICTs" as an umbrella term encompassing four types of access to ICTs (see Figure 2.3). Put differently, the term "access" is not reserved solely for physical access to computers and Internet connections, but is used to depict a process of appropriation of technology. Conceptually, van Dijk distinguishes among four specific, successive kinds of access: motivational, material, skills, and usage access (see Figure 2.3).

Figure 2.3. A cumulative and recursive model of successive kinds of access to ICTs



Source: van Dijk (2005, p. 22)

Van Dijk's model of digital inclusion is different from DiMaggio's et al. (2004) and Helsper's (2012) in that he proposes that the mediating factors (i.e. access, skills and attitudes) are indeed linearly related and successive, where motivation influences material access, which influences skills, which in turn influence Internet use. Van Dijk argues that motivation to use technologies is a preliminary condition of all other types of access. An individual acts on motivational access by acquiring material access. After acquiring material access one has to learn how to operate and use technologies, which encompasses skills access. Only after acquiring motivational, material and skills access can the process of appropriation end with usage. The four kinds of access are cumulative; hence the number of kinds of access an individual is able to gain is essential for engagement with technologies and its outcomes.

Van Dijk (2005, p. 48) defines material access as "possessing or having entry to PCs and Internet connections". Acquiring material access can involve buying a piece of Internet-enabled technology or obtaining access at places such as work, schools and libraries. He suggests that material access depends mostly on individuals' material, mental and social resources. In his discussion of material access, van Dijk (2005, p. 48) distinguishes between physical access and conditional access. Physical access is entry to digital technologies in the forms of hardware, software and networks, while conditional access encompasses "provisory entry" to networks, applications, programmes and contents. An example of conditional access is payment required for mobile network data transmission when users want to connect their mobile phones to a mobile Internet network. Increasingly, both types of access are required for gaining full access to Internet content and services. Further, van Dijk differentiates between types of computers and network connections. He provides examples of dial-up versus broadband connections, and PCs versus handheld devices, which afford distinct online experiences. In terms of access locations, van Dijk notes the evolution of diffusion from schools and work being the primary access points to home access being the primary access location. He predicts that ubiquitous computing (i.e. access at all public, home and mobile places) will be the last stage of this evolution.

Finally, van Dijk proposes that the four stages of access from motivation to use are recursive. It is expected that they will return in whole or partly when new technologies are invented. This is represented with a feedback loop pointing from usage access back to motivational access (see Figure 2.3). This is a distinctive feature of van Dijk's model. It makes all stages of technology appropriation dynamic and open to change. Van Dijk argues that the recursive loop is spurred by technological innovations. Thus, which stages of appropriation return depends on properties of a new technology. Using the example of broadband technology, van Dijk (2005, p. 22) argues that "motivation and skills to use broadband appear to be a lesser problem for those who already have computers and narrowband connections".

In terms of material access, the notion that new technologies spur a new cycle of technology appropriation is van Dijk's most important contribution. This makes access dynamic rather than static, and thus open to change. However, van Dijk says little about the processes underlying these dynamics. His example of broadband replacing narrowband technology is rather straightforward and a simple replacement, but it might not apply to adoption and use of new mobile Internet technologies that complement rather than replace existing modes of access. Thus, it is also unclear whether the linear flow from motivation to access to skills and use would apply to instances of adoption of mobile Internet technologies.

In discussing specific dimensions of access, van Dijk proposes a novel concept of conditional access. His discussion of physical access, however, is less clear. While he notes that access conditions, along with points and types of hardware, software and connection, matter, he does not elaborate on specific dimensions of access. Nevertheless, van Dijk notes that is it indeed this "multifaceted" nature of access that "increases the chances of inequality of physical and usage access” (van Dijk, 2005, p. 101). According to van Dijk, access inequalities are shaped by an individual’s resources and motivation to adopt and use technologies.

2.2.4 Summary and Gaps in Understanding of Access

All the theoretical approaches to studying digital inclusion discussed above deal with the question of material access. However, the authors conceptualise and position access in various ways. Here, I first explain how these existing approaches inform the present inquiry into the role of access in digital inclusion; and second, I identify gaps in our understanding of access and propose what aspects would benefit from further theoretical and empirical elaboration.

None of the authors discussed above provides a good definition of access. DiMaggio et al. (2004), Helsper (2012) and van Dijk (2005) all conceive of access as physical access to Internet-enabled devices and connections. By contrast, Selwyn (2004) introduces the notion of the context of ICT access, but does not define it clearly. Following from largely material conceptualisations of access, the most thoroughly discussed aspects of access pertain to its material nature. Taken together, authors discuss theoretical, effective, conditional and physical access as well as its quality, location, autonomy, ubiquity and mobility. While Selwyn notes that the context of access also encompasses an individual’s environment and perceptions, his discussion of how to account for these factors in empirical research is limited. Relatedly, except from van Dijk, all other authors provide static accounts of Internet access. While van Dijk allows for changes in material access driven by technological innovations, he does not elaborate on processes and outcomes of such change. Generally, the existing approaches lack a theory that accounts for changes in Internet access. However, in today’s technological landscape such understanding is crucial—Chapter 1 provided strong evidence of how technological developments reconfigure the ways people go online and conduct their everyday lives. These technological and societal developments challenge the existing static and largely material approaches to studying access inequalities.

In terms of positioning access within larger frameworks of digital inclusion, two different propositions have been developed. DiMaggio et al. (2004) and Helsper (2012) position access as a factor mediating between individuals' characteristics and online engagement. Contrastingly, van Dijk (2005) positions access in between motivations and skills in a linear model of stages in technology appropriation. Although a recent empirical test of van Dijk's model showed that Internet-related attitudes shape material access, which in turn shapes levels of skills, the study also indicates that both attitudes and access have a direct effect on the extent of online engagement (van Deursen & van Dijk, in press). Thus, in positioning access within a larger framework of digital inclusion I follow DiMaggio et al. (2004) and Helsper (2012) and conceive of access inequalities as a mediating factor in the relationship between offline resources and online engagement.

However, scholars of digital inclusion agree that access alone is not sufficient to ensure productive use (DiMaggio et al., 2004; Helsper, 2012; Robinson et al., 2015; Selwyn, 2004; van Dijk, 2005; Warschauer, 2003; Witte & Mannon, 2010). Besides access, all the above authors suggest that skills and motivation inequalities are significant factors in digital inclusion. Here I use van Dijk's terminology of motivation rather than Helsper's terminology of attitudes. Van Dijk (2005, p. 27, 2006a, p. 227) posits that motivation to "adopt, acquire, learn, and use" technologies is shaped by a combination of "social or cultural" and "mental or psychological" factors. Motivation is a complex phenomenon shaped by motives, needs, beliefs, goals and expectations (Gollwitzer & Brandstätter, 1996). By contrast, attitudes are generally conceived of more narrowly as learned predispositions shaped by classical conditioning and observational learning (Manstead, 1996). I use the terminology of motivation to encompass Internet-related goals, beliefs and expectations that shape technology adoption and use.

In the context of this research, access, skills and motivation are seen as equally important conditions for productive use (Helsper, 2012). They are believed to operate on the same level, simultaneously reinforcing engagement in the online realm. Unlike in van Dijk's model, no sequential path among the three factors is hypothesised. The population of Internet users is extremely diverse, and different combinations of factors may shape online engagement among different segments of the population. Thus, I believe this approach is apt for studying access inequalities among the population of Internet users. However, although access, motivations and skills are expected to have independent effects on online engagement, the three factors are not expected to be completely independent from one another (as empirically demonstrated by van Deursen and van Dijk, in press). For example, qualitative evidence shows a link between quality of Internet access and skills development (Eynon & Geniets, 2015), whereas typologies of digital skills include operational or technical skills (Helsper & Eynon, 2013; van Deursen & van Dijk, 2010). It is thus reasonable to expect that the ways material access is put to use will depend on individuals' levels of skills. By contrast, the link between material access and motivation has been less well established in the literature. As for some individuals Internet access becomes abundant, a better understanding of what motivational aspects of engagement with technologies are relevant to the study of digital inclusion is needed.

The above summary of existing theoretical approaches to studying the role of access in digital inclusion points to three gaps in our understanding of access. First, a better conceptualisation of access is needed to account for its dynamic nature, which is not shaped only by material characteristics of ICTs but by social factors as well. Second, theoretical and empirical approaches to studying Internet access need to be extended to address the processes and social practices involved in development of access. Third, a better understanding of social and cultural aspects of engagement with ICTs that shape these processes is needed. Below I discuss approaches that help enrich inquiry into access inequalities.

First, to account for the dynamic nature of access that is manifested in material artefacts as well as social practices shaping their adoption and use, a new conceptualisation of access is needed. Previous theoretical and empirical work most commonly defined access in terms of possession or entry to ICTs. Such approach to access is limiting in two ways. First, it implies focus on a single technology—the Internet—that nowadays exists in various forms and is accessed in various ways. Thus, technologies and places where people go online have to be studied holistically as repertories of access points. Second, it implies a purely material approach to access. However, when Internet access is considered as a repertoire, its non-material aspects, such as practices of developing and sustaining access, also become important. Thus, I turn to infrastructure studies to propose a new conceptualisation of Internet access, which accounts for its material as well as social aspects.

Second, while material elements of access have been well theorised in the existing approaches, the underlying processes and social practices shaping access have been less thoroughly addressed. However, when obtaining access to the Internet is perceived as a dynamic phenomenon rather than a one-off event, the underlying processes shaping access become important. Van Dijk (2005) pointed towards these dynamics by suggesting that his model of access is recursive, but he says little about processes of new technologies becoming part of existing access arrangements. To better understand the dynamics of access, individuals' technological "careers", emphasising the changing nature of people's relationships with and use of technology, should be considered (Murdock, 2002b, p. 27; Selwyn, 2003, 2005). To further our understanding of the processes shaping development and maintenance of access, I propose to study it by drawing on the domestication framework[4] (Haddon, 2006b).

Third, approaches to studying access have been preoccupied with its material nature. Of the authors discussed above, only Selwyn (2004) directly points to social and cultural factors shaping access, whereas van Dijk (2005) and Helsper (2012) address them indirectly. In the context of a dynamic approach to studying Internet access and following from the domestication framework, I argue that a possible way forward is to account for the role technologies play in an individual's life. In a way, this relates to Selwyn's concept of "socialisation into techno-culture". Similarly, Helsper (2012, p. 412) suggests that "centrality or importance individuals attach to ICTs" may shape their engagement with technologies. Thus, I propose to extend the idea of centrality of ICTs (Haddon, 2011; Jung et al., 2001) by drawing on the media system dependency theory (Ball-Rokeach, 1985).

In the sections that follow I elaborate on the challenges to studying material access and the proposed ways to tackle them. I start with proposing an alternative definition of access, followed by elaboration of its material dimensions by drawing on previous research, and of its social dimensions by discussing domestication and Internet centrality.

2.3 Access as Infrastructure

To develop an alternative operationalisation of Internet access, which accounts for both its material and social aspects, I turn to infrastructure studies. By and large, in the digital divide realm the term "infrastructure" has been used primarily to refer to the purely technical facets of Internet access, such as equipment and fibres (e.g. Barzilai-Nahon, 2006; De Haan, 2004;

[4] Haddon (2004) discusses whether the domestication should be labelled a framework or a theory and opts for calling it a framework.

Dutton, Gillett, McKnight, & Peltu, 2004; Rogers, 2001). By contrast, infrastructure studies extend the "conventional understandings of infrastructure as 'tubes and wires'" to also incorporate organisations, individuals, their interrelations and social practices (Bowker, Baker, Millerand, & Ribes, 2010, p. 98).

The Oxford English Dictionary (1989) defines *infrastructure* as "a collective term for the subordinate parts of an undertaking". Infrastructures are often thought of as large-scale systems, such as highway, water or telecommunication systems that operate as a substrate (Star & Ruhleder, 1996). Beyond that, however, infrastructures also encompass more abstract entities, such as protocols, standards and memory (Bowker et al., 2010). Star and Ruhleder (1996, p. 113) define infrastructure as "a fundamentally relational concept", where systems become infrastructures "in relation to organised practices".

A relational approach to studying infrastructure brings the background processes and relationships into the foreground (Sandvig, 2013). Infrastructure is a relation, not a set of things (Star & Bowker, 2006; Star & Ruhleder, 1996; Star, 1999). Star (1999) suggests that one person's infrastructure can be a difficulty for another person. Sandvig proposes that "thinking about infrastructure as a relation sensitises the scholar to these multiple perspectives by asking to whom an infrastructure is addressed and, therefore, who is left out" (Sandvig, 2013, p. 92). Thus, to study infrastructures means to study relations among individual users, technological artefacts and contexts.

By drawing on the relational stream of infrastructure studies, Sandvig (2013) identifies five attributes of infrastructure: (1) invisibility; (2) dependence on human practices; (3) modularity; (4) standardisation; and (5) momentum. First, invisibility refers to the idea that infrastructure becomes apparent only when it breaks. Second, infrastructure is an arrangement of human practices and routines. Third, infrastructure is modular and incremental—modifications of one part require adjustments to the others. Fourth, standardisation is a component of infrastructure's invisibility that allows for interconnection with other systems. Finally, large systems all benefit or suffer from "momentum", defined as a system's inertia or particular trajectory.

Commonly, infrastructure scholars have examined large distributed systems, such as software supporting geographically dispersed collaborative work (Star & Ruhleder, 1996), global information-collecting systems (Bowker & Star, 1999), the Internet (Sandvig, 2013) or mobile networks (Farman, 2013). I propose taking a relational approach to understanding an individual's Internet access. I argue that a relational approach to studying access inequalities could be helpful in developing an understanding of how individuals develop, maintain and use their *repertoires* of access to the Internet. This can be viewed as a call for a "social shaping of technology" approach rather than technological determinism (Lievrouw, 2006) in the study of material Internet access. The social shaping approach asserts that "some technologies certainly constrain action, but people can always make choices about using them" (Lievrouw & Livingstone, 2006, p. 21). I relate to Lievrouw's and Livingstone's (2006) definition of new media that encompasses (1) the artefacts and devices, (2) the practices we engage in to develop and use these devices, and (3) the social arrangements that form around the devices and practices. As such, the study of new media originating from the social shaping paradigm parallels infrastructure studies insofar as its inquiry involves artefacts, practices and social arrangements surrounding their adoption and use.

Understanding material access as *access infrastructure* opens up possibilities to move beyond the purely material and static view of access that it is either there or not. When an individual's Internet access is approached as an infrastructure, material artefacts as well as practices of configuring, managing and relating to them become important. I argue that by taking an infrastructural view of access, technologies and related social practices can be better understood in a holistic manner. In fact, an infrastructural approach to access speaks to the notions of context of ICT access (Selwyn, 2004), technological careers (Murdock, 2002b) and users' autobiographies of technology use (Selwyn, Gorard, & Furlong, 2005). These all suggest that access has to be considered dynamic and social.

I define *access infrastructure* as a background foundation of material artefacts and social practices that support an individual's Internet use. With this, material access does not lose its materiality, defined by Lievrouw (2014, p. 25) as "the physical character and existence of objects and artifacts that makes them useful and usable for certain purposes under particular conditions". Technologies in the forms of devices, their characteristics and locations of access are still at its core. However, by extending the conceptualisation of access to also encompass social practices and arrangements, access becomes dynamic and open to change. Therefore, this alternative conceptualisation is suitable for studying the role of new Internet technologies in digital inclusion of individuals who are technically on the "right" side of the digital divide.

Essentially, the proposed definition of access consists of two parts: the first refers to the material dimension of access, and the second to the social practices shaping them. Section 2.2 demonstrated that existing approaches to studying access in digital inclusion provide good insight into material dimensions of access. Thus, the following section draws on previous digital inequalities research to establish three material dimensions of access. In the part where social practices of access are considered, however, the inquiry is informed by domestication and media system dependency theories.

2.4 Material Dimensions of Access

Throughout previous sections I argued that previous conceptualisations of access mainly discussed its material dimension. Additionally, I argued that sometimes discussion of dimensions and their indicators is confused. Here, I consolidate previous theoretical work around three material dimensions: quality, locality and ubiquity. Moreover, I review empirical research that provides insight into how various dimensions can be operationalised and how they may shape online engagement.

2.4.1 Quality

Quality of material access is discussed by each of the four theorists as an important aspect of access. DiMaggio et al. (2004) and Helsper (2012) discuss it directly, Selwyn (2004) introduces it as a dimension of context of ICT access, and van Dijk (2005) relates quality to types of technologies and connections. Quality of access encompasses the state of devices in terms of whether they are up to date and working properly; reliability and speed of network connections in terms of network stability and transmission speeds; and affordances of specific technologies, where van Dijk suggests that access on a traditional PC is different from access on a small handheld device. Quality refers to device and network characteristics that are not contingent upon the location at which the device is used, such as its computing power, size, age or condition. The better the quality of technical equipment and network connection, the more likely online experience is to be favourable and the extent of engagement broader.

Qualitative studies offer the most nuanced insight into how poor quality of material access results in less favourable engagement with online resources. Gonzales (2015) noted that poor quality of access often results in disruptions of access. Low-income individuals experience poor quality of access in terms of slow and disrupted connections as well as broken, slow and outdated hardware and software. Robinson (2009) showed that youth with no or low-quality home access face significant spatial-temporal barriers that limit the extent of their digital engagement. “Insufficient financial resources to pay for uninterrupted home Internet service, ‘old’ and ‘slow’ hardware or software, sharing access with family, and dial-up connections” have been used as indicators of low-quality access (Robinson, 2009, p. 498). Robinson further suggests that young people with high-quality Internet access develop a playful or exploratory stance towards online engagement, whereas youth with low-quality access develop a task-oriented view of Internet use. Similarly, Eynon and Geniets (2015) showed that poor access to technology impedes young people from gaining online experience and developing digital skills. They found that poor-quality access manifests as a lack of physical access due to financial constraints, and as poor access in public settings due to social constraints (e.g. feelings of discomfort) or due to institutional restrictions (e.g. restrictions on content and time of use).

It is hard to operationalise quality of access with quantitative data. Zillien and Hargittai (2009) used a composite measure, which included a measure of quality of computer equipment, age of a computer, connectivity speed and Internet pricing. Their results show that quality of technical equipment is significantly and positively related to engagement with various types of Internet use. Zillien and Hargittai thus conclude that digital inequalities may be mitigated by improving people’s digital equipment.

Other authors examine quality by comparing different modes of access. Early research focused on comparing dial-up and broadband connections and found significant effects of network connection types on online engagement (Davison & Cotten, 2009; Dutton et al., 2004; Horrigan & Rainie, 2002). Eynon and Helsper (2015) operationalised quality of access in terms of locations of use: use of the Internet on any device or location; home access; and the number of all access locations. They show that the presence of children as well as education, socio-economic status, age and social isolation have significant effects on all three measures of quality of access. Similarly, Livingstone and Helsper (2007) examined differences in quality of access among young people by examining determinants of home access, broadband and access in the child's own room. They show that age, gender and socio-economic status all matter in predicting what kind of access young people have, and conclude that "as predicted by sociological theories of stratification and inequalities […] higher SES [socio-economic status] households will maintain their position of advantage, first through gaining access and then through increasing the quality of that access" (Livingstone & Helsper, 2007, p. 676). In a more recent study, Mossberger et al. (2012) compared characteristics and online engagement patterns among mobile-only and home broadband Internet users. The US-context study showed that mobile-only users are more likely to be low-income, less educated and black. In terms of online engagement, smartphone-reliant Internet users were less likely to engage in political and economic activities online, but were more likely to go online for entertainment. Mobile-only users also had higher rates of online job searching, indicating that jobs motivate Internet access among those socially excluded. Mossberger et al. (2012, p. 2492), however, note that "the growth in mobile phone use has not erased inequalities in participation online and seems unlikely to do so".

Combined, this evidence suggests that quality of access matters in developing favourable online experience. It also points to challenges of operationalising quality of access with quantitative data. Often, authors employ measures of access that pertain to locality or ubiquity. This is a conceptual confusion. Locality and ubiquity are discussed below as separate dimensions of access.

2.4.2 Locality

Locality of material access refers to the context of where access is being exercised. DiMaggio and colleagues (2004) argue that it matters because different locations of access afford varying levels of autonomy of use. Similarly, van Dijk (2005) suggests there are differences between various access points, while Selwyn (2004) perceives it within context of ICT access. Helsper (2012), however, blends quality and locality dimensions by proposing home access as a measure of quality. Within locality of access I differentiate among: (1) home access, (2) institutional access, and (3) mobile access. Researchers are in agreement that home access is more private than access in public spaces and thus allows for more autonomy of use (Eynon & Geniets, 2015; Hargittai, 2010; Helsper, 2012; Robinson, 2009). Therefore, it makes sense to differentiate between home access and access in public spaces, such as school, work or libraries, which I refer to as institutional access.

Finally, I suggest that mobile access is the third type of locality. In the last decade we have seen a rapid adoption of portable handheld Internet-enabled devices. Access on mobile devices can be more personal, has different temporal and spatial characteristics, and runs on a different network connection (see Chapter 1). Therefore, it seems appropriate to distinguish mobile access from home and institutional access types.

I use the term *locality* to differentiate among three modes of access. Locality is understood in a broad sense, referring to the context and ambience of access rather than just *location* of access. The fact that boundaries among the three localities are increasingly blurred is acknowledged, yet I argue that it is of value to address differences among them. For example, going online on a mobile device at home is understood as a mobile locality rather than home locality, taking into account differences in mobile and computer-based Internet access (Napoli & Obar, 2014). In doing so, I acknowledge differences among the three modes of access delineated by specific locations and devices, but do not assign any normative value to them. For example, home access is not perceived as superior to mobile or institutional access.

Locality of access has been examined in both quantitative and qualitative studies. Most commonly, researchers have examined differences between accessing the Internet at home and in public spaces in the context of varying levels of autonomy they allow. Both qualitative and quantitative studies show that there are qualitative differences between home and institutional access. Mossberger et al. (2003, p. 25) note the importance of not "lumping together" home and other locations, because home access allows more privacy, flexibility and availability. Other studies found that location of access mediates the effects of class (Schradie, 2011) or income and education (Blank, 2013; Hassani, 2006) on online engagement. Qualitative studies point to physical, social and regulatory constraints of institutional access. Evidence shows difficulties in accessing publicly available Internet access points due to their limited working hours and associated transportation costs; when located nearby, access is not guaranteed due to a limited number of available or working computers; and when access is established, constraints in terms of time, content and lack of privacy limit what types of uses people engage in (Eynon & Geniets, 2015; Gonzales, 2015; Kvasny & Keil, 2006; Rhinesmith, 2012; Robinson, 2009, 2014). Nevertheless, for Internet users of low economic, social and personal resources, institutional access remains a crucial point of connection.

Mobile access, however, is a fairly recent development and has not been widely researched in the field of digital inclusion (Mascheroni & Olafsson, 2015). There are only a few studies that have examined mobile access vis-à-vis the other two localities. Humphreys et al. (2013) conducted a qualitative study to provide a better understanding of mobile Internet within a larger media environment. Their analyses showed that the salient characteristics of the mobile Internet is mobility, which affords flexibility and access on the go. Smartphones were associated with "extractive usage" such as checking email, maps and finding information. By contrast, laptop usage was characterised as "immersive", such as doing work or surfing online, and usually lasted longer than mobile use. Humphreys et al. note that respondents also experienced immersive use of smartphones, particularly when bored or filling time; however, such use was sometimes perceived as a negative feature of the mobile Internet.

Using a quantitative approach, Lee et al. (2015) examined differences in adoption and Internet usage among three groups of users in the Korean context: wired-only; wired and smartphone; and wired, wireless, and smartphone users. First, the wired-only group was significantly different from the other two groups in terms of gender, age, income, autonomy of use and skills. The wired and smartphone group differed from the third group only in owning fewer ICTs and reporting fewer creative skills. Second, analyses of online engagement showed that, keeping a range of other factors constant, those in the wired-only group participated in a smaller number of communication, leisure and financial activities. In their study of mobile and PC users in Armenia, Pearce and Rice (2013) demonstrated that compared to users who have access on both mobile and PC, mobile-only users had significantly lower economic well-being and PC-only users were older. Examining specific online activities, they showed that PC-only users were more likely to use the Internet more for work and video watching, but less for social networking, while mobile-only users engaged in less instant messaging and reading of news online. Mobile-only users also exhibited lower variety of use.

Mascheroni and Olafsson (2015) examined smartphone ownership and use among children in seven European countries. Their analyses showed that age, country and parents' use of mobile devices contribute significantly to children's smartphone ownership. They find differences in daily smartphone use by age, country and socio-economic status and differences in the extent of engagement by age, country and daily use. Similar patterns were also reported for specific online activities, but with a significant contribution of online experience. Mascheroni and Olafsson (2015, p. 21) concluded that "social inequalities intersect with divides in access and result in disparities in online activities, with children who benefit from a greater autonomy of use and a longer online experience also engaging in more productive and capital-enhancing uses of the Internet".

The above studies provide support for distinguishing among home, institutional and mobile localities of access. They show that availability of offline resources shapes what localities of Internet access people have, which in turn has significant implications for engagement with online resources.

2.4.3 Ubiquity

Ubiquity of material access is the third dimension of access. It was envisioned by van Dijk (2005) as "ubiquitous computing", where people go online on a number of access points. Helsper (2012) suggests that indicators of ubiquity are a high number of access platforms and greater mobility in accessing content. I follow these propositions and define ubiquity in terms of access on various locations and devices. Ubiquity refers to availability of Internet connection anywhere and anytime (Peter & Valkenburg, 2006). It encompasses a seamless connection making online resources readily available in a form most appropriate to a specific use situation. Ubiquity of access, however, should not be conflated with mobility of access. Users who have mobile Internet access do not necessarily have ubiquitous access.

Commonly, ubiquity has been studied quantitatively, measured by a number of access locations or devices, where a larger number of access points indicates more ubiquitous access. Peter and Valkenburg (2006) examined adolescents' tendency towards ubiquitous access. They measured it in terms of locations and showed that socio-economic resources and education are positively related to adolescents' use of ubiquitous access. Similarly, Livingstone and Helsper (2007) showed that among young people, boys, older children and especially those of high socio-economic backgrounds had a larger number of access points.

Where ubiquity is included in models of online engagement, it consistently exhibits a positive impact on the extent of engagement. Hassani (2006) found that by a large margin, users who connect from various different access points (home, work, and others) are most likely to participate in all four examined activities. In their study of adults' engagement with the Internet, Eynon and Helsper (2015) showed that, controlling for a range of socio-demographic and Internet experience factors, a larger number of access locations was positively related to the extent of engagement in a range of different activities. In terms of devices, Blank (2013) showed that the number of devices in use was significantly positively related to skilled content production online. Similarly, a study of Korea demonstrated a positive relationship between multiple device ownership and leisure activities (Lee et al., 2015). Examining Internet access and use among older adults, Ihm and Hsieh (2015) found that age is negatively and income positively related to the number of ICTs they own. In turn, more varied access was strongly positively related to instrumental and social uses of the Internet.

Taken together, the above evidence suggests that users who can go online at a larger number of locations and devices throughout their daily lives are more likely to do more with the Internet.

2.4.4 Summary

Previous empirical work demonstrated that access inequalities in general as well as the specific material dimensions of access—quality, locality and ubiquity—shape what people do online and the extent of their engagement. However, the evidence is not abundant, and in many of the reviewed studies access was not actually the central concern. Research has also not kept up with the technological developments of the past years.

The above review was structured around three dimensions I identified in existing theoretical approaches to digital inclusion. While quality, locality and ubiquity of access are conceptually separate, empirical research has employed similar operationalisations to speak to different dimensions of access. For example, different localities are sometimes perceived as indicators of varying quality of access; and other times mobile access is perceived as an indicator of ubiquitous access.

Moreover, no study has systematically examined antecedents of different material dimensions of access and their impact on online engagement. The reason is probably the lack of consensus in the literature about what constitutes access and how to measure different dimensions. In the above review I consolidated the existing theories and empirical work on material access around the dimensions of quality, locality and ubiquity, which are further developed in the empirical part of this thesis.

2.5 Social Practices Shaping Access

The second part of the definition of access infrastructure concerns social practices involved in development, maintenance and use of material artefacts. These involve the ways users relate to their access repertories and social arrangements that form around them. Specifically, the social dimension of Internet access encompasses two elements of access—its dynamics and the role technology plays in individuals' everyday lives.

First, it speaks to access' dynamics and the underlying processes shaping them. In the field of digital inclusion, there is no widely accepted framework for studying access dynamics. Van Dijk (van Dijk & Hacker, 2003; 2005) comments on these dynamics in terms of technological developments in ICTs. However, little is known about how user careers of ICTs (Murdock, 2002b) are experienced on an individual level. Murdock suggests that "rather than taking successive single snap-shots of access and use […] it would be more useful to track user careers over time, […] identifying the dynamics that enable them to move on, or force them to remain in the same place or stop running altogether" (Murdock, 2002a, p. 388). There are many empirical challenges involved in studying such dynamics, thus existing evidence is scarce.

There are two recent exceptions. First, Smith and colleagues (2015) examined how and why diverse technology-related values and practices emerge among young people in the period between adolescence and early adulthood. They found that the process of "digital socialisation" is shaped by young people's access arrangements, where students who grew up with limited Internet access develop a task-oriented approach to technology use, whereas students who grew up with better and less regulated access value both educational and non-educational uses. Their findings highlight how social arrangements of access are involved in development of value orientations and Internet use practices. Second, Gonzales (2015) proposes a technology maintenance theory depicting unstable access dynamics among US low-income Internet users. These individuals struggle with sustaining access, resulting in limited engagement with health and employment information, as well as in biased technology attitudes. However, it is questionable whether these dynamics would be observed among other segments of the population as well. Thus, to contribute to this emerging stream of research, I propose to approach the study of access' dynamics by drawing on the concept of re-domestication.

Second, the social dimension of Internet access also concerns an individual's perceptions and ideas about technologies, which shape how technologies are placed in their everyday life and what roles they come to play. "As such ICT use is not just based on the individual being able to 'understand' the potential benefits of ICT use, but how well ICT-based activity 'fits' with the wider contexts within which they are operating" (Selwyn & Facer, 2009, p. 7). This point is inseparably related to the domestication approach to understanding access dynamics (see section 2.5.1 below). In order to understand what choices people make about their use of ICTs we need to understand the significance of technology in their daily lives (Allen, 2010; Jung et al., 2001). In this way, the inquiry into social practices shaping access converges with the study of motivations, which is usually treated as a separate factor of digital inclusion (Helsper, 2012; van Dijk, 2005). As such, it contributes to our understanding of underlying motivations driving engagement with Internet access. Put differently, this study focuses on motivational factors that relate to access, rather than motivations or attitudes related to specific online activities. I argue such nuanced understanding of motivations is needed. Here, a parallel can be drawn with the study of digital skills, where typologies of skills distinguish between technology-related or operational skills, and content-related or informational, creative, and strategic skills (e.g. Helsper & Eynon, 2013; van Dijk & van Deursen, 2014). To inform the study of technology-related motivations I draw on the concept of media centrality.

Both domestication and media system dependency approaches are related to infrastructure studies insofar as they acknowledge the role of social and human practices in designing, adopting and using personal ICTs or media systems.

2.5.1 Process: Re-domestication

Domestication research is concerned with how individuals place objects, such as new ICTs, in the context of their everyday lives (Haddon, 2006a, 2006b; Silverstone, Hirsch, & Morley, 1992; Silverstone, 2005). It considers processes shaping adoption and use of technologies, but in doing so the domestication framework also asks what technologies mean to people, how they are experienced and what roles they play in people's daily lives. The domestication framework "relates ICTs to the non-technological aspects of people's lives" (Haddon, 2011, p. 313).

Domestication analysis revolves around what various ICTs symbolise and social relationships surrounding them. There are five key characteristics of the domestication framework: (1) the emphasis is on consumption over adoption of technologies, focusing on how technologies are experienced; (2) adoption itself is seen as a process rather than an event; (3) “domestication” designates an appropriation process in which “taming of the wild” refers to users fitting technologies into everyday practices and routines; (4) individual consumption needs to be placed in a wider context; and (5) domestication is both shaped and shaping, which occurs through active consumption of media and technology in people’s everyday life contexts (Green & Haddon, 2009; Haddon, 2003, 2006b; Silverstone, 2006). Acceptance of new technologies is perceived as an active process where individuals “make choices on the basis of their own perceptions of their needs and values, and on the often unconscious frameworks which guide their actions and interactions” (Silverstone, 2005, p. 14). Through domestication, technologies become part of existing routines. As such, the domestication framework emphasises existing social organisation, values and norms, instead of emphasising what is dramatically different about new technologies, which may drive adoption in the first place.

Importantly, the domestication framework extends beyond the processes related to initial steps of acceptance and use of technologies. It also examines later careers of ICTs in looking at how people’s relationships with them change over time (Haddon, 2004). As such, domestication does not have an end point. It is an ongoing process concerning an individual’s technology repertoire as a whole. When new technologies enter the repertoire, the role of existing technologies may change and their use may become more specialised or rendered obsolete (Haddon, 2005). However, new technologies are not the only factor affecting choices within the repertoire. They may also be related to changes in individual circumstances, changes within individual social networks or wider societal changes (Haddon, 2005). Both technological developments and developments of a social nature can spur processes of *re-*

domestication, where roles and meanings of technologies change, or de-domestication, where technology is no longer used (Green & Haddon, 2009; Sørensen, 1994). Specifically, re-domestication encompasses adjustments in people's relationship to and use of old technologies when new innovations enter existing repertoires of ICTs (Bertel & Ling, 2014; Haddon, 2011).

The domestication framework speaks to the idea that access is a collection of material artefacts and social practices and can thus be helpful in disentangling meanings and roles of technologies within access infrastructure. Specifically, the concept of re-domestication appears especially relevant to studying how users' relationships with old technologies are re-assessed when new ones enter their access repertoires.

In fact, the domestication framework has been previously applied in studies of digital exclusion (Haddon, 2000, 2004). The approach is apt for addressing questions such as what the presence or absence of ICTs means to people or what the implications are of being "media-rich" or "media-poor" (Haddon, 2006b, p. 201). Thus, I propose that the domestication framework may help us better understand the processes underlying development and maintenance of Internet access. The concept of re-domestication suggests that meanings, roles and uses of old technologies may shift when new technologies enter repertoires of ICTs or when social arrangements of access change. Thus, it may be helpful in furthering our understanding of Internet access' dynamics.

2.5.2 Motivation: Internet Centrality

Motivational aspect of digital inequality has been most commonly examined with attitudes towards technology and the Internet (Blank & Reisdorf, 2012; Blank, 2013; Bonfadelli, 2002; Cotten, Hale, Howell, O'Neal, & Borch, 2011; Harambam, Aupers, & Houtman, 2013; Horrigan, 2007; Reisdorf & Groselj, 2014). In general, more positive attitudes towards technology have been demonstrated as an important antecedent of online engagement. Research focusing on attitudes is grounded in psychological theories, such as the technology acceptance model, theory of reasoned action, and theory of planned behaviour (Hsieh, Rai, & Keil, 2008). Here, however, I use a broader terminology of motivation to account for Internet-related goals, beliefs and expectations that shape technology adoption and use. In doing so, I draw on communication theories and turn to the concept of *Internet centrality*.

Centrality has been discussed in both domestication and digital inclusion studies. Haddon (2011) notes that domestication research could approach the issue of centrality of ICTs, since the changing centrality of ICTs relates to their long-term dynamics. Haddon suggests there are various factors shaping the degree of centrality: the range of things we can do with technologies, adoption and use of technologies by members of our social networks, and the degree to which we become locked into using some technology because parts of our lives are organised around them. Centrality has also been discussed in the digital inclusion realm. Sparks (2013) argues that the most important future issues of the digital divide research relate to the increasing centrality of Internet technologies to many aspects of social life. Similarly, Loges and Jung (2001, p. 538) stress that the digital divide:

> is not just a problem of […] having or not having connections to the technological network; […] it is an issue about how central the Internet is or could be in achieving various essential goals in individuals' everyday lives and how embedded the Internet is in the existing communication infrastructure.

To further develop the notion of Internet centrality and its role in digital inclusion, I turn to its origins in media system dependency, which originated in communications research (Ball-Rokeach & DeFleur, 1976).

The media system dependency theory draws on social ecology in studying individuals' relations with the media in a dynamic context, which is shaped by micro, meso and macro structures (Ball-Rokeach, 1998). Individuals are said to develop dependency relations with the media, where dependency is defined as a relationship in which "the attainment of goals by one party is contingent upon the resources of another party" (Ball-Rokeach & DeFleur, 1976, p. 6). The notion of dependency encompasses how central media is to individuals' everyday goal attainment.

The concept of centrality refers to media information functions. Information is conceptualised very broadly as all types of messages produced by the media system (Ball-Rokeach, 1998). For example, individuals depend on media to find information on current affairs, to find the best offer for a product, or to entertain and relax. Individuals are perceived as active and use media's information resources to attain their goals (Ball-Rokeach, 1998). The term "goals" implies a problem-solving motivation and individuals' capability of articulating most of the motivations shaping their media use (Ball-Rokeach, Rokeach, & Grube, 1984).

Motivation for media use stems from goals of understanding, orientation and play. All types of personal goals are equally important to an individual's welfare (Ball-Rokeach, 1985). *Goals of understanding* entail a cognitive dimension and can be directed to oneself or one's social environment. Goals of social understanding relate to the action of making sense of our social environment, whereas self-understanding goals are personal and related to self-actualisation through work, hobbies, and personal relations. *Goals of orientation* guide our action or interaction. Action orientation is sought when an individual needs information that directs their actions, such as voting behaviour, everyday coping behaviour, or behaviour concerning consumption of goods and services. Interaction orientation goals are developed when individuals seek guidance on social situations in order to achieve effective and satisfying interaction. Finally, *goals of play* are directed at escapist stress reduction as well as positive enjoyment of recreational activities. Individuals engage in solitary play when their goals relate to obtaining pleasure, excitement, aesthetic enjoyment or relaxation. By contrast, social play is directed by goals of social communication, focusing on pleasurable experience with family or friends (Ball-Rokeach et al., 1984).

The three dimensions of goals are used in operationalising media centrality—the greater the scope of goals individuals attain using a specific media, the greater their dependency on that media (Grant, 1996). Ball-Rokeach (1998) suggests that individuals' dependency relations with media are shaped by three groups of factors: individual differences, such as socio-demographic characteristics; personal environment, which encompasses an individual's life situation; and interpersonal environment, concerning an individual's interpersonal networks.

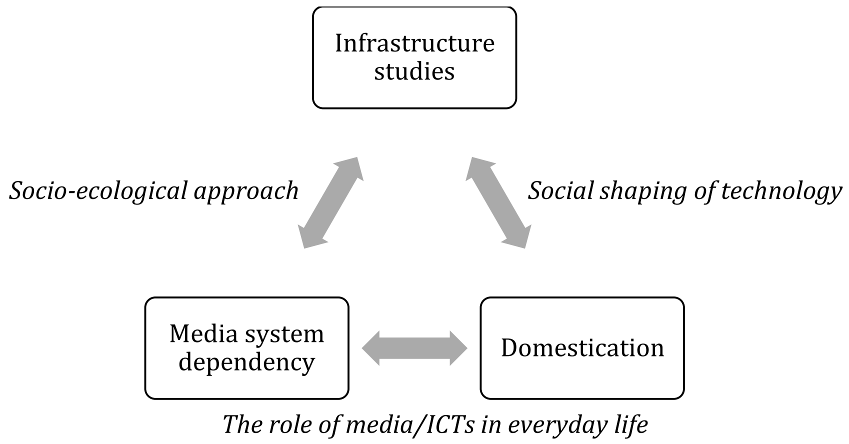
I draw on the media system dependency theory to examine Internet centrality as a motivational factor shaping engagement with Internet access. I use the typology of media goals to operationalise Internet centrality, defined as the significance of Internet technologies in attaining various goals. The concept of Internet centrality may help us better understand how people engage with their access infrastructure and online resources in general.

2.6 Theoretical Framework and Research Questions

The primary objective of this thesis is contributing to our understanding of meanings and roles of Internet access in engagement with online resources. In doing so, I draw on previous models of digital inclusion and suggest extending them in parts where they refer to material access. Specifically, throughout this chapter I outlined three approaches that may help further our understanding of Internet access and its role in digital inclusion. First, I propose conceptualising assess as infrastructure to move beyond a static view of access and to account for not just its material dimensions but also social practices shaping it. Second, I propose that processes underlying the development and maintenance of access infrastructures can be better understood through the lens of re-domestication. Third, to further our understanding of technologies' roles in individuals' daily lives, I propose to draw on the concept of Internet centrality and typology of media-related goals from the media system dependency theory.

The selected approaches are related in so far as they all acknowledge the role of human and social practices in designing, adopting and using various systems (infrastructure studies: large technical systems; domestication framework: systems of personal ICTs; media system dependency theory: media systems). Figure 2.4 outlines how the selected theoretical approaches are connected although they originate from disparate disciplinary orientations: infrastructure approach from the information studies, domestication framework from the UK qualitative strand of communication studies focusing on individuals' adoption and use of technologies, and media system dependency theory from the US quantitative strand of communication studies focusing on use of broadcast media. Importantly, all three take a holistic approach to understanding development and use of systems where attention is given to their material as well as social dimensions. Specifically, infrastructure studies and domestication framework are connected through the social shaping of technology perspective whereas infrastructure studies and media system dependency theory have in common the socio-ecological approach. Media system dependency theory and domestication framework both focus on individuals and the role of media technologies in their everyday lives.

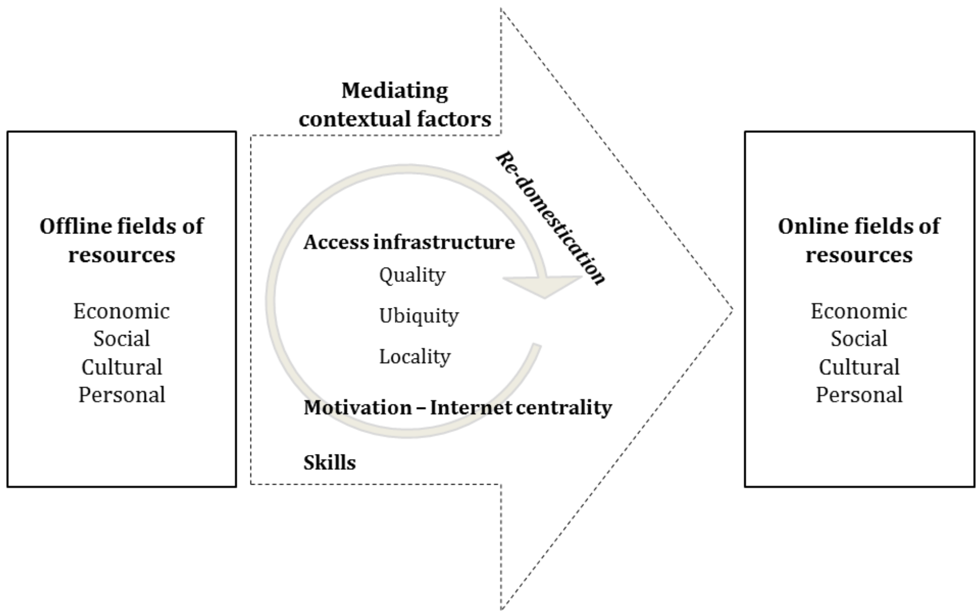
Figure 2.4. Connecting infrastructure, domestication and media system dependency theories



In essence, I propose integrating these theories because they are complementary and when combined can help paint a more comprehensive picture of Internet access. The domestication framework is used to extend the concept of Internet access infrastructure, while the media system dependency theory addresses some of the shortcomings of the domestication framework. For example, while infrastructure studies outline attributes of infrastructure as outcomes of social practices related to material artefacts (e.g. invisibility), the domestication framework offers ways of approaching the study of system dynamics from an individual's perspective. In a way, establishing an "access infrastructure" is a point in the domestication process where Internet technologies become parts of everyday routines (e.g. they are rendered invisible and suffer from momentum), whereby re-domestication analysis can help inform our understanding of the ongoing dynamics within the access infrastructure shaped by emergence of new technologies or disturbance in individuals' social arrangements. Furthermore, while the domestication framework revolves around roles technologies play in individuals' everyday lives, no general typology of ICTs' roles has been established in domestication research. Here, media system dependency theory is used to extend the concept of Internet centrality and to help operationalise Internet centrality with survey data.

Analytically, the selected approaches operate at different levels. Infrastructure studies commonly examine large systems and their use by large groups of people. Domestication framework focuses on adoption and use of functional technologies on an individual or small-group (e.g. household) level. Likewise, media system dependency theory focuses on an induvial, but perceives broadcast media as a large system shaped by other societal systems (e.g. political). In this research, however, these disparate theoretical approaches are integrated to examine Internet access and use on an individual level. Thus, the empirical part of this thesis examines the theoretical concepts such as attributes of infrastructure or media dependencies as experienced by individuals. The analysis does not extend to other relevant entities such as telecommunication companies, Internet service providers or regulators. As such, this study does not attempt to provide a large scale sociological account of digital inequalities and does not draw on general sociological theorists (e.g. Bourdieu or Weber) or concepts of class, status, power or culture. Instead, it focuses on individuals, their experiences, and the implications of disparate personal Internet access infrastructures for digital inclusion. I summarise the above propositions in a model that focuses on studying the role of access infrastructure in digital inclusion (see Figure 2.5).

Figure 2.5. Model for studying access infrastructures and digital inclusion



The model conceptualises Internet access holistically and as a dynamic phenomenon using the concept of access infrastructure. In terms of material dimensions of access, I draw on previous work that identified quality, locality and ubiquity as having a bearing on engagement with online resources. These are included in the model as dimensions of material artefacts. Social practices shaping access are depicted by the circle arrow. The processes of gaining, developing and maintaining access are enclosed in the concept of re-domestication. Motivational aspect of social practices is represented by Internet centrality, which is placed in the model as a factor of motivation. It is, however, placed onto the circle arrow to denote that it relates to social dynamics of access. Skills are placed in the model as the third crucial contextual factor. Taken together, access infrastructure, motivation and skills mediate the impact of offline resources on engagement with online resources. In terms of conceptualising offline and online resources, I draw on Helsper (2012), who provides the most elaborate indicators of economic, cultural, social and personal resources in both offline and online realms (this study, however, does not focus on examining the corresponding links between offline and online fields of resources).

The presented framework informs four specific overarching questions addressed in the empirical part of this study. Some research questions are operationalised by a set of specific questions. They all revolve around the conceptualisation of Internet access and its role in digital inclusion.

The first research question examines the suggestion to conceptualise Internet access as infrastructure. It aims at validating the proposition that Internet access can be better understood as infrastructure where material artefacts and social practices converge.

1. **Do interrelations between the material artefacts and the social practices shaping access correspond to attributes of infrastructure (as defined by Sandvig, 2013)?**

The second question addresses material dimensions of access, and their dynamics and determinants. It aims at providing a better understanding of quality, locality and ubiquity of access, and identifying gradations of inclusion in different kinds of access. Thus, questions 2a) and 2b) deal with operationalisations of quality, locality and ubiquity, whereas questions 2c) through 2f) deal with their longitudinal dynamics among British Internet users.

2. **How have both the material dimensions of Internet access and gradations in forms of inclusion changed over time?**
    a) How are quality, locality and ubiquity of access experienced?
    b) How can these experiences inform quantitative operationalisations of access dimensions?
    c) How has material access of British Internet users changed from 2005 to 2013?
    d) Have differences between users in terms of locality and ubiquity become larger?
    e) What offline resources shape gradations in inclusion in access locality and ubiquity?
    f) Have these factors changed from 2005 to 2013?

The third research question concerns practices shaping access. It aims at providing a deeper understanding of the social dynamics of Internet access. Thus, question 3a) addresses the re-domestication processes involved in access dynamics, whereas question 3b) concerns Internet centrality or the role of the Internet in an individual's everyday life.

3. **What social practices underlie the dynamics of Internet access?**

a) What re-domestication processes underlie gaining, maintaining and developing Internet access?

b) How is Internet centrality reflected in individual's relationship with Internet access?

The fourth overarching research question focuses on the role of access in online engagement. It aims at furthering our understanding of the changing role of access in online engagement in comparison to motivation and skills. Thus, questions 4a) and 4b) address the model for studying access infrastructure and digital inclusion in full, but focus on the impact of access on online engagement.

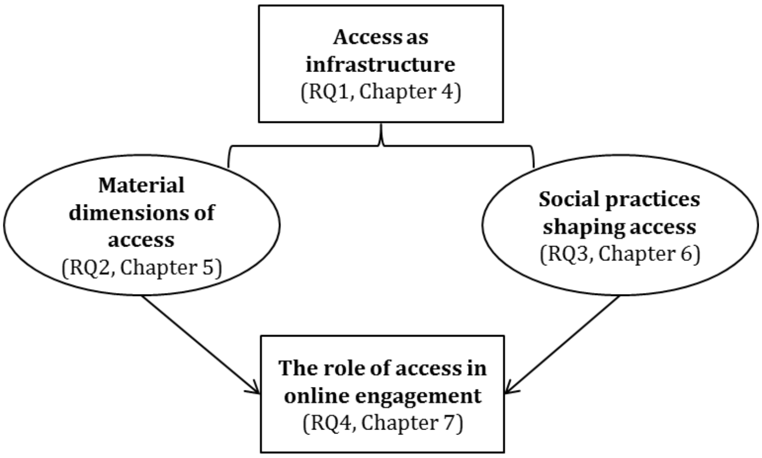
4. **How do differences in Internet access shape engagement with online resources?**

   a) Has the role of locality and ubiquity of access in explaining online engagement changed from 2005 to 2013?

   b) What is the role of access in explaining engagement with online resources vis-à-vis skills and motivation?

The themes of research questions are summarised in Figure 2.6, which indicates how specific research questions are related. The figure also indicates the structure of the empirical chapters, specifying which chapter addresses specific research question.

Figure 2.6. Summary of research themes



This research aims at providing a complete picture of how Internet users develop, maintain and engage with Internet access. Ultimately, the goal of this research is shedding light on inequalities in online engagement that stem from inequalities in Internet access. I argue that as the landscape of Internet technologies becomes more complex, inequalities in access among those who are technically on the right side of the digital divide need to be re-assessed and their role in digital inclusion re-examined. By combining complementary theoretical approaches and employing mixed-methods research design the significance of revisiting the dimensions of Internet access and their role in digital inclusion is demonstrated. The results of this study highlight the importance of a holistic approach to examining new Internet technologies. For example, differences in perceptions and uses of mobile technologies between people for whom mobile access is part of a rich media environment and those who rely only on mobile Internet access are uncovered. Such nuanced understanding of Internet access and its role in digital inclusion results from the infrastructural approach that focuses on holistically examining both material artefacts and social practices shaping Internet access.

Chapter 3: Research Design and Methodology

To examine material and social dimensions of Internet access and its role in online engagement I employ a mixed method research design, combining quantitative and qualitative data collections and analyses. This chapter focuses on explaining the rationale and procedures guiding the empirical part of this research. The first section of the chapter discusses a mixed methods approach to research inquiry outlining its underlying premises. Next, I describe the study's research design, specifically, how different phases of research were designed and conducted. Section 3.3 moves on to describe how survey and interview data were gathered and handled. Then, I outline a set of quantitative and qualitative strategies used to analyse the data. Finally, section 3.5 discusses what measures were taken to ensure that the conduct of this research adheres to ethical standards.

3.1 Mixed Methods Approach to Research Inquiry

Mixed methods research has been referred to as the "third research paradigm" that emerged as an alternative to the quantitative versus qualitative research dichotomy (Johnson & Onwuegbuzie, 2004, p. 14; Teddlie & Tashakkori, 2009). Understanding that "*both* quantitative and qualitative research are important and useful" (Johnson & Onwuegbuzie, 2004, p. 14; original emphasis) is at the heart of mixed methods inquiry. Mixed methods research is grounded in the pragmatist paradigm—it focuses on the research problem and uses a pluralistic approach to data collection and analysis (Tashakkori & Teddlie, 1998). These characteristics are summarised in Johnson, Onwuegbuzie and Turner's (2007, p. 123) definition of mixed methods research:

> Mixed methods research is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches

> (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration.

This thesis is positioned in an interdisciplinary realm of digital inclusion studies combining approaches of infrastructure and communication studies to provide a more thorough understanding of individuals' Internet access infrastructures as a form of digital inequality. The goal of achieving breadth as well as depth of understanding of how Internet users arrange their access and its role in online engagement led to the realisation that this project would benefit most from a mixed methods research design. In Chapter 2, I argued that studies of digital inequalities would benefit from a more nuanced understanding of practices shaping Internet access as well as from a better understanding of general patterns of how various forms of access lead to differential online engagement. Thus, the research questions guiding this inquiry could only be thoroughly addressed by combining quantitative and qualitative research methods. There are several advantages to combining research methods. Below, three of them are discussed in more detail.

First, mixing methods results in offsetting the limitations of quantitative methods with strengths of qualitative methods and vice versa (Creswell & Plano Clark, 2011). This study employs quantitative survey and qualitative interview methods. Survey research has several distinct characteristics: it is conducted on more than one case in order to observe variation; it is conducted at a single point in time; it produces quantitative or quantifiable data; and the data allows for examination of patterns of association (Bryman, 2012). Survey research allows for describing large populations, their behaviours and attitudes, and when probability sampling is used the results are generalisable (Babbie, 2010). Using survey data representative of the population of Great Britain enables me to describe patterns of access development and associations between various factors of digital inclusion at the level of the British online population. However, survey research is not efficient for eliciting in-depth information, meanings, opinions and motivations (Bryman, 2012), while qualitative research is especially effective for studying nuances in attitudes and behaviours, because it permits "depth of understanding" (Babbie, 2010, p. 353). Moreover, qualitative interviews are conducted in a natural setting by talking directly to people and observing their reactions. The research process focuses on learning what perceptions and meanings participants hold about the issue under study. As such, qualitative research aims at providing a holistic account of the issue under study, by providing multiple perspectives, identifying a range of factors involved, and sketching a complex, larger picture of a problem. Importantly, qualitative research is interpretive, where a researcher makes an interpretation of what has been said, seen and understood (Creswell, 2009). Combining quantitative and qualitative approaches in this research inquiry allows me to offset weaknesses and draw on the strengths of both approaches.

Second, mixed methods research provides more evidence for examining a research problem since inquiry is not restricted to specific types of data collection associated with different research traditions (Creswell & Plano Clark, 2011). It provides completeness by enabling a researcher to create a more comprehensive account of the issue under study (Bryman, 2012). Quantitative data are regarded as useful for providing a general understanding of Internet access inequalities, whereas qualitative data provide a more detailed understanding of practices and perspectives shaping them. A single data source was deemed insufficient for providing a thorough understanding of the research problem. In fact, developing a "*better understanding*" of the phenomena being studied is a general overall purpose of mixing methods in social inquiry (Greene, 2007, p. 98; original emphasis).

Third, by mixing research methods, research questions that cannot be answered by quantitative or qualitative approaches alone can be addressed (Creswell & Plano Clark, 2011; Patton, 1990). Specifically, in this study methods are being mixed primarily for the purpose of complementarity, which "seeks broader, deeper, and more comprehensive social understandings by using methods that tap into different facets or dimensions of the *same complex phenomenon*" (Greene, 2007, p. 101; original emphasis). The present study uses quantitative data to depict general patterns and determinants of access and its impact on Internet use, and qualitative data to illustrate practices, meanings and narratives shaping development and roles of Internet access in everyday life. Taken together, results of different research approaches are used to "elaborate, enhance, deepen, and broaden the overall interpretations and inferences" (Greene, 2007, p. 101) from this research project. Concurrently, mixing of methods was also used for the purpose of triangulation. Triangulation of results obtained with different methods is used for purposes of "enhanced validity and credibility of inference" (Greene, 2007, p. 101). Triangulation is applied in parts where this study seeks convergence between qualitative and quantitative results.

This study seeks to reap these advantages from using a mixed methods approach. Taken together, quantitative survey inquiry using data representative of the British population and qualitative in-depth interviews with random British Internet users was believed to be the best combination of research methods for achieving breadth and depth of understanding of Internet access. Below, I explain how the study was designed and what specific research methods were employed.

3.2 Research Design

In designing this research I followed Creswell and Plano Clark's (2011) recommendations on key decisions involved in choosing an appropriate mixed methods design. First, the interaction between quantitative and qualitative strands was planned to occur before the final interpretation of results. Creswell and Plano Clark (2011) call this an interactive level of interaction, whereas Greene (2007) refers to designs where methods interact during the course of the study as integrated designs. Second, the two methods were determined to have an equal priority. This means they play an equally important role in addressing the research questions. Third, the timing of quantitative and qualitative strands was essentially sequential due to the secondary nature of survey data. Interview data were collected after survey data had been collected and preliminary analyses already performed. Fourth, the two research approaches were most thoroughly mixed during data analysis, where both datasets were first analysed separately and then the results were brought together through a combined analysis.

The starting point of this research was obtaining and acquainting myself with the secondary survey data. The quantitative part of the study was designed as a trend study. A trend study is "a type of a longitudinal study that examines changes within a population over time" (Babbie, 2010, p. 107). Trend studies compare several datasets collected at more than one point in time, where each data collection has an independent sample of participants (Robson, 2011). I analysed five waves of survey data collected from 2005 to 2013 in order to identify longitudinal trends in Internet access and use in Britain. Preliminary analyses of survey data were performed to obtain an understanding of trends in Internet access and to develop possible operationalisations of several concepts relevant to the study, such as ubiquity of access and Internet centrality.

The initial results confirmed that the quantitative data alone would be insufficient to address the research questions of this project. Thus, the qualitative phase of the project was designed, where in-depth interview data were collected. The interview study, however, was not designed to explain specific quantitative results obtained in the preliminary analyses, but to examine facets of Internet access I was not able to address using quantitative data. The two samples were independent from one another. For the purposes of connecting both sets of data and triangulation of results, each interviewee was also asked to fill out a short questionnaire. The questionnaire included 16 items taken from the survey questionnaire. The items were selected based on the preliminary operationalisations of relevant concepts, measuring Internet centrality and related Internet attitudes. Two additional socio-demographic items were added to the questionnaire.

After initial analysis of the interview data, I returned to the quantitative data to perform additional analyses. Then, additional analyses of qualitative data were also performed. With a good understanding of quantitative and qualitative results, the final phase of analysis commenced, where insights from both strands were used to address the project's research questions. Both datasets were used concurrently, where quantitative results inspired further analysis of qualitative data and vice versa. The mixing of the two research strands was most prominent in the analysis stage of the project.

In essence, the study's research design was convergent (Creswell & Plano Clark, 2011) or blended (Greene, 2007, pp. 125–127), with a focus on complementarity, equal status of the two research strands, and the primary connection of methods during the analysis phase. However, it also included some characteristics of the explanatory sequential (Creswell & Plano Clark, 2011) or iteration (Greene, 2007) design with the purpose of making the overall research inquiry stronger and better connected. I provide more information on both strands in the section below, describing quantitative and qualitative methods and data.

3.3 Methods

3.3.1 Survey Data

The survey data were not collected specifically for this project, but within the context of a larger pre-existing OxIS project measuring Internet access, use and attitudes in Britain. OxIS is run by the Oxford Internet Institute at the University of Oxford. OxIS was first conducted in 2003 and is the longest-running academic survey of Internet use in Britain (OxIS, 2015). The survey is cross-sectional and bi-annual, resulting in six waves of data in the 2003–2013 time period. It was designed to provide a long-term insight into the role of the Internet in Britons' everyday lives. Thus, special attention is given to ensuring that different waves of data are comparable. This is ensured in two ways: first, by keeping the sampling and data collection procedures identical over all six waves; and second, by retaining a battery of about 180 items in all survey questionnaires from 2005 to 2013. I explain both dimensions of the OxIS survey in more detail below.

OxIS samples consist of about 2,000 randomly selected people aged 14 or older from England, Scotland and Wales. Northern Ireland is not included in OxIS samples, thus they are representative of the population of Great Britain. "How well a sample represents a population depends on the sample frame, the sample size, and the specific design of selection procedures" (Fowler, 2014, p. 14). OxIS aims for a sample representative of the population of Great Britain and it uses a random multi-stage sampling strategy. Here, I describe procedures that guided the last wave of data collection in 2013 (Dutton et al., 2013). An identical sampling method was employed in previous waves of data collection. More details on methodological procedures of each wave can be found online in the sections "Methodology" and "OxIS reports" (OxIS, 2015).

Multi-stage sampling is a useful approach "when there is no adequate list of the individuals in a population and no way to get at the population directly" (Fowler, 2014, p. 21). It is a strategy for linking individuals to a grouping that can be sampled as a first stage (Fowler, 2014). In OxIS, primary sampling units are output areas (OAs). OAs are created by the Office of National Statistics and are the lowest geographical level at which census estimates are provided.[5] At a first stage a random sample of 105 paired OAs (210 OAs) stratified by region

[5] More information on output areas is available at http://www.ons.gov.uk/ons/guide-method/geography/beginner-s-guide/census/output-area--oas-/index.html.

was selected. All OAs were arranged according to their ACORN type[6] and then a random start and a fixed sampling interval were employed to select the required number of OAs in each region. At the second stage "within each selected OA a random sample of 20 addresses was selected from the Postal Address File, with a further 10 addresses also selected but held back as reserves to be issued upon request" (Dutton et al., 2013, p. 59). The interviews were conducted face-to-face by visiting the selected addresses, where researchers asked to interview a person aged 14 or over on the next birthday. When it was not possible to employ this rule, a respondent was selected by choosing a person whose first name started with a letter nearest the beginning of the alphabet (Dutton et al., 2013, p. 60). The sampling and gathering of the interview data were performed by an external research agency.

In 2013, the core sample was boosted by a sub-sample of individuals from rural areas. In this thesis I only use the data from the main sample, since "the data from the core survey and the booster element can be treated independently of each other" (Dutton et al., 2013, p. 59). This decision was taken in order to ensure that the 2013 data are comparable to previous sets of data. To ensure the "sample-population consistency" (Frankel, 2010, p. 122), where characteristics of the sample population agree with the general socio-economic characteristics of the population of Great Britain, weighting schemes are created in each wave. OxIS data are weighted by gender, age, region, ACORN group and household size.

In this thesis five waves of OxIS data are analysed. The year 2005 is selected as a starting point because this was the first wave with a comprehensive questionnaire addressing various aspects of Internet access and use. The 2003 questionnaire was much shorter and would thus unnecessarily restrain the selection of variables available for trend analysis. Moreover, the year 2005 can serve as a good base year to examine trends in Internet access since the rapid

[6] ACORN is a consumer classification of the UK population at a household level. It segments postcodes and OAs into demographic types using demographic data, social factors, and population and consumer behaviour. More information on ACORN is available at http://acorn.caci.co.uk/what-is-acorn.

growth in mobile Internet access adoption started only around the year 2007 (ITU, 2015). Table 3.1 summarises characteristics of each OxIS dataset used in this study. In each year, only the subset of Internet users is included in the analysis. This means that in 2005 60% of the sample and in 2013 78% of the sample are included in the analysis. The results of this study will be generalisable to the population of Internet users in Great Britain.

Table 3.1. Overview of OxIS survey design 2005–2013

Wave	Data collection period	Response rate	N of respondents	N of Internet users	% of Internet users
2005	February – March	66%	2,185	1,309	60%
2007	March – April	68%	2,350	1,578	67%
2009	February – March	53%	2,013	1,401	70%
2011	February – March	47%	2,057	1,494	73%
2013	February – April	51%	2,053	1,611	78%

Source: OxIS 2005–2013.

The second unique characteristic of OxIS data is a large set of questions that are repeated in each survey wave. There are about 180 items available in all examined datasets. In 2013 alone over 550 items were included in the questionnaire. The questionnaire consists of four parts. The general questionnaire is answered by all respondents and it contains questions about ICTs in the household and attitudes towards different media and society. At the end of the general questionnaire respondents are asked "Do you, yourself, personally use the Internet on whatever device at home, work, school, college or elsewhere or have you used the Internet anywhere in the past?" Respondents who answer "Yes" to this question are classified as Internet users, those responding "No, but used it in the past" are classified as ex-users, and those responding negatively with "Never used the Internet" are categorised as non-users of the Internet. All three groups of respondents go on to answer a questionnaire designed specifically for them. This is the point in the survey where respondents are identified as Internet users. The users' questionnaire is the longest, including items about frequency of engagement with a plethora of specific online activities, Internet skills, previous online experience, attitudes towards the Internet relating to its content, privacy and role in society, and others. The questionnaire ends with a section on socio-demographic characteristics of respondents.

OxIS survey datasets are unique and were the preferred data source for three specific reasons. First, probability sampling ensures that the data are not biased in anyway but, when weighted, is representative of the British population. Second, the survey uses standardised measurement within as well as between waves. This means that comparable information is obtained about every participant and that comparisons across years can be made. Third, OxIS is a "special-purpose survey" (Fowler, 2014, p. 3) focusing on topics related to Internet access, attitudes and use, which are the subject matters of this thesis. As such, it enables rich analyses employing data on individuals' socio-economic backgrounds, current life situation, access to ICTs and various aspects of online engagement.

3.3.2 Qualitative Interviews

The aim of the qualitative interviews was to elicit in-depth information about how people develop, manage and perceive their Internet access infrastructure and to discern underlying mechanisms shaping them. Interviews had a semi-structured form, where a general form of an interview guide is used, but the sequence of questions can vary, and further questions in response to significant replies may be asked (Bryman, 2012). As such, semi-structured interviews allow interviewees' personal worldviews to be explored in detail (Gaskell, 2000) and were chosen in this study as the most appropriate method to examine individuals' online experiences. The interviews were *in-depth* in so far as they focused on getting "a sense of how the apparently straight-forward"—in the context of the present study of *Internet access*—"is actually more complicated" (Wengraf, 2001, p. 6).

To gain a thorough understanding of how individuals develop, manage and relate to their Internet access, this interview study was informed by narrative research as an approach to qualitative inquiry (Creswell, 2007). As a method, narrative research "begins with the experiences as expressed in lived and told stories of individuals" (Creswell, 2007, p. 54). Saldaña (2015) defines narrative as "a storied account of events, a symbolic representation of knowledge and experiences". Narrative qualitative inquiry when approached as "analysis of narratives" focuses on capturing detailed stories or life experiences to create descriptions of themes that emerge across stories or to create taxonomies of common elements, settings or types of stories (Polkinghorne, 1995, p. 12). Specifically, principles of *episodic interviewing* (Flick, 2000) grounded in a narrative approach to qualitative inquiry were followed.

Episodic interviewing has been developed in the study of social representation of technological change in everyday life and is "sensitive to concrete situational contexts in which small changes occur, and to the broad, general accumulation of such changes" (Flick, 2000, p. 76). Flick (2000) understands social representation as a form of social knowledge shared by members of a specific social group. He posits that first technological change has an impact on various aspects of people's daily lives, and second that such change occurs in concrete situational contexts whereby little (technological) changes sum over time and result in a more general change in some parts of everyday life (e.g. how individuals conduct interpersonal communication or how they go about buying goods). Next, Flick (2000, pp. 77–84) identifies nine phases involved in conducting episodic interviews: preparing the interview, introducing the interview principle to the participant; eliciting the interviewee's concept of the issue and biography in relation to it; eliciting the meaning of the issue for the interviewee's everyday life; focusing on the central parts of the issue under study; addressing more general relevant topics; concluding the interview with evaluation and small talk; and documenting and analysing the interview data.

These steps were largely followed in development of the interview guide. The first part of the interview was designed to elicit interviewees' technology biographies from the point when they first started using the Internet to changes in their access infrastructure. They were asked when, why and how new devices were adopted, what factors shaped this process and whether new devices in any way affected their relationships with existing infrastructure. Specific use practices were also discussed, with a focus on how they changed over time with changing Internet access. The second part of the interview focused on discussing the importance of the Internet in interviewees' daily lives, joys and frustrations going online brings and any related concerns. More general topics, such as the role of the Internet and technology in our society, were also discussed. The full set of questions included in the interview guide is available in Appendix A.1. However, how closely the guide was followed depended on how the interview unfolded, especially regarding what themes the interviewee brought up. As mentioned above, each interviewee was also asked to fill out a short questionnaire, which included some specific items taken from the OxIS questionnaire (see Appendix A.2).

3.3.2.1 Data gathering

The interviews were conducted in two cities. The first phase of data gathering was conducted in Scotland in and around the city of Glasgow in November 2014. Altogether, 20 interviews were collected in Glasgow. The second phase of the interviewing was done in England in the East Midlands region, in the city of Nottingham. This phase of data gathering was somewhat shorter, with nine interviews collected in Nottingham. Altogether, the qualitative dataset consists of 29 interviews. The interviews were conducted in Scotland and England to match the OxIS data, which is collected in England, Scotland and Wales. Wales, however, was not included as a research site in the qualitative study due to financial and temporal limitations of the study.

The target population of this interview study were British Internet users aged 18 or over, regardless of their experience with the Internet or levels of online engagement. In essence the interviewees were selected through purposive sampling (Miles & Huberman, 1994, p. 27). Purposeful sampling denotes a selection of cases because they are “information rich and illuminative, that is, they offer useful manifestations of the phenomenon of interest” (Patton, 2002, p. 40). The sample aimed for a representation of individuals with different Internet access arrangements and narratives surrounding their development. To achieve that, I recruited individuals from different walks of life who were expected to provide different manifestations of Internet access and use. Thus, throughout the data collection process, I tried to ensure that the sample was a balanced representation of men and women of different ages, employed and unemployed, educated and uneducated, with high and low incomes. Beyond that, the selection of participants was “serendipitous” (Saldaña, 2011, p. 33) to provide a collection of authentic narratives from disparate contexts.

I used several strategies to recruit individuals. First, in both cities I got in touch with my acquaintances to connect me to individuals who might want to participate in an interview. In Table 3.2 these individuals are listed as recruited via a personal connection. Importantly, I had never met any of these individuals before the interview (Saldaña, 2011). This mode of recruitment was useful to get access to higher educated and well-off individuals. Second, in both cities I approached random people on streets, in cafés and in public libraries. Third, I distributed flyers advertising the study in libraries and other public spaces across the cities. In Nottingham, where the recruitment process was somewhat slower, I decided to post an ad inviting people to participate online. I chose Gumtree.com, which is the largest British classified ads and community website. Fourth, two individuals were recruited by a snowballing approach, i.e. by asking interviewees if they knew anyone else who might be interested in taking part in the study (Bryman, 2012). Lastly, a large number of interviewees in Glasgow were recruited while visiting two learning and development centres (L&D

centres) on the outskirts of the city. The two L&D centres were identified via the UK Online Centres[7] website. They were selected as research sites because they provided access to low-income and unemployed individuals I found difficult to recruit via other means. I gained managements' permission to approach individuals visiting and working in the centres. Altogether, 12 participants were recruited in L&D centres. While this is a relatively big proportion of the sample, I believe it does not bias the data. While most people visiting and volunteering in the L&D centres had similar socio-economic backgrounds, their specific life situations and personal experiences with technologies differed significantly. The description of the sample is presented in Table 3.2.

All interviews were conducted fact-to-face in public spaces, either in cafés, fast-food restaurants, libraries or L&D centres. The interviews were between 25 and 60 minutes long, with an average of 45 minutes. Participation in the study was incentivised by £10 compensation in cash. Participants received the compensation after both parts of the interview—the discussion and the questionnaire—were completed. All interviews were recorded and later transcribed (see section 3.4.2.1 for details on transcription).

The data collection stopped at the 29th interviewee for two reasons. First, approaching this number, the amount of new data derived from each additional interview started decreasing. In a sense, it seemed that "theoretical saturation", or "redundancy", was being reached (Flick, 2009, p. 119; Patton, 2002, p. 246). However, there is no guarantee that the 30th or the 35th interviewee would not have brought some entirely new perspective to the study. Thus, the second reason relates to the breadth of the sample reached by that point. That is, the sample consisted of individuals from different age groups, and was balanced in terms of gender and levels of education and income, reassuring me that people from different segments of the population are represented. Although the decision to stop the data collection was also shaped

[7] https://www.ukonlinecentres.com/.

by availability of financial and temporal resources (Saldaña, 2011), the number of the interviewees is above the 15±10 sample size common in many interview studies (Kvale & Brinkmann, 2009, p. 113).

Table 3.2. Characteristics of interviewees

Interviewee	Age	Household income	Education	Life stage	Recruitment strategy
			Glasgow		
Jane	32	£30,000 or more	Further	Not working due to health reasons	Personal connection
Rose	62	£12,500 to £20,000	Secondary	Employed part-time	Personal connection
Aiden	28	Refused to state	Higher	Employed	Approached in a café
Eva	30	£20,000 to £30,000	Higher	Employed	Snowballing
Jacob	26	£30,000 or more	Higher	Graduate student	Personal connection
Victoria	44	£30,000 or more	Further	Employed	Visitor in an L&D centre
Liz	38	Up to £12,500	Secondary	Not working/jobseeker	Volunteer in an L&D centre
Barbara	48	Up to £12,500	No education	Not working due to health reasons	Volunteer in an L&D centre
Helen	53	Up to £12,500	No education	Not working/jobseeker	Visitor in a L&D centre
Thomas	58	£30,000 or more	Higher	Employed	Self-selected (flyer)
Olivia	53	Up to £12,500	Further	Not working due to health reasons	Visitor in a L&D centre
Mary	53	Up to £12,500	Secondary	Not working due to health reasons	Visitor in a L&D centre
Grace	49	Up to £12,500	No education	Disabled	Visitor in a L&D centre
Anne	44	Up to £12,500	Further	Not working/jobseeker	Visitor in a L&D centre
Harry	48	Refused to state	Higher	Employed (café owner)	Approached in a café
Sophie	36	£30,000 or more	Higher	Employed part-time	Personal connection
Alfie	31	£30,000 or more	Secondary	Employed	Employed in an L&D centre
Luke	19	£20,000 up to £30,000	Secondary	Employed	Employed in an L&D centre
Alex	21	Up to £12,500	Secondary	Not working/jobseeker	Volunteer in an L&D centre
James	41	£12,500 up to £20,000	Don't know	Not working/jobseeker	Visitor in an L&D centre
			Nottingham		
Ethan	27	£12,500 to £20,000	Higher	Graduate student	Personal connection
Max	19	Up to £12,500	Secondary	Not working/jobseeker	Self-selected (online)
Leo	26	Up to £12,500	Further	Self-employed	Self-selected (online)
Omar	45	Up to £12,500	Further	Employed (zero-hour contract)	Approached in a café
Oliver	28	£20,000 to £30,000	Secondary	Employed (zero-hour contract)	Self-selected (on site)
Sam	34	Up to £12,500	Further	Self-employed	Snowballing
Rebecca	30	£30,000 or more	Higher	Self-employed	Self-selected (online)
Emily	38	£30,000 or more	Higher	Employed	Personal connection
Laura	44	£30,000 or more	Secondary	Employed part-time	Personal connection

3.4 Analytical Strategies

In this section I describe specific analytical strategies employed to analyse the data. The first part of the section outlines the quantitative procedures, while the second part outlines the steps taken in the analyses of qualitative data.

3.4.1 Quantitative Analyses

In essence, the present analysis of OxIS survey data is a secondary data analysis (Bryman, 2012; Kiecolt & Nathan, 1985; Vartanian, 2011). A limitation of secondary survey analysis this project suffered from is the absence of survey items that would address some specific concepts under study. A big advantage of OxIS datasets, however, is their representative sample and a range of items available across five datasets. Survey data were handled and analysed using Stata version 13.1.

3.4.1.1 Descriptive statistics

Descriptive statistics are used to summarise data in order to make it easier to comprehend the information they encompass (Agresti & Finlay, 2009). The data are usually described with tables and graphs. Quantitative variables that can be described numerically in terms of variability of the data (Agresti & Finlay, 2009) were described with summary statistics, such as means, medians, standard deviations, and skewness. Throughout the results chapters I use graphs to represent relative frequencies and frequencies distributions of various variables. Specifically, descriptive statistics are used to show how trends in adoption of various ICTs and locations of Internet use changed over time and to describe newly created variables. Descriptive statistics were used also to analyse the interview questionnaire data.

3.4.1.2 Multiple linear regressions

Multiple linear regression is a type of multivariate analysis—that is, analysis of three or more variables. In multiple linear regression several quantitative or dichotomous variables (independent variables) are used to predict a value of a quantitatively measured outcome variable (dependent variable) (Meyers, Gamst, & Guarino, 2006). The main idea behind the use of multiple regression is that by using more than one explanatory variable, a more complete and possibly more realistic picture of how the world works can be painted.

The models tested in this study were built according to the existing theories of digital inclusion. Drawing on existing theoretical models makes this research explanatory, where the theory dictates what variables should be included in the model (Agresti & Finlay, 2009).

Multivariate linear regression models make a number of assumptions, such as that: the model is correct; the variance of the residuals is constant; the residuals are independent; and the residuals are normally distributed. Thus, detailed data diagnostics were performed before the analyses commenced and after preliminary analyses were run, to detect and fix any potential outliers, as well as non-linearity, collinearity, and heteroscedasticity between variables included in the models (Agresti & Finlay, 2009; Meyers et al., 2006; Wilkinson, Blank, & Gruber, 1996). No social science data are perfect, thus the diagnostics focused on uncovering whether any model assumptions are grossly violated and whether certain observations are highly influential in affecting the model fit or inference (Agresti & Finlay, 2009). No striking problems with the data were identified, thus no modifications were applied to the data (see Appendix A.3 for an example of regression diagnostics).

Multiple linear regressions were run where the dependent variable was continuous or could be treated as continuous, such as ubiquity of access and levels of online engagement. All regression parameters were estimated using the ordinary least squares (OLS) method. The OLS method makes "the difference between the predicted and observed values as small as possible" by minimising the sum of the squared residuals (Kohler & Kreuter, 2009, p. 185). As a general measure of model fit, adjusted R^2 is always reported. R^2 represents the "squared residuals that are explained by the model as a share of the total squared residuals" (Kohler & Kreuter, 2009, p. 195). It is usually interpreted as an indicator of the proportion of explained variance in the dependent variable. Adjusted R^2 results from a correction of R^2 value for the number of model parameters and the number of observations (Kohler & Kreuter, 2009). When hierarchical regression models are performed, the Bayesian information criterion (BIC) is also reported to allow the comparison of nested and nonnested models where the model with a smaller BIC is preferred (Long, 1997). For each model estimated regression coefficients, their standard errors and standardised regression coefficients (beta coefficients) are reported. Due to space limitations only standardised coefficients are reported in the main body of results chapters and full tables are reported in appendices.

3.4.1.3 Multinomial regressions

When the dependent variable in a regression model is not quantitative but has only two possible outcomes (the dependent variable is dichotomous), logistic regression models are used (Agresti & Finlay, 2009). However, when the dependent grouping variable has more than two categories that are assumed to be unordered, multinomial regression models are applied (Long & Freese, 2014). Multinomial logistic regression is an extension of the binary logistic regression. Multinomial models "simultaneously use all pairs of categories by specifying the odds of outcome in one category instead of another" (Agresti, 2007, p. 173). The order of categories in the response variable is irrelevant, because the response scale is treated as nominal (Agresti, 2007). Multinomial regression modelling is applied in Chapter 5, where I examine predictors of different types of access based on the locality dimension of access.

Logistic regression models are usually interpreted using odds ratios. Odds represent "the probability of belonging to one group (success) divided by the probability of not belonging to that group (not being successful)". The odds ratio is "a ratio of the odds for each group. It is a way of comparing whether the probability of a certain event is the same for two groups"

(Meyers et al., 2006, pp. 531–532). Technically, the estimated coefficients in all multinomial regressions were transformed to relative-risk ratios, which are defined as exp (b) rather than b. "Relative risk ratios are also referred to as odds ratios"(Long & Freese, 2014, p. 391). Thus, the results of multinomial regression analyses are interpreted in terms of odds ratios.

To estimate the fit of multinomial models two measures are used. McFadden's R^2 "compares a model with just the intercept to a model with all parameters" (Long & Freese, 2014, p. 126). Its adjusted version, which accounts for the number of variables in the model, is reported. As a second measure of fit I used the observed and predicted values to calculate the proportion of correctly classified cases.

3.4.1.4 Factor analyses

When new variables and scales were constructed data reduction methods, namely principal component factor analysis (PCFA) and principal components analysis (PCA) (Hamilton, 2009; Kohler & Kreuter, 2009), were used. PCFA was used to reveal patterns of interrelationship among variables and to test that the constructs were indeed unidimensional (Acock, 2013; Agresti & Finlay, 2009). PCA is a method of "reducing a large number of variables to a smaller number of statistically uncorrelated variables" (Agresti & Finlay, 2009, p. 532). It was used to "extract combinations of the observed variables" (Wilkinson et al., 1996, p. 633). When PCAs were performed, varimax rotation and Kaiser normalisation were used to produce clearly identified components (Wilkinson et al., 1996). Factor analyses were used primarily to assist construction of scales and new variables.

3.4.1.5 Measurement development

This section describes how variables used in quantitative analyses were selected and how new variables were constructed. I organise this section according to the three parts of the theoretical framework for studying access infrastructure and digital inclusion developed in

Chapter 2: offline fields of resources, mediating contextual factors and online fields of resources (see Figure 2.4).

Each OxIS dataset is a rich collection of items about individuals' Internet use and their socio-economic and personal characteristics. Although there are about 180 items that are present in all examined waves, selecting and constructing variables across waves was a challenge. There are subtle differences between items across waves. Thus, some modifications of items were necessary in order to test models across all years. Sometimes a compromise was needed in selecting a variable that is present in all five waves rather than the best one, which was present just in one or two waves.

Offline fields of resources

Following Helsper's classification of indicators in offline economic, cultural, social and personal fields of resources (see Helsper, 2012, pp. 406–410), I selected the next variables as indicators of individuals' offline resources; see Table 3.3.

Education, employment status, gender, ethnicity, age, marital status, presence of children in households and *disability* were measured in the same way in all five waves, as summarised in Table 3.3.

Income was measured in terms of total income of a household before tax. Income scales differed across survey questionnaires. In 2005 and 2007 income was measured on a five-category scale, whereas in year 2009 to 2013 it was measured on a six-category scale with a somewhat different composition of categories (see Table 3.3.).

Table 3.3. Variables measuring offline resources

Filed	Type	2005 2007 2009	2011 2013
Economic			
Income	Quasi-continuous	1: <=£12,500; 2: >£12.5-£25,000; 3: >£25-£37,500; 4: >£37.5-£50,000; 5: >£50,000	1: <=£12,500; 2: >£12.5-£20,000; 3: >£20-£30,000; 4: >£30-£40,000; 5: >£40-£60,000; 6: >£60,000
Education	Ordinal	0: No educational qualifications; 1: Secondary education; 2: Further education; 3: Higher education	
Employment status	Nominal	1: Students; 2: Employed; 3: Retired; 4: Unemployed (including permanently sick or disabled; doing housework; looking after children or other persons)	
Cultural			
Gender	Dummy	0: Male; 1: Female	
Ethnicity	Dummy	0: White; 1: Non-white	
Generation (age)	Continuous	18 or older	
Social			
Marital status	Dummy	0: Married, living with partner; 1: Single, divorced or separated, widowed	
Children in household	Dummy	0: No; 1: Yes (people under 18 live in the household)	
Extent of social contact	Quasi-continuous	Average. Range 1–5	
Participation in civic groups	Binary	0: No; 1: Yes (participate in at least one group)	
Extent of digital support	Quasi-continuous	Index. Range 0–5 (1–4 in 2005)	
Digital inclusion of a household	Binary	0: No; 1: Yes (other people in the household use the Internet)	
Personal			
Disability	Binary	0: No; 1: Yes (have a health problem or disability)	

Source: OxIS 2005–2013.

The variable *extent of social contact* measures individuals' intensity of social contact with family and friends who live nearby. It is constructed as a mean of respondents' scores on five items: "How often do you contact family or friends who live nearby by… (1) Going to visit them, they come here, or meet nearby? (2) Calling them on the phone (3) Emailing or instant messaging them (4) Writing a card or a letter to them (5) Text messaging". The response scale ranged from 1 "Less than monthly" to 5 "Several times a day". In 2007 and 2005 the item "By text messaging" was not available, thus the social contact item is a mean of four variables in those two years.

The variable *participation in civic groups* measures respondents' inclusion in various civic organisations. The variable is binary. If a respondent reports participating in at least one civic organisation they are coded as 1 "Yes". In 2013, 2011 and 2009 six items were included in the measure: participation in any social or sport club; residents', neighbourhood, school or other local group; environmental or animal welfare organisation; any other political or campaigning organisation; charity organisation or social aid organisation; or religious or church organisation. In 2007 and 2005, participation in civic groups was measured with a single question: "Do you attend meetings in your community of any club or association which is concerned with sports, charity, schools or hospitals, your neighbourhood, trade union, music or arts, or other community activity?"

The variable e*xtent of digital support* measures the extent of respondents' digital support network. It is a measure of what kinds of support people get in their Internet use. The variable is a sum of positive answers on five questions: "In the past year, have you… (1) Received help from family or friends (2) Received help from people at work/school (3) Received help from people at the Library (4) Received help from people at Internet cafés (5) Taken training courses". The item is constructed in the same way from 2013 to 2007. In 2005, however, the variable had a range from 0 to 4 because the item about receiving help at Internet cafés was not available.

Mediating contextual factors

Development of good measures of material dimensions of access is one of the goals of Chapter 5, thus they are discussed there. Likewise, providing a better understanding of technology-related motivational aspects of online engagement is among the aims of this research. Items used to measure motivations are discussed in Chapter 7. Lastly, online skills were measured with a single variable that was available in all OxIS waves. Respondents were asked "How would you rate your ability to use the Internet" and answered on a scale ranging from 5 "Excellent" to 1 "Bad". Previously, researchers used this item as a measure of Internet self-efficacy (e.g. Eynon & Helsper, 2010, 2015; Helsper & Eynon, 2013). In this study it is used as a general measure of online skills. This item was chosen because of its availability rather than its suitability to measure online skills. Many researchers have worked in this area and proposed more sophisticated measures of Internet skills (e.g. Hargittai, 2002a; Helsper & Eynon, 2013; van Deursen, Helsper, & Eynon, 2014; van Deursen & van Dijk, 2010). Unfortunately, OxIS introduced better measures of skills only in the 2009 questionnaire (see Dutton, Helsper, & Gerber, 2009, p. 15). Here, I work with a variable that is available in all five examined datasets.

Online fields of resources

Online fields of resources relate to activities people engage in online. In operationalising them, I follow Helsper's (2012) proposition and create six online engagement types, which map onto economic, cultural, social and personal fields of online resources. Helsper's (2012, p. 413) conceptualisation of online engagement types "relies less on people's own interpretation of whether they are included or not, and instead examines objectively what they actually do in the four fields of digital inclusion". Following this understanding, I classified different activities into six specific types of use based on what kind of engagement the activities represent, rather than creating types of use with an exploratory approach as they emerge from the data (see for example Blank & Groselj, 2014, 2015; van Deursen & van Dijk, 2014b).

Helsper (2012, pp. 412–414) proposes six types of online engagement in four fields of resources: (1) commercial and financial activities as well as information and learning activities are largely in the economic field of online resources; (2) creative and productive activities are mostly in the cultural field; (3) communication and interaction as well as participation and engagement activities are mostly in the social field; and (4) entertainment and leisure activities are mostly in the personal field. This classification is of course not clear-cut and Helsper acknowledges that specific types of use extend into multiple fields of resources. For example, some entertainment and leisure activities may enable people to connect to others, and thus facilitate access to social resources. Nevertheless, I find Helsper's categorisation of types of online engagement useful for thinking about what different online activities mean, and for organising Internet use data across five OxIS waves.

There were 27 items measuring online engagement that were available in all five datasets. They are displayed in Table 3.4 according to the six types of activities proposed by Helsper (2012). All items measure frequency of engagement in an activity on a six-item Likert scale ranging from 0 "Never" to 5 "Several times a day". As explained above, I categorised them into types of use based on their meaning. However, each type of use was tested for unidimensionality using the PCA method. In 2005 all but the variables included in commercial and financial activities loaded on one component. In commercial use the two items related to travel separated out. In 2007 the only two-dimensional type was entertainment and leisure, where getting information about local events and sport formed the second component. The same was true in 2011. In 2009 and 2013 entertainment and leisure also formed two components in the same way. Likewise, in those two years information and learning activities loaded on two components, where distance learning, looking for jobs and finding information for school loaded on the second component. Although some types of use are not perfectly distinct I decided not to make any changes to the initial grouping of the variables. The most problematic type is entertainment and leisure. However, separating out the events and sports variable does not make much conceptual sense. They are leisure activities like others included in that type. By contrast, it would make conceptual sense to distinguish between information and learning types of use. However, grouping these items into a single type is only problematic in two out of five waves. Thus, no changes were made to the composition of types, to ensure results are longitudinally comparable.

Table 3.4. Activities included in six online engagement types and proportions of users who engage in them

Activity	2005	2007	2009	2011	2013
Commercial and financial activities					
Buying a product online?	76%	79%	81%	88%	87%
Making travel plans?	82%	86%	88%	88%	81%
Making travel reservations/bookings?	75%	79%	78%	81%	77%
Using your bank's online services?	48%	55%	58%	63%	63%
Paying bills?	43%	51%	54%	62%	59%
Betting, gambling or entering sweepstakes?	10%	10%	11%	13%	20%
Information and learning activities					
Finding or checking a fact?	77%	80%	91%	90%	89%
Looking for news – local, national, international?	63%	69%	75%	79%	76%
Looking up a definition of a word?	45%	54%	71%	69%	72%
Looking for jobs, work?	43%	48%	47%	45%	49%
Getting information for school?	35%	33%	42%	43%	41%
Online distance learning for academic degree/job training?	21%	20%	23%	25%	27%
Creative and productive activities					
Write a web-log or blog?	5%	7%	19%	21%	19%
Maintain a personal website?	13%	12%	18%	22%	17%
Communication and interaction activities					
Check your email?	92%	92%	97%	97%	97%
Do instant messaging?	53%	57%	60%	60%	71%
Send attachments with your email?	67%	69%	74%	73%	69%
Make or receive phone calls over the Internet?	13%	20%	22%	25%	42%
Participation and engagement activities					
Post messages on discussion or message boards?	15%	25%	29%	36%	32%
Participate in chat rooms?	23%	27%	24%	28%	28%
Entertainment and leisure activities					
Getting information about local events?	66%	76%	82%	86%	80%
Downloading music?	51%	49%	55%	52%	57%
Looking for sports information?	53%	55%	57%	57%	57%
Playing games?	44%	39%	41%	46%	51%
To get jokes, cartoons or other humorous content?	33%	48%	40%	38%	41%
Downloading videos?	31%	31%	31%	31%	40%
Looking at 'adult' sites with sexual content?	15%	14%	12%	15%	12%

Source: OxIS 2005–2013.

Patterns of missing data on the activity items were inspected, and respondents who had missing items on more than 10 items were omitted from the analyses. In the remaining occurrences, "Don't know" responses were recoded to 0 "Never". I argue that in cases where respondents do not know how often they participate in an activity online it is reasonable to assume they do not do it. Participation in each type was measured in terms of intensity of engagement. Types were created by creating row means—for each respondent I calculated a mean of frequencies of engagement in activities pertaining to a type of use. Thus, each type of use has a range from 0 "a respondent never performs any activity of a type" to 5 "she does all activities of a type several times a day". Table 3.5 summarises characteristics of participation in six Internet use types.

Table 3.5. Summary statistics for online engagement types

		2005	2007	2009	2011	2013
Commercial & financial	% who participate	93%	94%	95%	96%	95%
	Mean (M)	0.95	1.04	1.09	1.2	1.18
	Standard deviation (SD)	0.66	0.68	0.67	0.67	0.69
Information & learning	% who participate	91%	92%	95%	96%	95%
	M	1.03	1.18	1.37	1.45	1.43
	SD	0.78	0.87	0.86	0.91	0.91
Creative & productive	% who participate	14%	16%	27%	29%	26%
	M	0.09	1.28	0.48	0.55	0.43
	SD	0.24	0.76	0.97	1.03	0.91
Communication & interaction	% who participate	92%	93%	97%	97%	98%
	M	1.81	1.98	2.07	2.11	2.23
	SD	1.01	1.11	0.99	1.01	1.02
Participation & engagement	% who participate	32%	39%	40%	45%	42%
	M	0.33	0.43	0.67	0.79	0.74
	SD	0.6	0.69	1.07	1.14	1.14
Entertainment & leisure	% who participate	88%	90%	93%	94%	91%
	M	0.91	0.95	0.98	1.03	1.1
	SD	0.77	0.77	0.72	0.77	0.77

Source: OxIS 2005–2013.

Lastly, the total amount of Internet use was determined by summing individuals' frequencies of participation in all 27 activities. The variable has a logical range from 0 to 135. This variable was constructed following procedures developed by Blank and Groselj (2014).

3.4.2 Qualitative Analyses

3.4.2.1 Data handling

Interview data was collected in a form of audio recordings. Gaskel (2000) argues that the first stage of interview data analysis is producing a good-quality transcript. The amount and form of transcribing, however, largely depends on the purpose of the study as well as availability of resources such as time and money (Kvale & Brinkmann, 2009). Taking into account resources available for this study, I decided to transcribe a portion of the interviews myself and to outsource transcription of the rest to freelance transcribers around the world. I transcribed eight interviewees using *transcribe*[8] software. All recordings were transcribed in full, word by word (verbatim). Care was taken to capture significant pauses and other aspects of speech that conveyed meaning (King & Horrocks, 2010). The same instructions were given to eight freelancers who transcribed the remaining 21 interviews. They were recruited via the UpWork[9] (formerly oDesk) online platform. Upon return, each transcription was inspected by re-listening to the accompanying recording to resolve inaudible parts, add contextual notes, and ensure quality. Recording quality and some respondents' thick accents were the major threats to the quality of transcriptions.

All transcripts were stored and managed using NVivo[10] software. Field notes and analytical notes were partly handled in NVivo and partly by using Excel spreadsheets, which I found very useful for categorising the data. The steps taken to ensure ethics throughout the data handing process are discussed in section 3.5.

3.4.2.2 Notes

An important part of data gathering and handling processes was note-taking. Richards (2009) discusses note-taking as a way of making data and recording contextual information. After

[8] Accessible at https://transcribe.wreally.com/.
[9] Accessible at https://www.upwork.com/.
[10] Accessible at http://www.qsrinternational.com/products_nvivo.aspx.

each interview was conducted, I took notes about the context of the interview and topics that the interviewee talked about most profoundly. Additional notes about observed general themes were taken after each transcription was completed or inspected. Notes were mainly kept in Excel spreadsheets together with interviewees' other attributes. During the coding process, notes and analytical memos (Saldaña, 2013) were taken using the annotations feature in NVivo. Extensive note-taking was used as a way of achieving rich rigor or "a rich complexity of abundance" in the process of data collection and analysis (Tracy, 2010, p. 841).

3.4.2.3 Coding

"Coding is analysis", state Miles and Huberman (1994, p. 56), who describe the process as reviewing qualitative data and dissecting them meaningfully while keeping the relations between parts intact. An integral part of this process is creating codes, which are most often "a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute to a portion of language-based or visual data" (Saldaña, 2013, p. 3). The broad aim of this process is "to look for meanings and understandings" (Gaskell, 2000, p. 53).

The coding as an analytical process in this study was iterative. My approach to the data was greatly shaped by Richards' (2009, p. 73) "up from the data" approach to analysis, which denotes "working up from them [data records] to ideas and explanations", and Saldaña's (2013) two cycles of coding methods. Richards (2009) distinguishes among descriptive, topic and analytical coding. The first, descriptive coding was done throughout the data collection and transcription process when each interviewee was described with general attributes. Second, topic coding that "merely allocates passages to topics" (Richards, 2009, p. 100) was performed in NVivo. In Saldaña's words this is the first cycle of coding. When starting the topic coding initial codes were developed to gather data relevant to the project's research questions. This part of the coding process was informed by previous digital inclusion research, infrastructure, re-domestication and media system dependency theories—"[i]t is on the basis of [...] theories that you work with [...] data to produce more theory, up from the data" (Richards, 2009, p. 74). Thus, some codes were developed deductively to capture concepts and processes relating to these theoretical propositions whereas other codes were developed inductively from the ongoing reading of the data. Specifically, in parts where the analysis concerned experiences of different modes of Internet access and processes of re-domestication inductive approach to the data was taken. By contrast, in parts where the analysis focused on infrastructural attributes of Internet access and experiences of Internet centrality a deductive approach was taken where specific existing theoretical categories were applied to the data for the purpose of validation.

The first cycle of coding where the process of close reading of the data was heavy with writing analytic memos (Saldaña, 2013)—over 16,000 words of memos were written—formed the ground for the second cycle of coding or analytical coding. Richards (2009, p. 102) defines analytical coding as "coding that comes from interpretation and reflection on meaning". It encompasses processes of classifying, integrating, synthesising, abstracting, conceptualising and theory building (Saldaña, 2013). This was a messy process where all memos were carefully read to identify larger themes in the data, parts of transcripts they referred to were revisited and interrogated, interviewees' experiences and practices were compared and contrasted, and new categories were developed. Most of this process was done on paper and using Excel spreadsheets, with constant checking and re-reading of the original transcripts.

The final stage of the analytical process emerged during the writing-up process, when the data were reorganised and specific snippets of data were selected to represent the underlying themes, concepts and processes identified in the interview data. To ensure credibility of the analytical process multivocality was aimed for by including interviewees' multiple and varied perspectives on the findings (Tracy, 2010).

3.5 Ethical Considerations

Any research that collects data from and about people needs to anticipate ethical issues that may arise during the research process (Creswell, 2009). Israel and Hay (2006) outline what social science researchers need to think about and do in order to conduct their research ethically. They argue that researchers should protect their research participants and minimise harm; develop trust with them by acting honestly and honourably; promote integrity of research and assure ethical behaviour during the all parts of the research process; satisfy organisational and professional demands of their institutions and professional bodies; and cope with new arising ethical problems (Israel & Hay, 2006). Below I explain what steps were taken to ensure that participants and data were dealt with in an ethical manner during the conduct of this research.

All OxIS survey interviews were conducted by an external research agency, which adheres to strict ethical guidelines. The interview research procedures were approved by the Central University Research Ethics Committee (CUREC) in November 2014. Participants in the qualitative interview study were given detailed information on the nature and goals of this research, as well as information on risks and benefits that could result from their participation. This information was summarised on a participant information sheet each participant received in a hard copy (see Appendix A.4), but the details of the study were also explained verbally. Participants were informed that the information they provide was to be kept confidential and when reported, their anonymity maintained. It was made clear to them that their participation was voluntary and that they could withdraw from the study at any point without loss of benefits (e.g. monetary compensation). If participants then agreed to take part in the study they were asked to sign a physical copy of a consent form (see Appendix A.5). Consent forms are used to "ensure that the voluntary nature of participation in the research project is explained an the details of the study have been directly and clearly explained to the participants" (Teddlie & Tashakkori, 2009, p. 199). When potential interviewees were approached and interviews conducted in public spaces like libraries and L&D centres, verbal consent from a member of staff was obtained.

Both survey and interview data were stored on a password-protected disk on the University of Oxford's private network. No third parties have access to the interview data. Before interview audio files were shared with the freelance transcribers they were asked to sign a non-disclosure agreement (see Appendix A.6). The agreement obliged the transcribers not to use the files for any other purpose but to complete the transcribing task, not to disclose them to any third party, and to delete any files associated with transcribing following the completion of the task. I tried to ensure that this agreement was enforced by reminding all transcribers to delete all the associated files upon submission of their work.

Finally, when the results of the interview study are reported, aliases are used to refer to the participants in order to assure their anonymity. Likewise, other private details that may reveal an interviewee's identity were anonymised.

Chapter 4: Studying Access as Infrastructure

4.1 Introduction

This chapter examines whether Internet access can be studied as infrastructure. In Chapter 2 I argued that a relational approach to studying complex systems developed within infrastructure studies can be applied to the study of individuals' Internet access to broaden our understanding of interrelations among individuals, technologies and social arrangements encompassing access. This chapter seeks to validate the infrastructural approach to studying Internet access by providing empirical evidence for conceptualising access as a foundation of material artefacts and social practices that support individuals' Internet use, as proposed in section 2.3. Concretely, this chapter addresses the first overarching research question of this project: *Do interrelations between the material artefacts and the social practices shaping access correspond to attributes of infrastructure (as defined by Sandvig, 2013)?*

Using qualitative interview data, the analysis presented here aims to establish a conceptualisation of Internet access as infrastructure. In doing so, I draw on Sandvig's (2013) conceptualisation of infrastructure, which revolves around its five attributes: invisibility, dependency on human practices, modularity, standardisation and momentum. The five attributes can be understood as outcomes of infrastructural processes. For example, when systems become invisible, become interrelated (modular), connect to other systems (standardisation), are hard to change (momentum) and reflect human practices, they can be perceived as a relational system—infrastructure—rather than simply as a collection of material artefacts. Infrastructural analysis of access extends beyond devices and locations and focuses on interrelations among them, human practices and the wider social system. Establishing that Internet access arrangements are complex systems of technologies and human practices, which can be thought of as infrastructures, is the goal of this chapter.

4.2 Attributes of Infrastructure

4.2.1 Invisibility

Infrastructures are normally invisible and become apparent only when they break. Infrastructure scholars study breakdowns because they illustrate dependencies (Nye, 2010). Sandvig (2013) argues that invisibility is an important attribute of Internet infrastructure—its major physical parts, from wireless signals to processes involved in loading a web page, are actually invisible.

In discussions with the interviewees, the invisibility attribute of access came to the fore when asked about things that frustrate them about the Internet. The connection being down or slow was the most commonly expressed frustration, which results in feelings of annoyance and impatience. For example, Anne, who always had an Internet-enabled device by her side, explained:

> When I've got to get on and the connection is down, aye. Or a certain website that you're wanting to go on it's like unable to access because it's down for maintenance or whatever. […] So that's the only kind of thing that really annoys me.

Other interviewees referred to unpleasant experiences with Internet connections as instances of "buffering", "lagging", "losing" or the connection being "cut off". However, a poor or unavailable connection is not the only reason for becoming aware of the access infrastructure. Apart from connection-related problems, interviewees started paying more attention to access when devices got slow, obsolete or broken. Such events spur conscious thinking about access arrangements.

Not being able to go online made participants feel annoyed, angry and frustrated. It also made them realise that a fast and working Internet connection is normally just taken for granted, as explained by Alfie:

> Um, just when you can't get a connection. That's probably the only thing which is probably quite sad, because you're used to being that fast and you're used to always having it there when it's not there. You become a frantic maniac […] It's made me very impatient I think, if I'm being honest.

These feelings were related to feelings of dependency. Participants expressed them when asked how they would feel if suddenly they lost an Internet connection or a specific device. Eva imagined she would feel "devastated" about losing her tablet because it is her "connection to the Internet" and she does "everything on it". While some interviewees expressed general feelings of dependency where not being able to connect would result in missing out on everything, others had more specific ideas about how limited access would be experienced. For example, missing out on information was unimaginable by Emily: "I would feel I was kind of losing out or […] I really do feel I would be missing out on information"; while for others not being able to talk to family and friends would be more problematic.

For the majority of interviewees the Internet was an integral part of their everyday lives. While they developed different Internet dependencies (this is elaborated on in section 6.3), most took Internet access for granted. It is always in the background and people become aware of it only when network connection is down or slow or when devices break. This is when access arrangements come to the fore, when access is thought about. Since the Internet is an integral part of the conduct of everyday life, broken devices, poor network connections or other unexpected changes in access infrastructure result in distress and feelings of missing out, whether related to staying in touch with people, keeping up to date with the world or maintaining business or family life.

4.2.2 Dependence on Human Practices

The second attribute of infrastructure is dependence on human practices. This pertains to the "soft" or non-technical part of an infrastructure manifested in practices and routines (Sandvig, 2013). Sandvig suggests that focusing on maintenance practices or practices that have to be learnt in order to use the infrastructure may be useful in understanding this attribute. Access infrastructure reflects an individual's investment of resources such as time, money or knowledge (Star & Ruhleder, 1996).

To understand human practices that shape access infrastructure, I focus on episodes of adoption of ICTs and practices that encompass maintenance of access. They reflect individuals' investment of resources. Thus, this section is organised around the four types of resources discussed in previous digital inclusion research. They range from social resources in the form of social networks, personal ones in the forms of knowledge and self-confidence, and cultural ones in the form of fitting in with users' surrounding "techno-culture", to economic resources in terms of disposable income (Helsper, 2012; Selwyn, 2004; van Dijk, 2005).

First, social resources in the form of an individual's social networks greatly shaped development of access infrastructure. The influence of social networks was observable in three specific instances—in obtaining Internet devices, in enabling a home Internet connection and sharing devices, and in providing support in terms of technical knowledge and use proficiency.

Many interviewees explained how they got a specific device as a present from their family or friends. In some cases, respondents wanted a specific device and they let their family and friends know about it, like Rose, who explained: "I've got it [a tablet] for my birthday and that's what I wanted of my husband". For Leo, getting a new laptop as a present from his girlfriend was not something he was "desperate for, but it was something that probably an extra year or two down the line I would have needed one, so I was quite thankful for it". For others, being given a new piece of technology was not something they wanted or felt they needed. Members of their social networks made that decision for them. Aiden told me how he got his tablet: “To be honest, my mum bought it for me, so I hadn’t actually buy it myself, so... I wouldn’t have actually bought it, if it wasn’t bought for me”. Similarly, Jacob was not keen on getting a smartphone, saying he hates them. However, he explained:

> I was very resistant to getting one. And my phone, that was my mum’s old phone, so a hand-me-down. […] Because she, she got a new one and... And she’s like, “Oh, you should get a smartphone!”

Jane got a tablet as a birthday present from her partner, but was not very excited about it, saying “I didn't feel like I needed it”. The important contrast between different ways that new technology entered access infrastructure was in whether respondents desired it or not. This had great implications for how devices were placed in the existing infrastructure. For example, Rose and Leo were really happy about their new devices, which took on roles of central devices in their access infrastructures. By contrast, Aiden and Jane did not really find a role for their new tablets within their existing infrastructure and thought buying them was a waste of money.

Apart from providing Internet-enabled devices, members of social networks were sometimes integral in enabling interviewees’ access to home Internet connections. This was especially important for respondents with low economic resources. Olivia explained she had gotten her Internet connection reactivated two months before the interview: “My brother and sister-in-law are paying for it for me in the house because I don’t have enough money”. James, who was unemployed and had five children, explained “My neighbour has WiFi. She lets us use her WiFi. Because we can pick it up in our house, so we can, so... She just gave us her password and that”. Similarly, Sam was using his neighbour’s WiFi, but was contributing towards the cost of it. For all three interviewees this was the only feasible way to have home broadband Internet access. In this way, their access was shaped not only by their own resources and practices, but also by those of their larger social networks. When people depend on other people for Internet access, changes in their life situations may result in access disruptions. For example, when Max’s sister went to university he lost access to a laptop. He explained, “Yeah, I used to use my sister's laptop, but then obviously, she goes to university, so she is quite busy with it. […] So, it is like, I am just stuck with my phone now”. Liz, whose old BlackBerry smartphone did not support access to the latest games, played games on her daughter’s phone: “I kinda wait until they’re sleeping and then I might be stealing their phones, sitting there [laughter], playing all the games”. Both examples illustrate how access to technology can be limited by other people’s daily routines. Liz waits for her children to be asleep so she can use their smartphones, while for Max a change in his sister’s life meant he lost access to a device they used to share.

Another way in which social networks were integral in developing and maintaining participants’ Internet access was by helping them learn how to use technologies. For Rose, this was very important in learning how to use a tablet:

> One of my other wee nieces had one [a tablet], my brother’s girl, and she showed me all the basics on it, how to do, and how to take your pictures and how to upload things.

Similarly, Liz, who was given a smartphone by her daughter, then asked her son to set it up for her (“to fix it”):

> I had to get my son to fix it all for me because he had something similar to my phone, so he just fixed it all for me, the BBM [BlackBerry Messenger], registered on uh Facebook and things like that and just starting “Alight mom this is how you go on this and that”.

For some respondents getting help from their social networks was not a one-off event, but they would rely on other people to perform activities they were not confident about. This mostly involved online shopping, like Helen, who found things on eBay and then “I say my son to get it for me and I’ll give him the money for it. But I don’t order it myself”, or Laura, who “can’t be bothered to go through the whole payment process”, so her husband does that for her. Relying on others for help is thus relevant not just in the phase of adoption but throughout one’s engagement with technologies.

This relates to the second type of resources shaping access infrastructure. Personal resources were manifested in terms of skills, self-confidence or self-efficacy in technology use. All played a role in respondents' engagement with access arrangements. For instance, Liz did not feel confident about touch screens, so when talking about what her new smartphone might be, she explained:

> I wouldn't go iPhone or anything like that […] because I've tried the touch screen phones and […] see all that swiping the screen and all that, and it just goes all… chaotic.

More technical knowledge was also desired by Aiden, who was explaining a network connection problem at work and how "if you've had just a bit more knowledge in computing you'd be able to fix it". Similarly, Olivia did not know how to deal with her laptop, which was heavily infected by viruses, and has thus stopped shopping online:

> I need to get a new laptop because I've got hackers that have gotten to it, and so I've been told… That you can't get rid of that once they get in, so I haven't bought anything for a couple of weeks.

Obviously, Olivia had little understanding of what was going on and it was her friend who had told her that there must be something wrong with her laptop. For others, their level of technical ability shaped management of access in a positive way. Thomas explained he did not need to upgrade his smartphone because he will

> download the stuff to a hard drive […] if I can work out how to do it because Apple are quite good at stopping you doing anything like that. But I've usually find a way around it. If I can clear the memory out, I'll probably keep it a little bit longer.

The above examples are contrasting. Lack of confidence and technical knowledge affects how people develop and engage with their Internet access in terms of what kind of devices they choose to buy and how they approach technology-related problems. By contrast, those who are confident in their technology use find ways to work around problems that may arise.

Third, cultural resources involved in development of access concerned fitting in with the present techno-culture. Selwyn (2004, p. 355) argues this is achieved through "socialisation into technology use and 'techno-culture' via techno-cultural goods". The importance of such socialisation was expressed by a number of interviewees. Eva told me about her mobile contract expiring soon, which is when she wants to get the "latest Samsung". When asked why, she explained that her present phone is "just embarrassing […] because it's a rubbish phone and my friends… Not that I wanna give in to peer pressure […] but you want something that looks nice". Alex, when asked whether he ever carried his tablet out and about, replied, "If it was an iPad, I would". Overall, acquiring devices because they "look good" or are "up to date" or because "everybody has them now" was a significant development, especially among younger respondents. However, even Barbara, who was unemployed, had no educational qualifications, only had a smartphone, and used the Internet very little and mostly for visiting Facebook, told me she had just gotten a new second-hand BlackBerry because "It's a more modern phone, so it's more updated". When asked why she needed a better phone she replied:

> **Barbara:** Aye. I don't know why, I just wanted one.
> **Interviewer:** Is it like, just to have something new?
> **Barbara:** Aye. It makes you feel better.
> **Interviewer:** To have a better phone?
> **Barbara:** Aye.
> **Interviewer:** Is it because your friends have them as well?
> **Barbara:** Probably aye! [laughter]

These examples can also be understood in terms of relative digital exclusion. When individual's family and friends move on in their technology use it is important to be able to follow them. For Ethan, not having an up-to-date phone, which would be able to handle applications his friends used, made him feel like he was missing out. He explained:

> I couldn't actually keep in touch with friends, because they had moved on in their technology… I ended up getting very frustrated and think that I was missing out on things, because people had begun to use Facebook messenger while they were using it kind of to organise meetings, and drinks at the pub while they were on the go, and because I was still just using Facebook when I was on the computer, kind of in the evening, and I was getting these… this information too late to actually… So I was missing out on things. So I, I just bought a new phone.

The above examples encompass practices of complying with an individual's reference group in terms of technology consumption. For some participants, being up to date with consumption of technologies was an important cultural resource, making them feel that they belonged to a particular group.

Lastly, practices associated with access development and management largely depend on individuals' economic resources. Technology-related expenses usually guided decisions about infrastructure maintenance. Especially in low-income households, this resulted in broken technologies not being replaced. Liz told me about replacing their laptop: "No, the weans[11] broke it and I thought, 'Too expensive to keep replacing it so you can just use the Internet so on your phones'". The same happened in James' household—children broke tablet computers and James decided they were not getting another one until they learn "how to be careful with this stuff". The amount of available economic resources is thus reflected in people's access infrastructure. Alex, who was using an old laptop, told me "As soon as I get a job, that [a new laptop] would be the first thing I'd put a wee bit money away for". Oliver, who had gotten his flat connected to broadband WiFi just a week before the interview, explained "It's mainly the money, I've only just been able to afford to commit to a contract where I have to pay for it monthly". Finally, for Sam, not having enough money to get a new laptop resulted in buying a tablet. By contrast, interviewees who were able to keep up with new technologies financially usually invested in new devices when old ones became obsolete or were no longer able to support their usage. A very general practice to save money on a daily basis was restricting usage of mobile data. Jane told me she has "got the thing [an app] that shrinks my data usage when I'm out". Many others were connecting their phones to WiFi connections whenever possible. These examples illustrate a strong influence of availability of economic resources on decisions related to consumption of technologies.

[11] A Scottish expression for children, little ones; also written as wee 'uns.

The above discussion of how access infrastructure is shaped by practices, which are itself shaped by social, personal, cultural and economic factors, demonstrates what complexities surround the dynamics of Internet access. It provides insight into how access to offline resources interacts with development and maintenance of access infrastructure.

4.2.3 Modularity

Modularity pertains to infrastructures being modular and incremental (Star, 1999). Since its parts are interconnected, modifying one part requires technical and social adjustments in other parts of the infrastructure (Sandvig, 2013). Modularity is understood in terms of interconnectedness. Specifically, in relation to Internet access, modularity concerns relations between different devices and connections.

Discussions with the interviewees showed that modularity of access infrastructure is manifested in various ways. When describing devices in use in his household, Alfie noted:

> We've got tablets, mobile phones, laptops in the house. Um, we've got a smart TV so there's, Internet's everywhere in our house and that's why we had to get fibre optics because the other one… We had to get a fast broadband to be able to cope with the demand, basically [laughter].

For Alfie, acquiring more and more Internet-enabled devices meant that his household needed to readjust the capabilities of its home Internet connection. A counterexample is Liz, who gave up her home Internet connection on realising that the Internet can be accessed using mobile network data. She told me she used to have a home broadband connection and explained:

> Oh it was in my house, my kids had been wantin' the Internet for stuff and I go to put on through the laptop and then I discovered that you could use it through your phone and that so that I got rid of the Internet that I had in the house.

In contrast to Alfie, Liz was not able to afford to pay for various ways to get online. After acquiring mobile Internet connection and realising that through a mobile hotspot her family members could connect all of their devices, she decided to cancel the home broadband connection. Oliver and his girlfriend, however, did just the opposite but for the same reason of saving money. When Oliver got his flat connected to a broadband WiFi they changed his girlfriend's mobile data plan. He explained:

> [N]ow she buys a cheap package each month, because we have Internet at home. So, when she leaves the home, she uses her Internet, and when she comes home she turns her Internet off and uses the WiFi.

All three examples show that parts of access infrastructure are interconnected. A change in one part of infrastructure often gets reflected in another part. Acquiring a new technology may interfere with individuals' daily use practices, but also with how the infrastructure at large is managed. Access is a dynamic entity where decisions related to one part get reflected in other parts, although they may not be directly related.

4.2.4 Standardisation

Standardisation allows infrastructure to connect with other systems (Star, 1999). Sandvig (2013) suggests that by focusing on boundaries of infrastructure and gateways that allow it to communicate with other systems, infrastructure's form and limits can be better understood.

Discussions with the interviewees identified two ways in which standardisation of Internet access is manifested. First, many participants explained how they connect their Internet-enabled devices to other technologies, such as televisions, portable speakers or cameras. Connecting an Internet-enabled device with a television screen was especially common. Usually, the process of connecting was perceived as easy and seamless. For example, Rose was explaining what she likes about her tablet and said that it has got "the television on it". What she had in mind were the BBC iPlayer and Netflix, which she was able to stream on her TV screen:

> So, I have Chromecast on my iPad and if I want to watch a film, I just press the Chromecast and it goes up to my television because it is connected through the Internet and through my hub. So, and I can watch television, look at my pictures, play my videos. Anything like that!

The majority of respondents who were connecting their Internet-enabled devices to other technologies were doing so in order to consume entertainment content like music, films, videos and video games. For some respondents, arranging the access infrastructure in a way it connected to other systems was really important. Alex, for example, mainly used his old family laptop as opposed to his new tablet just because the laptop was easier to connect with his TV. Laura and her husband were an exception, although Laura had rather negative views about the Internet in general, she refused to use a smartphone and has not used the Internet much outside work:

> The one good thing that you can do on that phone [her daughter's smartphone] and my husband's work phone […] We just had a new boiler and with that boiler comes an app called Hive. […] what it means is that you can be sat at work and from your phone you can switch the heating on, you can also control the heating, you can check any time and know what the temperature is in your house.

Laura further explained that controlling heating this way can save her family money and is just more efficient.

The examples above show that it is important to consider how access infrastructure can connect to other systems. Such possibilities may have various implications for people's daily lives. They can result in increased time spent on entertainment like in the case of Alex or may lead to financial gains as in the case of Laura.

The second example of how standardisation of access infrastructure enables users to connect to other systems is smartphones acting like hotspots. This is an example of how individuals can connect their own access infrastructure to another person's infrastructure. This attribute of access was used especially by those participants who were not able to afford a home broadband connection. Both Liz and Luke cancelled their wireless connections at home when they realised that mobile hotspots can be used to connect other family members' Internet-enabled devices. Luke explained:

> This phone can give out WiFi. So, we got rid of that [wireless broadband connection] and just use my phone. To get Internet. […] And, you know, that was the first big phone that I got. And I had found that I had a thing called Hotspot. It takes the Internet that it gets and gives it out and you can use that Internet on your phone or on a computer, on anything.

The ability of smartphones to act as routers and to connect other devices online is very important for users who cannot afford to pay for a broadband connection. This is a significant development in access infrastructure, which would not have been possible without standardisation practices in the wider technology industry. The same goes for Internet-enabled devices being able to connect with other technologies, which can contribute to users' online experience.

4.2.5 Momentum

The final attribute of infrastructure relates to the system's inertia and particular trajectory. Infrastructures are hard to change and their reorganisation would be costly and sometimes impossible (Sandvig, 2013). Momentum is most typical of large-scale systems and systems of great complexity. Although personal access infrastructures are more agile, they do take on particular trajectories and are sometimes hard to restructure.

Sometimes the reasons for rigidity of access are external, related to ways in which Internet companies operate. For example, Sam expressed his frustration over the inflexibility of Internet service providers. This was the main reason he did not have his own home Internet connection but was using and financially contributing to his neighbour's Internet plan:

> It's like, rented accommodation, so if I have to move, then I have to take it with me; and I've done that before, and I've found it's a real pain trying to move your Internet connection. Like, the companies don't really understand, oh, I'm like, "I'm moving, can

> I take it with me?" Or if you say, you know, "I only want it for a certain amount of time," they're like, no, you have to have it for two years.

Another example of such obstinacy in access pertains to mobile contracts that require users to pay for the phone and network usage for a certain amount of time. The contract cycle commonly determined respondents' decision to get a new phone, as in Thomas' case:

> I'm on a sort of two-year contract on mobile phone. When the two-year contract came to an end a year ago, I upgraded to an iPhone5, which is what I use now. […] It wasn't the free upgrade. But it was a nominal amount to upgrade it because I was the end of the contract if I renewed the contract.

By contrast, an active contract sometimes resulted in broken phones being replaced with users' old phones because new ones still had to be paid for.

Another important factor that shaped how access infrastructures' trajectories unfolded was the availability of economic resources in the form of disposable income that could be spent on technology. For the vast majority of the interviewees buying a new laptop represented a substantial investment and was not something that could be done right when a need emerged. This meant that old computers that no longer worked properly kept being used. For Alfie's family, buying a new laptop was perceived as a substantial expense and a considerable amount of thought was given to the right time for replacing their "very old" laptop; he explained "we kind of need a new one and we're being talking about it as for example, a joint Christmas present for the house". Sam also had an old laptop and when asked whether he ever considered replacing it, he answered, "If I'd had the money available, I would've bought another laptop". When discussing various parts of his access infrastructure Sam concluded: "but you know it's like, all these things I've got more from like financial points, rather than, like, sitting down and going 'Oh, what works well with what?'"

The above examples demonstrate that access infrastructures are sometimes hard to change and take on particular trajectories, which do not necessarily correspond to users' idea of optimal Internet access.

4.3 Conclusions

Throughout this chapter I demonstrated that people's experiences of access correspond to all five attributes of infrastructures as defined by Sandvig (2013). In this way the definition of Internet access infrastructure—a foundation of material artefacts and social practices that support an individual's Internet use—I proposed in Chapter 2 was validated. Internet access is a complex phenomenon and definitions focusing just on the material aspect of access cannot encompass all of its elements. The analogy with infrastructure not only informs a definition of access but also extends empirical grounds for studying it. Access is not just about devices and locations of use, but also about ways in which people experience it, augment it, rearrange it, and connect it to other systems, and about its openness to change.

For example, the above analysis showed that Internet access is often taken for granted. For most people it is always available and it runs in the background. However, when people experience trouble obtaining access, when devices become obsolete or break, access becomes visible. Such instances spur conscious thinking about access arrangements. Next, by illustrating how access infrastructure depends on human practices that stem from social, personal, cultural and economic fields of offline resources, I provided evidence of the relationship between offline resources and Internet access. Ways in which people arrange and relate to Internet access depend not only on an individual's knowledge about technologies, amount of disposable income and current life situation, but also on other people's actions and decisions, as well as on tacit norms of what is acceptable and appropriate within an individual's reference group. Importantly, an individual's practices shaping access reflect a complex combination of various competing factors. For example, individuals experience tensions between availability of economic resources and kinds of technologies acceptable in their reference group, resulting in specific use practices (e.g. Alex never carried his tablet around because it was not an iPad); or tensions between personal perceptions of technology and actions of their family or friends, resulting in adoption of technologies even when not desired (e.g. Jacob started using a smartphone because his mother gave it to him).

Next, I demonstrated how different parts of access infrastructures are related—changing one part often results in changes that affect other parts of an infrastructure. Thus, Internet access has to be studied holistically. In this, the metaphor of an infrastructure is especially useful, encompassing material and social elements of access. For example, when a new device with specific capabilities is adopted (e.g. a smartphone that can be used as a hotspot for connecting other devices), existing access arrangements are re-considered and re-adjusted. Furthermore, examples of how people connect their Internet-enabled devices to other systems like TVs or connect through hotspots were provided. Clearly, access infrastructures extend beyond personal use of devices but relate to other systems and other people's infrastructures as well. This development may gain further importance in the future with the emerging concept of Internet of Things, which refers to connecting a plethora of smart gadgets and devices to the Internet and each other (Ofcom, 2015c). It is likely that personal Internet infrastructures will become even larger and more complex concerning various aspects of everyday life, extending beyond entertainment to domestic management such as controlling heating. Finally, interviewees' experiences reflected the momentum of access infrastructures. For the majority, a complete reorganisation of their Internet access arrangements would be impossible. Apart from availability of offline resources, infrastructure's inertia is also shaped by the larger ecosystem of Internet service providers and mobile companies.

Taken together, the explanatory value of the concept of infrastructure—specifically, its five attributes—lies in providing ways in which the study of personal Internet access can move beyond binary and overly material approach to studying access. Conceptualising Internet access as infrastructure directs attention to access dynamics and relationships between its various parts, individuals and other systems. This is especially relevant in today's complex landscape of Internet technologies. For example, the five attributes can help guide inquiry into various dimensions of Internet access, such as: how people take access for granted and rethink its provision when connection is disrupted or when devices break (invisibility); how access is shaped by income, individual's self-efficacy, actions of family members or friends, or technology-related developments in individual's reference groups (dependence on human practices); how acquisition of a new device shapes decisions regarding existing devices and connections (modularity); how individuals use their mobile devices to use and control other devices (standardisation); or what factors hinder reorganisation of access arrangements (momentum).

Importantly, through examining the five attributes of infrastructures I demonstrated that Internet access is a complex and dynamic phenomenon. It consists not only of martial artefacts but also of relations between them and social practices that shape their organisation. Thus, conceptualising Internet access as infrastructure proved a useful approach to understanding its complexities, which reach beyond adoption or non-adoption of a specific device and encompass the ways people arrange and relate to different parts of it.

The next step in furthering our understanding of access is examining the material and social parts of access more specifically. While the above analysis shed light on the ways infrastructural attributes of Internet access are experienced, specific dimensions of material artefacts as well as specific processes underlying access' dynamics have not been disentangled. A lack of specific concepts to study these separate dimensions of infrastructure is a limitation of Sandvig's (2013) framework. Thus, other relevant concepts and theories of adoption and use of ICTs need to be incorporated into the infrastructural analysis of personal Internet access, as suggested in Chapter 2. The next chapter focuses on examining material dimensions of Internet access, whereas Chapter 6 is concerned with social practices shaping access.

Chapter 5: Material Dimensions of Access and Their Longitudinal Dynamics

5.1 Introduction

This chapter examines material dimensions of access—quality, locality and ubiquity—and, where possible, their longitudinal dynamics. The objective of the chapter is to address the second research question: *How have both the material dimensions of Internet access and gradations in forms of inclusion changed over time?* I aim at providing a thorough understanding of how material dimensions of access are experienced, their dynamics, and factors that shape access arrangements. The chapter focuses on describing developments in material access over time and highlighting any inequalities observed in this process, such as what segments of the population were able to develop more advanced material access infrastructure.

The chapter opens with an overview of how adoption of devices and locations of Internet access developed from 2005 to 2013. This section provides an insight into the landscape of Internet access in Britain. The remainder of the chapter is organised around the three material dimensions of access—quality, locality and ubiquity. Both qualitative and quantitative data are used to examine their characteristics and determinants. First, each dimension is examined with qualitative data to provide a better understanding of how different dimensions are experienced. Second, drawing on findings from the interview study, survey data are used to operationalise material dimensions and examine their longitudinal dynamics. Third, gradations in access inclusion are examined to identify segments of the population with less varied material access. No appropriate items to examine quality of access quantitatively were available in OxIS datasets. Thus, longitudinal dynamics and inclusion are only examined in terms of locality and ubiquity. The chapter concludes with a summary of the results and a short discussion of their implications for the following chapter.

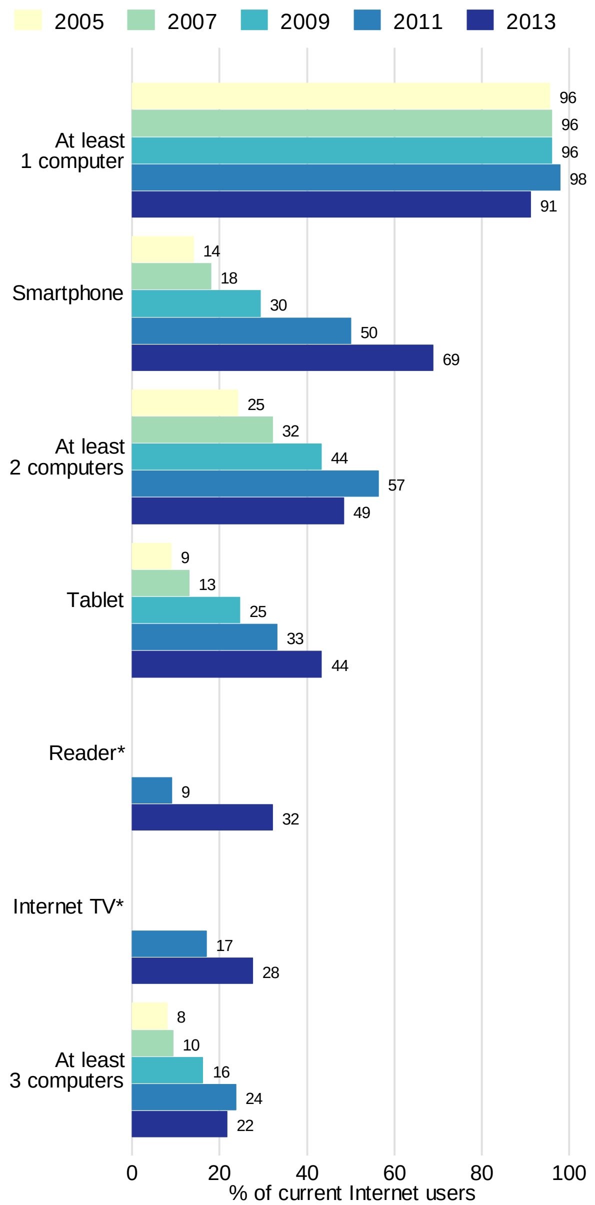
5.2 An Overview: Adoption of Devices and Locations

This section provides an overview of longitudinal dynamics in adoption of devices and locations of Internet use in Britain in the eight-year period from 2005 to 2013. Devices and locations of use are examined as the core components of material dimensions of access. Moreover, these are major sources of variation in access infrastructure. Among British Internet users, a home Internet connection is almost universal. In 2013, 98.67% of Internet users said they have Internet access in their home;[12] 0.64% said they had access in the past, but do not have it presently; and 0.67% of users said their household was never connected to the Internet. While there is some variation in the types of connections people use to go online, OxIS data (Dutton et al., 2013, p. 17) show that the vast majority of connected British households have a wireless Internet connection (96%). Similarly, Ofcom (2014) reports that all connected households in the UK have some level of broadband, although speeds vary considerably. Thus, this section examines adoption of devices and locations of Internet use from 2005 to 2013.

Adoption of Internet-enabled devices has grown steadily over the years (see Figure 5.1). Compared to 2005, in 2013 larger proportions of Internet users owned all examined devices. In 2013, a PC was the most widely adopted, with 92% of users having at least one PC at home. The second was smartphones (69%), followed by access to a second PC at home (49%), tablets (44%), e-readers (32%), and access to a third PC (22%). The least widely adopted was a TV with a built-in Internet connection (28%).

[12] Question: "Does your household have access to the Internet?"

Figure 5.1. Adoption of Internet-enabled devices (2005–2013)



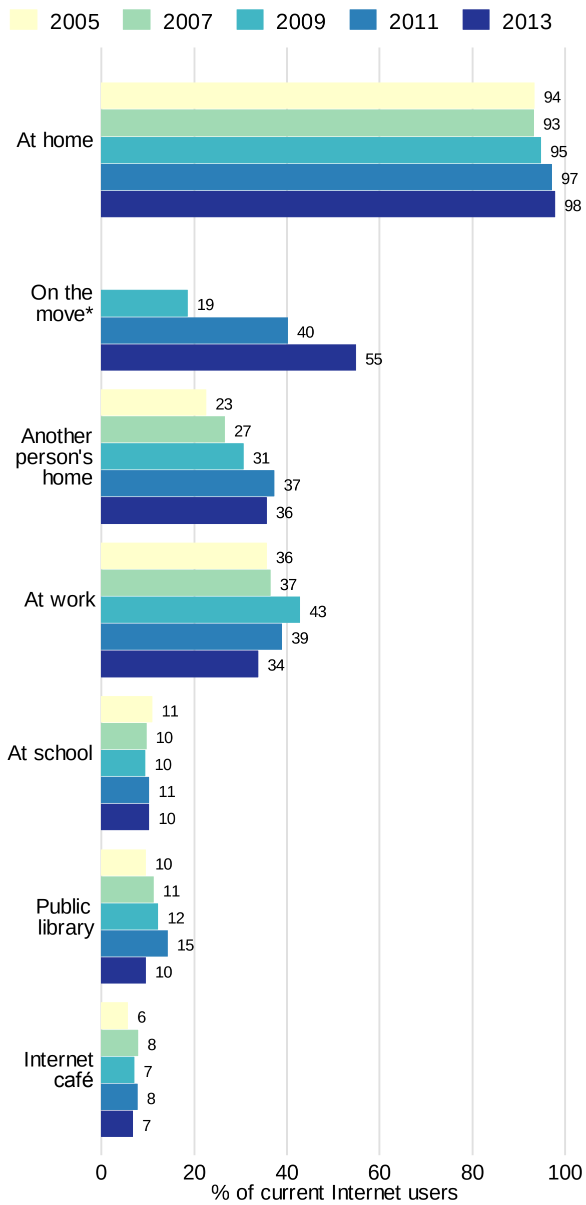
OxIS current users (>17): 2005 N=1,216; 2007 N=1,456; 2009 N=1,289; 2011 N=1,375; 2013 N=1,537
*Note: Question not asked in 2005, 2007, 2009.

Looking at the general longitudinal trends, the most dramatic shifts occurred in the adoption of mobile Internet-enabled devices. In 2005 only 14% of users had a smartphone, while in 2013 69% of users reported having one. Use of tablet computers increased from 9% to 44% from 2005. For both devices, the growth in adoption accelerated after 2009. Another trend observed in Figure 5.1 is a continued presence of computers at home. Well over 90% of users reported having at least one computer at home, and about half of users reported having at least two computers. Nevertheless, there seems to be a small but interesting shift in PC ownership in the last two waves. From 2011 to 2013 the percent of users who reported having at least one or at least two PCs decreased marginally by six and eight percentage points respectively. By contrast, there was an increase in the use of e-readers (from 9% to 32%) as well as Internet-enabled TVs (from 17% to 28%).

The second integral part of material access is locations at which people access the Internet. Figure 5.2 shows proportions of users who reported going online at seven different locations.

Home is by far the most common location of Internet use. In 2013, 98% of users went online at home, only up from 94% in 2005. As of 2013 the second most common location of Internet use is on the move (55%). There was an increase of 39 percentage points in use of the Internet on the go from 2009 to 2013. In 2013, home and on the move were followed by use at another person's home (36%) and at work (34%). Previously (2005–2009), access at work was the second most common location of use. On average, across five survey waves 38% of Internet users went online at work. The percentage of users going online at another person's home increased from 22% in 2005 to 36% in 2013. However, it is not clear whether this involves access on other people's Internet-enabled devices or on respondents' own portable devices. Over the years, there has been little change in the proportion of users who go online in various public places—less than 15% of users report going online at schools, public libraries or Internet cafés.

Figure 5.2. Adoption of Internet use locations (2005–2013)



OxIS current users (>17): 2005 N=1,216; 2007 N=1,456; 2009 N=1,289; 2011 N=1,375; 2013 N=1,537
*Note: Question not asked in 2005, 2007.

Overall, there has been relatively little change in terms of proportions of users who report going online at various locations. Access on the move and access at another person's home are exceptions. Compared to devices, there seems to have been more stability in the patterns of locations of Internet use over the observed eight-year period.

These longitudinal trends demonstrate that access is a dynamic phenomenon. The ways most people go online changed considerably from 2005 to 2013. Most significantly, mobile Internet access—either on mobile devices or in mobile contexts—became the second most common mode of access, with about two thirds of users having some mobile access. By contrast, in 2005 most people went online on PCs at home and at work. This indicates a major transformation in users' access arrangements with possible implications for how people engage with online resources. The remainder of this chapter provides a more nuanced picture of dynamics of material Internet access by separately examining quality, locality and ubiquity of access. To discern their meanings, each is first examined qualitatively. Dynamics and inclusion factors of locality and ubiquity are then also examined quantitatively using longitudinal survey data.

5.3 Quality

5.3.1 Experience

In discussions with the interviewees, quality of access infrastructure came to the fore in two ways, with sharp differences between those with poor- and good-quality access. Respondents most commonly indicated poor-quality access when they explained why they do or not do something online. Good-quality access was usually talked about in relation to device affordances and ease of use, supported by less concrete examples of usage but with more subjective perceptions and feelings.

Poor quality of devices and network connections was discussed in relation to concrete online experiences. For example, Oliver said that in terms of Internet use he mostly uses his BlackBerry for messaging, explaining:

> That's it, because if I go on the Internet, it really frustrates me, because when I try to search for a website, it cuts out, it doesn't do it very well. [...] It's not a very good phone for Internet. It's good for talking, not very good for Internet.

Similarly, Liz had an old BlackBerry and when discussing job searching on her phone she explained:

> I've tried but, see there's certain things that you cannot get on, in your phone, like my daughter can bring up like a lot of stuff on her phone obviously 'cause it's the iPhone, but I cannot get it on my phone I think it's because mine's a bit dated. […] [M]ine's just a limited thing.

Poor quality of network connections was mentioned less often. It was a significant problem for Mary, who lived in social housing. The housing association renovated her building and moved from "dishes" to "aerial", which resulted in their flat getting poor signal. Mary thought:

> I suppose it just all depends on the weather, on a signal you're getting. I can definitely see it's dropped quite a bit when they took away our dishes.

When asked how this affects her, she explained:

> As I said, shopping and you've lost the Internet connection so your shopping basket gets empty… Things like that and it could take you 5, 10 minutes before you even get back on. […] When it's slow – that can be quite frustrating.

The above examples indicate that poor quality of access is experienced most profoundly when it prevents people from engaging with the Internet in ways they want and expect to. This often results in feelings of frustration. When devices and connections are not working properly users are affected not only in terms of not being able to attain their use-related goals but also emotionally. Poor quality of access is frustrating especially because users are aware that better devices and connections would enable them to have a more favourable online experience. Oliver and Liz for example both expressed that their phones were not really good at connecting to the Internet. Liz specifically made a comparison to her daughter's phone to make a contrast between her "outdated" phone and her daughter's up-to-date phone. Poor quality of access constructed a part of their daily online experience and interviewees were aware how it limits Internet use. Thus, it would be reasonable to assume that most users experiencing poor-quality access would indeed engage with online resources more if they had better and up-to-date devices and network connections. In fact, interviewees who perceived their devices as old and incapable or their connections as slow often wished they could replace them.

By contrast, interviewees with good-quality access described their access arrangements in passionate and exciting ways. This was especially common when there was a relatively new piece of technology present in their infrastructure.

Jane, who had gotten a new smartphone three months before the interview, compared her new phone to the old one:

> It's just more intuitive, and it’s quite good, the camera is better and, it's just. It's definitely quicker. […] It doesn't maybe look as good, but it's definitely more user friendly. Yeah, it’s clever, it’s clever.

Similarly, Anne had gotten a new tablet just six weeks before the interview. She was extremely enthusiastic about it, exclaiming “The tablet’s pretty good. I love mine! […] That’s what I love about it – it's something so small, you can keep so much, so much data in it”. Omar also really liked the fact that his new smartphone was “[f]aster. Yeah you can just use with one hand. It’s easy. […] So, this is easier to carry, just put it in my pocket, yeah. […] It’s light, and small. It’s nice”.

When interviewees had good-quality access on up-to-date devices, they would not only explain about their technical affordances such as speed, size, or ease of use, but would also refer to the devices using words like “clever” or “nice” or by saying they “love” it. High-quality devices that enable favourable online experiences arouse positive emotions. Thus, high-quality access gets described as technologically capable but also with human-like adjectives like clever, smart or brilliant. Such experiences of quality usually do not relate to a specific online activity, but summarise a more general perception of one’s Internet access and online engagement.

5.4 Locality

5.4.1 Experience

Within the dimension of locality, I distinguish among three types: home, institutional and mobile access. Below, I discuss all locality types by providing evidence of how they were experienced by participants in the interview study.

Home and institutional access were commonly discussed in the context of having or not having access at home. The characteristics and significance of both are best understood through experiences of low-income individuals who struggled with obtaining access. This is because participants who had never experienced problems gaining access at home did not discuss its prominence. For them, access at home was something usual, normal and taken for granted. By contrast, Olivia, Liz and Oliver, who had struggled with obtaining Internet access at home, had strong opinions about it.

Olivia lost her connection after she stopped working because she was not able to afford it. She was without an Internet connection at home for three years and her brother and sister-in-law had started paying for it just two months before the interview. When asked how she felt about this she exclaimed, "Oh, it's good, because you can sit and look up anything". About the experience of not having access, she told me:

> Well, everyone would go "Oh, the Internet, oh the Internet; you need to get it, you need to get it" and then "Oh, I don't need it, I don't need it"; but it does open things up, because there are days that I can't go out [Olivia was diagnosed with fibromyalgia], you know, with the pain, so I can sit or lie with the laptop, you know, and still can communicate with people [laughing].

During the three-year period without home access, she was able to go online elsewhere—"I used it elsewhere, when I was over at my brother's and sister-in-law's or in here [at the L&D centre] and in library and that". However, her experience of library access was not favourable: "Anytime you go to the library you can guarantee that there's a class on or you can't get booked in…" Thus, Olivia asserted "but it is better having it at home. […] You're better having, like, the proper wireless".

Liz had similar views about going online in public places. She told me about not being able to send off job applications from her BlackBerry:

> I know it's alright sayin' that I can come down here [L&D centre] at the job club and do my applications and that, of course, in the computer room. But a lot of times they've got, there might be functions on and you cannot get on the computers or sometimes it's too busy; you come down and they are all took, so I find it I would rather have a phone of my own that way I know that I can sit in the house, that if there's any problem I can do it all through my own phone.

Helen, who was a regular user of the Internet in the same L&D centre, explained why being able to also go online at home is important in terms of job searching: "I can apply for a job in here [at the centre] and by the time I get back [home] I get a reply back in my email or so". She also added that if an application deadline for example falls on a Sunday, she needs to be able to do it from home.

The above examples make three related points. First, home Internet access is important and can make a difference in an individual's life. Having home access can make people feel more connected and in control of their daily online activities. Second, home access is different from institutional access. Institutional access is less flexible and more constrained and offers less autonomy, as suggested by many scholars of digital inclusion (see section 2.4.2). Having an Internet connection at home enables people to go online whenever they wish and do whatever they want. By contrast, institutional access can be "quite restricted" because "most sites are blocked" as interpreted by Max, but also because of temporal and spatial constraints described by Liz and Helen. Third, for some people both home and institutional access is integral to their daily Internet use, especially for the disadvantaged and unemployed users. Seven out of 29 interviewees at some point attended an IT class at an institutional locality.

Job clubs that offered support in creating CVs, finding jobs and sending applications online were integral to unemployed interviewees. Hence, institutional access and support constitute a noteworthy part of many British Internet users' access infrastructures. However, people are better able to reap more benefits of the Internet when they can also access it at home.

In discussions with the interviewees another important aspect of public Internet access was uncovered—availability of free wireless connections in public spaces. Omar, for example, bought a new smartphone four months before the interview, but had no mobile data allowance. Thus, he connected his phone only at home or in cafés—"I come to a coffee bar to connect to the Internet. I don't pay monthly". Similarly, Max for some reason was not able to use mobile Internet data on his new smartphone. However, this was not too problematic for him. He explained, "I can easily either jump into Burger King, or KFC, or McDonald's". Availability of free hotspots was one of the reasons Anne always carried her tablet around:

> There's WiFi all over the city, you know, at McDonald's, you get free WiFi at McDonald's. [...] And because my contract with this [smartphone] is run by O2, they have hotspots all over. [...] So I can get it on my tablet as well.

In short, interviewees were connecting their own Internet-enabled devices anywhere free WiFi was available. Availability of free Internet access is vital especially to those individuals who cannot always afford to pay for mobile data, like Omar and Max. Moreover, it may be especially vital to people who only go online on mobile devices. Ofcom (2015a, p. 27) reports that in 2014 6% of the UK population reported going online only on devices other than a PC, laptop or notebook. Thus, availability of free public Wi-Fi may become an increasingly important component of institutional access.

In this way nowadays institutional access blends together with mobile access, which is the third type of locality. In the context of this research, mobile access is understood as access on the go and access on portable Internet-enabled devices. Only three of the interviewees never carried their devices around or used a smartphone. All other interviewees, however, had experience of accessing the Internet on the go. In general they thought it was a great thing, enabling just-in-time access to information, constant contact to people and greater flexibility by enabling access anywhere and anytime.

Anne, for example, explained why she thinks it is important to be connected when out and about:

> Very important, aye. It keeps you in contact. It keeps you in contact so you know the minute – if a job came in you'll automatically get the email and it will ring on my phone, so I can check it on my phone.

For others, being able to connect when out and about was important because it enabled them access to information in "emergency" situations. Eva explained:

> I think it's important in the sense that there are occasions when you may get lost or you want to know train time or you want directions, something like that, then I think it's really important.

Jacob noted that "when you need the map it's really handy to have mobile access" and many others agreed with that. Being able to go online on the go meant that Internet connection was available if and when needed. This awareness was reassuring especially in emergency situations.

Similarly, with the Internet enabling interpersonal communication, keeping in touch with people while on the go was also revealed as an important feature of mobile locality. Anne explained:

> Especially if you're on Facebook seeing what somebody else is up to or whatever. Yeah... yeah, if you don't get Internet access then... aye, you don't know what's happening with people.

Thus, some interviewees noted that the feeling of connectedness is what they would miss most in case of losing mobile access. Jane noted "Umm, just being connected with people. Whether it's like strangers or friends". Mobile access was important also because there are specific communication tools only available through mobile Internet, as Oliver explained: "As long as my phone has Internet I can talk through BlackBerry [Messenger], or WhatsApp, there's communication Internet sites that, you know, all of my friends have".

Another theme related to mobile Internet access was the flexibility in where and when people could go online. This was nicely summarised by Sam, who had a smartphone as well as a 4G-enalbed tablet:

> [I]f I'm out and about, and you just, you know, want to play a game for a little bit, or check something, you know like... like last year, nice sunny day, I sat in the park, and it's like, oh, I could just play this game for a little bit! And, it's like, I like that because I like – I like the idea of being able to take that technology out into the world and not be confined to, like, a desk, because it's really useful and the Internet is, like, so essential to most things that everybody does.

Moreover, the flexibility of using Internet-enabled devices in any situation was not perceived as useful only when out and about but also within the home context. Omar, being a smoker, used his tablet in a very particular situation every morning: "I go sit outside, take my coffee and smoke, and I check my email [on a tablet].”". Mary, who had arthritis, liked the fact that with the tablet she could "sit at absolutely anywhere […] so that I'm in comfort".

In summary, interviewees associated mobile Internet access with convenience, and a possibility to go online anywhere and anytime. This was especially important in terms of access to information, communication and being able to respond quickly in situations that needed an immediate response like receiving a job advert. While everyone used their smartphones or tablets at home as well, when asked about importance of the "mobile Internet", participants would generally describe their experiences with going online out and about. Internet use outside the house was almost always on smartphones or tablets. Only Sam and Leo reported taking their laptops around to do work at various places. In general laptops were used at home or at work whereas smartphones and tablets were used on the go as well as at home, where their portability enabled distinct settings of online engagement.

5.4.2 Longitudinal Dynamics

Creating a typology of access localities across waves is a challenging exercise since there has been a considerable change in adoption of devices and locations of use over time (see section 5.2). Thus, the analysis below aims at creating broad categories of access localities depicting general arrangements of access. Surely, as the above analysis of interview data showed, every individual has their own repertoire and perceptions of access and no general typology can capture such nuances.

OxIS data are used to test whether different localities of access exist empirically and to examine their longitudinal dynamics. To identify types of locality, PCAs were ran on all devices and locations items with five waves of OxIS data from 2005 to 2013. Since not all access items are available in all datasets, two modifications to the treatment of variables were made after preliminary analyses. First, three "number of PCs" variables were grouped into a single variable of the number of working computers available in a household, ranging from 0 to 3. Second, two devices items were excluded from the analysis—e-reader and Internet-enabled TV items were only available in 2011 and 2013. To ensure results are comparable across the eight-year period, these two items were excluded from the analyses. However, the item "going online on the go" was included in the analyses although it was not present in all survey waves. This is because it is present in three out of five datasets (2009–2013) and because it relates to one of the major technological developments in the studied time period, i.e. development of the mobile Internet. Table 5.1 shows the rotated component loadings for components that had eigenvalues above 1.0, a standard cut-off point (Wilkinson et al., 1996). In each survey year three such components were identified, representing home, institutional and mobile access localities. To some extent the composition of components and their order changed over time.

Table 5.1. Locality types: PCA rotated component loadings (2005–2013)

		2005		
Variable	Component 1 **Institutional**	Component 2 **Mobile**	Component 3 **Home**	Unexplained
At library	0.524			0.505
At school	0.506	-0.169	0.364	0.462
At café	0.452			0.612
Other's home	0.427	0.140		0.632
At work		0.619	-0.241	0.438
Tablet		0.558	0.166	0.513
Smartphone	0.111	0.430		0.701
PCs at home		0.231	0.645	0.357
At home	-0.248		0.591	0.367
Eigenvalue	1.837	1.451	1.125	
Explained variance	0.191	0.154	0.146	0.491 (∑ Rho)
		2007		
Variable	Component 1 **Institutional**	Component 2 **Home**	Component 3 **Mobile**	Unexplained
At library	0.548	-0.105		0.459
At café	0.490			0.579
At school	0.462	0.280	-0.207	0.487
Other's home	0.368		0.236	0.672
PCs at home		0.646		0.365
At home	-0.293	0.584	-0.149	0.378
Tablet		0.372	0.302	0.610
At work			0.668	0.423
Smartphone			0.576	0.538
Eigenvalue	1.770	1.583	1.136	
Explained variance	0.193	0.160	0.145	0.499 (∑ Rho)
		2009		
Variable	Component 1 **Mobile**	Component 2 **Institutional**	Component 3 **Home**	Unexplained
On the go	0.545			0.360
Smartphone	0.525		-0.122	0.417
Tablet	0.442		0.176	0.498
At work	0.334		0.153	0.694
At library		0.593	-0.229	0.292
At café		0.548		0.460
At school		0.518	0.155	0.558
At home			0.672	0.359
PCs at home	0.173	0.177	0.553	0.403
Other's home	0.275	0.207	-0.287	0.615
Eigenvalue	2.466	1.687	1.191	
Explained variance	0.221	0.172	0.142	0.535 (∑ Rho)

Table continued

		2011		
Variable	Component 1 **Mobile**	Component 2 **Institutional**	Component 3 **Home**	Unexplained
Smartphone	0.567			0.324
On the go	0.560			0.313
Tablet	0.387		0.172	0.627
At work	0.301			0.795
Other's home	0.299	0.254		0.604
At library		0.618		0.348
At school		0.517	0.195	0.509
At café		0.505		0.532
At home		-0.104	0.690	0.417
PCs at home	0.139	0.108	0.654	0.365
Eigenvalue	2.641	1.440	1.086	
Explained variance	0.220	0.178	0.119	0.517 (∑ Rho)
		2013		
Variable	Component 1 **Mobile**	Component 2 **Institutional**	Component 3 **Home**	Unexplained
On the go	0.618			0.250
Smartphone	0.565			0.344
Other's home	0.435	0.148		0.545
At work	0.316		0.193	0.647
At café		0.594		0.317
At library		0.572		0.362
At home		-0.404	0.250	0.639
At school		0.346	0.234	0.671
PCs at home			0.697	0.312
Tablet			0.595	0.420
Eigenvalue	2.735	1.704	1.054	
Explained variance	0.211	0.191	0.147	0.549 (∑ Rho)

Source: OxIS 2005–2013. Blanks are loadings that are <0.1. Loadings >0.4 are shaded in grey.

In all five waves, access at a library, school and café load on the same component. All three are institutional and public spaces, thus this component corresponds to institutional access. In 2005, access at another person's home also loaded on the institutional component, indicating that this location was an alternative access point for those who did not have access at home—it loads very weakly and negatively on the home component.

The home access component was stable in the first four waves. Having one or more PCs at home and going online at home loaded strongly together from 2005 to 2011. These two items are the basic dimensions of home Internet access. However, in 2013 the item going online at home changed positions with the strongest (but negative) loading on the institutional component and a somewhat less strong loading on the home component.

The mobile access component was the least stable over the years. In 2005, the component was dominated by access at work, but having a tablet and a smartphone also loaded strongly on this component. In 2007, mobile was composed of access at work and smartphones. This suggests that in the early years mobile Internet-enabled devices were mainly in the domain of users who went online as part of their working life. Indeed, early studies of mobile Internet adoption identified a mix of work and leisure-related reasons for adoption and identified early users as having a large number of professional and personal roles (Pedersen, 2005). The mobile component changed in 2009 when the item “access on the go” was introduced. The constituent items of mobile became access on the go and having a smartphone—they loaded strongly on the mobile component in waves from 2009 to 2013. In years 2011 and 2013, access at another person’s home also clearly became a part of the mobile component while access at work weakened its connection with the mobile component.

The least distinctive is the position of the tablet item. In 2005 it loaded strongly on the mobile component. The next year, tablets loaded on both mobile (0.30) and home (0.37) components. In 2009 and 2011 tablets loaded distinctly on mobile components. In 2013, however, tablets loaded strongly on the home component together with a possession of PCs at home. The distinct loading of tablets on the home component in the last wave signals that tablets may be entering the home as a replacement for PCs.

The above analysis largely confirms the types of home, institutional and mobile access localities identified in Chapter 2. Clearly, there is no one single way of grouping access items into types. Some examined items changed meaning over years (e.g. access at another person’s home) and others developed or lessened a distinct loading onto one type. Based on theory and empirical evidence, I propose a typology of locality of access where:

(1) *Home access* is measured by the number of PCs and going online at home items;

(2) *Institutional access* encompasses access at work, school, a library or an Internet café;

(3) *Mobile access* consists of having a smartphone or tablet or going online on the go or at another person's home.

Home Internet access and availability of one or more PCs are part of the *home* locality. While the two items were not strongly correlated in 2013 they constituted a single component in all previous waves. Although interview data show that some individuals who go online at home have no working PCs, and this is also detectable in the 2013 OxIS data (in the 2013 sample there were 119 individuals going online at home but reporting having no PCs; of those 119 individuals, 63% had a smartphone and 23% had a tablet.), the majority of the interviewees without a PC wished they could afford one (see sections 4.2.2 and 6.2.3). This indicates that PCs are still regarded as an integral part of home Internet access. Thus, to distinguish home access from mobile access and to account for the long-term dynamics of home access, only possession of PCs and access at home constitute the home locality.

Access at a library, school and café loaded on the *institutional* component in all years. They are public spaces where Internet access may be limited in terms of time, content, convenience, quality of equipment and autonomy of use (see section 2.4.2). I argue that access at work also shares many of these limitations. Thus, it makes theoretical sense to treat it as part of the institutional locality, despite the fact that access at work loaded most strongly on the mobile component in all years. Institutional access points may not be strongly related in the sense that users go online at all of them. Instead, they are conceptually similar insofar as access at these locations is restricted and less autonomous.

The *mobile access locality* is most distinctly characterised by having a smartphone and going online on the go. The other two items assigned to the mobile locality are having a tablet and going online at another person's home. Tablets, however, have no clear position in the typology as they change the home and mobile components over years. Similarly, interview data show that tablets are used extensively at home as well as on the go. However, what all interviewees with tablets expressed is that tablets afford greater mobility within home as well (see section 6.2.1). Thus, I include tablets in the mobile locality. The second ambiguous item is access at another person's home. In 2005 and 2007 it loaded on the institutional component, but in 2009 it started loading on the mobile component, where it sat distinctly in 2013. This is the major reason that access at another person's home is included in the mobile locality. Another reason is that it does not correspond with the institutional access as conceptualised here. Thus, having smartphones or tablets, or going online on the go or at another person's home, constitute the mobile locality.

Unsurprisingly, the proposed typology of access localities worked better in more recent survey waves as compared to early waves. Table 5.2 shows alpha reliability scales for all localities across waves. All alpha values are below the 0.70 standard acceptable value (Acock, 2013). The home locality had a constant alpha of about 0.52 across all five waves. Mobile access variables did not create a reliable scale in 2005 and 2007, but the scale was reliable from 2009 on. Institutional access scale has the poorest performance, yet its reliability increased over the years to 0.48. In all years the institutional scale would work better without the access at work item. For the abovementioned theoretical reasons, no changes were made to the proposed categorisation of access items.

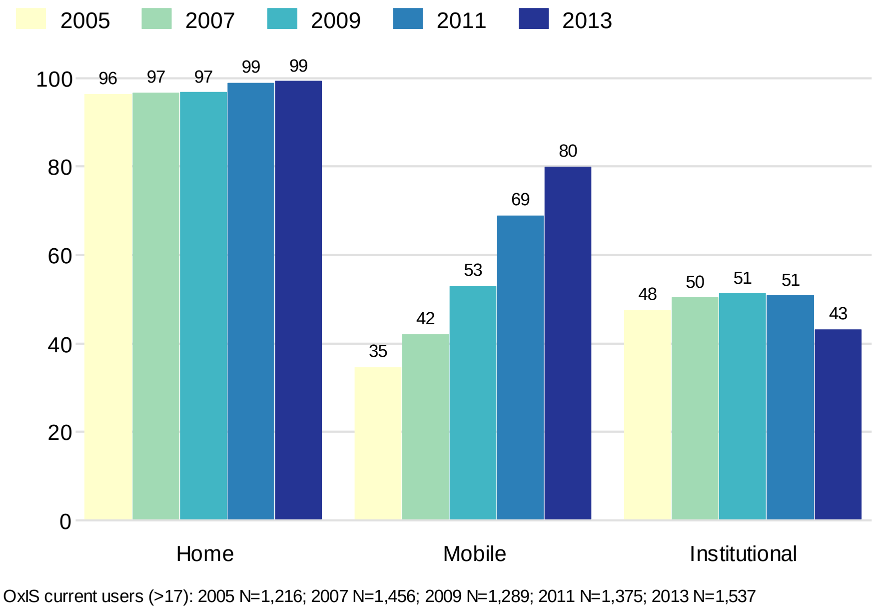
Table 5.2. Locality types: Cronbach's alphas

	2005	2007	2009	2011	2013
Home	0.53	0.50	0.54	0.49	0.52
Mobile	0.30	0.31	0.62	0.68	0.69
Institutional	0.27	0.33	0.37	0.42	0.48

Source: OxIS 2005–2013.

Next, I constructed three access locality variables in each survey wave. A respondent was included in a type if they use at least one device or location of that type. Locality items are binary variables, where 0 means a respondent does not go online at any one of four access points defining a type and 1 means they use at least one access point of that type. Figure 5.3 shows how inclusion into three access localities changed from 2005 to 2013.

Figure 5.3. Access locality types (2005–2013)



Over the years, there has been little change in terms of home Internet access. In 2005, 96% of users went online at home whereas by 2011 virtually all users had home access. Home access seems to be universal among British Internet users. Similarly, there has been little change in the proportions of users who utilise institutional access. In 2005, 48% of users went online at institutional locality. This proportion grew to 51% in 2011, but then fell to 43% of users in

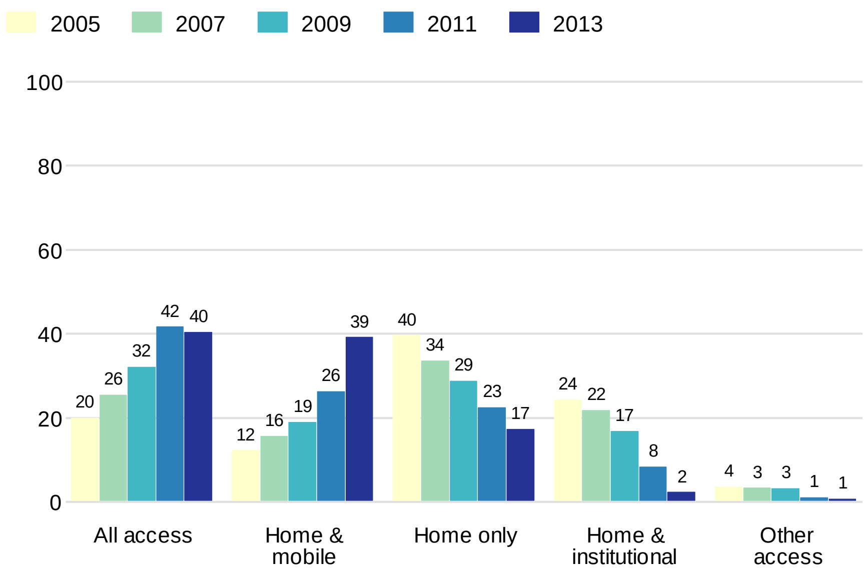
2013. This change reflects smaller proportions of users who reported going online at work or at libraries in 2013 as compared to 2011 (see Figure 5.2). The stability in use of institutional access is very interesting, because there are many initiatives in the UK to improve public Internet access infrastructure. For example, the UK Online Centres[13] network—an initiative started in 1992—now consists of over 5,000 centres operating in public places such as libraries, community venues, leisure centres, pubs and cafés. From 2005 to 2013 the percent of the British population online increased from 60% to 78%, yet there was no change in the proportion of users who utilise institutional access. Obviously, the raw number of institutional users increased over time, but the graph above suggests that there has been no change in how institutional access is integrated into individuals' access infrastructure. The opposite is true for mobile Internet access. The proportion of users who have mobile access grew from 35% in 2005 to 80% in 2013. Note, however, that the item "go online at another person's home" is included in the mobile access locality measure. In 2005 15.6% of users were included in the mobile locality based solely on this item (i.e. they did not have a smartphone or a tablet). In 2013, however, only 3.4% of users were categorised as mobile based solely on this item. Over eight years mobile access became firmly integrated into British Internet users' access infrastructure.

The above graph also indicates that a majority of British users now go online at more than one locality. Thus, I turn to examining locality combinations to better understand complexities of access. There are seven possible combinations of access localities: a user can engage in only one of them (home, mobile, or institutional only); in all of them; or in a combination of two out of three localities (home & mobile; home & institutional; mobile & institutional). Since some combinations had a very small N, four major combinations of access localities were identified. The first is a category of users who reported going online at all three localities. The second is a group of users who have home and mobile Internet access.

[13] https://www.ukonlinecentres.com/about-us.

Third are users who only go online at home. The fourth category represents users who have home and institutional access. All other possible combinations (mobile only; institutional only; mobile & institutional) are grouped under the "Other access" category. Figure 5.4 below shows how users were grouped into different access categories throughout the years.

Figure 5.4. Categories of Internet access localities (2005–2013)



OxIS current users (>17): 2005 N=1,216; 2007 N=1,456; 2009 N=1,289; 2011 N=1,375; 2013 N=1,537

In 2005, the vast majority of users (40%) only had home Internet access. The second most common category was "Home and institutional" access (24%). One fifth of users went online on all three localities and 12% had a combination of home and mobile access. By 2013 the locality landscape had changed significantly, with 40% of users reporting having all locality types, 39% of users having home and mobile access, and only 2% of users having a combination of home and institutional access. The proportion of users going online at home only decreased steadily year by year to 17% in 2013. Small proportions of users had some other kind of locality combination—4% in 2005 and 1% in 2013. Although these proportions are within the margin of error of the survey, it is worth keeping in mind that 1% of the British online population translates to about a half a million individuals.

Arguably, the above approach to constructing types of access locality has many limitations. Most importantly it oversimplifies complexities of individuals' material access infrastructure. Nevertheless, it is helpful in understanding how localities of access infrastructure changed over time. It also enables inquiry into gradations in access inclusion, which is the focus of the next section.

5.4.3 Gradations in Inclusion

This section addresses longitudinal patterns of inclusion in/exclusion from different localities of access. Above, I identified the most common combinations of localities: home only, home and mobile, home and institutional, and all locality types (see Figure 5.4). To examine what offline resources influence specific composition of material access I ran a series of multinomial logistic regressions.

The category "home access only" is the reference category, meaning that the results table (see Table 5.3) reports estimated odds of having "home and mobile", "home and institutional" or "all access" rather than "home-only" access. After the initial analyses of independent variables and locality categories, two data modifications were made. First, users in the "other" category (see Figure 5.4) were excluded from the analysis. In 2005 4% of users were in this category, followed by 3% in 2007 and 2009, and 1% in 2011 and 2013. This means that only a very few cases were in the "other" category in all five waves. Consequently, the models predicting other vs. home access had inflated standard errors and did not provide reliable results. Second, students were excluded from the analysis as well. A vast majority of students were grouped into the "all access" category. Again, this resulted in enormous coefficients with inflated standard errors.

Table 5.3 below shows results of multinomial logistic regressions in all waves. For each year, the odds of having home and mobile; home and institutional; or all access versus having home-only access are reported. For ease of interpretation only odds ratios are reported in Table 5.3. In the description of results I focus on comparing relative sizes of standardised beta coefficients. Output containing unstandardised regression coefficients and standard errors is included in Appendix B.1.

Table 5.3. Locality: Multinomial logistic regression coefficients, odds ratios (2005–2013)

	2005 (home access)			2007 (home access)			2009 (home access)			2011 (home access)			2013 (home access)		
	Home & Mob.	Home & Inst.	All access	Home & Mob.	Home & Inst.	All access	Home & Mob.	Home & Inst.	All access	Home & Mob.	Home & Inst.	All access	Home & Mob.	Home & Inst.	All access
Economic field															
Income	1.24*	1.31**	1.48***	1.06	1.24*	1.45***	1.20*	1.46***	1.54***	1.39***	1.13	1.51***	1.32**	1.00	1.67***
(No education)															
Secondary ed.	0.98	4.08**	2.42	1.48	1.38	2.64**	2.02*	1.56	2.77*	1.34	1.23	1.32	1.63	1.14	3.53**
Further ed.	0.73	8.89***	5.17**	2.20*	2.30**	4.45***	2.39*	2.32	6.10***	1.61	1.17	3.12**	1.34	1.89	4.16**
Higher ed.	0.95	7.46***	7.58***	1.68	2.97**	7.86***	1.52	5.29***	10.06***	1.64	6.25***	6.86***	1.59	2.49	9.37***
(Employed)															
Retired	4.06***	0.26***	0.28*	1.47	0.08***	0.04***	1.34	0.18**	0.13***	0.64	0.10***	0.07***	1.54	0.11**	0.15***
Unemployed	1.43	0.10***	0.26**	1.13	0.08***	0.33***	1.11	0.11***	0.32***	1.04	0.14***	0.21***	0.80	0.23	0.22***
Cultural field															
Female	0.50**	0.58**	0.42***	0.75	0.98	0.70	0.90	0.96	0.72	0.86	0.97	0.47***	0.73	1.30	0.70
Non-white	2.41	3.95**	4.60**	0.42*	0.89	0.51*	1.94	1.86	1.39	0.92	0.92	1.46	0.67	0.77	0.73
Age	0.94***	0.99	0.97***	0.98**	1.00	0.98*	0.98	0.99	0.97***	0.97***	1.00	0.96***	0.96***	1.02	0.95***
Social field															
Single	1.96*	1.01	2.18**	1.73*	0.96	1.55	2.35**	0.88	1.95*	1.79*	1.05	1.44	1.85*	1.68	2.54**
Children in HH	1.01	0.98	0.80	1.28	1.42	1.38	0.95	0.64	0.89	1.20	1.15	1.07	2.28**	1.45	2.16**
Social contact	1.55*	1.21	1.90***	1.45*	1.30	1.57**	1.28	0.91	1.14	2.20***	1.89**	2.67***	2.00***	1.10	2.43***
Civic groups	1.92**	2.57***	2.05**	1.20	1.37	1.43	1.41	0.73	1.10	0.83	0.99	1.46	1.40	1.78	1.86**
Digital support	1.23*	1.31**	1.44***	1.25*	1.83***	1.69***	0.76*	1.03	1.07	0.96	1.21	1.35**	0.90	1.26	1.28*
HH dig. included	1.39	0.53*	1.32	1.25	0.38**	0.62	1.72*	0.45*	1.27	1.21	0.65	0.80	2.53***	2.11	2.87**
Personal field															
Disability	1.54	3.03*	1.19	1.31	1.58	0.63	0.74	0.92	1.31	1.10	0.78	1.04	1.34	0.12	1.54
Constant	0.24	0.08**	0.01***	0.15**	0.14**	0.05***	0.13*	0.67	0.20	0.16*	0.07*	0.12*	0.48	0.02*	0.04***
McFad. adj. R^2		0.06			0.06			0.14			0.22			0.26	
% correctly predicted	23%	70%	73%	11%	71%	97%	30%	62%	78%	83%	93%	80%	93%	26%	96%
		Home (89%)			Home (86%)			Home (85%)			Home (80%)			Home (68%)	
N		961			1,127			883			1,118			1,188	

Notes: * $p<0.05$ ** $p<0.01$ *** $p<0.001$. Omitted categories: No educational qualifications; Male; White; Married/with partner; No children in household; Not a member of any civic group; No other Internet users in household; No disability. HH=”household”; dig.=”digitally”; McFad. adj. R^2=McFadden’s adjusted R-squared.

The table shows that resources in the economic field play a significant role in determining the likelihood of users having multi-local versus home-only access. In 2005 users with high incomes were 1.24 times more likely to have home and mobile rather than home-only access, and 1.48 times more likely to have all types of access. The odds of users with high incomes having multi-local access as opposed to home-only access increased over time. In 2013 a one unit increase in income would make users 1.67-times more likely to go online on all three localities rather than only at home. In 2011 and 2013, higher income also increases the odds of users having home and mobile as opposed to home-only access.

Home and mobile access as opposed to home-only access is not a function of a user's education. The results provide no general evidence that those with higher levels of education would be more likely to add mobile onto home access (there are only three significant education coefficients—one in 2007 and two in 2009). By contrast, in all years education was highly significantly related to access on all three localities. In 2013, users with secondary education were 3.53 times more likely to have all-encompassing access rather than home access compared to users without educational qualifications. Moreover, in all survey years those with higher education were at least six times more likely to be in the all access versus the home access category. In most years, any additional level of education resulted in an increased likelihood of going online at all three localities. Education was significantly related to the odds of being in the home and institutional versus the home-only category in years 2005 and 2007. The results suggest that in subsequent years more educated Internet users moved into the all access category (note that only 2% of users were in the home and institutional access category in 2013).

Employment status is also related to modality of Internet access. In all years retired and unemployed (except from 2013) users were much less likely to have home and institutional or all access than their employed counterparts. Interestingly, employment status does not play a role in predicting home and mobile as opposed to home-only access (with the exception of retired individuals in 2005).

Of cultural factors, only age has had a continuous effect on locality of access. Consistently, being older decreases users' odds of having multimodal access. In 2011 and 2013, older individuals were slightly more likely to have home-only as opposed to home and mobile or all-round access. Compared to 2005, the odds of older Internet users being in the home-only as opposed to the all access category increased in 2013. Compared to males, female users were more likely to only have home access as opposed to all three other access categories in 2005. However, in subsequent years the effect of gender on access locality largely disappeared. 2011 is an exception, with women being 2.1 times more likely than men to only have home access as opposed to all access. The same is true for ethnicity. In 2005 non-white users were more likely than white users to be in the home and institutional or all access categories as opposed to home only. The effects of ethnicity disappeared completely from 2009 on.

Resources in the social field have had various but scattered effects on access locality across years. In all years being single rather than living with a partner was associated with higher odds of having home and mobile as opposed to home-only access. Single individuals were also more likely than their coupled counterparts to have all access localities in 2005, 2009 and 2013. The presence of children in a household had no effect on access locality from 2005 to 2011, but it started to matter in 2013—compared to households without children the ones with children were 2.3 times more likely to have home and mobile access as well as 2.2 times more likely to have all rather than home-only access. The extent of social contact with family and friends became strongly associated with multi-local access in 2011 and 2013. Users with more social contact were at least twice as likely to have home and mobile or all access as opposed to home-only access. Participation in civic networks was significantly related to modes of access in 2005, but it lost its importance over the years. Interestingly, in 2013 taking part in civic groups only had a significant effect on the odds of users being in the all access category. The size of the digital support network was strongly related to multi-local access in 2005 and 2007. Users who got help with Internet use from several sources were more likely to be in any other but the home-only category. In more recent years, users with strong digital support networks were more likely to have all-round rather than home-only access. Digital inclusion of household members also had an interesting dynamic over the years. From 2005 to 2009 users whose households were digitally included were substantially less likely (1.9 to 2.6 times) to be in the home and institutional access category as opposed to the home-only group. This suggests that users who were the only ones going online in their homes were also going online at institutional points such as libraries, schools or work. However, in 2013 having other household members online significantly increased the odds of having home and mobile or all-round as opposed to home-only access.

Disability as the only indicator of resources in the personal field had no significant effect on locality of access (except from an outlier in 2005).

To examine gradations in adoption of the mobile locality more specifically, I now focus on comparing the 2009 and 2013 waves—the time period in which we have seen a growth in adoption of mobile locality (see Figures 5.1, 5.2, and 5.4). In 2009, adding mobile access onto home access was most strongly related to education and being single. Income, size of the digital support network and digital inclusion of the household also had marginally significant effects. By 2013, the proportion of users with home-only access decreased by 12 percentage points and the proportion of those with home and mobile access increased by 20 percentage points. In 2013 the biggest difference between the two groups was in their social resources. Users who were single, had children in the household, had more extensive social contacts with family and friends, and lived in digitally included households were about twice as likely to have home and mobile rather than home-only access. Besides, income and age also had significant effects.

By contrast, offline economic resources were the ones that distinguished home-only users from all-round users. In both 2009 and 2013, income, education and employment status had substantive significant effects on users' likelihood of being in the all access category rather than the home-only category. This is not surprising—compared to the home and mobile category the all access category has an addition of the institutional locality. The vast majority of users with institutional access report going online at work (78% in 2013). Naturally, this is conditional on being employed. However, in 2013 the results also show that higher education (e^b[14]=5.89***) and income (e^b=1.26***) strongly increased the likelihood of users being in the all access rather than the home and mobile access category, whereas being retired (e^b=0.10***) or unemployed (e^b=0.28***) decreased that likelihood (see Appendix B.2 for the table pertaining to the results in this paragraph). Furthermore, all of the social factors contributed to the likelihood of users being in the all access rather than the home-only category. To determine whether these social factors also contribute to explaining whether a user is in the all access as opposed to the home and mobile category, coefficients for this pair of responses were inspected. The results indicate that holding all other factors equal, only the size of digital support networks (e^b=1.42***; Appendix B.2) increased users' likelihood of being in the all access as opposed to the home and mobile group.

Two conclusions follow from the 2013 results. First, apart from weak effects of income and age, resources in the social field have the biggest effect on users' likelihood of having mobile access in addition to home access. Second, resources in the economic field are the most important factor determining all-round Internet access.

[14] Odds ratio

5.5 Ubiquity

5.5.1 Experience

Ubiquity of access, which is the third material dimension of access, has been largely defined as availability of access on multiple devices and in multiple locations. Discussions with the interviewees revealed that ubiquity gets experienced in different ways. Whether individuals take advantage of ubiquitous access or not strongly depends on whether the experience of ubiquity is appreciated or not. This relationship was observed among the interviewees who had similar access infrastructures but had very different views about ubiquity, and among those who refused to have ubiquitous access.

Ubiquity was experienced as availability of access anywhere and anytime. When Jane was asked where she goes online she exclaimed, "Well, EVERYWHERE! […] At home, out and about, when I'm walking, pretty much all the time. Every minute probably". She felt connected "all the time". For Jane, this experience was part of her everyday life. She noted that not being able to connect feels "quite stressful" and ascribed this feeling to being "so dependent on it [the Internet] at the moment". Others had similar experiences. Emily, who was a university lecturer, told me, "Well I'm online constantly at work. I'm online, I go online at home, I mean I am just online at home, I guess, all the time. Yeah. On the smartphone, or on my computer at home". Some participants felt that being constantly connected becomes a bit addictive. When I asked Thomas whether always-on access is important to him, he responded, "It is. I think a lot of the times I use it because it's available. So I'll check the news and I don't really need to. It becomes a bit addictive. […] You use it far more than you actually need to".

Ubiquitous access was experienced as constant connection to the Internet. Interviewees who experienced ubiquity felt they are always online, always "looking at it" and "constantly checking". Having access at any point throughout the day was an integral part of their daily lives to keep in touch with people and news, and to be reassured that the Internet is there in case they need it. Although some interviewees at times felt somewhat overwhelmed by the constant connectivity, they agreed that it is absolutely essential. They would feel a big void should they lose immediate connection to the Internet. Ubiquitous access was an important aspect of their daily lives and without it they would feel "lost", "stressed" and "out of touch".

Another group of the interviewees also experienced ubiquitous access but did not feel so empowered and excited by it. Harry was a café owner and he used the Internet a lot for his work. When asked where he goes online he explained:

> Aye, everywhere, I mean… Laptops and phones, you can check anywhere, although because sometimes it's nice just to switch things off, you know. That's the thing. People – and you know, famously—I've done it as well—we just sit and just look at stuff for the sake of looking at stuff, but I'm not… I don't find I need it to be online all the time, you know.

Similarly, Sophie used the Internet "the entire time at work" but tried to avoid being constantly connected in her daily life. At home her family had a laptop and two tablets, and she had a smartphone. When talking about their laptop she noted, "I think I probably do look at it, use it too much because it's a waste of time and I shouldn't [laughter]" and when asked about her smartphone she exclaimed she got it "under duress". Although she carried her smartphone around she rarely connected it to the Internet, explaining "I don't think any email is gonna be that important if I'm not working that day and don't need to get a work email there and then. And if it's a personal one, I'll see it when I get home. I don't think there's anything that's that important during the day". Laura, who shared many views about constant connectivity with Sophie, refused to have a smartphone. She decided not to upgrade her phone "in defiance" and explained:

> I wonder if we've become slaves to technology, slaves to the Internet rather than it become a choice, it becomes a habit, and then… You know, we've become dependent on it, we're too attached. It's like we're so attached to our phones and that worries me.

Jacob, who was younger than the above three participants, had significant struggles with the constant availability of the Internet. He found the Internet "very distracting having it there all the time", especially because of social media and news sites. When I asked Jacob whether he would miss anything about the Internet if for some reason he would lost connection, he responded:

> No, there is absolutely nothing. Actually I'd love it! When I go away and I can't access the Internet, and I actually feel like not only... not like that I'm missing anything, but I feel completely liberated. […] So, it's cause it's been in my life for a long time, I just, it's become a part of my life. Not necessarily a part that I like.

This group of interviewees also experienced ubiquity, but for various reasons they did not feel empowered by it. They tried to escape it whenever possible and did not feel the urge to be always connected. This decision was supported by a strong determination that there is no need to be constantly connected and by negative perceptions about the role of Internet technologies in our society. The above interviewees shared an ethos that technology is used too much, that it is a waste of time, that we are too attached to it and that not being connected feels liberating. They felt alienated from people who had an urge to always be connected. Thus, although they were surrounded by ubiquitous access they took conscious actions to avoid the Internet's constant presence.

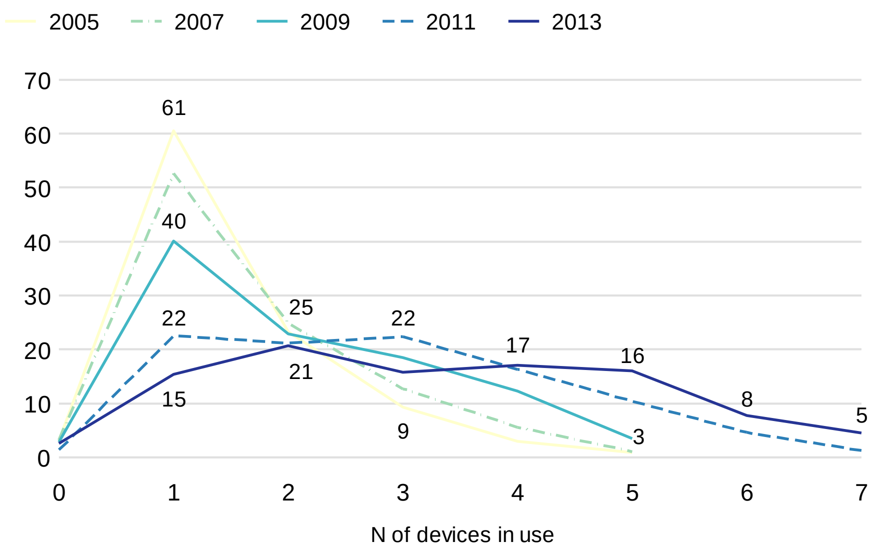
These experiences of ubiquitous access show a complex picture. Most of the interviewees had access with multiple devices and locations, but their experiences of ubiquity varied significantly. Some integrated it into their daily lives; others refused to follow this development. In this way, ubiquity of access proves to be a somewhat illusive concept. How people act on it seems to be closely related to their perceptions of Internet technologies and how they fit into their daily lives. This poses some challenges to how ubiquity is operationalised in the quantitative part of this study, which is what I do next.

5.5.2 Longitudinal Dynamics

To examine ubiquity of access quantitatively, I work with devices and location items and focus on multiplicity of access points. First ubiquity of devices and locations are examined separately and then joined into a single index of ubiquity of access.

I created an index of access devices counting the number of different devices Internet users own. Any missing values were coded as 0. For example, it is reasonable to assume that if a person does not know whether they own a tablet they probably do not own one. The index ranges from 0 to 5 in all years except from 2011 and 2013, when it ranges from 0 to 7. Figure 5.5 demonstrates that since 2009 a great majority of British Internet users goes online on multiple devices. In 2005, 61% of users reported owning only one Internet-enabled device. By 2013, this figure had plummeted to 15%. Interestingly, in 2013 2.6% of users did not have any of the seven devices OxIS asks about. These users may go online on devices owned by other people or by institutions such as libraries.

Figure 5.5. Adoption of multiple Internet-enabled devices (2005–2013)

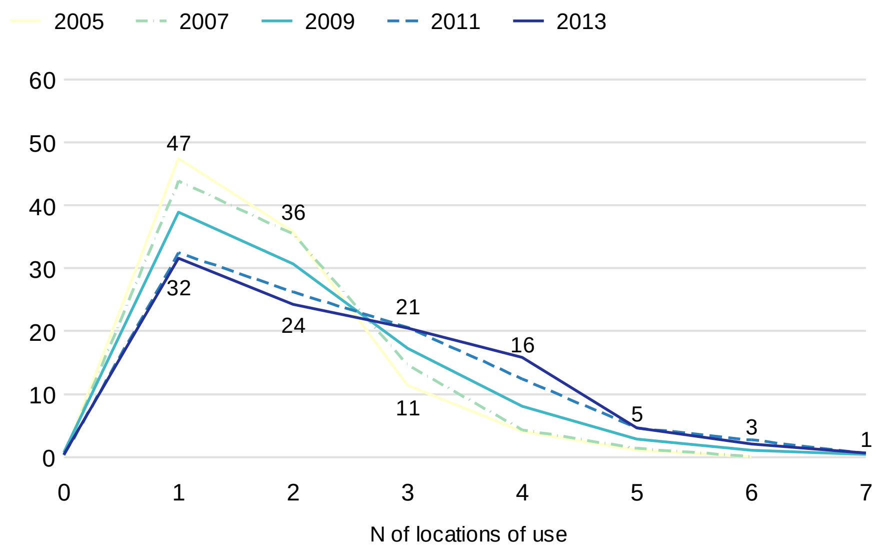


OxIS current users (>17): 2005 N=1,216; 2007 N=1,456; 2009 N=1,289; 2011 N=1,375; 2013 N=1,537
*Note: Two items missing in 2005, 2007, 2009.

In 2005 the modal category was one device (61%) and the mean was 1.5 devices (SD=0.88; Md=1), whereas in 2013, the modal category was two devices (21%) and the mean was 3.3 devices (SD=1.79; Md=3). In 2011 and 2013 Internet users spread surprisingly evenly in categories from one to five devices, with 15% to 22% of users in each category. This is reflected in the skew of the distribution, which was positive but small in both years (0.45 in 2011 and 0.20 in 2013). Figure 5.5 clearly demonstrates that there is a continuous trend among British Internet users towards adoption and use of multiple Internet-enabled devices. The steadily decreasing number of users who report owning one device and the evenness in proportions of users with different numbers of devices in recent years suggest that the online population is becoming more heterogeneous in terms of combinations of Internet-enabled devices.

Internet users may also go online at more than one location, thus I created an index of locations of access by summing the number of different use locations. Any missing values were coded as 0. It is reasonable to assume that if a person does not know whether they go online at work they probably do not do so. The index ranged from 0 to 7 in all years except from 2007 and 2005 (range: 0–6). The distributions are shown in Figure 5.6.

Figure 5.6. Adoption of multiple Internet access locations (2005–2013)



OxIS current users (>17): 2005 N=1,216; 2007 N=1,456; 2009 N=1,289; 2011 N=1,375; 2013 N=1,537
*Note: One item missing in 2005, 2007.

Over the years, the number of users who report going online at multiple locations has increased. In 2005, 48% of users went online at one location. This proportion fell to 32% by 2013, but access at one location remained the modal category. In 2013, a quarter of Internet users went online at two locations and 16% at four locations. The proportion of users going online at various locations has been steadily increasing, but less dramatically than in the case of devices. In 2005 the mean number of locations of use was 1.8 (SD=0.9; Md=2). In 2013 the mean number of locations of use was 2.3 (SD=1.4; Md=2). In all years a few respondents reported they do not go online at any of the seven locations. This is not surprising as research shows that apart from the examined locations people find various alternative locations to go online at. Eynon and Geniets (2012), for example, discuss an example of someone going online in Apple stores.

Devices and locations of access indices are expected to be closely related. Table 5.4 shows that from 2005 to 2009 the relationship between numbers of devices and locations grew stronger, from a moderate (0.24) to strong correlation (0.46). In the two subsequent waves, the correlation stabilised at 0.44. Notably, there was a big jump in the strength of the correlation from 2007 to 2009 (0.31 to 0.46). Some of this increase may be due to the fact that in 2009 the item going online "on the move/while travelling" was added to the questionnaire and thus to the location index. To disentangle the effect of this additional item I re-ran the correlations for 2009–2013 without the on-the-go item. The results show that there was still a slight increase in the strength of the correlations from 2007 (0.31) to 2009 (0.37), and stayed the same in 2011 and 2013. However, there seems to be no effect of e-readers and Internet TVs on the examined relationship. These two variables were added to the questionnaire in 2011 and 2013, when the strength of the correlation between devices and locations did not change. To ensure consistency of the ubiquity measure across years, these two items were removed from the subsequent analyses.

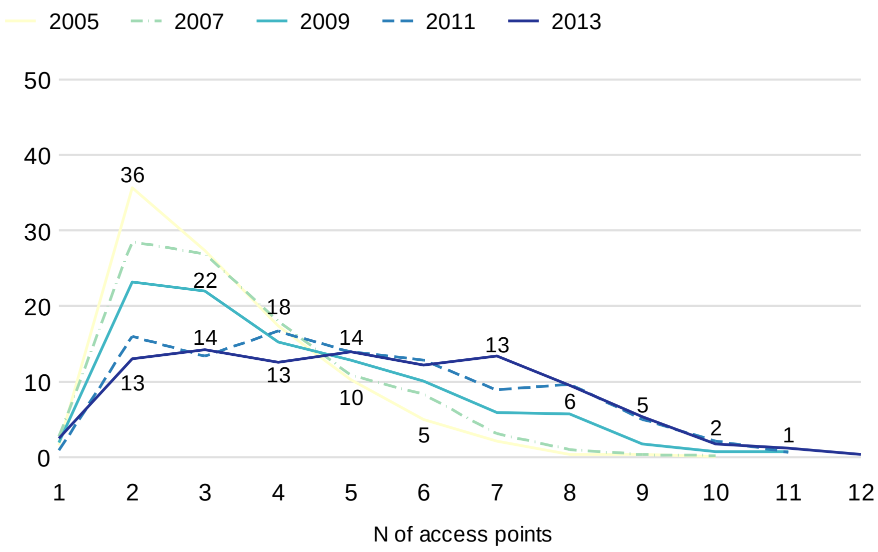
Table 5.4. Correlations between devices and locations indices (2005–2013)

	N of locations				
	2005	2007	2009	2011	2013
N of devices	0.24***	0.31***	0.46***	0.44***	0.44***

Source: OxIS 2005–2013. *** $p < 0.000$. Item "access on the go" was added to the questionnaire in 2009.

These results indicate a significant positive relationship between the number of devices users have and the number of locations they report to be going online at. Thus, I created an index of Internet access points as a measure of ubiquity of access, which combines the total number of devices and the total number of locations people report going online at (see Figure 5.7). The index has a range from 1 to 12, except for 2005 and 2007 (range: 1–11). In all years but 2009 all Internet users had at least one point of access. In 2009, however, two respondents responded either "No" or "I don't know" to all access items.

Figure 5.7. Adoption of multiple Internet access points (2005–2013)



OxIS current users (>17): 2005 N=1,216; 2007 N=1,456; 2009 N=1,289; 2011 N=1,375; 2013 N=1,537
*Note: One item missing in 2005, 2007.

In 2005, the modal category was access at two points, with 36% of users; in 2011 the modal category was four access points, with 17% of users; and in 2013 there were 12%, 13% or 14% of users in each category from two to seven access points. Figure 5.7 shows that the online population has become more heterogeneous in terms of access infrastructure. In 2005, two thirds of users went online at one to three access points (M=3.3; SD=1.4; Md=3). By contrast, in 2013 half of users went online at one to five access points (M=5.2; SD=2.4; Md=5). Notably, in 2013 the mean and the median are almost the same, which is a characteristic of a symmetric distribution. In fact, there are no dramatic jumps or dips in this distribution, meaning there are no obvious categories of users in terms of the number of access points they have or in terms of ubiquity of access. The next section examines what offline factors shape the extent of access ubiquity.

5.5.3 Gradations in Inclusion

Regression results in Table 5.5 demonstrate patterns of exclusion from ubiquitous access from 2005 to 2013. In all models, the dependent variable is the total number of access points respondents report going online at. Users with a larger ubiquity index go online on multiple devices and locations and live in ICT-rich homes. In the description of results I focus on comparing relative sizes of standardised beta coefficients. Output containing unstandardized regression coefficients and standard errors is included in Appendix B.3.

Table 5.5. Ubiquity: Standardised OLS regression coefficients (2005–2013)

	2005	**2007**	**2009**	**2011**	**2013**
	β	*β*	*β*	*β*	*β*
Economic field					
Income	0.19***	0.22***	0.25***	0.21***	0.21***
(No educational qual.)					
Secondary ed.	0.07	0.08*	0.12*	-0.01	0.15***
Further ed.	0.13**	0.15***	0.23***	0.06	0.13***
Higher ed.	0.26***	0.17***	0.33***	0.16***	0.26***
(Employed)					
Student	0.05	0.19***	0.08**	0.10***	0.13***
Retired	-0.01	-0.12***	-0.05	-0.17***	-0.10**
Unemployed	-0.05	-0.05	-0.08**	-0.12***	-0.10***
Cultural field					
Female (Male)	-0.13***	-0.10***	-0.09**	-0.08***	-0.05*
Non-white (White)	0.05	-0.03	0.02	0.07**	-0.03
Age	-0.11**	-0.02	-0.12**	-0.14***	-0.18***
Social field					
Single (With partner)	0.14***	0.11***	0.10**	0.09**	0.10***
Children in household (No children)	-0.01	0.08**	0.02	0.05	0.06*
Social contact w/fam. & friends	0.08**	0.08***	0.08**	0.20***	0.14***
Member of civic groups (No)	0.05	0.04	0.03	0.08**	0.10***
Size of digital support network	0.09**	0.09***	-0.02	0.02	0.09***
Other household members online (No)	0.14***	0.09**	0.10***	0.07*	0.16***
Personal field					
Disabled (No disability)	0.01	0.02	0.03	0.02	0.04
Constant	***	***	***	***	***
R^2	0.22	0.23	0.29	0.36	0.42
Adjusted R^2	0.21	0.22	0.28	0.35	0.41
N	1,053	1,242	958	1,183	1,229

Notes: * p<0.05 ** p<0.01 *** p<0.001. Omitted categories in (parentheses).

Of the economic resources, income is significantly positively related to ubiquity of access in all five years. Compared to 2005, the income coefficient was slightly bigger in 2013. Income had the biggest impact on the access index in 2009. Compared to all other coefficients within a survey wave, income had the biggest effect on ubiquity of access in 2007 and 2011. In the other three waves, education (higher education vs. no educational qualifications) had the biggest effect on ubiquity. Over time, the biggest change was in the sizes of the "Secondary education" coefficients. In 2005 having secondary education as opposed to no educational qualifications had no effect on the access index. By 2013 the coefficient had become large and highly significant. In other words, compared to users without educational qualifications, those with secondary education are expected to have a larger number of access points. Further and higher education coefficients in 2013 were the same to those in 2005. Employment status is the third indicator of economic resources. In all models being employed is the reference category. In 2005 labour status did not have any significant effect on ubiquity. In 2007–2013 being a student contributed to larger access infrastructure. Being retired had a negative effect in 2007, 2011 and 2013, and being unemployed had a negative effect in 2009–2013. Longitudinally, the effect of employment status on access ubiquity became more significant and larger. While employment status matters, with employed users having more ubiquitous access than those retired or unemployed, its effect is smaller as compared to income and education. Higher income and higher education contribute most substantially and significantly to ubiquity of access infrastructure.

Gender, ethnicity and age are indicators of individuals' resources in the cultural field. Over years, the effect of gender on ubiquity of access decreased in size but remained significant. By contrast, the negative effect of age increased in size and significance. Put differently, the differences in access ubiquity between female and male users decreased over time, whereas the differences between younger and older users increased. In the British context, ethnicity proved to be irrelevant when it comes to explaining ubiquity (except from an outlier in 2011).

A range of indicators encompass inclusion in the social field of resources. Users who are single had higher values on the access index throughout all waves. Presence of children in a household had a positive significant impact on access ubiquity in 2007 and 2013. The impact of social contact with friends and family who live nearby increased over the years. The coefficient was significant and positive but not very big in years 2005 to 2009 (0.08), but it increased sharply in 2011 (0.20) and then somewhat decreased in 2013 (0.14). Participation in civic networks started to matter in 2011 and slightly strengthened its importance in 2013. Availability of digital support networks had mixed effects on ubiquity over time—it had a significant effect in 2005, 2007 and 2013. Digital inclusion of household members had a positive and significant effect in all waves, with the smallest impact in 2011 and the largest in 2013. In general, the indicators of inclusion in the social field seemed to matter more in 2013 as compared to 2005. All six indicators had positive and significant effects in the most recent wave, whereas only four were significant in 2005. In 2013 the most important social factors were digital inclusion of household members and the extent of social contact with family and friends. This means that users whose households are not fully digitally included and those who do not have extensive social interactions are more likely to be excluded from ubiquitous access.

In the personal field, having a disability did not have any significant impact on ubiquity of access throughout the years.

To examine the dynamics of exclusion from ubiquity of access, Table 5.6 shows which coefficients were statistically significantly different in 2013 as compared to 2005. Out of 17 variables, eight coefficients were statistically significantly different. In 2013, having secondary education as opposed to no educational qualifications had a larger impact on ubiquity of access than in 2005. All employment status categories also had larger coefficients in 2013. The impact of age on the access index grew stronger over the years—older Internet users are now less likely to have more ubiquitous access. Finally, three factors from the social field of resources become more important over years: users with less social contact, those who do not participate in civic networks and those whose households are not fully digitally included were significantly less likely to go online on various devices and locations in 2013 as compared to 2005. These results once again demonstrate the importance of social resources in construction of ubiquitous access infrastructure.

Table 5.6. Chi² test of similarity of coefficients ($b_{2005}=b_{2013}$)

Variable	χ^2	*p-value*
Secondary education (no qualifications)	5.93	0.015
Student (employed)	6.54	0.011
Retired (employed)	4.74	0.030
Unemployed (employed)	4.26	0.039
Age	4.37	0.037
Extent of social contact	5.84	0.016
Participation in civic networks (no)	4.18	0.041
Household digitally included (no one)	6.64	0.010

Source: OxIS 2005–2013; reference category in parentheses.

In all years the model had good explanatory power. Interestingly, the R^2 values increased substantially year on year. In 2005 the model explained 21% of variance in the access index whereas in 2013 the same set of variables explained 41% of variance. The increase in the R^2 conveys that socio-demographic factors have become a better predictor of ubiquity over time. Early adopters of ubiquitous access were scattered and their inclusion depended on factors other than those examined here (possibly attitudes toward technologies). In recent years, adoption of multiple Internet-enabled devices and locations has depended more on the extent of individuals' economic, social and cultural offline resources. For example, highly educated people and those with frequent social contacts have become more distinct in having a larger number of Internet access points.

5.6 Conclusions

This chapter examined material dimensions of access. Specifically, it focused on how quality, locality and ubiquity of access are experienced, their longitudinal dynamics, and factors shaping their uptake.

Taken together, the results tell two overarching stories. The first concerns complexities of Internet access. Access is a dynamic phenomenon, which has transformed dramatically over the observed eight-year period. While in 2005 most Internet users went online at home on a PC, in 2013 four in five Internet users went online on at least two localities. Conceptualisations and operationalisations of material access that were valid in 2005 largely do not apply to the ways people go online in 2013. Similarly, the results show that a vast majority of users nowadays go online using various locations and devices. However, there was no clear modal category in the distribution of access points in 2013, indicating that individuals' collections of access points have become increasingly diverse (note also the increase in standard deviation of the access index from 2005 to 2013).

The complexities surrounding individuals' Internet access were to some extent also detected in the qualitative experiences of material dimensions. For example, while for some participants quality of access was problematic, others had no such concerns. Some participants struggled with obtaining home access, while others took it for granted. For some, mobile access was a matter of emergency in specific situations; for others it represented a constant connection to their friends, information and the world in general. Similarly, experiences of ubiquitous access varied considerably: from users depending on it throughout daily lives, to users who tried to escape constant connection to the Internet. Taken together, the results suggest that British Internet users' access is dynamic, diverse and complex.

The second major finding of this chapter relates to inequalities in access. Quality of access was mainly problematic for individuals who could not afford new devices and had trouble sustaining the quality of their devices and connections. Several interviewees struggled with obtaining and maintaining a home or mobile Internet connection. These examples demonstrate issues related to conditional access (van Dijk, 2005). For example, owning a mobile Internet-enabled device does not necessarily mean that users also have access to mobile Internet networks. Access to such networks is conditional on separate payment.

Although we have seen a swift uptake of mobile Internet technologies, 20% of British Internet users in 2013 did not go online using a mobile device or location. In fact, in 2013, 17% of British Internet users only went online at home. This is not a small number in a society permeated with Internet technologies, where the line between offline and online worlds is becoming increasingly blurred. Importantly, analyses of locality and ubiquity of access show that possession of offline resources has become an increasingly important factor in explaining gradations in access inclusion. Internet users who have more social and economic resources are becoming more distinctive in going online at more localities and in having more access points. In 2013, four out of six indicators of offline social resources were strongly involved in differentiating users who only go online at home from those who have home and mobile access. Specifically, home-only users were more likely to be the only person in their household using the Internet, reported less social contact with family and friends who live nearby, were less likely to have children in their household, and were more likely to be married or live with a partner. In terms of ubiquity of access, economic resources in the forms of income and education were the strongest explanatory factors. While there are probably numerous other factors shaping development of access, the basic set of 17 indicators used here has increased in its explanatory power over years. This suggests that inequalities in access are tightly related to fields of social exclusion. In both parts of the analysis, resources in the economic and social fields were found to have the most profound effects on gradations of access inclusion. Taken together, the results of this chapter suggest that access inequalities are persisting among British Internet users. They manifest in unilocal, less ubiquitous and poor-quality access, shaped crucially by limited availability of offline economic and social resources.

The preceding analyses provided a general understanding of dynamics in material access and factors shaping it. The results are based on longitudinal cross-sectional survey data and are generalisable to the population of British Internet users. The analyses were structured around material dimensions of quality, locality and ubiquity. Despite being insightful, the results offer a limited understanding of practices and processes shaping development and engagement with access. A better understanding of how access is experienced and how users relate to and engage with its various aspects is needed to further uncover complexities identified in the longitudinal analyses. Therefore, the next chapter moves on to examining social practices shaping Internet access. Using qualitative data, I approach the study of access from the domestication and Internet centrality perspectives, connecting material artefacts with practices and processes underlying development, maintenance and engagement with access.

Chapter 6: Social Practices Shaping Access

6.1 Introduction

This chapter focuses on social practices involved in the development, maintenance and use of Internet access. It aims at providing a deeper account of processes underlying the dynamics of Internet access by studying individuals' experiences of access in their everyday lives. The chapter addresses the third overarching research question of this project: *What social practices underlie the dynamics of Internet access?*

The first part of the chapter examines processes underlying the dynamics of Internet access. Drawing on the concept of re-domestication, the analysis focuses on individuals' experiences and trajectories of access infrastructures. Specifically, it examines users' relationships with different devices and how their roles in online engagement are re-assessed when new technologies enter access repertoires. The analysis of re-domestication processes focuses on how various parts of the infrastructure are experienced and what factors shape these experiences.

Following from the analysis of re-domestication processes, the second part of the chapter moves on to examining the role of Internet technologies in individuals' daily lives. Specifically, the analysis is organised around different re-domestication processes to disentangle whether the ways individuals engage with their access infrastructure reflect the role the Internet plays in their everyday life. I draw on the concept of Internet centrality and media system dependency theory to analyse specific dependencies people form with Internet technologies. In this way, this chapter further contributes to our understanding of complexities surrounding Internet access.

6.2 Dynamics of Access: Re-domestication Processes

This section explores the dynamics of access infrastructure. Chapter 2 argued that when new devices enter existing infrastructures, old and new modes of access have to be studied as assemblages. Thus, I focus on examining how new devices are placed in existing assemblages of ICTs, how different devices and locations of access are put to use and how people relate to their access infrastructure. To do so, I apply the concept of re-domestication to the analysis of qualitative data.

Three distinct re-domestication processes emerge. They encompass distinct ways in which the dynamics of Internet access are experienced and reflected in everyday ICT use practices. The three re-domestication processes are called spotlighting, distributing, and being stranded. Spotlighting refers to instances where one mode of going online takes the leading role and becomes the predominant way in which people engage with online resources. Distributing encompasses access infrastructures where various modes of access are being used on a daily basis. The choice of a specific kind of access depends on contextual factors of online engagement. Lastly, stranded re-domestication refers to instances where users struggle with sustaining the access infrastructure, resulting in access being limited. These three distinct re-domestication processes encompass dynamic complexities in Internet access, which extend beyond adoption of specific devices, and address the interconnectedness of its different parts.

6.2.1 Spotlighting

Spotlighting as a re-domestication process is a focus on a single way of going online, which becomes the most prominent mode of Internet use. Spotlighting occurs when a new device enters existing access infrastructure and profoundly changes relationships with and use of existing devices. Most often, the underlying reasons for such a change are the better quality of a new device, increased convenience of access and a perception that one mode of going online "fits all"—users feel it enables them to do everything they want to do. As a result, older devices and modes of going online take on very specific roles and are rarely or indeed never used. Coupled with an intense focus on a single mode of access, users express strong favourable perceptions about it and, by contrast, attach less favourable meanings to alternative modes of access. When the processes of infrastructure development result in spotlighting, users' attention is turned to a single mode of access and uses best supported by that specific way of going online. Below, I discuss how spotlighting was experienced by participants in the interview study. I focus on understanding their relationships with different devices, reasons for changes in how infrastructure is perceived and used, and what use practices are common among them.

Eleven interviewees were categorised as users who spotlight. For all of them, their first home Internet experience involved either a desktop or a laptop computer connected to the Internet. Over time and in line with technological developments, all of them focused their Internet access on either a smartphone or a tablet computer—six spotlighters predominantly went online on a smartphone and five on a tablet. They all, however, possessed or had household access to various other devices that connected to the Internet. Six spotlighters had a computer, a smartphone and a tablet; four had one or more computers and a smartphone; and one had a computer and a tablet (see Table 6.1). What they all had in common was an intense focus on a single mode of access throughout the interview.

Table 6.1. Interviewees in the spotlighting group

Interviewee name	**Age**	**Household income**	**Education**	**Life stage**	**Access infrastructure** (main device in *italics*)
Jane	32	£30,000 or more	Further	Not working due to health reasons	Laptop, *smartphone*, tablet
Victoria	44	£30,000 or more	Further	Employed	Laptop, *smartphone*
Thomas	58	£30,000 or more	Higher	Employed	Laptop, netbook, *smartphone*
Luke	19	£20,000 up to £30,000	Secondary	Employed	Laptop, *smartphone*
Omar	45	Up to £12,500	Further	Employed (zero-hour contract)	Laptop, *smartphone*, tablet
Emily	38	£30,000 or more	Higher	Employed	Desktop, netbook, *smartphone*
Rose	62	£12,500 to £20,000	Secondary	Employed part-time	Laptop, smartphone, *tablet*
Eva	30	£20,000 to £30,000	Higher	Employed	Laptop, smartphone, *tablet*
Mary	53	Up to £12,500	Secondary	Not working due to health reasons	Laptop, smartphone, *tablet*
Grace	49	Up to £12,500	No educational qual.	Disabled	Laptop, *tablet*
Anne	44	Up to £12,500	Further	Not working/jobseeker	Laptop, smartphone, *tablet*

Of those who were mainly smartphone users, I present Thomas and Jane's experience in more detail. They had both replaced several smartphones by the time of the interview. Since they had started using phones that offered a good online experience, their Internet use largely involved a smartphone. For Thomas, who worked in a telecommunications company, the transformation happened with an iPhone: "What changed things is when I got the iPhone because it is specifically designed for Internet use". After buying the first iPhone, all his Internet use transferred to a smartphone:

> Well, the iPhone brings together lots of devices and applications into one thing really. […] I can get directions to places. The screen resolution is very good. It's okay for watching video. It's a good Internet experience and there's a lot of mobile sites which are optimised. I've never used it for banking. I still don't trust mobile technology for banking. But I use it for buying things. […] I use it for mail, for sort of personal mail, for all sorts of personal things. I had Facebook on there. […] It's a very easy way to communicate to people.

The smartphone became his central Internet device because it enables him to do everything he wants to do in a seamless way at home or on the go. Due to privacy concerns, online banking remains the only thing Thomas uses his computers for:

> **Interviewer:** You said you got your iPhone a couple of years ago, has that affected in any way how you use the computers at home, your laptop?
>
> **Thomas:** I very rarely use a computer at home now. It's very unusual. I probably use it once every two months… If that…
>
> **Interviewer:** The laptop?
>
> Thomas: Yes. If that. I hardly ever use it. The only thing I use it for… I'm allowed to use my work laptop at home for personal use, but I try not to use it very much. But I will use a laptop for banking because I don't like to see financial transactions on a phone because it's not a fixed connection. I will use it for banking or I use my work laptop for banking.
>
> **Interviewer:** Okay. And the small...
>
> **Thomas:** Yeah, I haven't used that for a year probably.
>
> **Interviewer:** The netbook.
>
> **Thomas:** I don't use that at all, really no.
>
> **Interviewer:** Where is it located?
>
> **Thomas:** It's sat in a room and I don't use it. It's become obsolete because the iPhone gives me all the functionality I need really.

When asked whether he ever thought of buying a tablet, Thomas noted: "I don't really think it would do anything. It's a bit too bulky. The thing about the iPhone is it just slips in the pocket, so I can take it anywhere and it's quite unobtrusive". However, right at the end of the interview Thomas mentioned that he has an extra Motorola smartphone at home, which he bought

> specifically to connect it to the Internet at home to watch streaming video because it's a much better experience [compared to his iPhone]. I don't ever use it as a phone. It's got a SIM card in it, but it's got no credits on it. I just use it to view videos.

This example shows how Thomas arranged his access infrastructure to always get the "best experience" of whatever he wanted to do online. In most cases, however, the best experience was achieved on his smartphone.

Jane also used a smartphone for all her Internet activities—from communicating and using various social media apps, to buying things on eBay. She tried to explain why she does all that on her phone, rather than on her computer:

> I don't know… I think it's just because it's always besides you and if you suddenly have an idea to look up something you need it's quicker to look on my phone than it is to look on the laptop, definitely. I think it's just maybe because the phone is so good as well. […] Yeah, it's just so much easier and quicker. And I've got the apps that work fine, everything I need to see, it's just on there. The only time I'll ever really go over to the laptop to look at Internet things is if, other than social media stuff [work-related use], is if I can't get something to work on my phone.

Jane only used her laptop for very specific tasks, like when she needed to print something out or when she worked running other people's social media accounts: "It's just because you have it all on one big screen". She thought that laptops are good for doing a lot of writing, which she did not need to do. For going online, she would always choose a smartphone over a laptop. Interestingly, Jane also had a tablet computer, which she had received as a present from her partner. However, the device never got a prominent role within her access infrastructure. She only used it at home, occasionally to check emails, play some games or stream video content on her television screen via Chromecast. She felt she "just didn't really need it" and that although "it is handy for things like that, checking my email, it just seems like an expensive piece of kit, just to check my email".

In general, there is no evidence that going online on a smartphone in any way limits what spotlighters do online. All their day-to-day online activities are performed on a smartphone. Victoria, who had a rather old model of Samsung smartphone, listed a long list of apps she is using regularly, from a fitness diary app and various communication apps, to banking and online shopping apps. Spotlighters perceived their smartphones as very capable devices that enabled them to do anything online. Luke for example described his smartphone by saying, "It is like a mini laptop. It is just like a wee laptop. […] You can do anything on a phone what you can do on a laptop or a computer". However, as both Thomas and Jane pointed out, there is a handful of things that spotlighters still do on other devices. This can be related to perceptions of privacy and security (Thomas' example); or the fact that some things like printing, writing and using specific software are easier to do or only available on a PC (Jane's example; Emily using her netbook just for Skype conversations; and Victoria using her laptop for Excel spreadsheets). However, not everyone perceived this as a matter of choice, like Eva:

> I use my laptop if I'm typing documents – that I need to sit and use it for. It's not because I would rather use it, it's because I have no choice. You can't sit and type documents with your iPad, so that's why I turn to the laptop. It's not a fact that I want to use it, I just need to.

Therefore, although PCs and other devices play only a minor role in individuals' Internet use, their availability is very important. In a way, they still play an integral role in enabling users to perform these specific activities. They also act as back-up devices in case there is anything that cannot be performed on their device of choice.

Both Thomas and Jane explain how going online on their smartphone offers them the best online experience. Such access is easy, fast, seamless and, importantly, always available. This perception resonates with other interviewees in the spotlighting group. Emily for example used her smartphone a lot "[b]ecause you always can and it's always with you". Similarly, ease of use, portability and constant connectivity appealed to Luke:

> Yes, but it is just easier to email on the phone. It is there, it is faster as well. It takes A LOT less time. Waiting around. Waiting for stuff to load. Plus it is everywhere you go. You can take a phone everywhere and it is still connected to the Internet. If you take a laptop, it is limited.

These perceptions are closely related to feelings of ubiquitous access to the Internet. Sometimes, having constant access to emails and other online resources was actually the main reason for buying a smartphone in the first place. The importance of immediate access to online resources anywhere and anytime may indeed be one of the underlying reasons that some spotlighters chose their smartphone as the primary way of going online.

The importance of ubiquitous access was indeed a somewhat less prominent concept among spotlighters whose primary mode of going online was a tablet. Interestingly, the six spotlighters who mostly went online on tablet computers were all female. Apart from somewhat less intense feelings of ubiquity, they shared other perceptions with the spotlighters described above. Rose for example absolutely loved her tablet, which became her primary mode of access: "I thought that [a tablet] would suit me better, rather than the laptop. And it does. A laptop just sits in the bedroom, doesn't get used. Honestly, it doesn't. […] I love the sizes, it's really convenient. […] Love it! I love the iPad, yes, definitely!" Tablets were often perceived as much easier to use than laptops, especially by interviewees who had health problems. For example, Eva had eye problems and Internet use on her iPad "just felt more comfortable". Grace, a wheelchair user, also found the iPad much easier to use, saying how she is "all crouched up" when she uses a laptop. Moreover, the iPad's portability was really important because it enabled her to use it anywhere in the house or on the go:

> When I was using my laptop, I used to always be in the room, because the wee table thing was in the room. And it was kind of heavy to carry it from my room in the living room so. And I can just take this [iPad] anywhere with me all of the time. […] But I just usually go on this at night as well. I sit for a couple of hours on it before I go in my bed, when I'm in my bed I just sit and play on it. Wherever you are.

Like smartphones, tablets were perceived as very capable devices enabling interviewees to do everything they wanted to do online. Interestingly, four of those spotlighting on a tablet also had and used smartphones. There were several things these interviewees had in common. First, they used their smartphones more for calls and texts than for going online. They used the phones to access maps, email, Facebook or other apps on the go, but only when needed. Constant access to the Internet was less important to them. Second, they all had smartphones that were older than their tablets. Put differently, the tablet was the latest device to enter their access infrastructure and alter the ways they used PCs and smartphones. A good example is Anne, who used a smartphone for most of her Internet activities until shortly before the interview, when she got a tablet. When talking about her smartphone she noted, “I did have a lot more [apps] but since I got the tablet everything’s transferred through the phone onto the tablet […] now the phone’s used for basically for calls, texts, which is what a phone is for, originally”. Anne transitioned most of her Internet use from a smartphone to a tablet, which she always carried around and connected to WiFi hotspots across the city and at home. She was the only tablet spotlighter to whom ubiquity of access was really important.

The above observations suggest that the newest and most capable device is the one users tend to spotlight on. This is coupled with perceptions of ease of use, convenience and portability. Thus, I would assume that users in the spotlighting group will remain mostly mobile users on either smartphones or tablets. Considering their everyday Internet use practices, spotlighters have little incentive and motivation to invest into PCs, which can cost a substantial amount of money. By contrast, telecommunications companies make it very natural and easy to upgrade to a new mobile device after an existing contract runs out. Another advantage of the contract-based model is that users are paying off their device over time. Thus, new mobile Internet-enabled devices are most likely to be next in line for adoption by users in the spotlighting group.

6.2.2 Distributing

The *distributing* re-domestication process describes users who distribute or spread their Internet use across several devices and access locations. Each part of the access infrastructure is important in its own right to users who engage in distributing. Unlike in the spotlighting group, there is no single preferred mode of going online among distributors. All access modes are desired and used on a daily basis. In their discussions of use practices, interviewees explained how they do certain things on one device and others on another, or indeed said they do more or less similar things across various devices, where the choice of the device depends on a specific context of use. For distributors, it is important that all elements of their access infrastructure are of sufficient quality and work “properly”. If there was a device that performed poorly, users wished to replace it. This was especially true of PCs, which were often old and obsolete. While those in the spotlighting group had no intentions to replace such devices, users in the distributing group expressed strong desires to always keep their entire infrastructure up to date. Thus, their Internet use is spread across various modes of access, to which different meanings are attached.

Eleven interviewees were identified as performing distributing practices. The majority of them had further or higher education and were employed (see Table 6.2). They all had access to two or more devices in their access infrastructure. All but two distributors had access to a PC and a smartphone. As compared to spotlighters, tablets were somewhat less popular among this group of users. All distributors except from Alex either accessed the Internet at work or used it for work.

Table 6.2. Interviewees in the distributing group

Interviewee name	Age	Household income	Education	Life stage	Access infrastructure
Aiden	28	Refused to state	Higher	Employed	Laptop, tablet
Jacob	26	£30,000 or more	Higher	Graduate student	Desktop, smartphone
Harry	48	Refused to state	Higher	Employed (café owner)	Laptop, smartphone
Sophie	36	£30,000 or more	Higher	Employed part-time	Laptop, smartphone (2 tablets in house)
Alfie	31	£30,000 or more	Secondary	Employed	Laptop, smartphone (tablet for children)
Alex	21	Up to £12,500	Secondary	Not working/ jobseeker	Laptop, smartphone, tablet
Ethan	27	£12,500 up to £20,000	Higher	Graduate student	Laptop, smartphone
Leo	26	Up to £12,500	Further	Self-employed	Laptop, smartphone
Sam	34	Up to £12,500	Further	Self-employed	Laptop, smartphone, tablet
Rebecca	30	£30,000 or more	Higher	Self-employed	Laptop, smartphone, tablet
Laura	44	£30,000 or more	Secondary	Employed part-time	Laptop, tablet

Access and use practices were quite diverse among these users. But what they had in common was a clear idea of what each device is for. Put differently, specific roles and meanings were assigned to specific devices. Jacob, a graduate student in music, took the most extreme measures in assigning different roles to different devices. He was very motivated to be good at music and found the Internet in general very distracting. Thus, he decided to make his PC a work-related device and the smartphone a "casual, sort of social use" device. To do so, he restricted access to certain sites on the PC and only allowed access to them on a smartphone:

> I can't access Facebook on my computer, I've got it blocked, and any websites where I waste time are all blocked. [...] So, most of my Internet usage now [on a PC] is just the BBC website... And then I use the Internet for research, for like learning tunes and things, because I'm trying to learn new music all the time... [...] And then, I use my mobile phone for everything else now. So I can get Facebook on my phone but I can't have it on my computer... Because, I can use it like when I'm on the train, but I don't want it when I'm trying to practise. It's distracting.

However, when asked where he mostly uses his phone Jacob responded, "Just in the house actually, just right next to my computer [laughs]". Although Jacob had gotten a smartphone as a "hand-me-down" from his mother and not because he wanted it, the device played an important role in his access infrastructure. After he got it, he proceeded to

> swap the roles around of what the computers did [...] the phone replaced basically the sort of more casual Internet use, like, I'm checking Facebook, I'm talking to my friends, like I do that all on the phone now, and all the work-related stuff and study-related became on the primary computer.

While both modes of access were important to Jacob, there were distinct differences in what uses he performed on them.

Like Jacob, Ethan was a graduate student who used both his laptop and smartphone for much of his Internet activities. Due to the nature of his work, he spent a lot of time behind the computer, which was always connected. However, he liked to keep his work and personal uses of the Internet separate as much as possible. To do so, he for example set up two separate desktops on his computer:

> **Ethan:** I suppose that I find that a little bit invasive if everything's automatically present on every device. I quite like to have distinctions between work and home, where I can kind of separate off different aspects of my life.
>
> **Interviewer:** So how do you do that in terms of the Internet use?
>
> **Ethan:** Well, if I need to be reading something on my phone, a piece of work, then I will just put it on my phone to be able to read it on a train for example, but then I'll try and make sure I get rid of that afterwards, 'cause the temptation is always there to go back to it and never turn off and never relax. On my Mac I have different desktops with different things saved, so I … I use… I use the two different ones to try and differentiate between when I'm working and when I'm using the computer just for more personal uses…

Hence, for Ethan getting a new smartphone did not result in transferring all his Internet use to the new device but in creating more specific roles for each device—the laptop became a working device and the smartphone became more personal communication-centred device:

> **Interviewer:** So if you think about this new smartphone and, you know, when you bought it in May… Did it change how you use your computer?
>
> **Ethan:** Yes, definitely. I became a lot less dependent on using either my computer or office, or computer in the office […] Yes, I found that I was going on there less and less to contact people and kind of to organise kind of say social events and… Because I could just do it from my phone, so it was a lot more easier.

Ethan mostly used his smartphone to communicate and to receive news. Yet he did not do banking or shopping on his phone, because "I don't trust a phone app to do that". Hence, anything that required more attention or involved a financial transaction was performed on his PCs.

Similarly, in Alfie's household, all Internet use that involved financial transactions, like online shopping and banking, was on a laptop. He also used it for longer sessions of following sports online and for Skype conversations. In general, however, most of his communication and habitual Internet use was on a smartphone. This part of his online engagement used to involve a laptop, but that changed when a smartphone entered his access infrastructure:

> **Interviewer:** And, you know when you got your smartphone, did your use of the computer change in any way?

> **Alfie:** It did. I must admit the usage on the laptop kinda dropped, because there's so much you can do on your phone. Because basically a phone is just a small computer so that's, so the usage on the laptop did stop. Um, it didn't stop but it came down, just the amount of time I'm on it.
>
> **Interviewer:** Mhmm, do you think you are, you know are there specific things that you do just on the laptop and specific things you do just on your smartphone?
>
> **Alfie:** Yeah, like for example the shopping and that type of thing, and I do a lot of online banking as well. So I do all that through the laptop. And with regards to maybe like Facebook and that type of thing that would be on my smartphone. Checking sports results and that type of thing I can do on my phone.

Nevertheless, the laptop remained an important part of Alfie's access infrastructure. He told me that the laptop was getting old, but he and his wife planned to buy a new one. Unlike users in the spotlighting group who mainly abandoned old devices, those distributing used different devices on a daily basis and wished to keep all parts of their access infrastructures up to date. This was also true in the case of Sam, who responded vividly when asked on which devices he goes online:

> At the moment I've got a laptop and an iPad, and a smartphone. So, [I use] all of them in one way or another, you know. Mostly I use the iPad at the moment because the laptop... It's, like, eight years old, and it's already been resurrected once, so it's sort of – it doesn't really like doing very much [laughter]. So I mostly use the iPad, and like, yeah, if I'm out and about, maybe I look up a map on the smartphone, or check email or something like that.

He wished he could afford a new PC because although "the iPad is great, but what you can do with a laptop or a desktop is a lot more varied". Although the tablet was clearly the most prominent mode of access for Sam at the time of the interview, both the PC and the smartphone were also used regularly, yet in more specific contexts. The laptop was used at home to perform work-related activities and the smartphone was used in mobile situations for a quick check of online resources.

The idea that a PC is for "important" uses that require a larger investment in terms of time, attention or money, whereas smartphones are for convenience and instant checks of the

Internet, was also present among other people in the distributing group. Leo described his relationship with both as follows:

> Um, so my laptop is important for making informed decisions, doing work-based and more important things on. Also useful for entertainment… Whereas my phone is for convenience and to keep me up to date, up to the minute with emergencies, important things. It is basically an extension but more portable extension of a laptop, so that is how I look at it.

Another important concept that emerges from Leo's quote is the perception of a smartphone as an extension of a PC. This was common among users in the distributing group. As opposed to spotlighters, distributers did not conceive of mobile devices as superior devices that are easier to use and enable all desired uses. Instead, distributers thought of mobile devices as devices complementary to PCs. Hence, when a smartphone was adopted, most online activities that interviewees used to perform on PCs got transferred to mobile devices while PCs remained in use. Aiden for example described more or less the same uses on his laptop and tablet, where the tablet was used "a little bit more initially, just to sort of get it how to use it". After that, the tablet gained the role of a mobile device to use on the go, whereas the laptop acted as the main port of Internet use at home. By contrast, Rebecca noted that getting a smartphone changed the amount of time she spends on her laptop, but that "[I] probably just maybe stick to what I use in my phone, the same as what I use at home on the laptop". For her, the smartphone became the main port of email and social media use. Others agreed that smartphones are good because "you can still connect, keep an eye on emails and stuff like that" (Harry) wherever you are and "for pure convenience 'cause it's just really quick and easy" (Alex). These use practices suggest that distributing processes are greatly shaped by contexts of use (e.g. home vs. on the go) and the purpose of online engagement (e.g. doing important things vs. checking something).

In summary, there are three key characteristics that are common to Internet users for whom re-domestication processes result in distributing of Internet use. First, when new devices enter access infrastructure, uses and relationships with existing modes of access are not transformed dramatically. Instead, online engagement gets distributed across different modes of access. In a way, each mode of access gets a somewhat more specialised role in everyday Internet use. For example, PCs are used for serious, important, or longer sessions of online engagement, whereas smartphones are for personal, social and instant uses. The choice of mode of access depends on the context and goal of online engagement. Following from that, the second common characteristic of distributers is that they see mobile devices as extensions of more capable computers. Thus, mobile devices are not replacing but complementing PCs. Third, because each mode of access is in its own right important and fits distributers' everyday Internet use practices, distributers aim at keeping all parts of their access infrastructure working and up to date. Thus, it would be reasonable to expect that users in the distributing group will continue to buy and use different Internet-enabled devices. While the newest and most capable device might act as the main port of use or change some parts of the daily Internet routine, based on the above discussions, I would conclude that users in the distributing group are most likely to stay active users of various modes of Internet access.

6.2.3 Being Stranded

Being stranded emerges when access infrastructure cannot be maintained and put to meaningful use due to a lack of various offline resources. Stranded re-domestication also occurs when existing technologies get old, obsolete or broken or are taken away. I argue that users in such situations also re-domesticate the roles and uses of technology, but that these practices reflect circumstances of being stranded. In stark contrast to users who engage in spotlighting and distributing practices, users who are stranded do not exercise empowered choices over their use of technologies (Selwyn, 2006). Instead, they do what they can with the resources at hand. They are a truly disadvantaged group for whom poor access infrastructure is one of the main obstacles to developing more varied and rewarding Internet use.

Seven interviewees experienced various ways of being stranded in their engagement with Internet technologies. There were several commonalities among them (see Table 6.3). First, they all possessed only one personal Internet-enabled device, except from Oliver, who had two. All smartphone users but Max had old models of BlackBerry smartphones. Only Helen and Max had access via newer devices. Most of them struggled with obtaining a broadband connection at home. Apart from Oliver, who worked on a zero-hour contract, all other interviewees in this group were not working due to either unemployment or health reasons. Consequently, their households had very low incomes.

Table 6.3. Interviewees in the stranded group

Interviewee name	Age	Household income	Education	Life stage	Access infrastructure	Exclusion factor
Liz	38	Up to £12,500	Secondary	Not working/ jobseeker	Smartphone	Lack of economic resources
Barbara	48	Up to £12,500	No educational qual.	Not working due to health reasons	Smartphone	Lack of personal resources
Helen	53	Up to £12,500	No educational qual.	Not working/ jobseeker	Tablet	Lack of personal resources
Olivia	53	Up to £12,500	Further	Not working due to health reasons	Laptop	Lack of economic resources
James	41	£12,500 to £20,000	Don't know	Not working/ jobseeker	Smartphone	Lack of economic resources
Max	19	Up to £12,500	Secondary	Not working/ jobseeker	Smartphone	Lack of economic resources
Oliver	28	£20,000 up to £30,000	Secondary	Employed (zero-hour contract)	Smartphone, PlayStation	Lack of economic resources

Liz and James both went online on old BlackBerry smartphones. Their households used to have broadband connections and computers. However, both explained that "bills were too high" (James) to retain the connection while "the weans broke" (Liz) computers and other devices they used to have. Thus, they were stuck with mobile Internet access (although James' family was allowed to use a neighbour's WiFi) on smartphones with limited capabilities. Limited access infrastructure of poor quality significantly shaped their engagement with online resources. Using her phone, for example, Liz could look for jobs, but had problems applying for them:

> Like in my own phone, I can go and look and see what job vacancies there is but see when it comes to applying for them, it wouldn't let me attach my CV or anything so a lot of times, I'd send the application form away. But there's no anything attached to it because I've just assumed that it would work the same as the other phones, but it's not…

With a BlackBerry, she was also not always able to shop online, which she found strange:

> Sometimes, see that I can, I can go on my phone if I'm wanting something from Amazon, that's not a problem. But if I was to, if I was to go on another site, like say I wanted to go on Asda for my groceries I wouldn't be able to do it. But I can place an order through Amazon, which is quite weird 'cause I would have thought well, if you can do it with one you can do it with the rest of them…

James faced similar problems. He told me that he is mostly using the Internet to go on Gumtree, eBay and YouTube. However, having a device of poor quality coupled with a lack of skills resulted in not buying anything online himself: "I don't know how to set up an account on it [eBay] yet. Anything I want to buy on it, my partner's brother does it". Together with an Internet messaging service (WhatsApp) and Google Maps the three websites mentioned above represented almost all of his online engagement. However, at several points throughout the interview James noted how he likes to just "surf through" the Internet and that having Internet access is important to him.

The experiences of both Liz and James suggest that they would be able to further develop their online engagement if they had devices that enabled them to explore and use online services more easily. Moreover, better access would enable them to look and apply for jobs at home instead of doing that only in a local organisation supporting unemployed people. They both expressed a wish that they could afford home Internet connection and a more capable device. Their use concentrated on a single device not because they chose it (like users in the spotlighting group) but because they had no other option. This is a big difference between the spotlighting and stranded groups.

Olivia and Oliver were distinct among those being stranded because they had obtained a broadband Internet connection at home shortly before the interview. However, Olivia had problems going online because her laptop was of poor quality and infected by viruses, which she had little understanding of. Since she was not able to afford an expensive repair or a new laptop, she hoped that her brother and sister-in-law would get her one for Christmas. But Olivia was also actively seeking other options. She, for example, enrolled in Argos' digital skills workshop[15] (scheduled after the interview was held), which provided attendees with free tablets:

> **Olivia:** Well, I'm actually going to a wee course with Argos, and you do this course for 90 minutes, right, and you pay £20 and they show you how to do things online… I mean, I know how to do it all, but to get a tablet for £20, because you get a free tablet at the end of it, so [laughs]. I'm gonna do that!
>
> […]
>
> **Interviewer:** So, what do you think that you'll do with it once you get it [the tablet] in the house?
>
> **Olivia:** I don't know.
>
> **Interviewer:** Can you imagine?
>
> **Olivia:** It will probably lie beside in my bed, and I'd be able to do, for when I'm up in my bed, you know. Maybe, download some free books and something and try… 'Cause, I like the feel of a real book, but maybe download some books and read off the tablet and obviously it will be better for if I'm out and about… And photographs, apparently photographs in a tablet can be quite good, so… […] The only thing with the tablets is you can't use your memory stick or anything in them…

At the time of the interview Olivia's access infrastructure was unstable and bound to undergo some change. However, it was not clear how Olivia's access will indeed develop and how this will shape her online engagement. Two things were clear, though: first, that Olivia herself did not have sufficient economic and personal resources to manage the access infrastructure, and second, that better access would enable her more extensive engagement with online resources.

[15] More information available at https://www.homeretailgroup.com/news-and-media/news.aspx?smlbus=1519&article=6432 (accessed 2 July 2015).

Oliver's home was also connected to broadband just before the interview. Together with the Internet connection he had bought a PlayStation video game console, which he became preoccupied with. Apart from a BlackBerry smartphone, the video console was his only other Internet-enabled device. Oliver was extremely excited about this development. When asked why he decided to buy a PlayStation he replied, "All of my friends are in this game, so I wanted to be in this game that everyone else is involved in". For Oliver, getting a home Internet connection meant he was able to connect with his friends. Throughout the interview it became clear that Oliver was using the PlayStation predominantly for playing games and to stream YouTube videos, whereas the BlackBerry was used almost exclusively for online messaging—"That's it, because if I go on the Internet, it really frustrates me, because when I try to search for a website, it cuts out, it doesn't do it very well". Although Oliver had recently established a home connection and had a new Internet-enabled device, I see him as belonging to the stranded group. The reason is that his access infrastructure did not enable him to do much online. His online engagement was constrained to messaging and gaming. Technically, the gaming console enabled him to access the web, as Oliver described: "So I have my PlayStation console, I have my Joypad for my PlayStation, and through this I can go to my Internet browser and do a search". From the discussion with Oliver, however, it was not clear how his Internet use may develop in the future. Taking into account his great excitement about gaming, it seemed very unlikely that he would start using the gaming console for information searching, shopping, banking or other activities. In fact, Oliver acknowledged that having a "proper" computer would enable him to do much more online:

> I believe a proper built tower that can handle multiple screens would be more suitable for me. Because I am, I plan to use like business in the computer, umm... Like buying and selling through eBay or different websites, I like to do many searches, I can have my game on one screen, I can do my work on another screen. I maybe have music playing on a third screen, so I would like a proper tower that could handle [that].

In other words, apart from being able to engage in gaming Oliver did not seem empowered by his access infrastructure across a wider range of online activities. His use of online resources was very much focused in the personal field, despite knowing that there is much more that can be achieved through the Internet.

For similar reasons Max was also in the stranded group. He got a new smartphone shortly before the interview, but for an unknown reason he was not able to connect it to mobile data. He connected from home using WiFi (his sister was paying for it) and throughout the city using free hotspot connections, mostly to access social media sites like Facebook, Snapchat, Instagram and WhatsApp, and to look for jobs on Gumtree. Max was young and unemployed and perceived the Internet as an unlimited source of opportunities for success. He was eager to do business online and make his future better using the Internet—"the Internet has everything that you want, it's just how you find it, pretty much. Yeah, so it's like, the longer you stay on the Internet, the more things I find on the Internet". For this reason Max was really keen on having a computer. It would enable him to engage more with various online resources:

> If you are using a computer it's a lot easier to locate more sites, more web sites. I don't know, maybe it is because of the size of the screen. You can see a lot of things and you're a lot more comfortable, but yeah, I ... […] But I do need a laptop. I will get a laptop. I need to start trading again. I need a bigger screen.

Oliver and Max both had clear ideas of how more varied access infrastructure would enable them to do more online, especially in terms of engagement with economic online resources. Their current access infrastructures did not support all that they *could* do online. Thus, they were in a way stranded in their online engagement, despite Oliver's great excitement about gaming and Max' enthusiasm about being able to connect all the time.

Finally, Barbara and Helen, who also had limited access infrastructures, differed from other interviewees in this group by having very low personal resources. They both had no educational qualifications and were not working. Barbara only went online on a second-hand BlackBerry, whereas Helen had been bought a tablet by her son. Barbara went online mostly to use Facebook and occasionally searched for information on Google. She had a very basic smartphone, because newer models did not appeal to her: “No, because I don’t know how to use them. No, too fancy for me!” Helen used Facebook occasionally but used the Internet quite a lot to search for jobs. However, she preferred to do it on “big computers” in various centres she was going to: “I usually do a wee job search on it, I do job searches in here [the centre where the interview was held], because my tablet is only seven inches”. Helen had taken an IT course, but she noted, “I’m not great on them [computers], I’m getting there. […] Because I am a bit wee daft when it comes to computers [laughter]”. She also did not feel very comfortable when using a tablet: “The only thing is, the tablet I got is seven inches so quite small. And when you press it... When you bring up the keyboard on it... It’s quite fidgety”. This was the reason she did not use the tablet to apply for jobs but only did that in centres offering IT support to job seekers. While both Barbara and Helen had limited access infrastructure, a very important factor underlying their limited engagement with online resources was a lack of personal resources that would enable them to develop higher self-efficacy in use of technologies.

Lack of economic and personal resources needed for meaningful engagement with Internet technologies is what sets interviewees in the stranded group apart from those in spotlighting and distributing groups. They have very limited access infrastructure not by choice, but because of their life circumstances. In this way again they are very different from the other two groups. Their access and online engagement do not result from an empowered digital choice but from particular life situations related to social exclusion. Poor access to offline resources shapes how these individuals are able to develop their access, Internet skills and sufficient online experience. While their Internet access infrastructures are dynamic and get re-domesticated, these processes do not always results from new technologies entering their access arrangements, but rather from technologies becoming obsolete, broken or impossible to sustain, as well as from their changing life situations.

6.2.4 Summary

Throughout this section I identified three types of re-domestication processes, which characterise dynamics of Internet access infrastructure. Importantly, they demonstrate that not everyone experiences it in the same way and that reasons spurring re-domestication processes are not uniform. For users in the spotlighting and distributing groups, the dynamics of access were strongly influenced by technological developments. Most kept up with the changing technological landscape by adopting laptops or PCs first, followed by up-to-date smartphones and tablets. The differences between the spotlighting and distributing groups stemmed mostly from disparate ways in which they engaged with their access infrastructures—spotlighters concentrated their daily online engagement on a single, usually mobile, device, whereas distributers spread their online engagement across various devices and contexts. By contrast, re-domestication processes in the stranded group were influenced most significantly by individuals' life situations, characterised by limited access to various offline resources. Thus, changes in access infrastructure or their inertia often resulted from broken devices, inability to sustain access to certain technologies or a lack of self-confidence in technology use. Apart from different sources of access dynamics, some other important differences between the three groups of users displaying differential re-domestication practices were observed.

First, it seems that users in the spotlighting and distributing groups are exercising an empowered choice over their engagement with various ICTs, while those in the being stranded group are not. Those stranded often wish they could improve their access infrastructure with home Internet connections, better quality and multiplicity of devices. The most common factor preventing them from doing so is a lack of economic resources. Most stranded users are unemployed, poorly educated and have low incomes. Commonly, the single mode of access is a limited mobile device. They are the truly disadvantaged, where different forms of social exclusion translate to access inequalities and further to limited online engagement.

Second, the spotlighting and distributing groups, which exercise an empowered choice about specific mode of access, seem to have somewhat different perceptions of mobile technologies. Those in the spotlighting group see them as equivalent to computers and spend long sessions using them, whereas distributors see them as complementing computers and use them mostly for just-in-time access to online resources. Furthermore, users in the distributing group distinguish between different types of online engagement and choose a specific access mode according to what they are going online for. Each device in the infrastructure has a specific role, thus maintaining the quality of all parts of the infrastructure is important. By contrast, spotlighters focus on a single mode of access and are thus less concerned with other parts of their access infrastructure. Relatedly, apart from differences in how they engage with access infrastructure, spotlighting and distributing users are also different in terms of their offline resources. On average, distributors are better educated and have somewhat higher incomes. They are also more likely to use the Internet at or for work. This indicates they may have different lifestyles, resulting in disparities in how the Internet is incorporated into their daily lives.

The analysis of re-domestication processes provided further evidence of how Internet users engage with their Internet access differently. I demonstrated that theoretical access with multiple devices and locations, which was available to all of the interviewees, is experienced in contrasting ways among different segments of the British population. These results further uncover complexities in Internet access and challenge quantitative operationalisations of

Internet access. Taken together, the above results demonstrate that beyond differences in terms of material dimensions of access, as discussed in Chapter 5, differences in practices and processes underlying engagement with access also exist.

What the above analysis hinted at but has not disentangled completely is that the three groups may differ in how they perceive the role of the Internet in their daily lives. This relates to studying the centrality of technologies in everyday life, which according to Haddon (2011) is how the domestication framework can be extended to address the longer-term dynamics of adoption and use of ICTs. It also addresses the abovementioned differences in users' lifestyles and ways in which the Internet fits them. Although the domestication framework to studying adoption and use of ICTs revolves around the roles technologies play in an individual's life (see section 2.5.1), no typology of different roles or ICTs' centrality has been developed. However, establishing such a typology would not only help us to better understand why different people engage with ICTs differently, but may also help connect the qualitative domestication framework with quantitative approaches to studying digital inclusion. Thus, the section below focuses on specific roles the Internet plays in individuals' lives. In doing so, I draw on the concept of Internet centrality and extend it by a scheme of media-related goals originating from the media system dependency theory (see section 2.5.2).

6.3 The Role of Access: Internet Centrality

This section focuses on Internet centrality and the dependencies that constitute it. Internet centrality links the domestication and media system dependency approaches to understanding media use. I work from the qualitative results presented above to ascertain whether users who exhibit different re-domestication practices assign different roles to the Internet in their daily lives. This section provides a more detailed understanding of how individuals in the spotlighting, distributing and stranded groups position Internet technologies in their daily lives, first by examining different Internet dependencies, and second by discussing the observed differences.

I define Internet centrality as the embeddedness of the Internet in the existing communication infrastructure and significance of Internet technologies in attaining various goals (see section 2.5.2). I use the term Internet centrality to encompass the scope of Internet dependencies people develop as well as more general perceptions of the role of the Internet in an individual's daily life. To examine specific Internet dependencies I use a typology of media goals developed within the media system dependency theory. The framework was developed in relation to broadcast media and distinguishes among orientation, understanding, and play dependencies (see section 2.5.2). Throughout discussions with the interviewees it became clear that the media system dependency scheme of dependencies does not cover all major functions of Internet media. Specifically, interpersonal communication enabled by the Internet proved an important aspect of online engagement. Thus, I add communication dependency to the existing media system dependency framework.

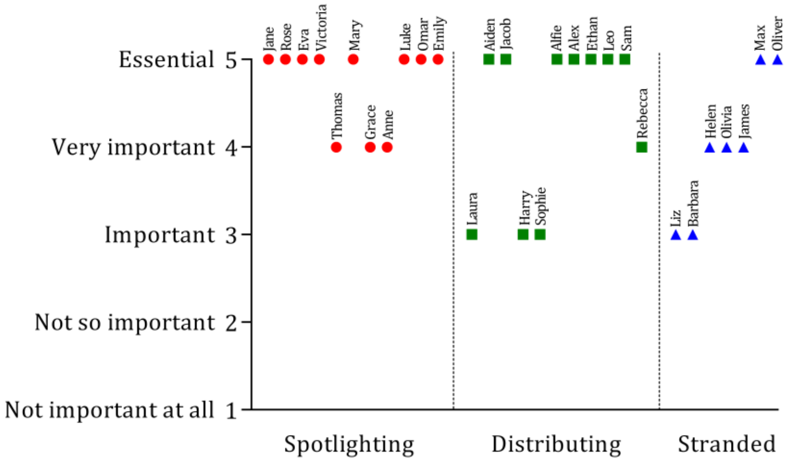
Internet dependencies are illustrated by interviewees' assessment of the importance of the Internet for attainment of various goals and attitudinal aspects of going online. To do so, I use interview data as well as data from a short questionnaire each participant was asked to fill out. The questionnaire contained a number of items measuring orientations towards the Internet taken from the OxIS questionnaire. Unfortunately these items were not developed specifically to measure Internet dependencies. Thus, they are not the best measures of Internet dependencies and do not cover their full range. Items available in OxIS questionnaire distinguish between orientation and play dependencies, while no items corresponding to understanding and communication dependencies are available. Thus, understanding and communication dependencies are examined with interview data only. When appropriate survey questionnaire data are available, I plot interviewees' scores on these items against membership in the spotlighting, distributing and stranded groups. An individual's specific position on the x-axis does not contain any additional information except from group membership (within groups, individuals were randomly assigned positions on the x-axis for increased legibility). The analyses below are descriptive and no significance testing was assigned to the data.

6.3.1 Orientation Dependency

I operationalise orientation dependency with an item asking about the importance of the Internet for information. To provide a more nuanced understanding of the functional role of the Internet encompassed by the orientation dependency, I explore agreement with two attitudinal items: the Internet makes life easier, and the Internet helps me save time.

Figure 6.1 displays interviewees' perceptions about the importance of the Internet as a source of information. The differences among the three groups are not big. Most users in the spotlighting and distributing groups agree that the Internet is essential as a source of information. Grace, Anne and Thomas from the spotlighting group and Rebecca from the distributing group said it is very important. Among those stranded, a majority also agreed that the Internet is essential or very important for information. Overall, 24 interviewees found the Internet at least a very important source of information. Only Harry, Sophie and Laura from the distributing group, and Liz and Barbara from the stranded group, thought the Internet is "important" for information.

Figure 6.1. Importance of the Internet for information



In general, there was a consensus across all groups that the Internet is a vital source of information. Thomas, for example, explained how instant access to information is important to him: "What would I miss most if I couldn't connect for a week? Probably looking at the share prices and currency prices actually, because I check that quite a lot all the time". Laura, who was otherwise rather reluctant to use Internet technologies, asserted "I could do most; I think all things without Internet access. Yeah. It's more for information, isn't it? For gaining information, yeah". Although she did not use the Internet very much, going online for information was an important part of her daily life.

To better understand interviewees' perceptions about the functional role of the Internet in their daily lives, their agreement with two attitudinal items is plotted in Figures 6.2 and 6.3. Figure 6.2 shows that all but two interviewees agree or strongly agree that the Internet makes life easier. Only Liz and Oliver from the stranded group neither agreed nor disagreed with this statement. Most of the interviewees, however, explained how performing certain day-to-day activities is just easier with the Internet. When I asked Sophie whether she does online banking, she answered: "Yes I do. I mean with children it's so much easier. You don't have to go to places to do it". Similarly, Alfie explained how going online helps him to orient his actions:

> For example, the car insurance and stuff, I could—the way they used to do it—I couldn't go phoning about all these companies, so you go in and compare the market or something... You do it online, it makes it so much easier. So much easier. So it's, it's very convenient and it saves a lot of time.

Figure 6.2. The Internet makes life easier

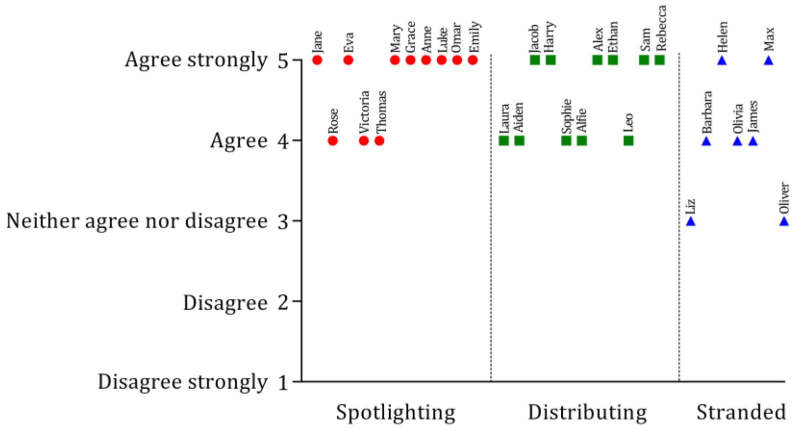
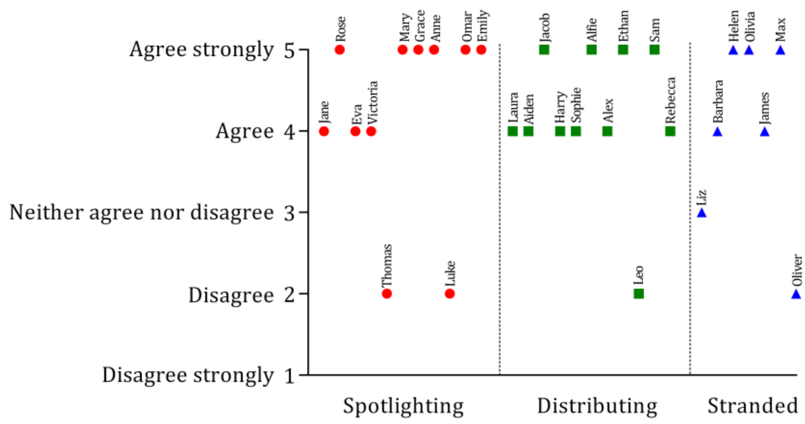


Figure 6.3 shows that the vast majority agree or strongly agree that the Internet helps them to save time. Thomas and Luke from the spotlighting group, Leo from the distributing and Oliver from the stranded group disagreed with this statement. When filling out the questionnaire, Oliver commented on the "Internet helps me save time" statement:

> Because it doesn't help me save time, I waste my time playing computer games. It would help me save time, if I used it properly, by selling things through Internet rather than through word of mouth and through friends. It *can* save time, but in my current circumstances it doesn't help me save time 'cause I just play computer [games].

Other interviewees who disagreed with this statement had similar tensions with using the Internet. On the one hand it helped them to do various things easily and quickly, and on the other hand they felt they were spending too much time online.

Figure 6.3. The Internet helps save time

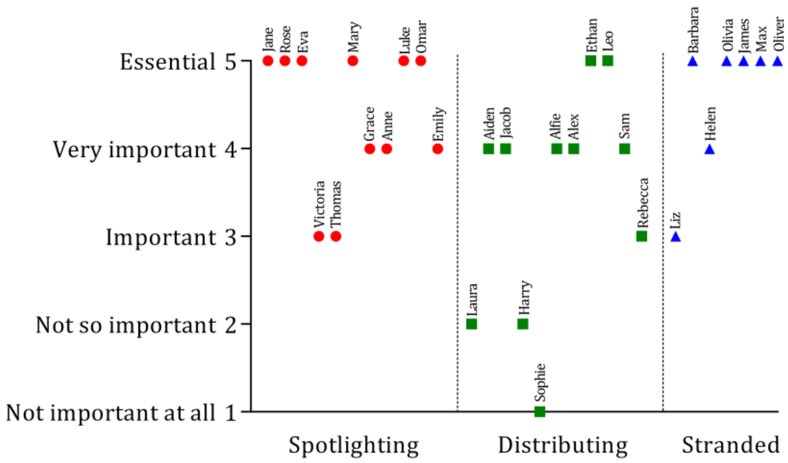


In summary, a large majority of participants in the interview study viewed the Internet as an important source of information and agreed that it makes life easier and saves time. Throughout the interviews, virtually all participants illustrated some sort of orientation Internet dependency. Participants described how they use the Internet to look for various information, from health information to factual information needed to orient their daily activities (e.g. timetables for public transport, cinema listings, maps, recipes); they said they shop, bank or search for jobs online. These are all examples of how the Internet is used to orient people's daily actions and interactions. Regardless of how people engage with their access infrastructures, orientation Internet dependency seems to be universal.

6.3.2 Play Dependency

Play dependency relates to the recreational and leisure use of the Internet. Figure 6.4 plots the three groups of interviewees against the importance they assign to the Internet as a source of entertainment.

Figure 6.4. Importance of the Internet for entertainment

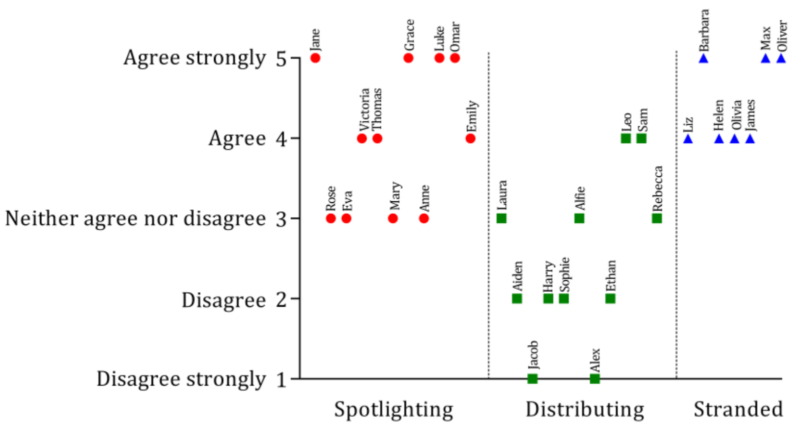


Here, we see much more heterogeneity between groups as well as within groups. Just over half of participants in the spotlighting group agreed that the Internet is essential for entertainment, and three participants said it is very important, whereas only Thomas and Victoria assigned it a middle value, “important”. Those in the distributing group have mixed opinions about the Internet’s importance for entertainment. Only Leo and Ethan said it is essential, followed by five interviewees saying it is very important, Rebecca assigning an “important” value to it, whereas Harry, Laura and Sophie said the Internet is not (at all) important for entertainment. Moving to the stranded group, there is a general agreement that the Internet is essential for entertainment. Only Helen and Liz say it is (very) important. Overall, there seems to be a consensus among interviewees in the spotlighting and stranded groups that the Internet is an indispensable part of their daily leisure. By contrast, it seems that the Internet is somewhat less important for entertainment to those in the distributing group.

To further disentangle interviewees’ perceptions about the recreational role of the Internet, Figures 6.5 and 6.6 show their agreement with two attitudinal items. First, Figure 6.5 shows interviewees’ agreement with the statement “I just enjoy being online to see what comes up”.

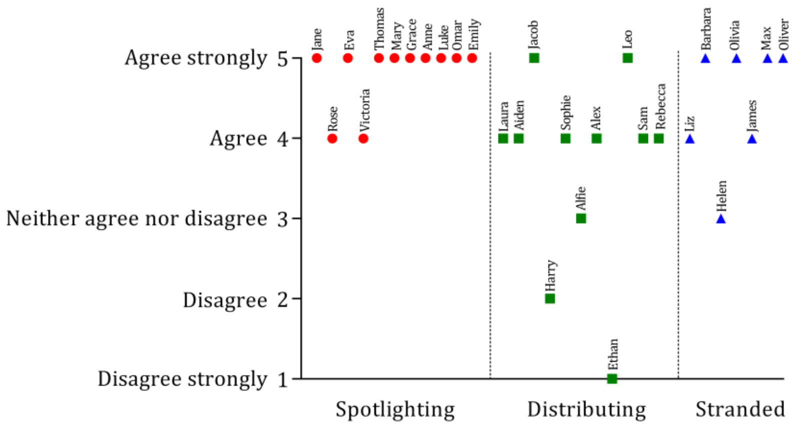
Here, the differences between the spotlighting and distributing groups are even more obvious. Over half of users in the spotlighting group agree or strongly agree that they just enjoy being online. By contrast, over half of users in the distributing group disagree or strongly disagree with this statement. Three were undecided, only Leo and Sam agreed with the statement, and no one agreed strongly. Furthermore, everyone in the stranded group agreed or agreed strongly that they just enjoy being online. Users in the distributing group clearly have different opinions about being online as compared to users in the other two groups.

Figure 6.5. I just enjoy being online



Second, Figure 6.6 displays interviewees' agreement with the statement "Going online helps me pass the time when I am bored or have nothing to do". A vast majority of users in the spotlighting group strongly agreed with this statement. Only Rose and Victoria said they agree. Similarly, everyone but Helen from the stranded group strongly agreed or agreed that the Internet helps them pass time. On the contrary, only Leo and Jacob of the distributing group agreed strongly with this statement, while the majority of distributors agreed. By contrast, Alfie, Harry and Ethan assigned values from 3 to 1 to this statement.

Figure 6.6. The Internet helps pass time



Figures 6.4 to 6.6 suggest that interviewees in different groups form very different play dependencies. The contrast is especially big between users in the spotlighting and distributing groups—those in the spotlighting group report much more favourable opinions about the use of the Internet for entertainment and leisure. Similarly, those in the stranded group enjoy going online for entertainment more than those in the distributing group.

In comparing participants in the spotlighting and distributing groups, larger play dependencies in the former were also identified in the interview data. A simple count of whether individuals mentioned whether they are playing games online or not shows that seven out of 11 spotlighters do so, compared to four out of 11 distributors. Rose for example said gaming would be one of the things she would miss most if she lost Internet access: “What would I miss most? My games!! I play Candy Crush, things like that. ” Anne also liked playing games in her leisure time—“Normally I play a game to relax or whatever, which is very good”—the same as Grace, who was disabled and spent a big part of her daily iPad time on games. Another common way of spending free time online was watching videos using services like YouTube, iPlayer or Netflix. About half of participants in both groups mentioned doing that. Other forms of play dependencies included listening to music or just “checking Facebook”. Going on social media like Facebook and Twitter was not always done for the purpose of communication. Jane, for example, explained she is sometimes "just looking at Twitter, just to pass time".

Furthermore, having stronger opinions about going online in leisure time as a waste of time was what set interviewees in the distributing group apart from the spotlighting group. In general, distributors found less room for going online as a leisure activity in their daily lives. Sophie, for example, thought spending time with her family is more important than spending it online for leisure:

> **Interviewer:** Do you go online just to, kind of, pass time and relax?
>
> **Sophie:** Um, I probably, yeah, waste time. Yeah, it does, 'cause it does feel like waste. I don't know, maybe I'm not, I haven't found any sites that particularly interested me. I do read the papers online. Um, but no, I mean I don't have time. By the time the children are in bed then I'm probably starting to cook, for my husband. And by the time he's home, we sit down and eat and I wouldn't go online then, I mean, I'd rather sit and eat and chat, read my book and watch some telly. Go to bed. I would guess probably more… when the two hours in the morning when my son's at nursery would probably be the most time, it would be the time I would tend to spend [online]. Cause I don't really like endlessly be on the computer when the kids are there cause again I'd rather focus on them than, I don't know, a picture of a cat on a hoover.

Similarly, Aiden asserted that gaming and social media apps are a "glorified waste of time", while Leo thought it is "easy to procrastinate and get distracted" when he is online. Distributors had much clearer ideas about what Internet use is a waste of time.

In summary, there were big differences in what play dependencies different groups of interviewees formed with the Internet. For spotlighters and those stranded going online for entertainment, to pass time and to just enjoy themselves was very important. Going online was a way of spending their leisure time. By contrast, distributors exhibited much weaker play Internet dependencies. They did not perceive the Internet as an important source of entertainment and thought undirected online activities were a waste of time.

6.3.3 Understanding Dependency

The third dependency identified in the media system dependency framework is understanding dependency. This relates to use of media for making sense of social environment and for self-actualisation through work, hobbies and personal relations. In discussions with the interviewees, understanding dependency was often expressed as “keeping up to date with the world” (Alfie) by following news or engaging in discussions online. There was no item in the OxIS questionnaire to measure understanding dependencies quantitatively.

For interviewees who developed understanding dependencies with the Internet, going online was important to keep informed and make sense of the world’s developments. Emily went online repeatedly throughout the day to satisfy her understanding dependency by checking news sites and Twitter. She said she would miss this part of going online most if she lost her Internet connection:

> I would feel I was kind of losing out or... or behind or... and I would miss out... I really do feel I would be missing out on information actually, and some of it important, some of it just stupid stuff, but some of it sort of what I perceive to be important. In, you know, for work or for research or for, I don’t know, for my knowledge about the world or something.

Jacob, talking about his habit of repeatedly visiting the BBC website, tried to explain his urge to keep up to date with the latest news in the following way:

> Now if you don’t check a website every day you feel like you’re missing stuff, because you know, you could’ve seen something that you really liked. So then you get the sensation that you got to keep up all the time. You know? Because you might miss something.

Aiden also had a very strong understanding dependency on the Internet. He mostly went online to read news, watch YouTube videos combining factual information with humour, and interestingly search for specific Twitter accounts. He explained “I don't use Twitter. I look at other people on Twitter, you know people by typing .com, slash, names [i.e. Twitter user handles]”. Other participants also perceived Twitter as a helpful news source for understanding the world. Emily told me:

> Twitter, I really use it as part of my news gathering, engaging with the world sort of… […] I find it fantastic for keeping in touch with things that I wouldn’t be able to keep in touch via mainstream news in the UK.

In defining understanding dependencies Ball-Rokeach (1985) also noted use of media for self-actualisation. An example of such Internet use was displayed by Olivia, who said: “I like to go on [the Internet] and look at crafts and things like that and see different things. The food stuff. I’m a foodie. I love going on and looking at different food things”. Similarly, Harry did not like to follow daily news, but liked to search about things that interested him, especially on YouTube, which offered him a more favourable way of experiencing the world:

> I think YouTube’s amazing, you know. I’ve been reading the Ernest Hemingway book. You can go on there and you can see wee interviews with Ernest Hemingway and wee documentaries about Ernest Hemingway. And then I was reading the Ernest Hemingway book with bull-fighting. Honestly, I don’t agree with bull-fighting, but I was reading a book about that and then, you know, you could go on YouTube and see footage of a 1930 Spanish bull-fighting, which was in the book...

All of the above examples show how participants form and attain understanding Internet dependencies. As part of the analysis, I assigned the two most prominently stated Internet dependencies to each interviewee. In this way I determined that understanding dependencies were to some extent more prominent among the distributing group as compared to spotlighting and stranded groups. As discussed above, interviewees in the distributing group were better educated and had higher incomes. It might be that stronger understanding dependencies are related to their interests and lifestyles, which may be different for interviewees in the other two groups. This point is addressed further in Chapter 8.

6.3.4 Communication Dependency

The original scheme of dependencies proposed by Ball-Rokeach (1985) does not include any form of communication. When the media system dependency theory was developed, it focused on dependencies that individuals form with mass media. Interpersonal communication did not represent a means of mass media use. The Internet, however, is different in this respect, offering many modes of mediated interpersonal engagement. For these reasons, researchers who use communication theories (e.g. uses and gratifications) to study online engagement argue that existing theories need to be expanded to include concepts such as "interactivity, demassification, hypertextuality, and asynchroneity" (Ruggiero, 2000, p. 3). Similarly, I suggest that the scheme of dependencies within the media system dependency framework needs to be extended to include dependencies related to interpersonal communication. Here, I call them communication dependencies.

Going online to keep in touch with family and friends was something that in one way or another all interviewees used the Internet for. The extent to which they relied on the Internet to do so varied according to individuals' life situations and perceptions about computer-mediated communication.

Using Facebook to connect to interpersonal networks online was almost universal. Everyone in the spotlighting and stranded groups used Facebook to some extent. There were, however, five interviewees in the distributing group who said they are not on Facebook (Harry is counted as non-user of Facebook although he used it for business purposes to run his café's Facebook page, but did not use it for personal communication). They had strong opinions about the downsides of social media use in general or about Facebook in particular. For example, Ethan and Alex were not on Facebook because of previous bad experience with the site, but they used other communication services. Differently, Aiden was strongly opposed to online social network sites:

> It seems like a waste of time, seems like you have to become an individual celebrity in your own right these days with, you know Facebook and YouTube, and self-promotion, seems kind of exhausting.

Laura also had deep concerns about computer-mediated communication. She explained:

> It's bad enough feeling that you can't go out without your mobile phone, so for then to it – It takes a step further, you can't go out without your phone and being able to connect to Facebook or – I don't know – Snapchat. [...] It's like there's 20 different ways of connecting with people, but nobody does it face-to-face very much. Do you know what I mean? So it creates miscommunication, I think.

The majority of interviewees, however, did not share such concerns and thought Facebook was great for keeping in touch with people. Victoria, for example, said it was the only thing she missed on vacation where she was not able to go online for a week. Similarly, Anne thought not being able to go online would make her miss Facebook because "that's where everybody keeps in contact with each other". Although Ling (2012) argues that social network sites are less prominent in maintenance of the intimate sphere, interviewees like Alfie explained he gets in touch and communicates with close friends and family over Facebook:

> And like Facebook, you're talking to people across the other end of the world. So I've got for example family in Australia, so we keep in contact through Facebook.

Furthermore, in line with Ling (2008) and many other scholars, who studied the use of mobile phones for interpersonal communication and argued that mobile phones connect us to those people with whom we are closest and are really important in our daily lives, using smartphones for messaging and making video calls was very important to a vast majority of the interviewees. Various email clients, WhatsApp, BlackBerry Messenger, Skype and FaceTime were the most common Internet-based applications used for communication. Rose, for example, had a truly empowering experience of communicating over the Internet. This became a central daily activity after she got an iPad, which was always next to her. At the time of the interview Rose had had her iPad for two years and I asked her whether this in anyway changed her daily life:

> **Rose:** Oh, I'm in touch will all my family [online] and I can look up, I've had... Friends have contacted me, on Facebook; that I have not seen for years. So now I go in to look for a friend *and* family that I've contacted through it.
>
> **Interviewer:** And you've mentioned you use FaceTime?
>
> **Rose:** FaceTime as well, yes, that's with my family, yes.
>
> **Interviewer:** So how often do you use these applications?
>
> **Rose:** See, ALL the time. I use them… See, I've got my wee granddaughters; they are not far from me. One's 8, one's 7 and one's 3. And they FaceTime *me* [surprised]! They use their mum's phone, because you can do it through the phone as well.

In this way, the Internet did not change how mobile phones are used by the interviewees. What has changed though is the range of different applications people can choose from to communicate with their closest friends as well as other people who are not part of their immediate intimate sphere. The changing choice of interpersonal communication applications was previously documented by Bertel and Ling (2014), who studied the changing centrality of SMS services.

Notably, all the communication applications mentioned above, which have become part of interviewees' daily communication repertoires, use mobile Internet data to connect. Communication was one of the two most important dependencies for just over half of the interviewees in all three groups.

6.3.5 Differences in Internet Centrality

The above analysis shows that orientation and communication dependencies are common among users in all groups. Regardless of their specific ideas about Internet technologies, people position the Internet in their daily lives as a tool enabling them to communicate, look for information and perform commercial activities online. The Internet makes the conduct of day-to-day activities easier. There are certain activities that most interviewees performed online, such as using Facebook, looking for information on Google, checking bank accounts and making financial transactions, searching for and buying goods online, and similar. Going online for leisure activities is where the distributing group differs distinctly from spotlighters and stranded, who displayed much stronger play dependencies than those in the distributing group. Going online to play games, watch videos or spend undirected time online was not something that appealed to interviewees in the distributing group.

The underlying reason was the lack of fit with interviewees' life endeavours. Going online to pass time and just enjoy its content and services was not perceived as a pleasurable experience. Instead it was seen as a distraction from more important things in life, be it their career, education, family, spending time with other people, and the like. Jacob, who was 26 years old and was focusing on his music career, explained his relationship with technology as compared to that of his friends in a very illuminating way:

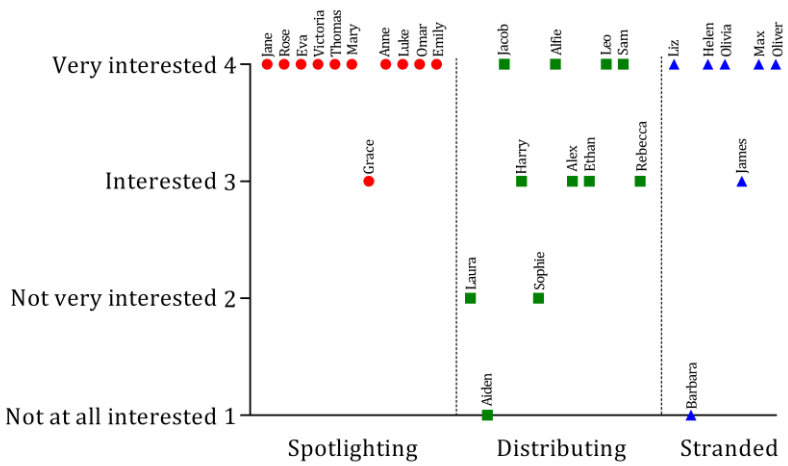
> I think the music changes how I look at this a lot because music is a thing that you don't just go to work from nine to five... And then you go home and then just go in the next day, because it needs a lot of emotional commitment and also at the same time you put your ego into it. So how good you are at the music is a reflection of you as a person. And I think that that's why I have the drive to practise so much as I do, because I feel like it's a reflection of myself, how much I've practised. Whereas if you go to a job, it's not the same reflection of you. And so I think my friends don't mind coming home and playing computer games for six hours, and checking their Facebook, and complaining about their day at work and posting pictures of themselves. Because I don't think they have the same urge to be doing something else, so I don't think they see it as a waste of time, they see it as passing time, or leisure time. But I don't... I don't feel it as leisure time, I feel it as stress time when I'm not doing what I want to be doing. So I think it's completely different relationship they have with technology. […] So I think it's a very particular thing of... like a certain mind-set where you're trying to achieve something, where your ego is invested in your job, rather than just... because like, I don't like the Internet. Because obviously there is a part of me that does [like going online].

In a similar way, Harry was invested in running a café and mainly used the Internet as a tool to run his business. He did not spend much leisure time online. He talked about the role of the Internet in his daily life in this way:

Business and that… I'd say 80% business, 90% business and 10% personal, because I don't… Because I don't really use Internet enough for a lot of personal stuff… Not really. You know, I don't… […] I just… I don't, honestly… Come 6 o'clock, finish work and I shut the laptop down, and I hate having to open it back up again, and because… […] I'm not somebody that needs to know what's happening, you know, I don't really read newspapers much, I don't watch the news very much so…You know, I've got enough happening in my own life without having to find what everybody else is up to. I've got my own life super busy, so I don't … I'm not that interested in what celebrities are up to or what some random associate is up to, so…

Both Jacob and Harry explain that their engagement with the Internet is different from that of other people. Their perceptions of the role of the Internet diverge from those of their peers. To further explore the differences in general Internet perceptions among the three groups, I examine interviewees' assessment of their interest in the Internet (see Figure 6.7). An interesting pattern appears among the three groups.

Figure 6.7. Interest in the Internet



All interviewees in the spotlighting group, except from Grace, reported they are "very interested" in the Internet. There is more variation in interest in the Internet among distributors. Sophie, Aiden and Laura said they are not (at all) interested, and the rest of the group splits evenly between the interested and very interested. In the stranded group there is again more homogeneity—everyone but Barbara and James say they are very interested in the Internet. Although the question about interest in the Internet may sound simplistic and fuzzy, it captures the differences in general perceptions about the Internet among groups very well. In discussions with the interviewees there was indeed much more homogeneity between users in the spotlighting group than among those in the distributing group.

Spotlighters simply agreed that the Internet is great and loved always being connected. In a way, they were emotionally attached to their devices and the idea of constant connectedness. Jane said “I feel connected all the time” and “It’s weird to even think about how much you need it”. Similarly, Eva could not imagine a life without the Internet: “Oh, my god, I couldn’t live without it. I couldn’t live without my iPad! Which is actually scary”—and was in a way surprised about the importance of the Internet in her daily life. When Anne was asked what she would miss most if she had lost access to the Internet, she exclaimed, “Everything, I think!”. Meanwhile, Emily said, “I would feel very out of touch with… people I communicate with regularly using Internet […] what’s happening and what people are kind of talking about […] I think I would feel a little bit out of the loop”. In general, spotlighters viewed the Internet very positively and agreed that not having access would present a big void in their daily lives.

Those in the distributing group also agreed that the Internet is important, but had somewhat less enthusiastic and emotional views about it. While Jane above expressed a feeling of need in relation to ubiquity of access, Rebecca, who also thought it is important to always be connected, assigned these feelings to habitual practices:

> **Interviewer:** Is it important for you to be always connected?
>
> **Rebecca:** I think so; I think I have just got used to it...

Users in the distributing group also had more ambivalent feelings about the role of the Internet in their daily lives and society as a whole. Leo, for example, told me: “So yeah, I think it is important and I think it has become a necessity, which is a little bit sad but can’t do much about it really”. Similarly, Sam liked the Internet and relied on it a lot, but exposed some negative sides of it as well:

> I am really excited and happy with the way it allows people to sort of connect and do things; it really, like, it gives a lot of freedom. On the other hand, the entertainment side of it, and the sort of social media side of it, is... I think that's changed social life quite a lot – and maybe not for the best. […] And then also... as much as it's made it a lot easier for people to get information that they want, it's made it a lot easier for companies and governments to get information *on* people.

Interviewees in the distributing group had more rational views about the role of the Internet. Like Leo and other members of this group, Ethan referred to the Internet as a necessity that helps people to conduct their daily lives: "I wouldn't consider it a hobby; I just consider it a necessity, like a necessity to be able to… And it's almost like an enabling tool rather than… Which means I can get more done in life".

Interviewees in the stranded group were also largely positive about the Internet, as Figure 6.7 suggests. Like users in the other two groups, they revealed that being online enables their "being connected" (Oliver) and "having a look about the world" (James). Relative to the other two groups, they also portrayed the Internet more as existentially important. For Liz, having access to email and being able to look and apply for jobs was crucial. Not having access could for example result in losing a jobseeker's allowance:

> **Interviewer:** If you would lose connection to the Internet what would you miss most?
>
> **Liz:** Well I would probably miss my Facebook and checking on Amazon to see what bargains I'm missing out. But other than that... Oh, I've to look... Because I get my, I get my emails about jobs—that's going, through my phone. So that, that lets me know to come down [to the centre where the interview was held] and apply for certain jobs so if I wasn't getting, if I didn't have my phone on the Internet I wouldn't receive the emails. So therefore I wouldn't know to come down and apply for jobs and there I would have the Job Centre saying "well you've no' applied for any jobs and you've not did this, so we're no' paying you any money".

Similarly, when Olivia was talking about her experience of not having Internet access at home, she related to young people who do not have access and those looking for jobs. She thought access is absolutely essential for those people:

> **Olivia:** And I do feel sorry for the kids that have it at school and don't have it at home. I think that every child should have access to the Internet at home.
>
> **Interviewer:** Do you think it's important?

Olivia: Mmm-hm.

Interviewer: For what reasons?

Olivia: For their education. They're taught to reference so many things and they're not given books and all that now, and the schools just expect them to have Internet in the house. Not every kid's got the Internet in the house. And I find that a bit unfair, you know. […] I think it's becoming an essential part of life. I don't think it's reached that point yet, that everything [is online], but if you're applying for jobs, you have to do it on the Internet now or that nonsense, you know. It's unfair on the people who don't have it or don't have the skills. I think the government needs to do more to make sure that everyone has at least the basic skills, you know.

I ascribe these different perceptions of stranded users to the fact that people in the spotlighting and distributing groups never had trouble acquiring Internet access. By contrast, those stranded can relate to situations when no access is available. Nevertheless, individuals in the stranded group showed great interest in the Internet and exhibited various Internet dependencies, like users in the spotlighting group. Yet often their access infrastructures prevented them from developing a fully gratifying online experience. In this way, they were different from the spotlighting group.

6.3.6 Summary

In the sections above, I explored how individuals with different access infrastructure arrangements differ in the types of dependencies they form on Internet technologies. Especially interesting are the differences between the spotlighting and distributing groups because they both have access to multiple devices and locations, yet the ways they position and use them in their daily lives are distinct. Both groups use the Internet to attain a rage of Internet use goals, with orientation dependency being the most common. However, users in the spotlighting group also form strong play dependencies, which are expressed by finding the Internet as a good source of leisurely activities. By and large, users in the distributing group did not exhibit strong play dependencies. By contrast, they were somewhat more likely to use the Internet to attain understanding-related goals. In terms of Internet dependencies, interviewees in the stranded group exhibited orientations similar to those of spotlighters. They also enjoyed going online as a leisure activity to play games or watch videos.

Section 6.3.5 provided some further evidence of the observed differences between groups. Specifically, interviewees in the spotlighting group displayed a stronger emotional attachment to Internet technologies. Being connected was an important part of their daily lives. By contrast, interviewees in the distributing group viewed Internet technologies as a necessity, as a tool to support their day-to-day activities. Lastly, interviewees in the stranded group mostly had favourable views about the Internet but also had stronger ideas about why the Internet is, in a way, existentially important nowadays. Taken together, the analysis of Internet centrality showed that there are distinct differences among the three groups in how they perceive the Internet and what roles it plays in their daily lives.

6.4 Conclusions

This chapter examined practices that shape development, maintenance and engagement with Internet access. In the first part, three distinct re-domestication processes were uncovered: spotlighting, distributing and being stranded. They represent different ways in which people (can) develop, maintain and engage with their Internet access infrastructures. To the best of my knowledge, no such typology of ICTs' re-domestication practices has been developed before. Its significance lies in the fact that it can help us better understand how individuals place new, especially mobile, Internet technologies in their existing access arrangements. This insight may help us better understand how future technological developments will shape Internet access among different segments of the population. The three groups identified here are expected to invest in different technologies in the future: spotlighters are likely to remain mostly mobile; distributors are expected to invest into new technologies according to their life cycle, i.e. to replace PCs and smartphones when they become obsolete;

and those stranded are expected to keep struggling with maintaining high-quality access, unless affordable alternatives to PCs, smartphones or tablets become available.

Furthermore, the analysis of Internet centrality and specific Internet dependencies showed that, apart from differences in offline resources (which are particularly significant for the stranded group), distinct re-domestication practices also relate to differences in what roles the Internet plays in individuals' daily lives. These disparities were established by drawing on the scheme of media-related goals established in the media system dependency theory. The typology of Internet dependencies informs domestication approach to understanding adoption and use of ICTs. While the domestication framework revolves around roles of ICTs in people's daily lives (Haddon, 2006b), no general framework for studying them has been developed. Apart from mapping differences in ICTs' roles, such a framework is useful for connecting the qualitative domestication approach with quantitative approaches to studying adoption and use of ICTs.

The obvious question that arises next is how differences in access infrastructures shape what people do online. While qualitative analysis above offered some insight into this relationship, general patterns of use cannot be discerned using qualitative data. Thus, the next chapter brings together the findings of this and the preceding chapter and uses quantitative survey data to examine how inequalities in access shape patters of online engagement.

Chapter 7: Access and Online Engagement

7.1 Introduction

This chapter focuses on the role of access in online engagement. It uses quantitative data to address the fourth research question of this thesis: *How do differences in Internet access shape engagement with online resources?* In doing so, this chapter draws on the preceding chapters and examines how material dimensions of access and social practices shaping it govern patterns of online engagement.

In Chapter 2 I argued that access alone is not sufficient for meaningful engagement with online resources. Scholars of digital inclusion agree that apart from access, motivation and skills are also factors integral to online engagement. In the model for studying access infrastructures and digital inclusion (see Figure 2.4) access, motivation and skills are named mediating contextual factors and are expected to mediate the effects of offline resources on engagement with online resources. Thus, to provide a comprehensive picture of the role of access in online engagement, quantitative models presented in this chapter also include measures of technology-related motivation and Internet skills.

In Chapter 5 I developed quantitative measures of locality and ubiquity of access. They are used to examine how inequalities in material dimensions of access shape patterns of Internet use. Chapter 6 focused on social practices shaping access. Specifically, it examined re-domestication processes underlying the development of access and established that these practices are related to the role the Internet plays in an individual's daily life. In this way, the social dynamics of Internet access are closely related to motivational aspects of online engagement. As suggested in Chapter 2 (see section 2.5) differences in social practices shaping access are operationalised with Internet centrality as a technology-related motivational factor in online engagement.

Therefore, the first part of the chapter brings together qualitative findings of Chapter 6 with OxIS survey data to develop quantitative measures of Internet centrality as a technology-related motivational factor and of Internet skills. This analysis informs the quantitative longitudinal models of Internet use presented in the second part of the chapter. There the impact of Internet access vis-à-vis motivations and skills in online engagement and its longitudinal dynamics are examined.

7.2 Measures

7.2.1 Internet centrality as a motivational factor

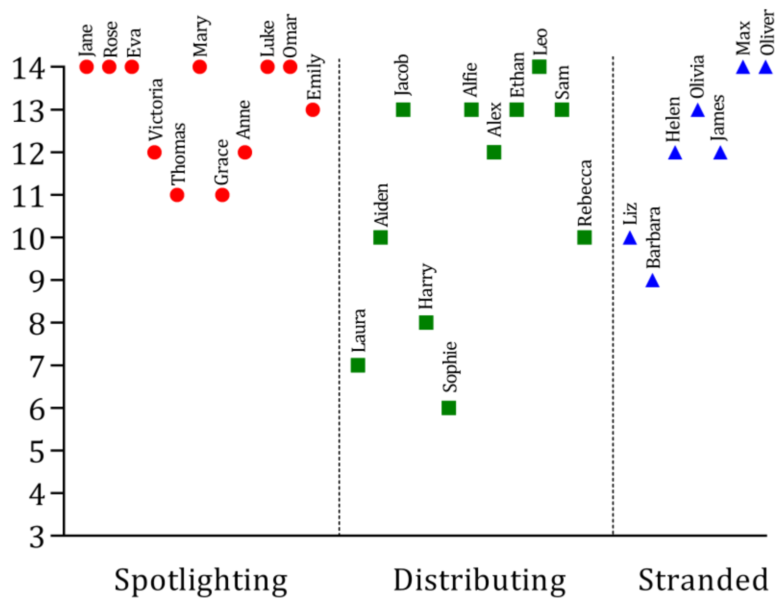
Internet centrality is an umbrella concept that encompasses Internet dependencies individuals form with the Internet. To operationalise Internet centrality I draw on the media system dependency theory and its premise that people develop dependency relations with media in order to attain various goals. The greater the scope of goals individuals attain by using the Internet, the greater their Internet dependencies and centrality.

Based on the analyses of the interview questionnaire data in Chapter 6 and previous work on Internet dependency (Ognyanova & Ball-Rokeach, 2015), I operationalise Internet centrality with three items: importance of the Internet as a source of information (orientation dependency), importance of the Internet for entertainment (play dependency), and interest in the Internet (general perceptions of the Internet; see Chapter 6).

The measure is first tested with interview questionnaire data by comparing Internet centrality scores of the three groups of interviewees with distinct re-domestication practices.

Each individual is assigned the Internet centrality score by summing their scores on the three items. Figure 7.1 shows the interviewees' overall Internet centrality scores, ranging from 3 to 14. In line with the results of Chapter 6, the three groups exhibit different Internet centrality scores. The Internet plays the most central role in the spotlighting group (M=13; SD=1.26) and the least central role in the distributing group (M=10.8; SD=2.79), whereas the stranded group lies between the two (M=12; SD=1.91). The spotlighting group is also the most homogeneous, whereas the distributing group is the least homogeneous (see standard deviations).

Figure 7.1. Internet centrality



Based on these results, I create an Internet centrality variable in each OxIS dataset. I use the same three variables as above in the waves 2007 to 2013 (interest in the Internet measured on a scale from 1 to 4; importance of the Internet for information measured on a scale from 1 to 5; and importance of the Internet for entertainment measured on a scale from 1 to 5). In 2005, the item on the importance of the Internet for entertainment was not available. Thus, I replaced it with another available item asking "How important is the Internet to your everyday life?" The scale for this item ranged from 1 "Not at all important" to 4 "Very important" (in 2005, the item asking about importance of the Internet for information was also measured on a scale from 1 to 4, thus the centrality score ranges from 0 to 12). In all waves, each respondent is assigned an Internet centrality score by summing their values on the three variables. If a respondent has missing values on all three items, their centrality score is 0. In all waves, Internet centrality items load on a single factor and form reliable scales with alpha values around 0.70. In the last three waves, the means, medians and standard deviations of the Internet centrality scale have not changed substantially (see Table 7.1).

Table 7.1. Internet centrality (2005–2013)

	2005	2007	2009	2011	2013
Mean	9.12	9.83	10.65	10.62	10.79
Median	9	10	11	11	11
Standard deviation	1.84	2.35	2.12	2.34	2.18
Range	3 – 12	2 – 14	0 – 14	0 – 14	3 – 14
α	0.69	0.74	0.68	0.69	0.72

Source: OxIS 2005–2013.

The proposed measure of Internet centrality is far from being perfect. It only includes items pertaining to general perceptions of the Internet and orientation and play dependencies. Unfortunately, no items corresponding to understanding and communication dependencies are available in OxIS datasets. It is important to keep this limitation in mind when interpreting the results of section 7.3. Nonetheless, a composite measure of Internet centrality captures further complexities that may help explain how people engage with their access infrastructure and online resources. Quantitatively, a scale with additional attitudinal variables examined in Chapter 6 was also considered. However, not all attitudinal items are available in all waves, and where available they did not form a single factor together with the Internet interest and importance variables. In quantitative models of digital inclusion, Internet centrality is used as a technology-related motivational factor mediating the effects of offline resources on engagement with online resources.

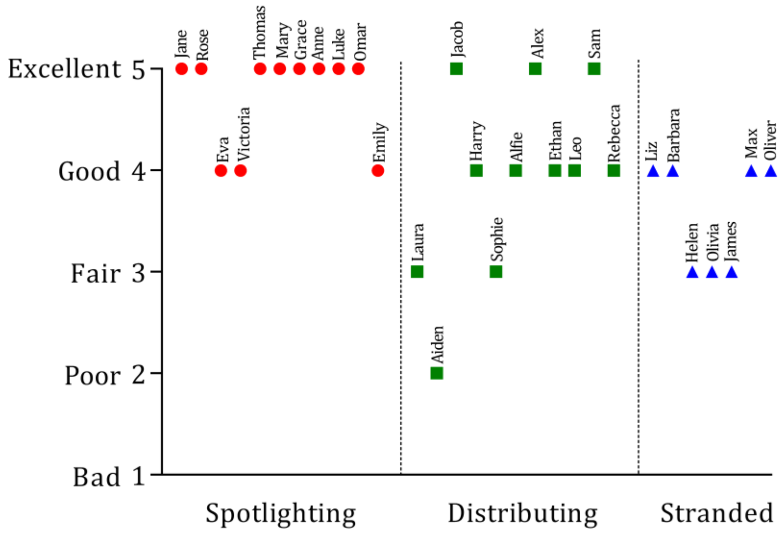
7.2.2 Internet skills

Together with access and motivations, Internet skills are the third contextual mediating factor in the model of digital inclusion (see Figure 2.4). As discussed in Chapter 3 (see section 3.4.1.5), a single measure of Internet skills is available in all examined OxIS waves. The item measures self-rated ability to use the Internet.

To examine whether differences in Internet access infrastructures are related to differences in Internet skills, this item was included in the interview questionnaire. Figure 7.2 shows that interviewees in the spotlighting, distributing and stranded groups exhibited different perceptions of their ability to use the Internet.

A majority of the spotlighting group rated their ability to use the Internet as excellent. Only Eva, Victoria and Emily said they are good at using the Internet (M=4.73; SD=0.47). By contrast, most of the distributors rated their ability to use the Internet as good. Jacob, Alex and Sam said their skills are excellent, whereas Laura, Aiden and Sophie rated their skills as fair or poor (M=3.91; SD=0.94). No one in the stranded group said their ability to use the Internet is excellent. Helen, Olivia and James rated their ability as fair and the rest rated their Internet use ability as good (M=3.51; SD=0.53). The differences in the self-rated ability to use the Internet are interesting. They convey that those in the spotlighting group are also more confident in using the Internet as compared to participants in the distributing and stranded groups.

Figure 7.2. Self-rated ability to use the Internet



The interview questionnaire data on self-rated ability to use the Internet (overall: M=4.14; SD=0.83) is in line with OxIS data. Across years, the mean values of Internet skills ranged from 3.70 to 3.95, with a median of 4 and standard deviations at about 0.80 (see Table 7.2).

Table 7.2. Internet skills (2005–2013)

	2005	2007	2009	2011	2013
Mean	3.76	3.70	3.87	3.86	3.95
Median	4	4	4	4	4
Standard deviation	0.79	0.84	0.80	0.81	0.79

Source: OxIS 2005–2013.

Equipped with measures of Internet centrality as a motivational factor in digital inclusion and a measure of Internet skills, I now move to examining the impact of contextual mediating factors on online engagement. The next section uses OxIS data to investigate the role of Internet access in online engagement vis-à-vis motivations and skills, as well as its longitudinal dynamics.

7.3 Integrated Quantitative Model of Digital Inclusion

This section focuses on examining the role of Internet access in explaining online engagement. Access is operationalised with its material dimensions: specifically, with locality and ubiquity (see Sections 5.4 and 5.5). Online engagement is studied in two ways—with total amount of use and with six different types of use (see Section 3.4.1.5). To analyse the role of access vis-à-vis skills and motivations I run three hierarchical regressions for each type of online engagement. Model 1 includes 17 indicators of offline resources as independent variables, Model 2 adds a dimension of access; in Model 3 self-rated ability to use the Internet (skill variable) and Internet centrality (motivation variable) are added as independent variables. All analyses are run across five waves of OxIS data. Results tables across all waves are presented in appendices. With this type of analysis, I can describe whether the influence of locality and ubiquity of access has increased, decreased or remained stable over the period from 2005 to 2013. However, I cannot ascertain whether the changes between the waves are significant.

7.3.1 Locality

Analyses below examine how locality of access shapes online engagement. In Table 7.3 standardised OLS linear regression coefficients predicting total amount of use are displayed for the years 2009 and 2013. I choose 2009 as a base year because this is when the mobile locality became more widespread (see Chapter 5). It serves for a better comparison for studying access inequalities: in 2005 there were still 40% of users going online only at home, in 2009 this proportion fell to 29%, and in 2013 to 17%. To analyse how mobile access shapes online engagement, I focus on the time period when adoption of the mobile locality grew most substantially.

A set of independent variables includes 17 indicators of resources in the offline economic (income, education, life stage), cultural (gender, race, age), social (marital status, presence of children in the household, extent of social contact with family and friends, participation in civic groups, size of digital support networks, use of the Internet by other members of the household) and personal fields (disability) (Model 1). In Model 2, I add a four-category access variable measuring combinations of access localities. Users who were in the "Other access" category were omitted from the analysis. There were only 3% to 1% of users in this category, hence the results of the home vs. other access comparison were not reliable. In Model 3, I add variables measuring levels of skills and motivations (full tables in Appendix B.4).

In 2009, offline factors alone explain 31% of variation in the total amount of use. Adding the access locality variable increases the adjusted R^2 to 37%. Users with home and mobile as well as all access localities are more likely to use the Internet more extensively as compared to users with home-only access. This remains the same in Model 3, where skills are motivations are also included. The size of access coefficients, however, decreases. Interestingly, Internet centrality has the largest coefficient in 2009's Model 3, followed by the all access locality variable. Of the offline factors, education and gender have the largest effects on the extent of online engagement. In 2013's Model 2, all users with more than home-only access engaged with the Internet more extensively. The access variable adds 5 percentage points to the explanatory power of the model. The full model including Internet skills and centrality explains 50% of the variation in total amount of use. Here, skills have the largest coefficient, followed by the all access coefficient. The Internet centrality coefficient is the smallest of the three mediating factors. Of the offline factors, income and education have a positive effect; being female and older has a negative effect; and the extent of social resources has a positive effect on online engagement. In 2013, adding mobile onto home access adds less to the total amount of use as compared to 2009 (0.07 vs. 0.14). The same is true for the all access category (0.20 vs. 0.25). This suggests that the effect of access locality on online engagement decreased over time. The same is true for the effect of Internet centrality, whereas the effect of skills increased.

Table 7.3. Locality: Total amount of use, standardised OLS regression coefficients

	2009			2013		
	Model 1 β	*Model 2* β	*Model 3* β	*Model 1* β	*Model 2* β	*Model 3* β
Economic field						
Income	0.12***	0.08*	0.03	0.17***	0.12***	0.11***
No education	ref.	ref.	ref.	ref.	ref.	ref.
Secondary education	0.07	0.03	0.01	0.19***	0.15***	0.13***
Further education	0.16***	0.10*	0.09*	0.13***	0.10**	0.09**
Higher education	0.32***	0.26***	0.19***	0.25***	0.18***	0.12**
Employed	ref.	ref.	ref.	ref.	ref.	ref.
Student	0.10**	0.09**	0.06*	0.03	-0.00	0.00
Retired	-0.02	-0.00	0.00	0.00	0.06	0.03
Unemployed	-0.03	-0.01	0.00	-0.02	0.02	0.01
Cultural field						
Female	-0.21***	-0.20***	-0.17***	-0.15***	-0.14***	-0.10***
Non-white	0.04	0.03	0.04	-0.01	-0.01	-0.02
Age	-0.18***	-0.15***	-0.06	-0.30***	-0.26***	-0.15***
Social field						
Single	0.16***	0.12***	0.11***	0.05	0.03	0.01
Children in HH	0.03	0.03	0.02	0.01	-0.01	-0.01
Social contact	0.15***	0.14***	0.10***	0.21***	0.18***	0.17***
Civic groups	0.10***	0.09**	0.10***	0.18***	0.15***	0.15***
Digital support	0.01	0.01	0.01	0.08***	0.06*	0.10***
HH dig. included	0.05	0.02	0.04	0.02	-0.00	-0.02
Personal field						
Disability	0.02	0.02	-0.02	0.05	0.04	0.04
Home access		ref.	ref.		ref.	ref.
Home & mobile		0.19***	0.14***		0.14***	0.07*
All access localities		0.29***	0.25***		0.36***	0.20***
Home & institutional		0.06	0.05		0.06*	0.02
Skills (ability)			0.16***			0.27***
Internet centrality			0.28***			0.17***
Adjusted R^2	0.31	0.37	0.48	0.35	0.40	0.50
BIC	7534.6	7475.8	7265.9	9976.0	9906.3	9646.4
N	928	928	924	1,220	1,220	1,213

Notes: * p<0.05 ** p<0.01 *** p<0.001. Omitted categories: No educational qualifications; Male; White; Married/with partner; No children in household; Not a member of any civic group; No other Internet users in household; No disability. HH="household"; dig.="digitally".

To discern the impact of locality on the extent of engagement with specific types of online resources, I run OLS regressions on respondents' average levels of engagement with activities pertaining to six use types (see section 3.4.1.5). In describing the results I focus on three things: uses that locality types have the largest impact on, longitudinal dynamics of this relationship, and the role of locality in explaining use in comparison to skills and motivations (see Table 7.4; full tables in Appendix B.5).

Table 7.4. Locality: Types of use, standardised OLS regression coefficients

	2009 Commercial & financial			2013 Commercial & financial			2009 Information & learning			2013 Information & learning		
	Model 1	*Model 2*	*Model 3*	*Model 1*	*Model 2*	*Model 3*	*Model 1*	*Model 2*	*Model 3*	*Model 1*	*Model 2*	*Model 3*
	β	β	β	β	β	β	β	β	β	β	β	β
Income	0.24***	0.22***	0.18***	0.18***	0.15***	0.15***	-0.00	-0.03	-0.07*	0.04	0.00	-0.00
No education	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Secondary education	0.07	0.04	0.03	0.22***	0.19***	0.18***	0.05	0.02	0.00	0.19***	0.16***	0.15***
Further education	0.14**	0.11*	0.09*	0.21***	0.17***	0.17***	0.16***	0.11*	0.10*	0.16***	0.13***	0.13***
Higher education	0.28***	0.23***	0.19***	0.29***	0.22***	0.18***	0.40***	0.35***	0.29***	0.36***	0.30***	0.26***
Employed	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Student	-0.06	-0.06*	-0.08**	-0.07*	-0.09**	-0.09**	0.21***	0.21***	0.19***	0.25***	0.22***	0.22***
Retired	-0.02	-0.01	-0.01	-0.03	0.02	0.00	-0.08*	-0.07	-0.06	-0.02	0.03	0.01
Unemployed	-0.11**	-0.09**	-0.08**	-0.12***	-0.08**	-0.10***	-0.00	0.02	0.03	0.04	0.08**	0.07**
Female	-0.07*	-0.06*	-0.05	-0.07*	-0.06*	-0.03	-0.07*	-0.06*	-0.04	-0.07**	-0.06*	-0.03
Non-white	0.02	0.02	0.03	-0.04	-0.04	-0.05*	0.05	0.04	0.04	0.02	0.02	0.01
Age	-0.07	-0.05	-0.00	-0.14***	-0.10*	-0.02	-0.03	-0.01	0.06	-0.15***	-0.13***	-0.06
Single	0.04	0.02	0.02	-0.06	-0.07*	-0.08*	0.09**	0.07	0.06	0.03	0.02	0.01
Children in HH	-0.00	-0.00	-0.01	0.07*	0.05	0.05	0.06	0.05	0.05	0.03	0.02	0.02
Social contact	0.12***	0.12***	0.10**	0.08**	0.05	0.05	0.07*	0.06*	0.04	0.15***	0.13***	0.12***
Civic groups	0.11***	0.10***	0.11***	0.12***	0.10***	0.10***	0.07*	0.06*	0.07*	0.15***	0.14***	0.13***
Digital support	0.01	0.01	0.01	-0.02	-0.04	-0.01	0.01	0.01	0.01	0.10***	0.08**	0.11***
HH dig. included	0.06*	0.05	0.06*	-0.01	-0.03	-0.04	0.11***	0.10**	0.11***	-0.02	-0.03	-0.04
Disability	0.04	0.04	0.01	0.03	0.02	0.02	0.04	0.04	0.01	0.06*	0.05*	0.05*
Home access		ref.	ref.		ref.	ref.		ref.	ref.		ref.	ref.
Home & mobile		0.12***	0.10**		0.18***	0.11**		0.14***	0.10**		0.08*	0.02
All access localities		0.19***	0.16***		0.33***	0.20***		0.22***	0.19***		0.28***	0.17***
Home & institutional		0.08*	0.07*		0.08**	0.05		0.06	0.05		0.05*	0.03
Skills (ability)			0.10**			0.20***			0.15***			0.20***
Centrality			0.18***			0.13***			0.17***			0.09***
Adjusted R^2	0.24	0.25	0.30	0.20	0.23	0.29	0.25	0.28	0.33	0.31	0.34	0.39
BIC	1733.6	1729.3	1674.5	2332.2	2299.5	2205.8	2187.3	2171.6	2087.6	2835.1	2795.1	2705.7
N	928	928	924	1,220	1,220	1,213	928	928	924	1,219	1,219	1,212

Table continued

	2009 Creative & productive			2013 Creative & productive			2009 Communication & interaction			2013 Communication & interaction		
	Model 1	*Model 2*	*Model 3*	*Model 1*	*Model 2*	*Model 3*	*Model 1*	*Model 2*	*Model 3*	*Model 1*	*Model 2*	*Model 3*
	β	β	β	β	β	β	β	β	β	β	β	β
Income	0.03	0.02	-0.00	0.17***	0.15***	0.14***	0.18***	0.14***	0.08*	0.16***	0.11***	0.09***
No education	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Secondary education	0.02	-0.01	-0.02	0.11*	0.10*	0.09	0.10	0.06	0.04	0.09*	0.05	0.03
Further education	0.05	0.03	0.02	0.07	0.06	0.06	0.13**	0.08	0.06	0.10*	0.05	0.04
Higher education	0.08	0.06	0.02	0.09	0.06	0.04	0.29***	0.22***	0.14**	0.22***	0.13**	0.08*
Employed	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Student	-0.02	-0.02	-0.03	0.03	0.01	0.02	0.06*	0.05	0.01	-0.04	-0.07**	-0.06*
Retired	0.02	0.01	0.02	0.00	0.02	0.00	0.02	0.05	0.06	-0.01	0.06	0.03
Unemployed	-0.01	-0.01	-0.00	-0.00	0.02	0.01	-0.03	0.01	0.02	-0.02	0.03	0.01
Female	-0.12***	-0.11***	-0.09**	-0.09**	-0.08**	-0.07*	-0.09**	-0.08**	-0.05	-0.04	-0.03	0.01
Non-white	0.03	0.03	0.03	0.04	0.04	0.04	0.02	0.01	0.03	0.03	0.04	0.02
Age	-0.15***	-0.13**	-0.09*	-0.11**	-0.10*	-0.05	-0.15***	-0.11**	-0.03	-0.26***	-0.21***	-0.10**
Single	0.14***	0.12**	0.11**	0.03	0.02	0.01	0.10**	0.08*	0.07*	0.05	0.03	0.02
Children in HH	0.05	0.04	0.04	-0.04	-0.05	-0.05	-0.02	-0.02	-0.03	0.00	-0.02	-0.02
Social contact	0.02	0.01	-0.01	0.15***	0.14***	0.14***	0.17***	0.16***	0.13***	0.22***	0.18***	0.17***
Civic groups	0.08*	0.06	0.07*	0.06*	0.05	0.05	0.07*	0.06	0.08**	0.13***	0.11***	0.10***
Digital support	0.05	0.06	0.07*	0.11***	0.10***	0.13***	-0.00	-0.01	-0.00	0.01	-0.01	0.03
HH dig. included	-0.01	-0.03	-0.02	0.00	-0.00	-0.01	-0.01	-0.02	-0.01	0.04	0.02	0.01
Disability	0.01	0.01	-0.00	0.04	0.03	0.03	-0.03	-0.03	-0.08**	0.00	-0.01	-0.01
Home access		ref.	ref.		ref.	ref.		ref.	ref.		ref.	ref.
Home & mobile		0.15***	0.12**		0.01	-0.03		0.11***	0.06		0.19***	0.12***
All access localities		0.11*	0.10*		0.10*	0.03		0.29***	0.24***		0.43***	0.28***
Home & institutional		-0.02	-0.02		0.00	-0.01		0.11**	0.09**		0.07**	0.04
Skills (ability)			0.11**			0.12***			0.20***			0.27***
Centrality			0.10**			0.08*			0.27***			0.14***
Adjusted R^2	0.07	0.09	0.10	0.12	0.12	0.14	0.21	0.25	0.37	0.29	0.35	0.44
BIC	2697.9	2694.1	2661.2	3164.8	3177.4	3147.7	2507.3	2473.9	2310.1	3220.7	3127.7	2951.1
N	926	926	923	1,218	1,218	1,211	928	928	924	1,220	1,220	1,213

Table continued

	2009 Participation & engagement			2013 Participation & engagement			2009 Entertainment & leisure			2013 Entertainment & leisure		
	Model 1	*Model 2*	*Model 3*	*Model 1*	*Model 2*	*Model 3*	*Model 1*	*Model 2*	*Model 3*	*Model 1*	*Model 2*	*Model 3*
	β	β	β	β	β	β	β	β	β	β	β	β
Income	0.01	-0.00	-0.04	0.15***	0.13***	0.11***	0.05	0.03	-0.02	0.11***	0.09**	0.08**
No education	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Secondary education	0.01	-0.02	-0.03	0.13**	0.12**	0.10*	0.01	-0.02	-0.03	0.08	0.06	0.04
Further education	0.05	0.02	0.02	0.01	-0.01	-0.02	0.07	0.03	0.03	0.01	-0.01	-0.02
Higher education	0.08	0.06	0.04	0.02	-0.02	-0.06	0.06	0.02	0.01	0.04	-0.00	-0.05
Employed	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Student	0.02	0.03	0.02	-0.08**	-0.10***	-0.09**	0.06*	0.07*	0.06	-0.06*	-0.07**	-0.06*
Retired	0.02	0.01	0.02	0.01	0.04	0.02	-0.00	-0.00	-0.00	0.05	0.08*	0.06
Unemployed	0.03	0.02	0.04	-0.03	-0.01	-0.02	-0.00	-0.00	0.01	0.01	0.03	0.02
Female	-0.15***	-0.15***	-0.13***	-0.05	-0.05	-0.02	-0.35***	-0.34***	-0.32***	-0.28***	-0.28***	-0.25***
Non-white	0.00	-0.00	-0.00	0.00	0.01	-0.01	0.03	0.03	0.04	-0.03	-0.03	-0.04
Age	-0.20***	-0.18***	-0.13**	-0.28***	-0.26***	-0.19***	-0.22***	-0.19***	-0.14***	-0.37***	-0.34***	-0.26***
Single	0.20***	0.17***	0.16***	0.04	0.03	0.02	0.19***	0.16***	0.14***	0.09**	0.08*	0.07*
Children in HH	0.04	0.04	0.04	-0.08**	-0.09**	-0.09**	-0.01	-0.01	-0.01	-0.02	-0.03	-0.03
Social contact	0.08*	0.07*	0.05	0.12***	0.11***	0.10***	0.13***	0.12***	0.09***	0.18***	0.17***	0.16***
Civic groups	0.07*	0.05	0.06	0.14***	0.13***	0.13***	0.07*	0.05	0.06*	0.14***	0.13***	0.13***
Digital support	-0.00	0.01	0.00	0.11***	0.10***	0.12***	-0.00	-0.00	-0.01	0.08**	0.07**	0.09***
HH dig. included	0.01	-0.01	-0.01	0.00	-0.01	-0.02	0.02	0.00	0.01	0.04	0.03	0.02
Disability	-0.03	-0.02	-0.05	0.04	0.03	0.03	0.02	0.02	-0.01	0.04	0.03	0.03
Home access		ref.	ref.		ref.	ref.		ref.	ref.		ref.	ref.
Home & mobile		0.18***	0.14***		0.05	0.01		0.16***	0.13***		0.09*	0.02
All access localities		0.13**	0.12**		0.18***	0.08		0.21***	0.20***		0.20***	0.07
Home & institutional		0.01	0.00		0.01	-0.01		-0.02	-0.02		0.02	-0.01
Skills (ability)			0.06			0.16***			0.05			0.18***
Centrality			0.20***			0.10***			0.23***			0.17***
Adjusted R^2	0.13	0.15	0.19	0.16	0.17	0.21	0.28	0.32	0.36	0.30	0.31	0.37
BIC	2797.0	2787.8	2732.0	3665.1	3667.2	3610.0	1822.0	1786.0	1715.2	2495.9	2492.8	2370.7
N	926	926	923	1,218	1,218	1,211	928	928	924	1,220	1,220	1,213

Notes: * $p<0.05$ ** $p<0.01$ *** $p<0.001$. Omitted categories: No educational qualifications; Male; White; Married/with partner; No children in household; Not a member of any civic group; No other Internet users in household; No disability. HH="household"; dig.="digitally".

Adding the access locality variable to models of use contributes the most to the explanatory power of the communication and interaction model in both 2009 (4 percentage points) and 2013 (6 percentage points). In 2009 the access variable also added 4 percentage points to the adjusted R^2 of the entertainment and leisure model. Having all modes of access as opposed to only home access had the largest impact on participation in "communication and interaction" and "information and learning" activities (see Models 2). In 2009 adding mobile onto home access as opposed to having home-only access had largest effects on engagement in "participation and engagement" and "entertainment and leisure" activities. In 2013, the effects of mobile locality are elsewhere: compared to home-only access, adding mobile access had the largest effects on engagement in "communication and interaction" and "commercial and financial" activities. The same is true when users with all access localities are compared to home-only users—users going online at home, mobile and institutional localities have more communicative and commercial uses.

Longitudinally, the effect of access locality changed differently for different uses. From 2009 to 2013 the significance and/or size of locality coefficients dropped in information and learning, creative and productive, participation and engagement, and entertainment and leisure uses. The significance and/or size of locality coefficients increased over time in the commercial and financial and communication and interaction models (see Model 3). A conclusion that follows from these results is that users who only have home Internet access are now most profoundly excluded from economic and social online resources. Those two were the only uses where in 2013 adding mobile onto home access increased participation when all other factors are controlled for. Importantly, having all access localities as opposed to home only also had a significant positive effect in the "information and learning" model. I assume that using the Internet at work and using it at school are the two institutional access points that add most to this coefficient.

Now I turn to comparing the effects of access locality to the effects of skills and Internet centrality. From 2009 to 2013 the significance and/or size of skills coefficients increased, whereas centrality coefficients decreased in all six use models. The longitudinal increase in the skills coefficient was the biggest in the “entertainment and leisure” model, whereas for centrality the biggest longitudinal decrease occurred in the “communication and interaction” model. Of the three mediating factors, in 2013 skills had the largest impact on information and learning, creative and productive, and participation and engagement uses; skills and centrality had similar effects on entertainment and leisure use; and skills and access in all localities had similar effects on commercial and financial, and communication and interaction uses.

Taken together the above analyses show that the impact of access localities on online engagement decreased over time, and that users who only go online on PCs at home engage to a significantly lesser extent with commercial and communicative uses of the Internet. These results are summarised in Table 7.5 below where shaded cells indicate a longitudinal increase in significance and/or size of locality coefficients and coefficients in bold denote the strongest contextual mediating factor in a specific 2013 model.

Table 7.5. Locality: Summary table, standardised OLS regression coefficients

	Total amount of use		Commercial & financial		Information & learning		Creative & productive	
	2009 *Model 3* β	2013 *Model 3* β	2009 *Model 3* β	2013 *Model 3* β	2009 *Model 3* β	2013 *Model 3* β	2009 *Model 3* β	2013 *Model 3* β
Home access	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Home & mobile	0.14***	0.07*	0.10**	0.11**	0.10**	0.02	0.12**	-0.03
All access localities	0.25***	0.20***	0.16***	**0.20*****	0.19***	0.17***	0.10*	0.03
Home & institutional	0.05	0.02	0.07*	0.05	0.05	0.03	-0.02	-0.01
Skills (ability)	0.16***	**0.27*****	0.10**	**0.20*****	0.15***	**0.20*****	0.11**	**0.12*****
Internet centrality	0.28***	0.17***	0.18***	0.13***	0.17***	0.09***	0.10**	0.08*
Adjusted R^2	0.48	0.50	0.30	0.29	0.33	0.39	0.10	0.14

	Communication & interaction		Participation & engagement		Leisure & entertainment	
	2009 *Model 3* β	2013 *Model 3* β	2009 *Model 3* β	2013 *Model 3* β	2009 *Model 3* β	2013 *Model 3* β
Home access	ref.	ref.	ref.	ref.	ref.	ref.
Home & mobile	0.06	0.12***	0.14***	0.01	0.13***	0.02
All access localities	0.24***	**0.28*****	0.12**	0.08	0.20***	0.07
Home & institutional	0.09**	0.04	0.00	-0.01	-0.02	-0.01
Skills (ability)	0.20***	**0.27*****	0.06	**0.16*****	0.05	**0.18*****
Internet centrality	0.27***	0.14***	0.20***	0.10***	0.23***	**0.17*****
Adjusted R^2	0.37	0.44	0.19	0.21	0.36	0.37

Notes: Shaded cells indicate a longitudinal increase in significance and/or size of locality coefficients. Coefficients in bold denote the strongest contextual mediating factor in a specific 2013 model.

7.3.2 Ubiquity

In this section, I perform analyses similar to those above, but focusing on the role of ubiquity of access in online engagement. To assess its longitudinal dynamics I compare the waves 2005 and 2013. Results tables for other waves are available in Appendices B.6 and B.7. Like above, I present three hierarchical models where Model 1 includes 17 indicators of offline resources as independent variables, Model 2 adds ubiquity of access variable, and Model 3 adds self-rated ability to use the Internet and Internet centrality variables.

To account for the results of the qualitative study, which suggested that Internet centrality and skills vary across groups with different re-domestication practices (see section 7.2), the analysis of ubiquity is extended with a model (Model 4) that tests interaction effects among access, motivations and skills. According to the results of the qualitative study, I would expect that larger access infrastructures (i.e. more ubiquitous access) have a larger impact on online engagement when individuals have stronger Internet centrality and/or rate their Internet skills as better. For example, users in the spotlighting group said the Internet is really important for both information and entertainment and had more favourable opinions about ubiquitous access. They seemed to be always connected and were confident about their Internet skills. By contrast, users in the distributing group said the Internet is very important for information but not so important for entertainment. They seemed to enjoy constant connectivity less and were less confident about their skills. Such disparities between groups suggests that how Internet access is put to use may be shaped by interactions among access, motivations and skills. Interaction effects are tested with 2013 data in columns in Model 4, which include all three interaction effects between mediating variables—between access and Internet centrality, between access and Internet skills, and between Internet centrality and skills. In three examined models—total amount of use, commercial and financial, and communicative and interaction use—none of the interaction terms was significant. In other models interaction effects were small and added little to their explanatory power. Thus, I provide Model 4 results in Appendix B.8 and only describe them in words below.

In discussing the results, I focus on describing uses ubiquity of access has the largest impact on; how this relationship has changed over the years; and the role of ubiquity in explaining online engagement vis-à-vis skills and motivation.

Table 7.6. Ubiquity: Total amount of use, standardised OLS regression coefficients

	2005			2013		
	Model 1	*Model 2*	*Model 3*	*Model 1*	*Model 2*	*Model 3*
	β	β	β	β	β	β
Economic field						
Income	0.09**	0.02	0.02	0.17***	0.09***	0.08***
No education	ref.	ref.	ref.	ref.	ref.	ref.
Secondary education	-0.12*	-0.14**	-0.11*	0.19***	0.14***	0.11***
Further education	-0.04	-0.09	-0.07	0.14***	0.09**	0.08**
Higher education	0.06	-0.03	-0.02	0.26***	0.16***	0.10**
Employed	ref.	ref.	ref.	ref.	ref.	ref.
Student	0.03	0.01	-0.00	0.03	-0.02	-0.01
Retired	-0.05	-0.05	-0.03	0.00	0.04	0.02
Unemployed	-0.06	-0.04	-0.03	-0.03	0.01	-0.00
Cultural field						
Female	-0.21***	-0.17***	-0.11***	-0.15***	-0.13***	-0.09***
Non-white	0.09**	0.07**	0.06**	-0.01	-0.00	-0.02
Age	-0.23***	-0.19***	-0.14***	-0.30***	-0.24***	-0.14***
Social field						
Single	0.03	-0.01	-0.02	0.04	0.00	-0.00
Children in HH	-0.02	-0.02	-0.02	0.01	-0.01	-0.02
Social contact	0.09**	0.06*	-0.01	0.21***	0.16***	0.15***
Civic groups	0.05	0.03	0.04	0.17***	0.14***	0.14***
Digital support	0.10***	0.07**	0.11***	0.08***	0.05*	0.09***
HH dig. included	0.08*	0.03	0.02	0.02	-0.04	-0.04
Personal field						
Disability	0.00	0.00	-0.01	0.05*	0.03	0.03
Ubiquity of access		0.35***	0.21***		0.37***	0.26***
Skills (ability)			0.23***			0.25***
Centrality			0.29***			0.16***
Adjusted R^2	0.19	0.29	0.46	0.35	0.44	0.52
BIC	8454.9	8327.6	8035.0	10052.8	9895.1	9651.7
N	1,053	1,053	1,050	1,229	1,229	1,222

Notes: * p<0.05 ** p<0.01 *** p<0.001. Omitted categories: No educational qualifications; Male; White; Married/with partner; No children in household; Not a member of any civic group; No other Internet users in household; No disability. HH="household"; dig.="digitally".

Table 7.6 shows that in 2005 and 2013 ubiquity of access adds importantly to the explanatory power of the total amount of use model, by 10 and 9 percentage points respectively. Ubiquity is significantly positively related to the extent of online engagement. In fact, from 2005 to 2013 the size of the ubiquity coefficient increased. One standard deviation increase in access ubiquity contributed more substantially to the extent of online engagement in 2013 as compared to 2005 when all other factors are controlled for (see Model 3). This result is different from the above, where the effect of locality of access decreased over time. While it seems that combinations of localities are becoming less important in explaining the extent of online engagement, sheer availability of different access points seems to be gaining importance.

Interestingly, over time the impact of Internet centrality on explaining the total amount of use decreased substantially from 0.29 to 0.16. By contrast, the effect of skills increased slightly. In 2013, ubiquity of access and skills had effects of similar sizes, while the effect of Internet centrality was smaller, but still important. In fact, ubiquity, skills and centrality are the three strongest predictors of the total amount of use in 2013. The model explains 52% of variance in the extent of use.

Table 7.6 also shows interesting longitudinal dynamics in the offline resources. Compared to 2005, in 2013 income, education and two measures of social resources (extent of social contact and participation in civic groups) increased in significance and the size of their effects on the extent of online engagement. They all contribute positively to online engagement.

Next, I look at how ubiquity of access shapes engagement with specific types of Internet use. Results are displayed in Table 7.7. Both in 2005 and 2013 adding ubiquity to the model increases the adjusted R^2 the most in "communication and interaction" model, by 8 and 9 percentage points respectively. In 2005 ubiquity had the largest effects in "communication and interaction" followed by the "commercial and financial" and "information and learning" models. The same was true in 2013—ubiquity adds the most to communication, commerce and information uses. Over time, however, the effect of ubiquity of access increased in the "commercial and financial", "information and learning", "communication and interaction" and "entertainment and leisure" models; the effect remained the same in "participation and engagement", but decreased in the "creative and productive" model (see Model 2). These results suggest that in 2013 users with more access points had more distinct online engagement patterns in relation to users with fewer access points as compared to 2005.

In examining full models (Model 3) I focus on comparing ubiquity coefficients to skills and centrality. Over time, the size of the skills coefficient increased for commercial and informational uses, remained the same for communication, participation and entertainment uses, and decreased for creative uses. By contrast, the Internet centrality coefficient increased in the creative model, remained the same in the participation model, and decreased in size in all other models. It is interesting that over time the ubiquity coefficient strengthened in four models whereas skills coefficient strengthened in only two models. The uses where the ubiquity coefficient became stronger and the skills coefficient remained at the same level are communication and entertainment uses. This suggests that over time inequalities in ubiquity of access have contributed more to differences in engagement with these two uses than inequalities in skills have. Comparing all three mediating factors in 2013, ubiquity has the largest effect in two models: commercial and communication uses. Ubiquity and skills have effects of the same magnitude on entertainment, information and participation uses, whereas skills contribute more to creative uses of the Internet. In fact, this is the only model where the effect of ubiquity is not significant.

Overall, in 2005 and 2013 Model 3 had the most explanatory power in predicting the extent of engagement with communication, information, entertainment uses. The model has the poorest fit in predicting creative uses. Controlling for skills and motivational factors, ubiquity of access has the largest effects in communication and interaction, commerce and finance, and information and learning activities. Interestingly, in 2013 Internet centrality was most strongly related to entertainment and leisure activities. Its coefficient was at the same level as those of skills and access. This probably has to do with the way Internet centrality is measured (i.e. it includes a measure of play dependency).

The results suggest that ubiquity or availability of Internet access on multiple devices and locations matter in explaining users' online engagement. Those with more access points are likely to engage more extensively in a range of uses, but especially in communicative, commercial and informational uses.

Looking at the role of offline resources in online engagement, some interesting patterns also emerge (see Model 3 in 2013). Income has the largest effects on creative and commercial uses. Education is strongly related to informational and commercial uses. The same holds for life stage. Of the cultural factors, being female is strongly negatively related to entertainment uses—the same as being older. Race has no effect on Internet use in 2013. Social resources exhibit various different effects. Being single is negatively related to commercial activities. Having children in a household is negatively related to participatory activities. The extent of social contact positively affects a range of activities. Its effects are strongest on communication, entertainment and creative uses. Participation in civic groups affects the extent of information and entertainment uses. The extent of the digital support network has the largest effects on creative and participation uses. Interestingly, digital inclusion of a household has a small negative effect on informational and commercial uses. Finally, disability, as a measure of resources in the personal field, has a small positive effect on information uses.

Table 7.7. Ubiquity: Types of use, standardised OLS regression coefficients

	2005 Commercial & financial			2013 Commercial & financial			2005 Information & learning			2013 Information & learning		
	Model 1	*Model 2*	*Model 3*	*Model 1*	*Model 2*	*Model 3*	*Model 1*	*Model 2*	*Model 3*	*Model 1*	*Model 2*	*Model 3*
	β	β	β	β	β	β	β	β	β	β	β	β
Income	0.24***	0.19***	0.19***	0.19***	0.12***	0.12***	0.05	0.01	0.01	0.04	-0.02	-0.02
No education	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Secondary ed.	-0.01	-0.03	-0.01	0.23***	0.18***	0.17***	-0.10	-0.11*	-0.09	0.19***	0.15***	0.13***
Further ed.	0.04	0.01	0.02	0.21***	0.17***	0.16***	-0.02	-0.05	-0.04	0.17***	0.13***	0.13***
Higher ed.	0.09	0.03	0.04	0.29***	0.21***	0.16***	0.13*	0.07	0.08	0.36***	0.29***	0.25***
Employed	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Student	-0.10**	-0.11***	-0.12***	-0.07*	-0.11***	-0.10***	0.19***	0.18***	0.17***	0.25***	0.21***	0.21***
Retired	-0.03	-0.03	-0.02	-0.03	0.00	-0.00	-0.04	-0.03	-0.02	-0.02	0.00	-0.01
Unemployed	-0.06	-0.05	-0.04	-0.13***	-0.10***	-0.10***	-0.03	-0.02	-0.01	0.03	0.06*	0.06*
Female	-0.08*	-0.05	-0.01	-0.06*	-0.05	-0.02	-0.03	0.00	0.05	-0.07**	-0.05*	-0.02
Non-white	-0.05	-0.06*	-0.07**	-0.04	-0.03	-0.05	0.13***	0.12***	0.11***	0.02	0.02	0.01
Age	-0.10*	-0.08	-0.05	-0.14***	-0.08*	-0.01	-0.12**	-0.09*	-0.06	-0.15***	-0.11**	-0.04
Single	-0.07	-0.10**	-0.11**	-0.06	-0.09**	-0.09**	-0.01	-0.04	-0.05	0.03	-0.00	-0.00
Children in HH	-0.04	-0.04	-0.05	0.07*	0.05	0.05	0.04	0.04	0.04	0.03	0.01	0.01
Social contact	0.09**	0.07*	0.02	0.08**	0.03	0.03	0.02	0.00	-0.06*	0.15***	0.11***	0.10***
Civic groups	0.03	0.02	0.03	0.12***	0.09***	0.09***	0.08**	0.07*	0.08**	0.15***	0.12***	0.12***
Digital support	0.02	0.00	0.02	-0.02	-0.05	-0.02	0.08**	0.06*	0.09***	0.10***	0.07**	0.11***
HH dig. included	-0.01	-0.04	-0.05	-0.01	-0.06	-0.06*	0.03	-0.00	-0.00	-0.02	-0.06*	-0.07*
Disability	-0.02	-0.02	-0.02	0.03	0.02	0.01	-0.01	-0.01	-0.02	0.06*	0.05	0.05*
Ubiquity of access		0.24***	0.15***		0.31***	0.22***		0.24***	0.14***		0.28***	0.20***
Skills (ability)			0.11***			0.19***			0.17***			0.20***
Centrality			0.23***			0.13***			0.22***			0.08**
Adjusted R^2	0.13	0.17	0.25	0.20	0.26	0.31	0.18	0.22	0.31	0.31	0.36	0.39
BIC	2073.9	2023.7	1931.9	2349.2	2268.2	2183.6	2352.9	2300.7	2173.2	2857.4	2779.7	2698.8
N	1053	1053	1050	1229	1229	1222	1053	1053	1050	1228	1228	1221

Table continued

	2005			2013			2005			2013		
	Creative & productive			**Creative & productive**			**Communication & interaction**			**Communication & interaction**		
	Model 1	*Model 2*	*Model 3*	*Model 1*	*Model 2*	*Model 3*	*Model 1*	*Model 2*	*Model 3*	*Model 1*	*Model 2*	*Model 3*
	β	β	β	β	β	β	β	β	β	β	β	β
Income	-0.02	-0.05	-0.05	0.17***	0.15***	0.14***	0.09*	0.02	0.02	0.16***	0.08**	0.06*
No education	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Secondary ed.	0.11	0.10	0.10	0.11*	0.09*	0.08	-0.07	-0.09	-0.07	0.10*	0.04	0.02
Further ed.	0.07	0.05	0.06	0.07	0.05	0.05	0.00	-0.04	-0.03	0.10**	0.05	0.04
Higher ed.	0.15**	0.11	0.11	0.09	0.06	0.03	0.11*	0.03	0.03	0.23***	0.13**	0.07
Employed	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Student	-0.02	-0.03	-0.04	0.03	0.01	0.02	-0.02	-0.04	-0.05	-0.04	-0.09***	-0.07**
Retired	-0.07	-0.07	-0.06	0.00	0.01	0.00	-0.06	-0.06	-0.05	-0.01	0.03	0.01
Unemployed	0.01	0.01	0.02	-0.00	0.01	0.00	-0.08*	-0.06*	-0.05	-0.03	0.01	0.00
Female	-0.16***	-0.14***	-0.12***	-0.09**	-0.08**	-0.06*	-0.14***	-0.10***	-0.05	-0.04	-0.01	0.02
Non-white	0.09**	0.08*	0.09**	0.04	0.05	0.04	0.09**	0.07**	0.07**	0.03	0.04	0.02
Age	-0.04	-0.02	-0.00	-0.11**	-0.09*	-0.04	-0.10*	-0.07	-0.02	-0.26***	-0.19***	-0.09**
Single	-0.01	-0.03	-0.03	0.03	0.01	0.01	0.07	0.03	0.02	0.05	0.01	0.00
Children in HH	-0.01	-0.00	0.00	-0.04	-0.05	-0.05	-0.03	-0.03	-0.02	0.00	-0.02	-0.03
Social contact	0.09**	0.07*	0.05	0.15***	0.13***	0.13***	0.21***	0.18***	0.12***	0.22***	0.17***	0.16***
Civic groups	0.05	0.04	0.04	0.06*	0.05	0.05	0.05	0.03	0.04	0.13***	0.09***	0.09***
Digital support	0.08**	0.07*	0.09**	0.12***	0.10***	0.13***	0.08**	0.05	0.09***	0.01	-0.03	0.01
HH dig. included	0.00	-0.02	-0.02	0.00	-0.01	-0.02	0.05	0.01	0.00	0.05	-0.02	-0.02
Disability	-0.00	-0.00	-0.01	0.04	0.03	0.03	0.04	0.03	0.03	0.00	-0.01	-0.02
Ubiquity of access		0.16***	0.11**		0.12**	0.06		0.32***	0.20***		0.39***	0.29***
Skills (ability)			0.16***			0.12***			0.25***			0.25***
Centrality			0.04			0.07*			0.21***			0.14***
Adjusted R^2	0.04	0.06	0.09	0.12	0.13	0.14	0.15	0.23	0.36	0.29	0.38	0.46
BIC	95.4	80.2	66.9	3181.4	3177.6	3150.1	2960.9	2859.8	2674.2	3246.3	3084.6	2914.8
N	1053	1053	1050	1227	1227	1220	1052	1052	1049	1229	1229	1222

Table continued

	2005 Participation & engagement			2013 Participation & engagement			2005 Entertainment & leisure			2013 Entertainment & leisure		
	Model 1	*Model 2*	*Model 3*	*Model 1*	*Model 2*	*Model 3*	*Model 1*	*Model 2*	*Model 3*	*Model 1*	*Model 2*	*Model 3*
	β	β	β	β	β	β	β	β	β	β	β	β
Income	-0.05	-0.09**	-0.09**	0.15***	0.10**	0.09**	-0.03	-0.07*	-0.07*	0.11***	0.06*	0.05
No education	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Secondary ed.	-0.11	-0.13*	-0.12*	0.13**	0.10*	0.08	-0.15**	-0.16**	-0.14**	0.09*	0.05	0.03
Further ed.	-0.13**	-0.16**	-0.15**	0.01	-0.02	-0.03	-0.11*	-0.13**	-0.12**	0.02	-0.02	-0.02
Higher ed.	-0.08	-0.14**	-0.14**	0.02	-0.04	-0.07	-0.08	-0.14**	-0.14**	0.05	-0.02	-0.06
Employed	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Student	-0.06	-0.07*	-0.08*	-0.08**	-0.11***	-0.10***	0.02	0.01	-0.01	-0.06*	-0.09***	-0.07**
Retired	-0.04	-0.04	-0.03	0.01	0.04	0.02	-0.02	-0.01	-0.00	0.06	0.08*	0.07*
Unemployed	-0.02	-0.01	-0.01	-0.04	-0.01	-0.02	-0.01	0.00	0.01	-0.00	0.03	0.02
Female	-0.12***	-0.10**	-0.07*	-0.05	-0.04	-0.02	-0.33***	-0.30***	-0.25***	-0.28***	-0.26***	-0.24***
Non-white	0.14***	0.13***	0.13***	0.00	0.01	-0.00	0.06*	0.05	0.04	-0.03	-0.03	-0.04
Age	-0.16***	-0.13**	-0.11**	-0.28***	-0.24***	-0.18***	-0.30***	-0.28***	-0.24***	-0.37***	-0.32***	-0.25***
Single	0.13***	0.10**	0.10**	0.04	0.01	0.00	0.07*	0.04	0.04	0.08**	0.06	0.05
Children in HH	0.00	0.00	0.01	-0.08**	-0.10**	-0.10***	-0.04	-0.04	-0.04	-0.02	-0.03	-0.03
Social contact	-0.00	-0.02	-0.06	0.12***	0.09***	0.09**	-0.02	-0.04	-0.10***	0.19***	0.15***	0.14***
Civic groups	-0.03	-0.04	-0.03	0.14***	0.11***	0.12***	-0.00	-0.02	-0.01	0.14***	0.11***	0.12***
Digital support	0.04	0.02	0.05	0.11***	0.09***	0.12***	0.11***	0.09**	0.11***	0.08**	0.05*	0.08**
HH dig. included	0.09*	0.06	0.06	0.00	-0.03	-0.03	0.12***	0.09**	0.08**	0.04	0.00	-0.00
Disability	-0.03	-0.04	-0.04	0.04	0.03	0.03	0.01	0.00	-0.00	0.04	0.03	0.03
Ubiquity of access		0.23***	0.16***		0.22***	0.15***		0.23***	0.13***		0.26***	0.18***
Skills (ability)			0.14***			0.14***			0.15***			0.16***
Centrality			0.11**			0.10***			0.22***			0.17***
Adjusted R^2	0.09	0.13	0.17	0.16	0.19	0.22	0.23	0.27	0.35	0.30	0.34	0.39
BIC	2013.0	1970.7	1935.5	3687.6	3652.8	3604.1	2294.4	2243.1	2121.2	2517.2	2452.0	2346.3
N	1,053	1,053	1,050	1,227	1,227	1,220	1,053	1,053	1,050	1,229	1,229	1,222

Notes: * $p<0.05$ ** $p<0.01$ *** $p<0.001$. Omitted categories: No educational qualifications; Male; White; Married/with partner; No children in household; Not a member of any civic group; No other Internet users in household; No disability. HH="household"; dig.="digitally".

Lastly, as already mentioned above, the three interaction terms had some significant effects in the four models of online engagement: information and learning, creative and productive, participation and engagement, and entertainment and leisure. Their standardised beta coefficients ranged from 0.05 to 0.08 and were never significant at the 99% confidence interval. In terms of the adjusted R^2, interaction effects either did not increase it or added 1 or 2 percentage points to the explanatory power of the models. Therefore, results tables containing interaction effects are only available in Appendix B.8.

The results show that interaction between ubiquity and Internet centrality is significant in predicting the extent of engagement with entertainment as well as participation activities. The strength of the effect of ubiquity on leisure activities to some extent depends on levels of Internet centrality. For users with low Internet centrality, increasing ubiquity has a negative effect on the extent of entertainment activity. For those with high levels of centrality, more access points translate to more leisure use of the Internet (see Appendix B.8). Unsurprisingly, interaction between access and skills has a significant effect on creative and informational uses. These activities require more specific knowledge of how to navigate the web and its tools. Finally, the interaction term between skills and centrality has a positive effect on creative as well as entertainment uses. In fact, the most significant outcome of the analysis of interaction effects is that access, Internet centrality and skills have independent effects on engagement with online resources. They all matter and they matter differently. This is further discussed in Chapter 8.

The results relating to ubiquity of access are summarised in Table 7.8 below where shaded cells indicate a longitudinal increase in significance and/or size of locality coefficients and coefficients in bold denote the strongest contextual mediating factor in a specific 2013 model.

Table 7.8. Ubiquity: Summary table, standardised OLS regression coefficients

	Total amount of use		Commercial & financial		Information & learning		Creative & productive	
	2005 *Model 3* β	2013 *Model 3* β	2005 *Model 3* β	2013 *Model 3* β	2005 *Model 3* β	2013 *Model 3* β	2005 *Model 3* β	2013 *Model 3* β
Ubiquity of access	0.21***	**0.26*** **	0.15***	**0.22*** **	0.14***	**0.20*** **	0.11**	0.06
Skills (ability)	0.23***	**0.25*** **	0.11***	0.19***	0.17***	**0.20*** **	0.16***	**0.12*** **
Internet centrality	0.29***	0.16***	0.23***	0.13***	0.22***	0.08**	0.04	0.07*
Adjusted R^2	0.46	0.52	0.25	0.31	0.31	0.39	0.09	0.14

	Communication & interaction		Participation & engagement		Leisure & entertainment	
	2005 *Model 3* β	2013 *Model 3* β	2005 *Model 3* β	2013 *Model 3* β	2005 *Model 3* β	2013 *Model 3* β
Ubiquity of access	0.20***	**0.29*** **	0.16***	**0.15*** **	0.13***	**0.18*** **
Skills (ability)	0.25***	0.25***	0.14***	**0.14*** **	0.15***	**0.16*** **
Internet centrality	0.21***	0.14***	0.11**	0.10***	0.22***	**0.17*** **
Adjusted R^2	0.36	0.46	0.17	0.22	0.35	0.39

Notes: Shaded cells indicate a longitudinal increase in significance and/or size of ubiquity coefficients. Coefficients in bold denote the strongest contextual mediating factor in a specific 2013 model.

7.4 Conclusions

This chapter focused on examining how differences in Internet access shape online engagement. The first part of the chapter developed a measure of Internet centrality as a technology-related motivational factor in digital inclusion. It combines individuals' scope of Internet dependencies and general perceptions about the Internet. The results showed that the extent of Internet centrality varied across groups of users with different access infrastructures. Thus, I argued that Internet centrality can act as a motivational factor in explaining online engagement, addressing the role Internet technologies play in individuals' daily lives. Similarly, self-rated ability to use the Internet as a measure of Internet skills was shown to vary across groups with distinct infrastructural practices. Taken together, these results led to an assumption that interaction effects among access, motivations and skills may exist.

These findings informed the subsequent quantitative analyses, where the role of locality and ubiquity of access in online engagement was examined. The analyses showed that over time the sizes of locality coefficients decreased whereas the sizes of ubiquity coefficients increased. This suggests that nowadays having access on multiple devices and in multiple locations has a bigger effect on online engagement than specific types of access localities. Specifically, the ubiquity dimension explains more variance in online engagement as compared to locality for five engagement types: total amount of use, along with commercial and financial, communication and interaction, participation and engagement, and entertainment and leisure uses. In summary, having more access points contributes significantly to the extent of overall engagement with the Internet and activities related to commerce, communication, participation and leisure.

Furthermore, both of the material dimensions of access examined here have the most pronounced effects on commercial and communicative uses. In fact, these were the only two uses where in 2013 having mobile access as opposed to home-only access contributed significantly to the extent of engagement. Users who go online at home and on the go are more likely to shop and bank online and to communicate via email and instant messaging. This finding is in line with the interview data. A vast majority of interviewees described using their smartphones to shop, book cinema tickets, or use bank services online. Most agreed that doing that on a smartphone is very easy and instantaneous. Similarly, many interviewees displayed strong communication dependencies where most of the day-to-day online communication with family and friends is performed via mobile Internet services (see Chapter 6). Taken together, these results suggests that users who are “home-only” Internet users—17% of the British online population in 2013—are excluded from online economic and social resources.

In terms of ubiquity of access, having a larger number of access points contributes to participation in a wide range of online activities in addition to commercial and communication uses. Internet users who always have access at hand tend to be more active. This relationship grew stronger over the years. This suggests that providing users with a range of access points is important. This finding is especially important in the light of the stranded group of users, which was identified in the interview data (see Chapter 6). What stranded users have in common is that they usually possess only one working Internet-enabled device, often of poor quality. Thus, a larger range of access points seems to be related to quality of access and, in turn, to more extensive engagement with online resources.

Taken together, the above analyses also showed that the three factors that were said to mediate the effects between offline and online resources—access, skills and motivation—are critical in explaining online engagement. The hypothesis of interaction effects between the three factors was not fully supported. Instead, their effects were determined to be independent. Moreover, in several models, access, skills and motivations were among the strongest predictors of the extent of online engagement. Thus, it is important for scholars of digital inclusion to consider the three contextual mediating factors holistically. This area deserves more research attention, which is further discussed in Chapter 8.

Chapter 8: Discussion

8.1 Introduction

This chapter brings together the findings presented in the above empirical chapters and synthesises them around the core themes of this research inquiry. The first part of the chapter critically discusses the theoretical contributions of this research. Specifically, the conceptualisation of Internet access as infrastructure proposed in Chapter 2 is re-evaluated and its implications for digital inclusion research are discussed. These are summarised in an updated model for studying access infrastructures and digital inclusion, which hopes to inform future research in this area by indicating the complex relationship between material dimensions of access and its social dynamics as well as the interplay among access, motivations and skills—the three critical factors of digital inclusion.

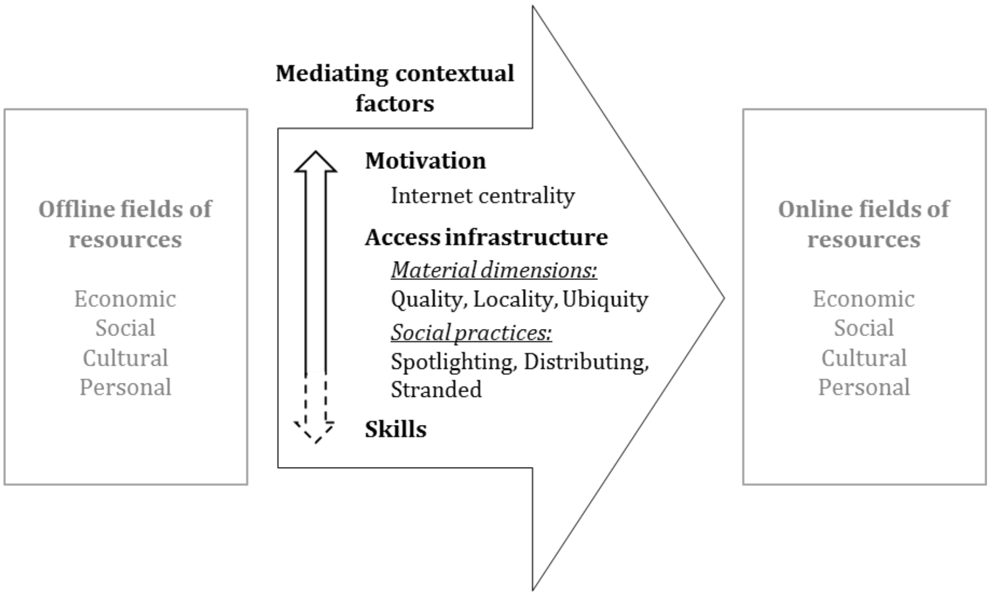
The second part of the chapter further demonstrates the value of the infrastructural approach to studying Internet access and its role in digital inclusion by discussing the empirical findings of this research more thoroughly. Specifically, I demonstrate how the present study informs our understanding of gradations in access inclusion and the role of access in online engagement. This discussion is structured around Selwyn and Facer's (2007) conceptualisation of digital inclusion and the questions of digital exclusion and digital choice (Eynon & Helsper, 2010). I argue that different mechanisms underlie the development, maintenance and engagement with access, depending on whether Internet access arrangements are shaped by digital exclusion or choice. Furthermore, a distinction between the disadvantaged and the empowered users is made. I discuss what online engagement inequalities stem from inequalities of access and what contextual factors shape Internet use among those empowered by Internet technologies. Finally, section 8.5 focuses specifically on the role of mobile Internet access in digital inclusion, since understanding the implications of mobile Internet access for digital inclusion was the core motivating factor behind this research and is high on the current research agenda in the digital inclusion field.

8.2 Access Infrastructures and Digital Inclusion

In Chapter 2 I argued that a better conceptualisation of Internet access is needed if we are to fully understand its complex and dynamic nature. Traditionally, access has been conceived of as an indicator of digital inclusion (Helsper, 2012) and approached in binary terms to distinguish between those who do and those who do not use the Internet. Access has been largely thought of in material terms by focusing on specific Internet technologies and their characteristics. To address the limitations of existing approaches to studying Internet access, I drew on infrastructure studies and defined Internet access infrastructure as a foundation of material artefacts and social practices that support an individual's Internet use.

This definition implies that access infrastructure has two dimensions: material and social. Thus, after establishing that Internet access in fact corresponds to characteristics of infrastructure (Chapter 4), its specific dimensions were examined (Chapters 5 and 6). Taken together, the results of this study offer ample evidence that in thinking about Internet access we need to move beyond specific devices and locations to approach the study of access holistically, encompassing its material and social aspects. This overarching finding informs the updated model for studying access infrastructures and digital inclusion presented in Figure 8.1. The theoretical contributions of this research concern the mediating contextual factors (see Figure 8.1), which are said to mediate the impact of offline resources on online resources. I discuss them in the sections below.

Figure 8.1. Updated model for studying access infrastructures and digital inclusion



8.2.1 Conceptualisations of access

This study used a novel conceptualisation of Internet access as infrastructure. I argued that broadening the scope of Internet access beyond "possessing or having entry to PCs and Internet connections" (van Dijk, 2005, p. 48) may help us better understand its dynamics, related social practices, and their implications for digital inclusion. The empirical results of this study demonstrated value in extending the conceptualisation of access beyond devices and locations of use to encompass its dynamics and the ways people experience, maintain and develop it. Thus, in Figure 8.1 the framing of access as *"access infrastructure"* is retained. I argue that this conceptualisation of access has value for digital inclusion research because it helps structure research inquiry into specific dimensions of access and their role in explaining online engagement. Concretely, the infrastructural approach distinguishes between material and social dimensions of Internet access. As outlined in Figure 8.1, this research established three specific material dimensions of access as well as three specific social practices shaping access.

First, in developing specific material dimensions of access I drew on previous research (see section 2.4) and consolidated it into dimensions of quality, locality and ubiquity. The three dimensions are conceptually separate and relate to different aspects of Internet access. The importance of recognising what specific dimensions of access entail was demonstrated in the empirical part of this study (Chapters 5 and 7). For example, the results suggest that offline social resources play a bigger role than offline economic resources in explaining mobile gradations in access inclusion, whereas in explaining ubiquity of access availability of economic resources was a bigger factor. Similarly, the results indicate the changing dynamics of locality and ubiquity of access in explaining online engagement—over time, the importance of locality in explaining engagement decreased, whereas the importance of ubiquity increased. Accordingly, distinguishing between specific material dimensions of access is important because of their distinctive roles in digital inclusion. Researchers of Internet access and use have to acknowledge implications of specific measures of material access they are using. Counting the number of access points users have available (ubiquity) or examining home versus mobile Internet access (locality) will likely result in divergent conclusions. These differences are interesting in their own right and deserve more research attention in the future. Likewise, the schema of material dimensions of access needs to be further theoretically validated and possibly extended.

Second, a schema of social practices shaping Internet access, which reflect ways users develop, arrange, maintain and relate to their Internet access, was developed. Specifically, I focused on the processes of re-domestication and provided empirical evidence depicting three different processes shaping access: spotlighting, distributing and being stranded. They encompass practices users engage in when there are technological or social changes, such as adoption of new devices or shifts in availability of offline resources, and their impact on access infrastructure arrangements. Spotlighting and distributing result from new devices entering access arrangements, whereas being stranded results from breaks in access and difficulties in sustaining it. The schema of re-domestication practices involved in development and maintenance of access is an important contribution to our understanding of the social dynamics of Internet access. It encapsulates the underlying complexities and dynamics of such access. As such, the schema of social practices complements the schema of material dimensions of access by providing further understanding of how and why different segments of the population engage with Internet-enabled devices and locations differently. The schema was developed by drawing on the concept of re-domestication, which presents one possible way to examine dynamics of Internet access. More research is needed in this area, both in extending the domestication approach to studying access and in developing alternative approaches. Recent examples of the latter include the technology maintenance theory (Gonzales, 2014, 2015), diffusion of innovations theory (Rice & Pearce, 2015), and longitudinal digital socialisation approach (Smith et al., 2015). Digital inclusion research would benefit from further work in this area.

Any approach to studying Internet access should address its dynamic and complex nature in a holistic manner drawing upon a variety of theoretical sources as demonstrated in the present study. By focusing solely on a single device or locality of use, a complete picture of access could not be painted. It is important to consider how different dimensions of access are interrelated. Moreover, the study of Internet access needs to include individuals' experiences. For example, conceptualising ubiquity by counting individuals' access points is limited. It is important to also understand how users perceive and experience it, since these subjective perceptions will greatly impact how access is acted upon. Thus, social practices need to be part of new conceptualisations of access. This is related to Selwyn's (2004) distinction between perceived and theoretical access.

In summary, conceptualising Internet access as infrastructure helps paint a more complete picture of complexities surrounding Internet access. It opens up possibilities for studying both its material dimensions and underlying social processes. The present study offers one way of moving forward in our understanding of access. However, more work is needed in the development of theoretically informed dimensions and measures of Internet access, which would allow for depicting complexities of access at the individual as well as population levels.

8.2.2 Access-related motivational factors

This study also informs conceptualisation of motivational factors in digital inclusion. As depicted in Figure 8.1, Internet centrality is perceived as a motivational factor shaping online engagement. Internet centrality was developed by applying the media system dependency theory to the study of roles Internet technologies play in individuals' everyday lives. It is understood as an umbrella concept encompassing a range of dependencies individuals form with the Internet.

While Internet centrality was used primarily to help explain disparate infrastructural social practices (see Chapter 6), its role in explaining online engagement was also demonstrated (see Chapter 7). Theoretically, the results of this study extend the schema of media dependencies. Apart from orientation, play and understanding Internet dependencies, which are included in the original schema of media dependencies, communication Internet dependency was also identified. Communication dependency is Internet-specific (it was not identified in research examining mass media dependencies), and it constitutes a very important part of motivations driving online engagement. If motivations for engagement with Internet technologies are examined by using a schema of media-related goals as suggested by the media system dependency theory, then goals related to communication need to be considered. The schema of four dependencies corresponds with Allen's (2010) work on experiences of Internet connectivity, which encompass ways people utilise the Internet to live their lives. Allen distinguishes among connectivity as a process of collaboration, communication, and combination (communication and play dependencies); connectivity as knowledge in action (orientation dependency); and connectivity as self-presentation and exploration (understanding dependency).

In Chapter 2 I argued that Internet centrality can be understood as a motivational factor that relates to access insofar as it encompasses roles Internet technologies play in individuals' everyday lives. Put differently, Internet centrality is perceived as a measure of the significance of Internet access to individuals. More work is needed in the area of motivational factors in digital inclusion, which needs to follow advancements that have been made in the area of studying digital skills. Over the past decade new conceptualisations and measures of skills have been developed, which contributed importantly to our understanding of gradations in digital inclusion (see van Deursen, Helsper, et al., 2014; van Dijk & van Deursen, 2014). Similarly, research into specific motivational factors driving engagement with Internet technologies is needed.

8.2.3 Access, motivations and skills

Chapter 2 discussed various theoretical approaches to studying digital inclusion. All authors agree that access is a necessary but not sufficient factor in meaningful engagement with Internet technologies. A consensus has been reached that access, skills and motivations are the core mediators of the effect of offline resources on engagement with online resources. However, the relationship among the three mediating factors has been less thoroughly discussed. There are differences in how theorists of digital inclusion position them: van Dijk (2005) established a successive relationship between motivations, access and skills; Selwyn (2004) thinks of skills and motivation as necessary factors in converting mere access to meaningful online engagement; and Helsper (2012) does not discuss whether and how the three factors are related.

It is indeed very hard to establish a theoretically and empirically meaningful relationship among access, motivations and skills. In the next paragraphs, I focus on discussing the relation between access and motivations, which was more closely studied in this research.

According to the results of the present study, van Dijk's (2005) approach appears too linear in depicting a complex interrelationship between motivation and access. I would argue that his model is more in tune with processes at play when individuals transition from complete non-use to use of the Internet. It is harder to say what comes first—motivation or access development—among individuals who are already online. As exemplified in the analysis of infrastructural practices (see Chapter 4), new technologies sometimes enter individuals' infrastructures without their consent or specific motivation. The viability of the one-way link between motivations and access also depends on how motivations are conceptualised. Here, van Dijk offers a range of factors, which mostly pertain to adoption rather than use of technologies, such as computer anxiety or lack of interest, time, money and self-confidence.

The present study, however, took a theoretically informed approach to motivational factors geared towards understanding everyday engagement with ICTs rather than mere adoption. This in a way makes it harder to unpack the relationship between motivations and access. When are Internet dependencies formed and how do they relate to the dynamics of access infrastructures? Do specific Internet dependencies drive development of access infrastructures or do changes in access lead to changes in Internet dependencies? The qualitative results of this study suggest that access and motivations in fact mutually shape each other. On the one hand, I demonstrated that differences in Internet centrality are reflected in access arrangements. On the other hand, interviewees reported that acquisition of new mobile devices resulted in more intense Internet use for communication or informational purposes; that is, Internet centrality grew stronger (see Chapter 6). However, there was no clear evidence of the interaction effects among the three mediating factors in the quantitative strand of this study. Its main conclusion was that the three factors matter separately and differently for different types of engagement.

Therefore, positioning access, motivations and skills at the same level as mutually reinforcing seems most appropriate. This is in line with Helsper's (2012) model. In Figure 8.1 this is depicted by an arrow running alongside motivations, access and skills. Since this research focused on interrelations between motivations and access infrastructure, the part of the arrow connecting the two is solid. Similar mutual shaping of access characteristics and attitudes was demonstrated by Gonzales (2015) and Smith et al. (2015). Since this research did not contribute to furthering our understanding of the relationship between skills and the other two mediating factors, the part of the arrow connecting skills is dashed. However, previous research suggests that access characteristics and development of skills are related (Eynon & Geniets, 2015).

Taken together, the conclusions of this research suggest that motivations, access infrastructure and skills operate at the same level and are interrelated. Thus, it is very important that empirical research into gradations in digital inclusion approaches contextual mediating factors holistically. More research is needed to establish how and when the three factors are interrelated and reinforce themselves. Such research is timely especially because, as this study shows, the influence of the three factors on online engagement has increased over time (this is not always the case for motivational factors as measured here, but, as discussed in Chapter 9, the measure of Internet centrality has several limitations).

8.2.4 The value of connecting theoretical approaches

This study demonstrates the added value of connecting different media and communications theories with established theoretical approaches to studying digital inclusion. Specifically, I combined theories of infrastructure studies, domestication framework and media system dependency theory to inform our understanding of the meaning and role of Internet access in digital inclusion.

The notion of infrastructure was used to encompass technological and social complexities surrounding Internet access. The infrastructural approach is useful in guiding research into relationships between the technical and non-technical elements of systems (Sandvig, 2013). It proved valuable in developing a more complex conceptualisation of Internet access, but it does not inform the specific dimensions of such access since it has not been previously applied to the study of personal Internet access. Thus, alternative media and communications theories were used to complement the infrastructural approach to studying Internet access.

I drew on the domestication framework to inform the inquiry into the social dynamics of Internet access in everyday life. In this way, this part of the study makes a twofold theoretical contribution. First, it contributes to domestication research by applying the concept of re-domestication to the study of Internet technologies. To the best of my knowledge, this has not been done before. While early domestication studies focused on relations between new media (e.g. mobile phones, PCs) and old media (e.g. television, radio), the present study focused on relations between different Internet technologies. As a result, three specific re-domestication practices shaping Internet access were developed. Such a typology is useful not only in hypothesising about future developments of individuals' Internet access, but also in connecting the qualitative domestication approach with quantitative approaches to studying digital inclusion. Re-domestication practices can inform development of appropriate survey items. Second, re-domestication analysis contributes to a more nuanced understanding of "dependence on human practices" attribute of infrastructure. It demonstrates the value of connecting a largely technical schema of infrastructure attributes with approaches originating in the social shaping of technology perspective.

Lastly, I employed the media system dependency theory to inquire into motivational factors in digital inclusion. The premise that individuals form various dependencies with the media was used to further our understanding of the roles Internet technologies play in individuals' everyday lives. As such, the typology of Internet dependencies complements the domestication approach to understanding media use. Although the roles ICTs play in people's daily lives are at its core, no typology of such roles has been developed in the domestication research. Since differences in Internet dependencies were found among users with disparate re-domestication practices, a composite measure of Internet centrality can be understood as a technology-related motivational factor of digital inclusion. In this, the media system dependency theory contributes to our understanding of motivational factors in digital inclusion. As argued above, more work is needed in this area. The present study demonstrates how development of specific motivational factors relevant to digital inclusion can be informed by drawing on existing media and communications theories.

Combining these seemingly unrelated approaches with frameworks of digital inclusion resulted in a comprehensive framework for studying material and social dimensions of Internet access, its dynamics, and its role in online engagement. This research clearly demonstrates the value of informing specific factors of digital inclusion with existing media and communications theories. Furthermore, this approach led to various empirical findings shedding light on complexities of Internet access and its impact on online engagement. They are thoroughly discussed in the following sections.

8.3 Gradations in Access Inclusion

Scholars of digital inclusion have previously dealt with the question of whether users engage with Internet technologies and online resources in different ways, because they decide to do so (digital choice) or because of involuntary exclusion (digital exclusion).

For example, taking into account that not everyone *wants* to use the Internet, Wyatt and colleagues (2002) categorised Internet non-users into four types: “resisters”, who do not want to use the Internet; “rejectors”, who stopped using it voluntarily; “excluded”, who never went online because they cannot obtain access; and “expelled”, who stopped going online involuntarily due to lack of access. In this typology, the first two groups are believed to exercise a digital choice whereas the third and fourth groups are being digitally excluded. Similarly, Selwyn and Facer (2007) note the importance of people’s ability to make a choice about technology use. They argue that governments should seek to

> [e]nable all individuals to make informed and empowered choices about the uses of ICTs whilst ensuring these individuals have ready access to the resources required to enable them to act on these choices (Selwyn & Facer, 2007, p. 4).

Yet the line between choice and exclusion in relation to use of ICTs is very thin. Selwyn and Facer’s policy recommendation in fact implies that only those who are not socially or digitally excluded in the first place, i.e. people who “have ready access to the resources required”, are in a position to make an empowered choice about use of ICTs. The complexity of the relationship between digital choice and exclusion was also deliberated by Eynon and Helsper (2010). They hypothesised that people who have Internet access at home, but do not use it, “are arguably more likely not to use the Internet based on an informed ‘choice’; that is, a decision not based on socioeconomic disadvantage, but on personal preferences and needs” (p. 536). However, based on their empirical investigation they conclude that “both social exclusion and choice play a part in understanding non-use of the Internet, but the significance of these factors may differ for different segments of the population”, which is why “distinguishing different types of users and non-users and understanding how they are different is important” (Eynon & Helsper, 2010, p. 546).

Thus, although it is difficult to unpack whether reasons for differentiated engagement with technologies stem from factors related to digital exclusion or those related to digital choice, it is an important task. It can shed light on differences in mechanisms underlying digital inclusion/exclusion among different segments of the population. Such analysis can also help inform policy endeavours targeting different groups by outlining what combinations of factors govern their engagement with technologies. However, it is important to acknowledge that it is almost impossible to consider all factors shaping an individual's relationship with ICTs, thus any attempt to classify users as "digitally excluded" or "digitally empowered" is an oversimplification. Nevertheless, it may help us distinguish between the most significant factors shaping engagement with ICTs among different segments of the population. Taking these complexities into account, I turn to discussing the empirical results of this study through the lens of digital exclusion and choice.

8.3.1 Digital exclusion

Digital exclusion pertains to involuntary exclusion from digital resources (Eynon & Helsper, 2010). Since this is a study of people who consider themselves Internet users, I discuss digital exclusion in relation to Internet access: specifically, exclusion from high-quality, multi-local, and ubiquitous access. The three types of access inequalities are indeed interrelated and the empirical results suggest that they are persisting among Internet users who are socially and economically excluded.

Access inequalities matter because they lead to unequal societal participation in fields ranging from the labour market to education, politics, culture, and social relationships, and new mobile Internet technologies may further reconfigure participation in these fields (see Chapter 1). Chapter 5 identified that in 2013 17% of British Internet users only go online on PCs at home—they do not have any mobile access nor access at institutional localities. In today's technological landscape where the majority of users go online on multiple devices and locations (Chapter 5 of this thesis; Dutton & Blank, 2011; Ofcom, 2015a), users who only go online on PCs at home may be considered disadvantaged. The present results show that exclusion from mobile Internet access is most significantly related to exclusion from social offline resources.

In a way, the strong relationship between exclusion from social offline resources and mobile Internet access is not surprising. Among interviewees, communication with family and friends was one of the most prominent uses of the mobile Internet (see section 6.3.4). Having less social contact with family and friends or being in a less digitally included social network may thus result in less motivation to adopt mobile Internet access. However, the logic of the argument may also be reversed. Users who only go online at home may have less social contract with family and friends, particularly because they are not using communication services powered by mobile Internet (services such as WhatsApp, Snapchat, BBM, or FaceTime). In fact, controlling for access to various offline resources, skills, and motivations, users with home *and* mobile access participate more extensively in online communication and interaction activities than users who only go online at home (see Chapter 7), while many interviewees explained how mobile access helps them to keep in touch with family and friends. In sum, a lack of social offline resources is significantly related to a lack of mobile Internet access, which in turn results in lesser engagement with online social resources. Availability of social resources was also significantly positively related to ubiquity of Internet access, where the strength of this relationship increased over time (see section 5.5.3). These findings inform Helsper's (2012) theory that links between social and digital exclusion are strongest between corresponding fields of resources. The present study suggests a possible mechanism where exclusion from offline social resources operates via access inequalities, resulting in exclusion from online social resources.

The group of Internet users excluded from mobile Internet access was identified using OxIS data, but not in the interview study. Social exclusion of home-only Internet users may in fact explain why none of the participants in the interview study pertained to this group. All interviews were conducted in public spaces, such as L&D centres, libraries or cafés, where people with fewer social resources are probably less likely to go to. Nevertheless, results of the interview study provide further insight into how offline social resources are involved in development of Internet access (see Chapter 4). Interviewees explained how family and friends provided them with Internet-enabled devices and connections, and provided support when help with Internet use was needed. The importance of social resources in providing Internet access and supporting online engagement has been demonstrated previously (Bakardjieva, 2005; Courtois & Verdegem, 2014; Dolničar, Hrast, Vehovar, & Petrovčič, 2013; Eynon & Helsper, 2015; Selwyn et al., 2005). The results of this study contribute to this stream of research by proving quantitative and qualitative evidence of the continued and increasing importance of social support in digital inclusion, especially in relation to adoption of mobile Internet technologies. Networks of family and friends are integral not only to obtaining Internet access but also to its maintenance and development.

Exclusion from economic offline resources is another form of exclusion inseparably related to gradations in access inclusion. Quantitative analyses demonstrated persistent effects of income, education and employment status on multi-locality access as well as ubiquity of access. Moreover, a lack of economic resources was identified as the core factor impeding development and maintenance of access infrastructures among participants in the interview study. Users with few economic resources were most likely to be excluded from high-quality and ubiquitous access—"stranded" access infrastructures were characterised by a single, low-quality device. Interestingly, users in the stranded group did not report a lack of motivation to use the Internet. They enjoyed being online and would most likely engage with the Internet more had they better Internet access. The main obstacle to developing high-quality and ubiquitous access was a lack of economic resources.

Although these users were on the right side of the digital divide, they struggled with maintaining and developing access. This is in line with work by Gonzales (2014, 2015), who developed a technology maintenance theory, which posits that "as the poor increasingly have initial in-home and public access to technology, the digital divide will begin to center on differences in the ability to *maintain* that access" (Gonzales, 2015, p. 2; original emphasis). Using qualitative interviews Gonzales demonstrated that among the US poor, unstable Internet access results from a lack of financial resources to cover technology maintenance costs. The present study of British Internet users provides further support for the technology maintenance theory. However, Gonzales also found that due to struggles with technology maintenance, some users rationalise that they do not want nor need access. This orientation was not detected within a small sample of interviewees in the stranded group. A majority of stranded users expressed the need for and interest in the Internet, thus their access arrangements were regarded as a result of digital exclusion rather than choice. These results are conflicting. Thus, the complex relationship among Internet access, offline resources and motivation deserves more future research attention.

Taken together, the results of this inquiry suggest that even among people who are using the Internet, there is a group of users digitally excluded in terms of access. Inability to maintain and develop Internet access stems from exclusion from social and economic offline resources. Although online, some users experience involuntary access inequalities in terms of poor-quality, unilocal and non-ubiquitous access, and can thus be considered digitally excluded.

8.3.2 Digital choice

Gradations in access inclusion based on voluntary digital choice were uncovered in the qualitative part of this study. Qualitative results point to the interplay of motivations, attitudes and personal preferences in explaining how users develop and act on their access arrangements. Specifically, users who engaged in practices of spotlighting or distributing in relation to their access infrastructures had similar ranges of devices and locations where they could go online, but their ideas about Internet technologies and their roles in daily lives were substantially different.

The analyses of experiences of ubiquitous access (see section 5.5.1) and Internet centrality (see section 6.3) showed that those in the spotlighting group appreciated ubiquity of access and much of their daily lives revolved around the Internet. By contrast, those in the distributing group had mixed feelings about ubiquitous access. They appreciated periods of disconnection, and although they used the Internet for various activities, it played a less central role in their daily lives. The ways in which spotlighters and distributors arranged access infrastructures corresponded to the role the Internet played in their daily lives and differences in their lifestyles. Although spotlighters had somewhat lower income levels, most of them would be able to afford a new laptop if they thought they needed one. However, such a need was not present because they were happy with most of their Internet use occurring on a mobile device. Being mostly mobile users resulted from a digital choice based on how the Internet fitted their lifestyles. Likewise, users in the distributing group made choices about engagement with Internet technologies based on perceptions and goals of Internet use. Distributors maintained entire access infrastructures because each part supported a certain aspect of their daily Internet use.

Digital inclusion can be understood as "'smart' use of ICTs", where people engage with technologies when appropriate and desired (Selwyn & Facer, 2007, p. 14). As follows from the above discussion, users in the spotlighting and distributing groups were able to make such empowered digital choices. They used technologies they wanted and when they wanted to. Thus, while gradations in access inclusion are strongly related to availability of offline resources, specific access arrangements are also shaped by individuals' perceptions and the life-fit of Internet technologies. In a way, the ability to make empowered digital choices regarding technology use is a privilege of the privileged. This relates to Selwyn and Facer's digital inclusion policy recommendation cited above: individuals need ready access to resources required to enable them to act on their digital choices.

In this way, the work presented in this section differs from previous work where authors argue that issues related to life-fit are not necessarily empowered choices (Gonzales, 2015; Reisdorf, 2011, 2012; Selwyn, 2006). A crucial distinction, however, is that interviewees who exhibited empowered digital choices in the present study actually had relatively advanced access infrastructures. Their choices did not concern the question of whether to use the Internet on a daily basis or not. They were all regular Internet users. Their empowered digital choices concerned decisions about (non-)acquisition of devices and about use of specific devices in specific situations.

As such, digital choices of users in the spotlighting and distributing groups pertained to arrangements of ubiquitous Internet access. This is an important point for developing a more nuanced understanding of access ubiquity. Operationalisation of ubiquity employed in the quantitative strand of this study was based on definitions and operationalisations found in previous research (see section 2.4.3) as a sum of all access points. However, qualitative results suggest that ubiquity is also a matter of lifestyle. Some users decide to act on their ubiquitous access infrastructure and others decide not to do so. This finding resonates with early research on broadband adoption, which suggested an emergence of "broadband lifestyles" where the Internet is "always-on" and central to a wide range of daily activities (Horrigan & Rainie, 2002, pp. 15–18). In a similar vein, we may speak of a "ubiquitous access lifestyle", which extends beyond the home and is characterised by the Internet being strongly interweaved with individuals' everyday lives (Lindley, Meek, Sellen, & Harper, 2012). Concurrently, a counter lifestyle that refuses the idea of ubiquity is likely to emerge. Similar refusal of Internet technologies was identified among the population of non-users, where

Lenhart and colleagues (2003) identified a group of "net evaders" for whom Internet non-use was "a distinct life style choice". However, it is important to keep in mind that opting out of ubiquitous access is a "luxury problem, if it is a problem at all" (van Dijk, 2005, p. 34, in his discussion of the net evaders group) for users who enjoy availability of multiple Internet access points. Thus, research into ubiquity of access needs to extend beyond counting Internet access points and account for issues related to life-fit (Selwyn & Facer, 2009). This example also demonstrates the value of more complex conceptualisations of Internet access.

Taken together, the results of this research suggest that examining the role of the Internet in individuals' daily lives deserves more research attention not just in relation to online engagement but also in relation to development and maintenance of access infrastructures. Insight into dimensions of empowered digital choices shaping access infrastructures is needed in order to fully understand how people with sufficient offline resources manage and relate to their access.

8.4 The Role of Access in Online Engagement

This section turns to discussing how differences in access impact engagement with online resources. Throughout Chapters 6 and 7, I demonstrated that access is inseparably related to ways in which people use the Internet. Here, I discuss these empirical insights, focusing on how users are disadvantaged or empowered in their online engagement by Internet access infrastructure.

8.4.1 The disadvantaged

Following from the above discussion of access inequalities, the conclusion that users with poor-quality, unilocal and less ubiquitous access exhibit different patterns of online engagement is not surprising. Most pronounced are the findings that access inequalities lead to inequalities in engagement with online social and economic resources.

The present study shows that users with home-only access were less likely to engage in commercial and communication activities as opposed to users with home and mobile access. In terms of ubiquity, access was significantly positively related to five out of six examined use types, but its effect on the extent of engagement was the strongest in the communication and commerce models. Previous studies reached similar conclusions (Eynon & Helsper, 2015; Hassani, 2006; Lee et al., 2015). The qualitative findings reinforce these results: for those stranded, poor-quality and intermittent access hindered the extent, quality and outcomes of online engagement. Most significant were their struggles with applying for jobs online and engaging in commercial activities such as online buying, selling or trading (see Chapter 6).

Taken together, both parts of this research inquiry suggest that users with less well-developed access infrastructures are disadvantaged in terms of economic opportunity. The notion of an "economic opportunity divide" was developed by Mossberger et al. (2003, p. 79) and pertains to an individual's "ability to subsist above the poverty line, to enjoy some choice and mobility in the labour market, and to realise higher returns for additional experience, skills, and training". The authors conceive of economic opportunity mostly in terms of its relation to computer skills and argue that just like education, skills are "increasingly important throughout the economy" (Mossberger et al., 2003, p. 5).

Although interviewees in the stranded group rated their ability to use the Internet less favourably than the other two groups, the quantitative strand of this study showed that even after controlling for skills, users with less developed access engage in online commercial and financial activities to a lesser extent. In fact, some interviewees' favourable experiences of easy access to online banking and shopping on up-to-date smartphones may help explain why users with mobile access engage in commercial online activities more. In essence, the findings of this study suggest that users with poor-quality, unilocal and less ubiquitous access are more likely to be disadvantaged in terms of economic opportunity—not just because of their poor online skills, as suggested by Mossberger et al. (2003), but also because of their poorly developed access infrastructures.

This finding also provides support for Helsper's (2012) hypothesis of the corresponding exclusion between the offline and online fields of economic resources. The results show that economic resources are one of the most important factors in access maintenance and development, and that poor access is related to lesser engagement with online economic resources. This in turn can lead to even stronger exclusion from offline economic resources, because it is more difficult for users with poor Internet access to look and apply for jobs or to accrue savings from buying and selling goods online. This feedback loop was demonstrated by most users in the stranded group.

Economic benefits are among the most commonly reported outcomes of Internet use (Helsper, van Deursen, & Eynon, 2015). Thus, the question of how stranded individuals will develop their access in the future is very important. Will they continue to use low-quality, second-hand mobile devices where it may be hard or impossible to re-do a CV, apply for jobs or shop online? Users in the stranded group would benefit from access on modern smartphones or tablet computers. In fact, many users in the spotlighting group using advanced smartphones reported favourable online shopping, banking and job search experiences. Similarly, one of the unemployed spotlighters explained how getting a cheap tablet enabled her to re-do a CV and write documents—something she was not able to do on her old smartphone. An up-to-date mobile device may thus enable stranded users to experience more favourable online engagement. This is an important point because tablets tend to be more affordable than laptops,[16] which are often considered superior to mobile devices (Napoli & Obar, 2014). Importantly, users in the stranded group exhibited mostly positive beliefs about the Internet. Their online engagement was strongly limited by poor access, which probably also hindered their development of skills (Eynon & Geniets, 2015). Thus, it would be reasonable to expect that acquisition of up-to-date and capable devices, even if mobile, would result in an overall more favourable online experience.

8.4.2 The empowered

Users empowered by their access infrastructures are those who can make a choice of when, where and on what device to go online. They experience mostly favourable online engagement. This can only be achieved when access infrastructures are multifaceted and of good quality.

The present quantitative study shows that users with multifaceted access infrastructures engage more extensively with resources in all—economic, social, personal and cultural—online fields. A comparison of results using locality and the ubiquity dimension of access demonstrates that having a wide range of access points contributes more substantively to online engagement than having access at all examined localities. In other words, adding another locality to access infrastructure contributes less to online engagement than adding additional access points, regardless of what they are. Connecting this finding with insights from the interview study may help explain why. Multiplicity of access points (ubiquity) seems to be related to quality of devices. Users tend to keep old devices when new ones are added to the infrastructure. Thus, having more devices in infrastructure means there is a larger probability that at least some devices are up to date and of good quality. It also means there are more devices to choose from according to specific goals and the context of online

[16] A simple price comparison on PC World (www.pcworld.co.uk), one of the UK's largest mass-market ICT retailers, shows that laptop prices start at about £160 whereas tablet prices start at about £50.

engagement. This pattern was observed in both spotlighting and distributing groups, both of which I consider to be empowered by access infrastructures in supporting their online engagement.

Specifically, users in the distributing group can be considered the most empowered by their access infrastructure. Its various parts are of good quality and of different characteristics. Being empowered by access infrastructure is reflected in their patterns of Internet use—they distribute it across various devices and locations according to specific contexts of engagement. They do so because they can. They use mobile devices for quick or instantaneous uses and communication, and PCs or tablets for longer sessions including work and use of financial services. Online engagement patters of distributing users correspond to the usage patterns of students examined by Humphreys and colleagues (2013), who used smartphones for extractive and laptops for immersive uses. These usage patterns reflect the distributing approach to online engagement where a choice of a device is made based on specific goals of Internet use. Users in the spotlighting group were different. They mostly used a single mobile device. However, they had access to a range of working supporting devices, such as additional mobile devices and PCs. Thus, if and when a need arises, spotlighters can turn to these supporting devices to perform specific activities, such as writing documents or creating spreadsheets. In this way, their infrastructure supports all of their desired uses.

Both distributors and spotlighters have a range of devices to choose from, but they make different choices. These choices are in line with the role the Internet plays in their daily lives. Since the spotlighting group exhibited much stronger play dependencies, a possible conclusion would be that mobile devices are better suited for attainment of leisure, enjoyment and recreation goals. However, regardless of what choices different users make, the important point here is that access infrastructures empower users' online experience.

The empowered users can choose from a range of different devices in accordance with specific Internet-related goals and the context of engagement.

8.5 Mobile Access and Digital Inclusion

Recently, a debate about the role of mobile Internet in mitigating digital inequalities has emerged in the field of digital inclusion (Milner, 2013a; Napoli & Obar, 2014). Will cheap mobile devices with Internet connections help bring more people online? Will they provide users with constant access to online resources? Do mobile Internet technologies enable the same online experiences as PCs? These are all very important and timely questions that can shape the future development of research and policy work in digital inclusion. In fact, this thesis set out to contribute to this discussion. Based on this study's empirical insights, I argue that there is a crucial difference between *mobile-mostly* and *mobile-only* Internet users; that is, between Internet users who mostly go online on mobile devices have home broadband connections and ready access to other working devices, and users who only go online on mobile devices and have no ready access to other means of connection. Since the present study was conducted in Great Britain, the discussion below concerns the role of mobile Internet technologies in developed countries.

The mobile-only group of Internet users was not identified in the quantitative strand of this study. In the 2013 OxIS sample, 72 smartphone-only users and 8 tablet-only users reported going online at home, but had no PC. Together, they represent about 5% of the British online population. These numbers are too small for any meaningful multivariate analysis using survey data, thus this group was not analysed separately. The latest Ofcom (2015a) report provides similar insight: 6% of the UK population only use devices other than PCs to go online. Furthermore, using data representative of the US population, Pew reports that 7% of Americans rely heavily on smartphones—they have no broadband access and limited options for going online on devices other than smartphones (Smith, 2015). Pew's analyses show that those with lower income levels and education, and who are younger and non-white, are especially likely to be "smartphone-dependent" (Smith, 2015, p. 3). All three sources indicate that a group of mobile-only Internet users is emerging. In terms of proportions this is not a big group, but in terms of raw numbers 5% of the British online population translates to more than 3 million individuals. The important questions are: will this group of users become larger in the future, and what implications does mobile-only access have for their digital inclusion? Here, I attempt to provide some insight that may inform the second question.

The group of mobile-only users was detected in the qualitative part of this study. Among seven individuals in the stranded group, five only went online on mobile phones or a tablet. A comparison of stranded users to the other two groups can help inform the discussion about the implications of mobile-only access for digital inclusion. Two important related points arise: (1) mobile-only users are more likely to be socially excluded, thus (2) their access arrangements are limited insofar as they cannot rely on additional devices to support their online engagement.

First, in agreement with Smith (2015), mobile-only users were more likely to be of low incomes, of low education and unemployed. In other words, mobile-only users are more likely to be socially excluded. The present results indicate that, as a consequence, they are digitally excluded in terms of access. Among the interviewees, being a mobile-only user was not a result of an empowered choice, but a result of an individual's life circumstances. Another related important point is that due to limited economic resources, mobile-only access is often also of poor quality. None of the stranded interviewees owned upmarket smartphones. The most common device was an old-model BlackBerry smartphone. I already discussed above how such limited access constrains engagement with online resources.

Second, comparing stranded users to those in the spotlighting group, another important distinction emerges. There is a great disparity between *mobile-only* and *mobile-mostly* Internet users. Stranded interviewees were mobile-only, whereas spotlighters were mobile-mostly. For spotlighters, mobile-mostly use resulted from an empowered choice. They had other means of Internet connection available, which were used to support and complement their mobile-mostly access. In comparison to the stranded users, spotlighters also had mobile devices of much better quality. By contrast, stranded interviewees were mobile-only, with devices of poor quality, and had no other means of going online.

Therefore, I argue that mobile Internet use, when it results from an empowered choice and is in fact mobile-mostly, is not problematic from the digital inclusion perspective. On the contrary, the evidence presented here suggests that mobile-only coupled with poor-quality access is problematic because it leads to less favourable engagement with online resources. Thus, it is very important that researchers consider an individual's Internet access holistically—focusing empirical research just on mobile Internet use will disguise an important distinction between mobile-only and mobile-mostly users.

Similarly to the conclusion of Mossberger et al. (2012), the results of this study suggest that mobile-based Internet access will not eliminate inequalities in online engagement. It is indeed likely to increase the online engagement gap between users who have mobile access on top of other access points, leading to ubiquitous access, and users who rely solely on mobile phones and mobile Internet data to go online.

It seems likely that mobile Internet access will become a preferred way of going online among users with few economic resources. There are various reasons that Internet users with limited economic resources may prefer mobile Internet access over home broadband and PC access. Mobile device and data plans offered by telecommunications companies that are being paid for over a period time may be more attractive to users who cannot afford a PC. Related to this, going online using mobile Internet data and public WiFi connections can be cheaper than paying for a home broadband connection. The emerging group of mobile-only Internet users presents a new challenge to research and policy work in the area of digital inclusion. Thus, mobile-only Internet users deserve more future research attention. A better understanding of factors resulting in mobile-only access and of specific ways it constrains engagement with online resources is needed. Some of these points are further discussed in Chapter 9.

Chapter 9: Conclusions

The goal of this thesis was to further our understanding of how inequalities in Internet access shape digital inclusion. By focusing on the population of Internet users, this research studied Internet access as experienced among those who are on the "right" side of the digital divide, since their Internet access characteristics are commonly no longer called into question. By taking an infrastructural approach to studying Internet access and employing a mixed methods research design, this study shed light on a complex interplay of material and social dimensions of access and provided ample evidence demonstrating the impact of access on engagement with online resources.

In the sections below, I elaborate on policy recommendations that stem from this research. The study, however, is characterised by several limitations, which are discussed in section 8.2. These lead to some concrete directions for future research (section 8.3). The chapter closes with a summary of findings and some concluding remarks.

9.1 Policy Recommendations

The results of this study provide some insight that may help inform policy initiatives in the area of digital inclusion. The suggestions below are by no means fully formulated policy agendas but rather ideas that may inform policy-makers in the area of Internet access provision. These recommendations are intended to complement policy-focused work on digital inclusion (e.g. Helsper & van Deursen, 2015; Jeffrey, Macintosh, & Riddington, 2013; Yates, Kirby, & Lockley, 2014), especially in the UK context.

Previously, the British government's digital inclusion policies have been criticised for their focus on providing access infrastructure and their lack of attention to other factors of digital inclusion such as levels of necessary Internet skills (Helsper, 2011a, 2011b). However, issues of physical access are now again being increasingly addressed, especially in light of the "digital-by-default" policy for provision of welfare services in Britain (Jeffrey et al., 2013; Milner, 2013b; Yates, Kirby, & Lockley, 2015). The results of the present study echo concerns about how poor-quality Internet access among those who are technically on the "right" side of the digital divide, i.e. are considered digitally included, may affect their engagement with governmental services. The results of this study suggest that issues of access infrastructure remain salient. Put differently, poor-quality Internet access and interruptions in provision of access are a significant obstacle in engagement with online resources among those who do consider themselves Internet users. They are part of the *digital underclass*— "a group of people that is increasingly disadvantaged in comparison to those who have full access to and use of the Internet" (Helsper, 2011b, p. 4). Specifically, this study suggests that more attention has to be paid to issues of sustainability and maintenance of Internet access. Many British Internet users struggle with sustaining up-to-date and high-quality Internet access. To those, policies supporting provision of access infrastructure remain important.

Concretely, digitally disadvantaged Internet users would benefit from various access-related initiatives. For example, several interviewees reported struggles with securing home and mobile Internet connections. Thus, provision of free community Wi-Fi connections, which would enable users to connect their own Internet devices, would be helpful. Provision of free public WiFi points may help people deal with the costs of Internet access. Several interviewees explained that they connect to publicly available Internet to reduce their mobile data usage. Pew data also support this point. They show that smartphone-dependent users are more likely to have to cancel or suspend their mobile service due to financial constraints and that they are more likely to reach the maximum data allowed on their smartphone plan

(Smith, 2015, p. 19). This relates to van Dijk's (2005) notion of conditional Internet access, where users have to pay for entry to networks and applications. Free WiFi access points can help users mitigate the cost of conditional access to the mobile Internet.

Users with outdated and low-quality mobile devices would also benefit from access on up-to-date devices. The Internet has been characterised as an "experience technology" (Dutton & Shepherd, 2006), where it is difficult for people to understand Internet technologies until they use them. Thus, I assume users would be more likely to adopt newer mobile devices if they have experienced them. For example, some interviewees did not feel confident operating a touch-screen device and mobile app-based systems. Therefore, apart from providing Internet access and training on computers, organisations like libraries and community centres should consider providing access and training on low-cost, up-to-date mobile devices, such as smartphones and tablets. In this way, low-income individuals would be able to gain initial experience of handling touch-screen app-based mobile devices. Based on the qualitative insights of this study, I assume that users with scant economic resources will be more likely to adopt mobile Internet devices rather than PCs in the future, because smartphones and tablets are considered cheaper. This was experienced by one of the interviewees, who explained that she would rather pay £50 for a new tablet than spending the same or possibly a larger amount of money for a repair of her broken laptop. Thus, one possible development in policies concerning Internet access could include helping Internet users with limited economic resources get acquainted with using online services on touch-screen, app-based mobile devices.

Although mobile devices are considered cheaper than PCs, they are by no means cheap. In relation to technology costs, Warschauer (2003, p. 64) discusses the concept of the "innovator's dilemma", where industries, "as they become more successful, are driven to seek high profit margins in order to survive". These profits are achieved by adding new value to products and targeting the high-margin upper end of the market, whereas there is little incentive to reach low-margin markets. Thus, interventions such as the one mentioned by one of the interviewees, where a retail group Argos partnered with digital skills charity Go ON UK to provide tablet computers and a training course to Internet non-users for a £20 participation fee, should be continued in the future. This is one way that private organisations could assist in provision of Internet access as part of their corporate social responsibility.

However, some online activities, such as searching for jobs and submitting job applications, may be difficult even on a good quality mobile device. Thus, institutional Internet access with capable computers remains very important. Continued support is needed to charitable and other third sector organisations that provide support in Internet access and training. They remain central access points not only to Internet non-users but also to many users who experience difficulties in developing and maintaining personal Internet access. I assume that the importance of provision of high-quality, computer-based Internet access among users will indeed increase over time. Many interviewees with few economic resources were found to abandon home Internet connections and, coupled with outdated or broken devices, move to mobile-only Internet use. The present and other studies found that mobile-only Internet access often results in limited engagement with online resources, especially with economic activities such as buying and selling goods online or applying for jobs. Most likely, mobile-only individuals would also experience difficulties using governmental services online, which is in fact what the "digital-by-default" provision of the welfare system strives for. Thus, access and support available in L&D or community centres, libraries and similar third sector organisations remains crucial. Their support in terms of financial and other necessary resources needs to be matched with their needs to allow them to further develop in supporting digitally excluded individuals.

9.2 Limitations

The present study is characterised by several limitations. Empirically, the quantitative strand of the study was limited by the characteristics of the secondary survey dataset. Specifically, conducting a longitudinal trend study across five waves of data resulted in imperfect measures of various concepts.

First, all three contextual mediating factors in digital inclusion—access, motivations and skills—would benefit from more refined operationalisations. For example, measures of access were constrained by 12 available items measuring devices individuals own and locations where they go online. These items were identified as measures of material dimensions of access. Items that would address social practices surrounding access (e.g. how different modes of access are perceived or what specific uses occur with specific devices or locations) would also be helpful. Similarly, the measure of Internet centrality was shaped by availability of appropriate items. OxIS does not include media dependency items that were developed within the media system dependency research (e.g. Jung et al., 2001; Loges, 1994). While proxy items were used to measure play and orientation dependencies, no items that would tap into the understanding and communication dimensions of Internet dependencies were available. Thus, the measure of Internet centrality used in the quantitative models of digital inclusion is incomplete. It only provides a limited view of dependencies people form with the Internet. Next, only a single-item Internet skills measure was available in all examined OxIS datasets. A large body of previous research (e.g. Helsper & Eynon, 2013; van Deursen, Helsper, et al., 2014; van Dijk & van Deursen, 2014) demonstrates that several dimensions of skills exist. This study would benefit from survey items that address specific types of skills. Since this study examined the role of Internet access in online engagement, a measure of operational skills—basic skills needed in using Internet technology (van Deursen & van Dijk, 2010)—would be especially helpful. In fact, the single-item skills measure used in this research can be understood as a measure of self-efficacy, asking about one's belief in ability to use the Internet. Although Eastin and LaRose (2000) identified self-efficacy as a crucial factor in online engagement and previous research found that self-reported levels of skills help explain various dimensions of online engagement (Eynon & Malmberg, 2012; Hargittai & Hinnant, 2008; Livingstone & Helsper, 2007, 2010), a multifaceted measure of Internet skills would provide stronger results.

Second, indicators of engagement with online resources used in the study were also limited by the availability of indicators across five survey waves. This is a downside of conducting a trend study using several different datasets. As a result, 27 indicators of online activities were employed in this study. Although this number is still larger than in numerous previous studies of digital inclusion, working with only the most recent OxIS datasets would enable me to use about 50 indicators of online engagement. Concretely, using early OxIS datasets resulted in omission of items that pertain to use of social network sites, content creation online (e.g. posting photos, videos or anything creative online), and to online engagement activities (e.g. posting comments or product reviews or sharing content created by others). Nowadays, these are all common online activities, and their inclusion would make operationalisation of online fields of resources more robust.

Third, in terms of indicators of offline resources, the most limited was the measure of resources in the personal field. The item measuring physical health was the only available measure in all examined waves. Helsper (2012) suggests that psychological health and personality traits are other important indicators of resources in the offline personal field. Similarly, measures of resources in the offline cultural field could be extended. A possible way forward is connection to Max Weber's theory of social stratification where social status pertains to an individual's particular set of values and style of life. The three indicators used in the present study could be complemented by measures of rural residence, religion, or measures of consumption of cultural goods (see Blank & Groselj, 2015).

Fourth, one of the objectives of this research was to examine access and its role in digital engagement as a dynamic phenomenon. In doing so, the quantitative part of the study was designed as a trend study. The explanatory power of this part of research is limited by use of cross-sectional survey data. To examine the dynamics of Internet access and use, longitudinal panel data would be more appropriate. Furthermore, the analysis of the dynamics of Internet access and use could be extended by applying a multidimensional approach combining absolute, relative and time distance analyses (Dolničar, Prevodnik, & Vehovar, 2014; Vehovar, Sicherl, Hüsing, & Dolničar, 2006).

Lastly, the qualitative part of the study is limited by the number of the interviews conducted, which is common in single-author studies. Since the sampling frame of the study was very broad (i.e. the population of British Internet users), the qualitative study would also benefit from a wider range of approaches to inviting participants to the study. This could be achieved by extending the range of locations and settings where potential participants were approached. These limitations are related to issues of resources and safety, which importantly shape designs of qualitative studies (Saldaña, 2011).

9.3 Directions for Future Research

Although this study contributed to our understanding of access and its role in online engagement theoretically as well as empirically, many aspects of Internet access remain understudied. Below I identify four areas that would benefit from future research.

First, the field of digital inclusion would benefit from examination of various theoretical approaches to studying Internet access. This research proposed an infrastructural approach and identified three material dimensions of access as well three specific social practices shaping maintenance and development of access infrastructures. Future research should further develop the infrastructural approach to studying access as well as identify alternative approaches that could offer new insights into characteristics of access and social practices shaping it. Such further insight would also help clarify the role of Internet access in models of digital inclusion. Another area that deserves future research is the role of Internet access in everyday life among different segments of the online population. This would also help theoretically inform conceptualisations of Internet access.

Second, more work is needed in the area of developing up-to-date survey measures of Internet access. Survey research conducted on samples representative of populations is crucial for obtaining general trends in Internet access and use, and for conducting inferential statistical analyses. Thus, it is of the utmost importance that measures employed in national-level survey research are up to date and that they capture various dimensions of access. Most commonly, questionnaires include binary items asking whether a respondent has access on specific devices and locations, like the ones present in OxIS. The results of this study point to further complexities of Internet access, and better survey questions are needed in order to capture such complexities quantitatively. A good example of such development is Pew's questionnaire used in measuring adoption and use of smartphones in the US. One of its questions had the following wording: "Which of the following statements comes closest to describing how you use your cell phone to access online services and information, even if neither is exactly right?" The available answers were as follows: a) "Other than my cell phone, I have a limited number of ways to get online"; and b) "I have a number of other options for getting online in addition to my cell phone" (Smith, 2015, p. 51). However, it is hard to develop good survey measures without qualitative insight into Internet users' everyday life practices surrounding Internet access. Thus, a mixed methods approach to studying access is crucial. Good measures that move beyond devices and locations of use and encompass more complex arrangements of access can only be developed with a good understanding of what these complexities consist of.

Third, this study as well as other recent studies (van Deursen & van Dijk, in press) show that all three factors I referred to as mediating contextual factors (access, motivations and skills) play a role in explaining online engagement. Thus, future research should, where at all possible, incorporate all three contextual factors of digital inclusion. As hierarchical regression models presented in Chapter 7 showed, examining the role of access in online engagement without including motivations and skills in the models would paint a distorted picture. The same goes for the study of skills or motivations and their role in online engagement. Future research on digital inclusion would benefit most from studies that provide a comprehensive insight into all of its determinants. Next, future research should further investigate how access, motivations and skills shape and relate to one another. Although quantitatively this study found that their effects on online engagement are largely independent, the qualitative strand of this research as well as previous studies (Eynon & Geniets, 2015; Gonzales, 2015; van Deursen & van Dijk, in press) suggest that the three factors are interdependent. These relationships deserve future research attention as such insight would help inform theoretical models of digital inclusion. Moreover, it would help explain the underlying mechanisms of the links between social and digital exclusion.

Fourth, the results of this study point to specific groups of Internet users that deserve attention in future research. First, a relatively large group of Internet users (i.e. 17% of the online population in 2013) was identified who only go online at home. In comparison to their counterparts who also use mobile devices, these individuals were found to be socially excluded. A more detailed study of home-only Internet users is needed to provide further understanding of their access characteristics, attitudes, skills and patterns of online engagement. In this study, they were found to engage less with economic and social online resources. However, the results do not provide full answers regarding why their Internet use patterns differ. Future research could provide deeper understanding of whether, why and how these individuals are digitally excluded. The second group that deserves future research attention is a group of mobile-only Internet users. This study did not provide any generalisable results about their characteristics and online engagement patterns, but previous research suggests they are more likely to be socially excluded and that their Internet use patterns are limited (Mossberger et al., 2012; Smith, 2015). Studies also show that this group of users is likely to grow in the future (Ofcom, 2015a). Thus, it is extremely important that mobile-only Internet users are closely examined in the future. We need a better understanding of their struggles with obtaining and maintaining access, and of ways this affects their ability to meaningfully engage with the Internet. It is also crucial to better understand their Internet use motivations and their levels of Internet skills. It is especially important to gain better insight into the needs and difficulties this group of users is faced with in order to inform future policy-making in the area of digital inclusion.

9.4 Summary of Findings

This section summarises the main findings of this thesis coming back to the four research questions outlined in Chapter 2. Below, I briefly sum up how the results of this study help inform our understanding of Internet access and its role in digital inclusion.

> *(1) Do interrelations between the material artefacts and the social practices shaping access correspond to attributes of infrastructure (as defined by Sandvig, 2013)?*

The first research question aimed at validating the infrastructural approach to studying Internet access. Specifically, in Chapter 2 a definition of Internet access infrastructure was proposed—a background foundation of material artefacts and social practices that support an individual's Internet use—which was tested by examining users' experiences of Internet access through Sandvig's (2013) five attributes of infrastructure. Qualitative analysis in Chapter 4 demonstrated that Internet access is in fact a dynamic and complex phenomenon where material artefacts and social practices interrelate. I provided examples of how unproblematic Internet access is often rendered invisible (invisibility); that various parts of access arrangements are interrelated where changes in one part affect other parts (modularity); how Internet access connects to other systems (standardisation); and showed that access takes on specific trajectories, which are often hard to change (momentum). Focusing on human practices stemming from various offline resources, I provided examples of how individuals' personal characteristics, social networks and socialisation into the larger techno-culture shape development of Internet access (dependence on human practices). By demonstrating that people's experiences of Internet access correspond to all five attributes of infrastructures as defined by Sandvig (2013) the infrastructural approach to studying Internet access was validated.

(2) *How have both the material dimensions of Internet access and gradations in forms of inclusion changed over time?*

Consolidating previous work on Internet access (see Chapter 2) three material dimensions of Internet access were established: quality, locality and ubiquity. In Chapter 5 the three dimensions were first examined qualitatively providing evidence that they are conceptually separate. Furthermore, the quantitative longitudinal analyses showed that locality and ubiquity of access became more diverse over time. In 2005 most Internet users went online at home only. By 2013 both home and mobile as well as access at home, mobile and institutional localities became most common combinations of access. In terms of ubiquity, in 2005 most users went online at two access points. In 2013 users exhibited many different combinations of access points. Users' access arrangements became more diverse over time.

Regarding gradations of access inclusion, those who remain home-only Internet users are economically disadvantaged in terms of lower incomes and socially disadvantaged in having less social offline resources as compared to users who go online on multiple localities. Similarly, those with lower economic and social offline resources were more likely to be excluded from ubiquitous access in 2013 as compared to 2005. Taken together, the results show that those disadvantaged in terms of economic and social offline resources are now also more likely to be digitally disadvantaged in terms of poor Internet access, which is of low quality, unilocal and less ubiquitous.

(3) What social practices underlie the dynamics of Internet access?

Social practices shaping development, maintenance and use of Internet access were examined through the concepts of re-domestication and Internet centrality (see Chapter 6). Focusing on episodes of change in Internet access infrastructures and on relationships between different technologies three re-domestication practices were identified. Users who have access on multiple Internet-enabled devices but focus their use on a single (usually mobile) device engage in spotlighting. Users who allocate their use across different devices and points of access according to the context of engagement perform distributing practices. Thirdly, a group of users was identified for whom re-domestication practices stemmed from breaks or discontinuance of access and were considered being stranded. The three practices reflect disparate ways in which access infrastructures are engaged with. For example, spotlighters care about quality of their central device, distributors ensure their entire access infrastructure is up to date, whereas stranded users were unable to maintain their access infrastructures. Furthermore, the analysis of Internet centrality showed that access arrangements also reflect differences in roles Internet technologies play in individuals' everyday lives. While orientation and communication dependencies were common among all interviewees, users in the spotlighting and stranded groups were found to use the Internet more for entertainment and leisure purposes (play dependency) whereas users in the distributing group exhibited somewhat stronger understanding dependencies. Taken together, the presented typologies of re-domestication practices and Internet dependencies provide a deeper understanding of the social dynamics of Internet access.

(4) How do differences in Internet access shape engagement with online resources?

The analysis of qualitative data in Chapter 6 indicated numerous ways in which access arrangements shape online engagement. For example, interviewees in the stranded group explained how their Internet use was limited by their unstable access infrastructures. They displayed difficulties in engagement with economic online resources, such as finding and applying for jobs or buying and selling goods online. These findings were reinforced quantitatively in Chapter 7. The results of the longitudinal analysis show that over time ubiquity of access became a stronger predictor of patterns of online engagement. More ubiquitous access contributes significantly to the extent of engagement with Internet activities related to commerce, communication, and leisure. Furthermore, the strongest effects of mobile Internet access and ubiquity of access were found in commercial and communicative uses. These results suggest that users who are "home-only" users are excluded from online economic and social resources. Finally, the analyses also showed that all three contextual mediating factors—access, skills and motivation—are critical in explaining online engagement. They matter separately and differently for different types of use. This finding further demonstrates the value of a holistic approach to studying Internet access and its role in digital inclusion.

9.5 Concluding Remarks

The introductory chapter of this thesis called for revisiting the role of access in digital inclusion in light of recent technological developments and dynamics in adoption of new Internet-enabled devices. I argued that new Internet technologies could potentially lead to new forms of digital inequalities in networked societies (Castells, 2010; Rainie & Wellman, 2012). Taken together, the results of the present study provide support for this premise.

While the gap between British Internet non-users and users has been narrowing over time with more people going online (Ofcom, 2015a), the gap between Internet users in terms of their access arrangements has been widening. Put differently, users' access infrastructures have become more diverse—as opposed to 2005, in 2013 there was no typical way in which users accessed the Internet. The inequalities of access have not been resolved with more and more people using the Internet. Instead, access is becoming an important issue once again, with increasing access inequalities among people who are technically on the "right" side of the digital divide. Internet access should no longer be thought of solely in terms of an Internet connection either being there or not. Access has evolved into a complex phenomenon where material artefacts and social practices interrelate.

This is an overarching conclusion of the present study, which makes a theoretical as well as empirical contribution to scholarly understanding of access and its role in digital inclusion. Theoretically, existing models of digital inclusion were informed by infrastructural and communications theories to aid inquiry into dynamics of access and its underlying mechanisms. The infrastructural approach allowed for distinguishing between material dimensions of access and social practices shaping it. Related to this, the concept of Internet centrality, which sheds light on access-related motivational factors in digital inclusion, was developed. Empirically, the mixed methods approach to research inquiry, combining longitudinal survey data with in-depth interview data, provided new insight into material and social dimensions of Internet access, gradations in access inclusion and the role of access in online engagement. Combining different sources of data resulted in a more nuanced understanding of complexities surrounding development and maintenance of access.

In summary, the work presented here warrants the call for revisiting the role of access in digital inclusion made in the introductory chapter. It demonstrates the continuing importance of Internet access in digital inclusion and makes a strong case for placing the study of access inequalities again at the forefront of digital inclusion research. This call is especially relevant considering that provision of Internet access is becoming more complex and that issues related to development and maintenance of access are emerging. Together with evolving technologies, issues of access inequalities are reoccurring as well as expanding. It is crucial not only for individual users to keep up with technological developments but also for scholars of digital inclusion to continue developing theoretical and empirical research instruments to keep up with the dynamic phenomenon under study.

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Appendices

Appendix A: Methodological Specifics

A.1 Interview Guide

1. Can you remember when you first started using the Internet?
2. Now, if you think about today, can you tell me about how and where you access the Internet today?
3. Do you ever have difficulties getting access to the Internet?
4. Is it important for you to have Internet access?
5. What are the things that you most often do online?
6. If you would have lost connection to the Internet, what would you miss most?
7. Does using the Internet helps you with anything that you do in your daily life?

8. Which devices do you use to go online?
    a. Do you have access on a PC, a computer at home?
    b. Do you have access on a smartphone?
    c. Do you have access on a tablet computer or an e-reader?
9. So which is your primary device to go online?
10. Can you tell me a story about your devices? [*start with PC, only ask questions that apply*]
    a. When did you get [device]?
    b. What was your thinking when you first bought the [device]? What did you want to do with it? What was the main reason for buying [device]?
    c. Are there things you use it for that you didn't expect you would when you first bought it? What other things become important to have on your [phone]?
    d. When you were deciding to buy it, was the cost of it an important factor?
    e. Were you at all concerned whether you would know how to use it?
    f. What do you mostly use it for? What are the websites/apps that you most often access on [device]? How often you use them? Are those uses in anyway essential?

[for mobile/tablets]

    g. Where do you mostly use it? [*home, on the go?*]

h. Do you always have it with you? Do you feel you can leave it behind?

i. Do your friends and family also use [device]?

j. Are there any apps that are important for you to stay in touch with your family friends?

11. Is your use of a computer any different now that you have a smartphone? [Do you use your PC more, less or to the same extent?]
    a. Can you give examples, in what ways?
    b. How did you used to do [X] before?
    c. Are there things that you just do on your computer or just on your smartphone? What, for example?
12. Is it important to you to have Internet access on your mobile phone?
13. Has getting mobile Internet access changed how you do things?
    a. For example, how you stay in touch with people or look for information?

14. On average, how much do you spend on your Internet connection per month? (home, mobile)

15. In general, do you find the Internet useful?
    a. For what purposes?
    b. Why, why not? Can you give examples?
16. Do you think that having Internet access increases your chances in life?
17. Does it play a role in making decisions in your everyday life?
18. Is the Internet important for you to stay in touch with family and friends?
19. Some people tell me that going online is a waste of time and others talk about how it helps them to get things done. What's your opinion?
20. Is there anything that frustrates you about the Internet?

21. We haven't really talked much about [x]. Do you have anything you'd like to say about [x]

Finally, I'd like to ask you just a couple of questions about what you do:

22. Could you tell me a bit about what do you do?
23. Can you describe your typical day?
24. What is the highest educational or vocational qualification that you have?
25. Is there anything else you would like to tell me?

A.2 Interview Questionnaire

Oxford Internet Institute
University of Oxford

UNIVERSITY OF OXFORD

Technology and Internet use in everyday life

Below are a few questions about your use of the Internet and yourself. Please answer them by circling the number that applies to you best. Thank you!

Q1. For you, personally, how important is each of the following as a source of **information**? Would you say they are essential, very important, important, not so important or not important at all? Circle the number that applies to you best.

	Essential	Very important	Important	Not so important	Not important at all	Don't know
a. Television	5	4	3	2	1	-3
b. Radio	5	4	3	2	1	-3
c. The Internet	5	4	3	2	1	-3
d. Newspapers	5	4	3	2	1	-3

Q2. How important is each of the following for your **entertainment**? Would you say they are essential, very important, important, not so important or not important at all? Circle the number that applies to you best.

	Essential	Very important	Important	Not so important	Not important at all	Don't know
a. Television	5	4	3	2	1	-3
b. Radio	5	4	3	2	1	-3
c. Spending time with other people	5	4	3	2	1	-3
d. The Internet	5	4	3	2	1	-3

Q3.How would you rate your ability to use the Internet? Circle the number that applies to you best.

Excellent	Good	Fair	Poor	Bad	Don't know/ Can't say
5	4	3	2	1	-3

Q4. Generally speaking, how interested would you say you are in the Internet? Would you say you are:

Very interested	Interested	Not very interested	Not at all interested	Don't know/ Can't say
4	3	2	1	-3

Q5. Here are things people sometimes say about going online. Can you please tell me to what extent do you agree or disagree with each statement circling the number that applies to you best:

	Disagree strongly	Disagree	Neither agree nor disagree	Agree	Agree strongly	Don't know
a. The Internet makes life easier	1	2	3	4	5	-3
b. I find dealing with the amount of information online exhausting	1	2	3	4	5	-3
c. Going online helps me pass the time when I am bored or have nothing to do	1	2	3	4	5	-3
d. The Internet helps me save time	1	2	3	4	5	-3
e. I waste too much time going through irrelevant information online to get to what I am looking for	1	2	3	4	5	-3
f. I just enjoy being online to see what comes up	1	2	3	4	5	-3

Q6. In what year were you born?

Q7. The incomes of households differ a lot in Britain today. Here is a table showing the range of incomes that people have. Which of the letters on this table best represents the total income of your household before tax? Circle one answer only.

Up to £12,500 per year	K
£12,500 up to £20,000 per year	B
£20,000 up to £30,000 per year	G
£30,000 or more per year	S
Don't know/Rather not say	-3

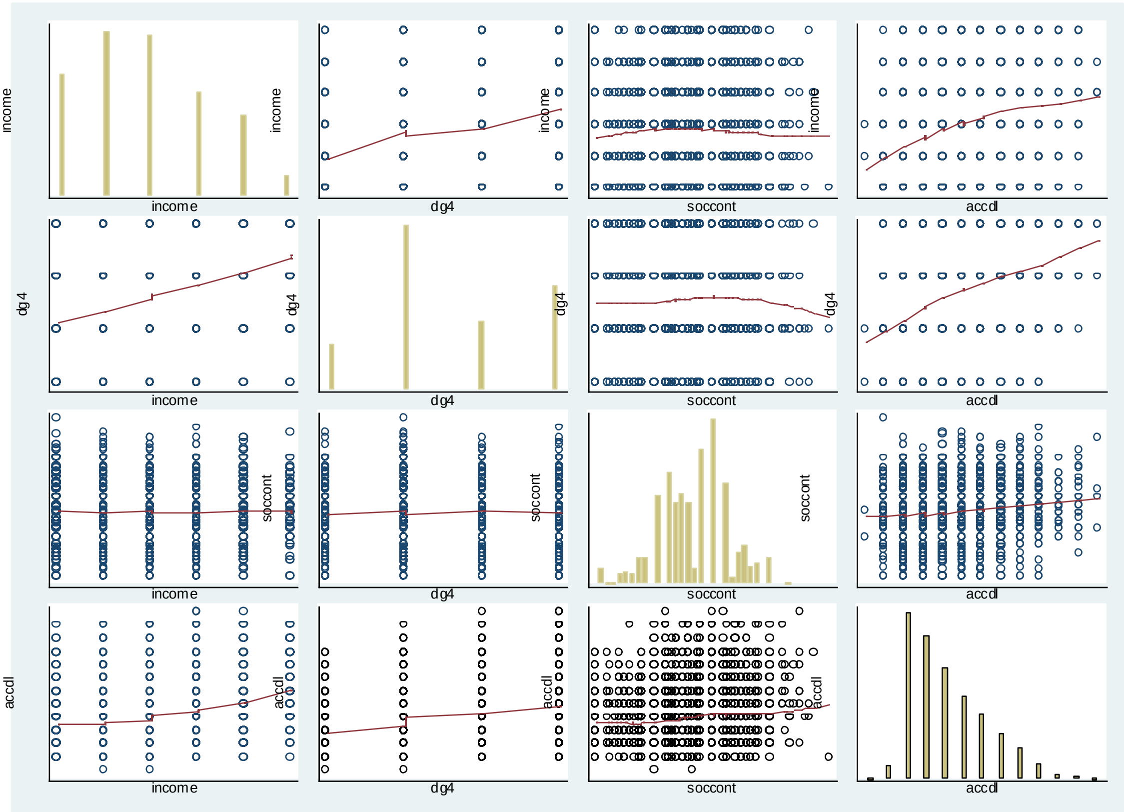
THANK YOU FOR HELPING ME WITH THIS RESEARCH!

A.3 Example of Multiple Linear Regression Diagnostics

Below I provide an example of data diagnostics tests that were performed before final multivariate linear regression models were run. The data below pertain to the regression model 2013 in Table 5.5. The reported results are typical of the results found in other regression models. This is also consistent with previous work performed using OxIS data.

Non-linearity

SPLOM plots were run to check for non-linearity and relationships between variables. Generally, the plots indicated no non-linearity problems. This example SPLOM shows relationships between income, education, extent of social contact and ubiquity of access:



Collinearity

Collinearity was tested for with a table of condition indexes where a condition index over 15 may indicate a collinearity issue. In the example tables below no collinearity issues are indicated.

Condition indexes:

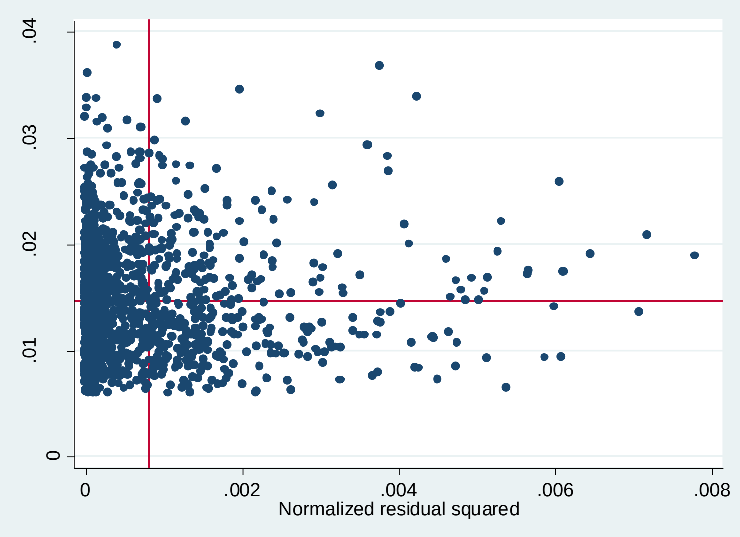
Condition number using scaled variables = 12.49

Condition Indexes and Variance-Decomposition Proportions

	condition index	accdl	income	dg4	gender	eth2	age	labfor4	marstat2	kidhh	soccont	civnet2	digsup	nacc2	disab
1	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	2.94	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.52
3	3.05	0.00	0.00	0.00	0.01	0.51	0.00	0.00	0.10	0.04	0.00	0.00	0.00	0.01	0.12
4	3.38	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.26	0.12	0.00	0.01	0.01	0.01	0.22
5	3.69	0.00	0.01	0.02	0.09	0.00	0.00	0.00	0.11	0.12	0.00	0.34	0.01	0.00	0.00
6	4.30	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.10	0.18	0.00	0.17	0.51	0.00	0.00
7	4.56	0.01	0.02	0.03	0.02	0.00	0.01	0.00	0.00	0.09	0.00	0.39	0.37	0.01	0.00
8	4.86	0.02	0.00	0.01	0.61	0.04	0.01	0.00	0.06	0.23	0.00	0.03	0.06	0.00	0.02
9	5.86	0.03	0.01	0.29	0.21	0.00	0.08	0.08	0.01	0.00	0.01	0.02	0.02	0.01	0.07
10	7.02	0.23	0.02	0.47	0.01	0.00	0.07	0.03	0.02	0.08	0.00	0.01	0.00	0.13	0.01
11	8.58	0.49	0.00	0.04	0.00	0.00	0.04	0.01	0.20	0.01	0.00	0.02	0.00	0.62	0.01
12	8.69	0.12	0.85	0.12	0.00	0.00	0.01	0.02	0.04	0.03	0.00	0.00	0.00	0.14	0.01
13	11.08	0.02	0.05	0.00	0.02	0.00	0.77	0.56	0.04	0.07	0.05	0.01	0.00	0.05	0.00
14	12.49	0.07	0.02	0.00	0.01	0.00	0.00	0.29	0.06	0.00	0.94	0.00	0.01	0.02	0.01

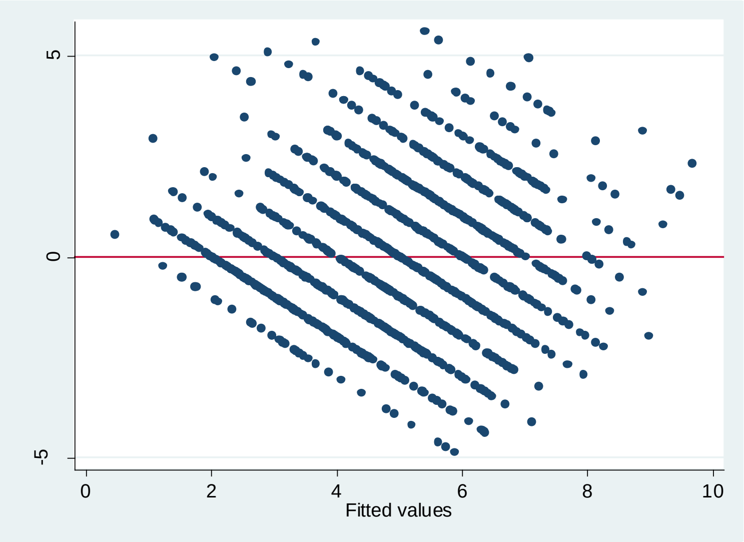
Outliers

Outliers and potential influential cases were inspected for using the leverage against residual squared plots. In the example below no obviously influential cases are detected:



Heteroscedasticity

Heteroscedasticity was inspected for using a graphical method of plotting residuals versus fitted (predicted) values where the variance of residuals should appear constant. The example residual-versus-fitted values plot below is influenced by the quasi-continuous nature of the dependent variable (i.e. ubiquity of access with a range from 1 to 12), but it does not indicate any apparent heteroscedasticity:


5
0
-5
0
2
4
6
8
10
Fitted values

A.4 Participant Information Sheet

Oxford Internet Institute
University of Oxford

Participant Information

Interviews on Technology and Internet Use in Everyday Life

You are kindly invited to participate in a research study in the context of my doctoral thesis at the University of Oxford. You are asked to take part in an interview on technology and internet use in everyday life. Questions will be about your uses and experiences with the Internet. The interview should take approximately 45 minutes to complete. You will receive £10 as compensation for your time.

Confidentiality and Anonymity: The information you provide for this research will be kept confidential and when reported will maintain your anonymity. Different names will be used to refer to you when the results are reported in a form of anonymous verbatim quotes based on the interview. You will not be directly identified in any publication of the results.

Participation: Although your participation is greatly valued it is important to remember that it is voluntary; you may refuse to participate. If you decide to participate, you may withdraw from the study at any time without penalty and without loss of benefits. If you withdraw from the study before data collection is completed your data will be destroyed.

Risks and Benefits: No risks are foreseen from this research. The benefits of this research are that it will contribute to a scholarly understanding of how internet users engage with various technologies and online resources.

Data: Interviews will be recorded, so that they can be transcribed and analyzed. Once transcribed, the original recordings will be deleted. This information will only be used for research purposes. Data collected during the research process, and identifying data, will be kept secure using the highest security standards and only made available to the researcher and her supervisors.

Your Protection: If you feel you have not been treated according to the description of this form, or your rights as a participant in research have been violated during the course of this project, you may contact the *Research Ethics Committee at the University of Oxford* (ethics@socsci.ox.ac.uk; 0044 1865 614871; Social Sciences & Humanities Inter-Divisional Research Ethics Committee, Oxford University, Hayes House, 75 George Street, Oxford, OX1 2BQ, UK).

Contact: In case of questions before or after the completion of the interview, I may be contacted at darja.groselj@oii.ox.ac.uk or 07514279154. If you have a concern about any aspect of this project, please let me know and I will do my best to answer your query.

Best wishes,
Darja Groselj

Oxford, October 2014

A.5 Consent Form

Oxford Internet Institute
University of Oxford

UNIVERSITY OF OXFORD

Oxford, October 2014

Consent Form

Interviews on Technology and Internet Use in Everyday Life

I agree to participate in this interview study as part of the doctoral thesis research project by Darja Groselj. I hereby declare that

- ✓ I have read the participant information sheet;
- ✓ I have had the opportunity to ask questions about the study and have received satisfactory answers to questions, and any additional details requested;
- ✓ I understand that participation in the study is voluntary and I may withdraw from the study and have my data destroyed at any time;
- ✓ I understand that audio recordings will be made during the interview process and that his data will be stored securely and remain confidential;
- ✓ I understand that any quotes from the interview will be reported anonymously, with details potentially altered to preserve anonymity;
- ✓ I understand that this project has been reviewed by, and received ethics clearance through the University of Oxford Central University Research Ethics Committee;
- ✓ I understand who will have access to personal data provided, how the data will be stored, how the data will be published; and what will happen to the data at the end of the project;
- ✓ I understand how to raise a concern and make a complaint.

_______________ _____________________________ _____________________________

(date) (printed name) (signature)

Optional: I wish to be informed about the results of this research, and hereby provide my contact details for this purpose:

Email address: ____

or

Postal address: ____

A.6 Non-disclosure Agreement

Non-disclosure agreement

Date 16 February 2015

Parties

[Insert your name] of [Insert your address]
(the Recipient)

and

Darja Groselj of the Oxford Internet Institute, University of Oxford, located at 1 St Giles', OX1 3JS Oxford, United Kingdom
(**the Discloser**)

1. The Discloser intends to disclose information (**The Confidential Information**) to the Recipient for the purpose of transcribing audio files (**the Purpose**).

2. The Recipient undertakes not to use the Confidential Information for any purpose except the Purpose stated in clause 1.

3. The Recipient undertakes to keep the Confidential Information secure and not to disclose it to any third party.

4. The recipient undertakes to delete any files associated with the Purpose following the completion of the transcription task. The Recipient will not retain any copies or records of the Confidential Information.

5. The undertakings in clause 2 and 3 will continue in force indefinitely.

6. This Agreement is governed by, and it to be construed in accordance with English law.

Signed by the Recipient

____

NAME DATE

Appendix B: Results Tables

B.1 Locality: Unstandardised regression coefficients and standard errors (Table 5.3)

	2005 (home access)			2007 (home access)			2009 (home access)			2011 (home access)			2013 (home access)		
	Home & Mob.	Home & Inst.	All access	Home & Mob.	Home & Inst.	All access	Home & Mob.	Home & Inst.	All access	Home & Mob.	Home & Inst.	All access	Home & Mob.	Home & Inst.	All access
	b/(SE)	b/(SE)	b/SE	b/SE	b/SE	b/SE	b/SE	b/SE	b/SE	b/SE	b/SE	b/SE	b/SE	b/SE	b/SE
Economic field															
Income	0.22*	0.27**	0.40***	0.05	0.22*	0.37***	0.18*	0.38***	0.43***	0.33***	0.13	0.41***	0.28**	0.00	0.51***
	(0.11)	(0.10)	(0.10)	(0.09)	(0.09)	(0.09)	(0.09)	(0.10)	(0.09)	(0.08)	(0.11)	(0.08)	(0.10)	(0.19)	(0.10)
(No education)															
Secondary ed.	-0.02	1.41**	0.88	0.39	0.32	0.97**	0.70*	0.44	1.02*	0.29	0.21	0.27	0.49	0.13	1.26**
	(0.33)	(0.51)	(0.52)	(0.27)	(0.29)	(0.35)	(0.33)	(0.46)	(0.45)	(0.28)	(0.45)	(0.34)	(0.25)	(0.65)	(0.39)
Further ed.	-0.31	2.19***	1.64**	0.79*	0.83**	1.49***	0.87*	0.84	1.81***	0.47	0.16	1.14**	0.29	0.64	1.43**
	(0.44)	(0.54)	(0.56)	(0.31)	(0.31)	(0.37)	(0.38)	(0.51)	(0.48)	(0.34)	(0.57)	(0.39)	(0.34)	(0.76)	(0.45)
Higher ed.	-0.06	2.01***	2.03***	0.52	1.09**	2.06***	0.42	1.67***	2.31***	0.50	1.83***	1.93***	0.46	0.91	2.24***
	(0.42)	(0.54)	(0.55)	(0.37)	(0.35)	(0.39)	(0.40)	(0.49)	(0.47)	(0.35)	(0.48)	(0.38)	(0.31)	(0.72)	(0.43)
(Employed)															
Retired	1.40***	-1.33***	-1.26*	0.38	-2.47***	-3.24***	0.30	-1.70**	-2.07***	-0.44	-2.34***	-2.66***	0.43	-2.23**	-1.92***
	(0.42)	(0.38)	(0.50)	(0.36)	(0.45)	(0.76)	(0.42)	(0.55)	(0.60)	(0.36)	(0.52)	(0.45)	(0.32)	(0.78)	(0.46)
Unemployed	0.36	-2.33***	-1.33**	0.13	-2.49***	-1.11***	0.10	-2.17***	-1.14***	0.03	-2.00***	-1.58***	-0.23	-1.46	-1.50***
	(0.28)	(0.48)	(0.42)	(0.24)	(0.44)	(0.30)	(0.25)	(0.50)	(0.29)	(0.24)	(0.50)	(0.29)	(0.26)	(0.75)	(0.31)
Cultural field															
Female	-0.69**	-0.54**	-0.87***	-0.28	-0.02	-0.36	-0.10	-0.04	-0.33	-0.15	-0.03	-0.76***	-0.31	0.26	-0.36
	(0.23)	(0.20)	(0.22)	(0.20)	(0.18)	(0.19)	(0.22)	(0.24)	(0.21)	(0.21)	(0.27)	(0.21)	(0.20)	(0.43)	(0.22)
Non-white	0.88	1.37**	1.53**	-0.87*	-0.12	-0.66*	0.66	0.62	0.33	-0.09	-0.09	0.38	-0.40	-0.26	-0.32
	(0.61)	(0.53)	(0.54)	(0.40)	(0.30)	(0.32)	(0.46)	(0.49)	(0.44)	(0.41)	(0.56)	(0.40)	(0.37)	(0.76)	(0.39)
Age	-0.06***	-0.01	-0.03***	-0.02**	0.00	-0.02*	-0.02	-0.01	-0.04***	-0.03***	0.00	-0.04***	-0.04***	0.02	-0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
Social field															
Single	0.67*	0.01	0.78**	0.55*	-0.04	0.44	0.85**	-0.13	0.67*	0.58*	0.04	0.37	0.61*	0.52	0.93**
	(0.28)	(0.27)	(0.27)	(0.23)	(0.24)	(0.23)	(0.26)	(0.33)	(0.27)	(0.27)	(0.38)	(0.28)	(0.25)	(0.56)	(0.29)
Children in HH	0.01	-0.02	-0.22	0.25	0.35	0.33	-0.05	-0.44	-0.12	0.19	0.14	0.07	0.82**	0.37	0.77**
	(0.26)	(0.22)	(0.23)	(0.21)	(0.20)	(0.19)	(0.24)	(0.27)	(0.23)	(0.22)	(0.30)	(0.23)	(0.26)	(0.52)	(0.27)

Social contacts	0.44*	0.19	0.64***	0.37*	0.26	0.45**	0.25	-0.10	0.13	0.79***	0.64**	0.98***	0.69***	0.10	0.89***
	(0.20)	(0.17)	(0.19)	(0.16)	(0.16)	(0.16)	(0.17)	(0.19)	(0.17)	(0.16)	(0.23)	(0.18)	(0.15)	(0.35)	(0.18)
Civic groups	0.65**	0.94***	0.72**	0.18	0.32	0.36	0.34	-0.32	0.09	-0.18	-0.01	0.38	0.33	0.58	0.62**
	(0.24)	(0.20)	(0.23)	(0.21)	(0.20)	(0.20)	(0.22)	(0.24)	(0.21)	(0.20)	(0.27)	(0.20)	(0.20)	(0.44)	(0.22)
Digital support	0.21*	0.27**	0.37***	0.22*	0.61***	0.52***	-0.27*	0.03	0.06	-0.04	0.19	0.30**	-0.10	0.23	0.24*
	(0.10)	(0.09)	(0.09)	(0.11)	(0.10)	(0.10)	(0.13)	(0.13)	(0.11)	(0.11)	(0.14)	(0.11)	(0.11)	(0.21)	(0.12)
HH dig included	0.33	-0.64*	0.28	0.22	-0.96**	-0.48	0.54*	-0.79*	0.24	0.19	-0.43	-0.22	0.93***	0.75	1.06**
	(0.35)	(0.31)	(0.35)	(0.30)	(0.31)	(0.31)	(0.27)	(0.38)	(0.32)	(0.33)	(0.46)	(0.35)	(0.26)	(0.63)	(0.33)
Personal field															
Disability	0.43	1.11*	0.17	0.27	0.46	-0.46	-0.29	-0.08	0.27	0.09	-0.25	0.04	0.29	-2.13	0.43
	(0.49)	(0.56)	(0.79)	(0.32)	(0.38)	(0.47)	(0.34)	(0.46)	(0.36)	(0.31)	(0.54)	(0.36)	(0.26)	(1.55)	(0.33)
Constant	-1.44	-2.56**	-4.23***	-1.92**	-1.93**	-2.99***	-2.05*	-0.40	-1.61	-1.83*	-2.73*	-2.11*	-0.73	-4.09*	-3.14***
	(0.92)	(0.93)	(1.01)	(0.73)	(0.70)	(0.74)	(0.87)	(1.00)	(0.90)	(0.82)	(1.16)	(0.87)	(0.78)	(1.78)	(0.91)
McFad. adj. R^2		0.06			0.06			0.14			0.22			0.26	
N		961			1127			883			1118			1188	

Notes: * p<0.05 ** p<0.01 *** p<0.001. Omitted categories: No educational qualifications; Male; White; Married/with partner; No children in household; Not a member of any civic group; No other Internet users in household; No disability. HH="household"; dig.="digitally"; McFad. adj. R2=McFadden's adjusted R-squared.

B.2 Locality: All access vs Home & mobile access coefficients ($p < 0.05$), 2013

	b	z	P>|z|	e^b
Income	0.23	3.867	0.000	1.26
Secondary education	0.77	2.249	0.024	2.16
Further education	1.13	3.082	0.002	3.11
Higher education	1.77	4.952	0.000	5.89
Retired	-2.35	-5.701	0.000	0.10
Unemployed	-1.27	-5.604	0.000	0.28
Digital support network	0.35	4.398	0.000	1.42

B.3 Ubiquity: Unstandardised regression coefficients and standard errors (Table 5.5)

	2005	2007	2009	2011	2013
	b/(SE)	b/(SE)	b/(SE)	b/(SE)	b/(SE)
Economic field					
Income	0.22***	0.28***	0.35***	0.32***	0.35***
	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)
(No educational qual.)					
Secondary ed.	0.19	0.26*	0.51*	-0.03	0.73***
	(0.15)	(0.13)	(0.21)	(0.19)	(0.18)
Further ed.	0.47**	0.56***	1.24***	0.39	0.82***
	(0.17)	(0.14)	(0.24)	(0.22)	(0.21)
Higher ed.	0.86***	0.70***	1.45***	0.76***	1.32***
	(0.17)	(0.15)	(0.23)	(0.20)	(0.20)
(Employed)					
Student	0.33	1.17***	0.75**	1.02***	1.35***
	(0.19)	(0.17)	(0.28)	(0.27)	(0.27)
Retired	-0.06	-0.63***	-0.41	-1.19***	-0.65**
	(0.16)	(0.17)	(0.27)	(0.23)	(0.21)
Unemployed	-0.20	-0.22	-0.45**	-0.69***	-0.64***
	(0.13)	(0.12)	(0.17)	(0.16)	(0.15)
Cultural field					
Female (Male)	-0.35***	-0.31***	-0.37**	-0.39***	-0.26*
	(0.08)	(0.08)	(0.12)	(0.11)	(0.11)
Non-white (White)	0.30	-0.16	0.19	0.57**	-0.24
	(0.17)	(0.14)	(0.22)	(0.20)	(0.18)
Age	-0.01**	-0.00	-0.02**	-0.02***	-0.03***
	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Social field					
Single (With partner)	0.41***	0.34***	0.46**	0.42**	0.52***
	(0.10)	(0.10)	(0.15)	(0.15)	(0.14)

Children in HH (No kids)	-0.04	0.24**	0.09	0.22	0.27*
	(0.09)	(0.09)	(0.13)	(0.12)	(0.12)
Social contact w/fam. & friend	0.21**	0.23***	0.27**	0.77***	0.53***
	(0.07)	(0.07)	(0.10)	(0.09)	(0.09)
Member of civic groups (No)	0.17	0.13	0.14	0.37**	0.50***
	(0.09)	(0.09)	(0.12)	(0.11)	(0.11)
Size of digital support network	0.11**	0.16***	-0.05	0.05	0.22***
	(0.04)	(0.04)	(0.06)	(0.06)	(0.05)
Other household members online (No)	0.50***	0.35**	0.47***	0.47*	1.04***
	(0.12)	(0.13)	(0.14)	(0.18)	(0.17)
Personal field					
Disabled (No disability)	0.06	0.10	0.22	0.18	0.32
	(0.22)	(0.16)	(0.21)	(0.20)	(0.17)
Constant	1.46***	1.36***	1.79***	1.99***	1.88***
	(0.34)	(0.30)	(0.47)	(0.46)	(0.45)
R^2	0.22	0.23	0.29	0.36	0.42
Adjusted R^2	0.21	0.22	0.28	0.35	0.41
N	1053	1242	958	1183	1229

Notes: * p<0.05 ** p<0.01 *** p<0.001. Omitted categories in (parentheses).

B.4 Locality: Total amount of use, Unstandardised regression coefficients and standard errors (Table 7.3)

	2005 Model 1		2005 Model 2		2005 Model 3		2007 Model 1		2007 Model 2		2007 Model 3	
	b/SE	beta	b/SE	beta	b/SE	beta	b/SE	beta	b/SE	beta	b/SE	beta
Economic field												
Income	0.95*	0.08*	0.53	0.05	0.40	0.03	1.28**	0.10**	0.69	0.05	0.37	0.03
	(0.39)		(0.38)		(0.33)		(0.39)		(0.38)		(0.34)	
No education												
Secondary education	-3.15*	-0.11*	-3.62*	-0.13*	-2.82*	-0.10*	2.00	0.06	0.95	0.03	-0.80	-0.03
	(1.57)		(1.53)		(1.32)		(1.31)		(1.26)		(1.12)	
Further education	-0.97	-0.03	-2.22	-0.06	-1.81	-0.05	5.15***	0.14***	3.43*	0.09*	1.85	0.05
	(1.80)		(1.77)		(1.53)		(1.46)		(1.41)		(1.25)	
Higher education	2.03	0.06	0.09	0.00	0.03	0.00	6.95***	0.17***	4.54**	0.11**	0.31	0.01
	(1.76)		(1.74)		(1.50)		(1.57)		(1.52)		(1.39)	
Employed												
Student	1.39	0.02	0.46	0.01	-0.69	-0.01	5.14**	0.08**	2.91	0.05	1.38	0.02
	(1.98)		(1.94)		(1.67)		(1.80)		(1.74)		(1.55)	
Retired	-2.40	-0.06	-1.71	-0.04	-1.22	-0.03	-7.68***	-0.14***	-5.21**	-0.10**	-4.05**	-0.08**
	(1.61)		(1.59)		(1.38)		(1.75)		(1.72)		(1.54)	
Unemployed	-2.86*	-0.07*	-1.78	-0.04	-1.57	-0.04	-1.85	-0.04	-0.17	-0.00	0.81	0.02
	(1.32)		(1.31)		(1.13)		(1.31)		(1.29)		(1.15)	
Cultural field												
Female	-5.74***	-0.20***	-4.96***	-0.18***	-3.16***	-0.11***	-5.42***	-0.17***	-4.91***	-0.16***	-3.81***	-0.12***
	(0.87)		(0.85)		(0.74)		(0.86)		(0.82)		(0.73)	
Non-white	6.71***	0.10***	5.86**	0.09**	4.76**	0.07**	2.94*	0.06*	3.55**	0.07**	2.29	0.04
	(1.87)		(1.83)		(1.60)		(1.42)		(1.36)		(1.21)	
Age	-0.23***	-0.24***	-0.19***	-0.20***	-0.15***	-0.16***	-0.13***	-0.12***	-0.10**	-0.10**	-0.06*	-0.06*
	(0.04)		(0.04)		(0.03)		(0.03)		(0.03)		(0.03)	
Social field												
Single	0.75	0.02	-0.10	-0.00	-0.55	-0.02	3.54***	0.11***	2.68**	0.08**	2.62**	0.08**
	(1.09)		(1.07)		(0.92)		(1.06)		(1.02)		(0.91)	
Children in HH	-0.81	-0.03	-0.49	-0.02	-0.61	-0.02	-0.79	-0.02	-1.29	-0.04	-0.83	-0.03
	(0.95)		(0.92)		(0.80)		(0.92)		(0.88)		(0.78)	
Social contact	1.99**	0.08**	1.37	0.05	-0.53	-0.02	4.85***	0.18***	4.20***	0.15***	2.60***	0.10***
	(0.75)		(0.73)		(0.64)		(0.72)		(0.69)		(0.62)	
Civic groups	1.39	0.05	0.89	0.03	1.55*	0.05*	1.27	0.04	0.78	0.02	0.40	0.01
	(0.89)		(0.88)		(0.76)		(0.93)		(0.90)		(0.79)	
Digital support	1.32***	0.10***	0.99**	0.07**	1.61***	0.12***	-0.22	-0.01	-0.86	-0.05	0.12	0.01

	(0.38)		(0.37)		(0.33)		(0.45)		(0.44)		(0.40)	
HH dig. included	1.82	0.05	1.60	0.04	1.05	0.03	1.82	0.04	2.13	0.05	2.32*	0.06*
	(1.34)		(1.31)		(1.13)		(1.36)		(1.30)		(1.16)	
Personal field												
Disability	-0.09	-0.00	-0.29	-0.00	-0.65	-0.01	0.34	0.01	0.66	0.01	2.01	0.03
	(2.31)		(2.25)		(1.94)		(1.68)		(1.61)		(1.43)	
Home access												
Home & mobile			2.88*	0.07*	1.89	0.05			4.87***	0.11***	2.64*	0.06*
			(1.26)		(1.10)				(1.20)		(1.08)	
All access types			9.32***	0.27***	5.39***	0.16***			12.01***	0.34***	8.05***	0.23***
			(1.20)		(1.06)				(1.13)		(1.04)	
Home & institutional			2.92**	0.09**	1.02	0.03			5.12***	0.14***	3.64***	0.10***
			(1.10)		(0.96)				(1.14)		(1.03)	
Skills (ability)					4.67***	0.25***					5.64***	0.29***
					(0.53)						(0.51)	
Centrality					2.35***	0.30***					1.59***	0.23***
					(0.22)						(0.17)	
Constant	28.78***	***	28.39***	***	-7.12		18.28***	***	17.16***	***	-14.75***	***
	(3.62)		(3.54)		(3.64)		(3.18)		(3.06)		(3.27)	
Adjusted R^2	0.19		0.24		0.43		0.20		0.27		0.42	
BIC	8136.7		8096.7		7785.8		9879.1		9789.6		9488.9	
N	1013		1013		1010		1203		1203		1200	

	2009 Model 1	2009 Model 2	2009 Model 3	2011 Model 1		2011 Model 2		2011 Model 3		2013 Model 1	2013 Model 2	2013 Model 3
	b/(SE)	b/(SE)	b/(SE)	b/(SE)	beta	b/(SE)	beta	b/(SE)	beta	b/(SE)	b/(SE)	b/(SE)
Econ. field												
Income	1.31***	0.92*	0.33	0.11	0.01	-0.22	-0.02	-0.39	-0.04	2.00***	1.47***	1.32***
	(0.37)	(0.36)	(0.33)	(0.32)		(0.31)		(0.29)		(0.33)	(0.33)	(0.30)
No education												
Secondary education	2.45	1.05	0.30	3.57*	0.11*	3.44*	0.10*	2.30	0.07	6.58***	5.33***	4.50***
	(1.64)	(1.59)	(1.44)	(1.39)		(1.36)		(1.25)		(1.38)	(1.34)	(1.23)
Further education	6.57***	4.28*	3.65*	7.07***	0.16***	5.73***	0.13***	3.76**	0.09**	6.00***	4.27**	4.03**
	(1.84)	(1.79)	(1.63)	(1.59)		(1.55)		(1.43)		(1.61)	(1.57)	(1.44)
Higher education	10.81***	8.56***	6.39***	11.10***	0.32***	9.00***	0.26***	6.52***	0.19***	9.36***	6.60***	4.45**
	(1.76)	(1.73)	(1.60)	(1.50)		(1.48)		(1.38)		(1.50)	(1.48)	(1.36)
Employed												
Student	6.66**	6.35**	4.45*	4.29*	0.06*	2.60	0.03	1.15	0.02	2.02	-0.26	0.36
	(2.09)	(2.02)	(1.84)	(1.99)		(1.94)		(1.78)		(2.03)	(1.98)	(1.84)
Retired	-1.20	-0.26	0.05	-2.04	-0.04	1.03	0.02	-0.50	-0.01	0.14	2.88	1.52
	(2.03)	(1.98)	(1.79)	(1.67)		(1.69)		(1.55)		(1.62)	(1.59)	(1.47)
Unemployed	-1.13	-0.40	0.10	-3.44**	-0.08**	-1.38	-0.03	-1.13	-0.03	-1.09	1.04	0.24
	(1.31)	(1.29)	(1.17)	(1.19)		(1.19)		(1.10)		(1.18)	(1.17)	(1.08)
Cultural field												
Female	-6.79***	-6.35***	-5.40***	-7.59***	-0.23***	-6.73***	-0.20***	-4.91***	-0.15***	-5.13***	-4.85***	-3.45***
	(0.92)	(0.88)	(0.80)	(0.84)		(0.82)		(0.76)		(0.83)	(0.80)	(0.74)
Non-white	2.30	1.98	2.43	-0.75	-0.01	-1.23	-0.02	-0.76	-0.01	-0.52	-0.31	-1.34
	(1.72)	(1.65)	(1.51)	(1.46)		(1.42)		(1.30)		(1.38)	(1.33)	(1.22)
Age	-0.21***	-0.17***	-0.07	-0.33***	-0.30***	-0.30***	-0.27***	-0.21***	-0.19***	-0.32***	-0.28***	-0.16***
	(0.04)	(0.04)	(0.04)	(0.04)		(0.04)		(0.04)		(0.04)	(0.04)	(0.04)
Social field												
Single	5.32***	4.16***	3.80***	0.45	0.01	0.46	0.01	0.14	0.00	1.65	0.91	0.49
	(1.12)	(1.09)	(0.98)	(1.08)		(1.05)		(0.97)		(1.05)	(1.01)	(0.93)
Children in HH	0.90	0.81	0.52	1.02	0.03	1.07	0.03	0.62	0.02	0.25	-0.34	-0.40
	(1.00)	(0.96)	(0.87)	(0.90)		(0.87)		(0.81)		(0.94)	(0.92)	(0.84)
Social contact	3.70***	3.42***	2.60***	6.69***	0.25***	5.89***	0.22***	5.15***	0.19***	5.57***	4.81***	4.60***
	(0.72)	(0.69)	(0.63)	(0.69)		(0.68)		(0.63)		(0.66)	(0.64)	(0.59)
Civic groups	3.28***	2.78**	3.20***	1.11	0.03	0.50	0.02	0.59	0.02	6.04***	5.31***	5.25***
	(0.93)	(0.89)	(0.81)	(0.83)		(0.81)		(0.74)		(0.84)	(0.82)	(0.75)
Digital support	0.20	0.19	0.23	0.43	0.03	0.06	0.00	0.70	0.04	1.36***	0.96*	1.63***

	(0.48)	(0.47)	(0.43)	(0.41)		(0.40)		(0.37)		(0.39)	(0.38)	(0.35)
HH dig. included	1.66	0.85	1.28	-0.01	-0.00	0.52	0.01	0.83	0.02	0.88	-0.04	-0.73
	(1.10)	(1.06)	(0.96)	(1.37)		(1.33)		(1.22)		(1.29)	(1.25)	(1.15)
Personal field												
Disability	1.25	1.13	-1.12	-1.00	-0.02	-1.04	-0.02	-0.92	-0.02	2.47	2.12	1.90
	(1.61)	(1.55)	(1.40)	(1.48)		(1.44)		(1.32)		(1.30)	(1.26)	(1.15)
Home access												
Home & mobile		7.73***	5.53***			2.68*	0.07*	0.88	0.02		5.06***	2.31*
		(1.28)	(1.17)			(1.19)		(1.10)			(1.22)	(1.13)
All access types		9.72***	8.31***			9.66***	0.29***	5.50***	0.16***		12.45***	6.90***
		(1.24)	(1.15)			(1.25)		(1.19)			(1.38)	(1.32)
Home & institutional		2.67	2.03			2.81	0.05	1.40	0.02		6.53*	2.67
		(1.42)	(1.29)			(1.64)		(1.51)			(2.70)	(2.54)
Skills (ability)			3.23***					6.31***	0.31***			5.76***
			(0.58)					(0.52)				(0.55)
Centrality			2.20***					0.83***	0.11***			1.31***
			(0.21)					(0.17)				(0.18)
Constant	19.77***	17.36***	-17.26***	26.49***	***	23.24***	***	-8.60*	*	19.06***	16.20***	-20.25***
	(3.59)	(3.48)	(3.97)	(3.44)		(3.38)		(3.81)		(3.45)	(3.38)	(3.95)
Adjusted R^2	0.31	0.37	0.48	0.35		0.38		0.48		0.35	0.40	0.50
BIC	7534.6	7475.8	7265.9	9494.2		9442.0		9216.8		9976.0	9906.3	9646.4
N	928	928	924	1169		1169		1165		1220	1220	1213

Notes: * p<0.05 ** p<0.01 *** p<0.001. Omitted categories: No educational qualifications; Male; White; Married/with partner; No children in household; Not a member of any civic group; No other Internet users in household; No disability. HH="household"; dig.="digitally".

B.5 Locality: Types of use, Standardised regression coefficients (2005, 2007, 2011) (Table 7.4)

This appendix contains standardised beta regression coefficients for six types of use for waves 2005, 2007 and 2011. Due to space limitations, full results tables (unstandardised regression coefficients and standard errors) are not included and are available from the author.

Commercial & financial

	2005			2007			2011		
	M1 β	**M2 β**	**M3 β**	**M1 β**	**M2 β**	**M3 β**	**M1 β**	**M2 β**	**M3 β**
Income	0.24***	0.21***	0.20***	0.16***	0.14***	0.12***	0.10**	0.07*	0.06
No education									
Secondary ed.	-0.01	-0.02	0.00	0.17***	0.16***	0.11**	0.08	0.08	0.05
Further ed.	0.05	0.02	0.03	0.22***	0.19***	0.16***	0.18***	0.15***	0.12**
Higher ed.	0.09	0.04	0.04	0.17***	0.14***	0.07	0.31***	0.25***	0.19***
Employed									
Student	-0.11***	-0.13***	-0.14***	-0.09**	-0.10***	-0.12***	-0.04	-0.07*	-0.08**
Retired	-0.04	-0.03	-0.02	-0.11**	-0.09*	-0.07*	-0.06	-0.01	-0.03
Unemployed	-0.07*	-0.05	-0.05	-0.07*	-0.05	-0.03	-0.12***	-0.08*	-0.07*
Female	-0.07*	-0.05	-0.01	-0.07*	-0.06*	-0.03	-0.06*	-0.03	0.01
Non-white	-0.02	-0.03	-0.05	-0.01	-0.00	-0.02	-0.02	-0.03	-0.03
Age	-0.11**	-0.07	-0.05	-0.04	-0.03	0.00	-0.12**	-0.09*	-0.03
Single	-0.08*	-0.10**	-0.12**	-0.04	-0.06	-0.06	-0.09*	-0.09*	-0.10**
Children in HH	-0.05	-0.04	-0.05	-0.00	-0.01	-0.00	0.03	0.03	0.01
Social contact	0.08**	0.06*	0.01	0.12***	0.11***	0.06*	0.16***	0.14***	0.11***
Civic groups	0.03	0.02	0.04	0.05	0.04	0.03	0.01	-0.01	-0.00
Digital support	0.01	-0.01	0.01	-0.06*	-0.07**	-0.03	-0.01	-0.03	-0.00
HH dig. included	-0.03	-0.04	-0.05	0.00	0.01	0.01	-0.02	-0.01	-0.01
Disability	-0.01	-0.01	-0.02	0.01	0.01	0.03	0.00	0.00	0.00
Home access									
Home & mobile		0.06	0.04		0.09**	0.05		0.05	0.01
All access types		0.24***	0.17***		0.17***	0.09**		0.26***	0.15***
Home & institutional		0.05	0.02		0.08*	0.05		0.05	0.03
Skills (ability)			0.12***			0.20***			0.24***
Centrality			0.24***			0.20***			0.14***
Constant	***	***		**	**	***	***	***	**
Adjusted R^2	0.13	0.17	0.25	0.12	0.14	0.23	0.17	0.20	0.27
BIC	1993.2	1967.4	1864.6	2429.8	2423.6	2295.4	2264.5	2235.9	2134.4
N	1013	1013	1010	1203	1203	1200	1169	1169	1165

Information & learning

	2005			2007			2011		
	M1 β	**M2 β**	**M3 β**	**M1 β**	**M2 β**	**M3 β**	**M1 β**	**M2 β**	**M3 β**
Income	0.05	0.02	0.01	0.09**	0.06*	0.04	-0.03	-0.05	-0.06*
No education									
Secondary ed.	-0.09	-0.12*	-0.09	0.03	0.01	-0.02	0.11*	0.11**	0.09*
Further ed.	-0.01	-0.05	-0.05	0.15***	0.12**	0.09*	0.17***	0.14***	0.12**
Higher ed.	0.14**	0.08	0.08	0.21***	0.17***	0.10**	0.38***	0.33***	0.29***
Employed									
Student	0.18***	0.17***	0.15***	0.17***	0.14***	0.12***	0.12***	0.10***	0.08**
Retired	-0.04	-0.01	-0.00	-0.12***	-0.09**	-0.07*	-0.07	-0.01	-0.03
Unemployed	-0.03	0.00	0.01	-0.02	0.01	0.02	-0.03	0.02	0.03
Female	-0.02	0.00	0.05	-0.07*	-0.06*	-0.03	-0.14***	-0.11***	-0.08**
Non-white	0.13***	0.11***	0.10***	0.19***	0.20***	0.18***	0.07**	0.06*	0.07**
Age	-0.11**	-0.10*	-0.06	-0.05	-0.04	-0.01	-0.13***	-0.10**	-0.06
Single	-0.01	-0.02	-0.03	0.10**	0.09**	0.09**	0.02	0.02	0.02
Children in HH	0.05	0.05	0.05	0.01	-0.00	0.01	0.05	0.05	0.05
Social contact	0.01	-0.00	-0.06*	0.09***	0.08**	0.04	0.19***	0.17***	0.15***
Civic groups	0.09**	0.07*	0.09**	0.04	0.04	0.03	0.03	0.01	0.01
Digital support	0.08**	0.06*	0.09**	-0.01	-0.04	0.00	0.02	-0.00	0.02
HH dig. included	0.03	0.04	0.02	0.02	0.03	0.03	0.06*	0.08*	0.08**
Disability	-0.01	-0.02	-0.02	0.01	0.02	0.03	-0.03	-0.03	-0.03
Home access									
Home & mobile		0.01	-0.01		0.03	-0.00		-0.01	-0.04
All access types		0.20***	0.11**		0.21***	0.13***		0.23***	0.16***
Home & institutional		0.13***	0.09**		0.12***	0.09**		0.04	0.03
Skills (ability)			0.17***			0.21***			0.19***
Centrality			0.24***			0.15***			0.03
Constant	***	***	*	**	**	***	**	*	
Adjusted R^2	0.17	0.20	0.31	0.21	0.24	0.31	0.26	0.29	0.32
BIC	2265.8	2251.0	2108.9	2893.7	2872.0	2760.0	2842.0	2806.2	2759.4
N	1013	1013	1010	1203	1203	1200	1168	1168	1164

Creative & productive

	2005			2007			2011		
	M1 β	**M2 β**	**M3 β**	**M1 β**	**M2 β**	**M3 β**	**M1 β**	**M2 β**	**M3 β**
Income	-0.01	-0.03	-0.04	0.08*	0.06	0.05	-0.00	-0.02	-0.03
No education									
Secondary ed.	0.11	0.09	0.10	0.02	0.00	-0.02	-0.04	-0.05	-0.07
Further ed.	0.07	0.05	0.05	0.09*	0.07	0.05	0.05	0.04	0.01
Higher ed.	0.15**	0.12*	0.12*	0.14***	0.12**	0.08*	0.02	0.00	-0.04
Employed									
Student	-0.01	-0.02	-0.02	0.12***	0.12***	0.11***	0.08*	0.07*	0.06
Retired	-0.07	-0.06	-0.06	-0.03	-0.04	-0.03	0.06	0.08	0.06
Unemployed	0.01	0.03	0.03	0.04	0.03	0.04	-0.05	-0.04	-0.04
Female	-0.16***	-0.14***	-0.11***	-0.06	-0.04	-0.03	-0.08**	-0.07*	-0.04

Non-white	0.06	0.05	0.06	-0.01	0.00	-0.01	0.02	0.02	0.03
Age	-0.02	0.00	0.03	-0.04	-0.02	-0.01	-0.25***	-0.23***	-0.18***
Single	0.00	-0.01	-0.01	0.13***	0.10**	0.10**	-0.02	-0.02	-0.03
Children in HH	0.00	0.01	0.01	-0.03	-0.03	-0.03	0.01	0.01	0.01
Social contact	0.09**	0.07*	0.05	0.10***	0.09**	0.07*	0.11***	0.09**	0.07*
Civic groups	0.02	0.01	0.01	0.05	0.04	0.04	-0.04	-0.05	-0.04
Digital support	0.07*	0.05	0.08**	-0.04	-0.05	-0.03	0.02	0.02	0.05
HH dig. included	0.02	0.02	0.01	0.02	0.01	0.01	-0.02	-0.02	-0.02
Disability	-0.01	-0.02	-0.02	-0.03	-0.02	-0.02	-0.02	-0.02	-0.01
Home access									
Home & mobile		0.07*	0.07*		0.12***	0.10***		0.09*	0.06
All access types		0.13***	0.09*		0.15***	0.11**		0.12**	0.04
Home & institutional		0.10**	0.07		-0.02	-0.04		0.03	0.01
Skills (ability)			0.17***			0.10**			0.21***
Centrality			0.03			0.08*			0.05
Constant			***	***	***		***	**	
Adjusted R^2	0.03	0.04	0.07	0.08	0.11	0.13	0.09	0.10	0.14
BIC	87.4	94.3	78.7	2756.6	2737.3	2724.0	3390.9	3403.7	3356.7
N	1013	1013	1010	1194	1194	1191	1167	1167	1163

Communication & interaction

	2005			2007			2011		
	M1 β	**M2 β**	**M3 β**	**M1 β**	**M2 β**	**M3 β**	**M1 β**	**M2 β**	**M3 β**
Income	0.08*	0.04	0.03	0.13***	0.08**	0.06*	0.11***	0.07*	0.06*
No education									
Secondary ed.	-0.06	-0.09	-0.06	0.02	-0.02	-0.08*	0.05	0.04	0.01
Further ed.	0.02	-0.02	-0.01	0.07	0.02	-0.02	0.09*	0.05	0.01
Higher ed.	0.11*	0.04	0.04	0.17***	0.10**	-0.00	0.20***	0.13**	0.06
Employed									
Student	-0.03	-0.05	-0.06*	0.05	0.00	-0.02	0.06*	0.04	0.02
Retired	-0.07	-0.04	-0.03	-0.09*	-0.02	-0.01	-0.07*	0.00	-0.02
Unemployed	-0.09**	-0.05	-0.05	-0.05	-0.00	0.01	-0.08**	-0.03	-0.02
Female	-0.13***	-0.11***	-0.05	-0.08**	-0.07*	-0.03	-0.12***	-0.09***	-0.03
Non-white	0.10**	0.08**	0.07**	0.04	0.05*	0.03	0.09**	0.08**	0.09***
Age	-0.13**	-0.10*	-0.06	-0.06	-0.03	0.01	-0.14***	-0.10**	-0.02
Single	0.05	0.03	0.01	0.10**	0.07*	0.07*	0.02	0.02	0.01
Children in HH	-0.04	-0.03	-0.03	-0.03	-0.05	-0.04	0.01	0.01	-0.01
Social contact	0.20***	0.18***	0.11***	0.17***	0.14***	0.09***	0.22***	0.18***	0.16***
Civic groups	0.04	0.02	0.04	-0.00	-0.02	-0.03	0.08**	0.06*	0.06*
Digital support	0.08**	0.05	0.10***	-0.00	-0.05	0.00	0.00	-0.02	0.02
HH dig. included	0.00	0.00	-0.01	0.03	0.04	0.05	-0.03	-0.02	-0.01
Disability	0.03	0.02	0.02	0.03	0.04	0.06*	-0.00	-0.00	0.00
Home access									
Home & mobile		0.05	0.03		0.13***	0.08**		0.12***	0.07*
All access types		0.25***	0.15***		0.40***	0.29***		0.35***	0.23***
Home & institutional		0.14***	0.08**		0.20***	0.16***		0.08**	0.05

Skills (ability)			0.27***			0.32***			0.31***
Centrality			0.22***			0.15***			0.13***
Constant	***	***	***	***	***	***	***	***	***
Adjusted R^2	0.14	0.18	0.33	0.12	0.22	0.34	0.22	0.28	0.38
BIC	2836.8	2807.4	2603.8	3578.5	3460.1	3247.7	3143.1	3079.1	2904.3
N	1012	1012	1009	1200	1200	1197	1169	1169	1165

Participation & engagement

	2005			2007			2011		
	M1 β	**M2 β**	**M3 β**	**M1 β**	**M2 β**	**M3 β**	**M1 β**	**M2 β**	**M3 β**
Income	-0.06	-0.08*	-0.08*	-0.03	-0.04	-0.06	-0.10**	-0.11***	-0.12***
No education									
Secondary ed.	-0.10	-0.10	-0.08	-0.10*	-0.11**	-0.15***	0.06	0.05	0.03
Further ed.	-0.13*	-0.12*	-0.11*	-0.06	-0.08	-0.10*	0.03	0.01	-0.01
Higher ed.	-0.08	-0.09	-0.10	-0.04	-0.07	-0.12**	0.14**	0.11*	0.07
Employed									
Student	-0.06	-0.06	-0.07*	0.02	0.01	-0.00	0.07*	0.06	0.05
Retired	-0.04	-0.06	-0.05	-0.05	-0.04	-0.03	0.00	0.03	0.01
Unemployed	-0.03	-0.04	-0.04	-0.01	-0.00	0.01	-0.03	-0.01	-0.00
Female	-0.12***	-0.11**	-0.07*	-0.11***	-0.10***	-0.08**	-0.07*	-0.06*	-0.03
Non-white	0.16***	0.16***	0.16***	-0.02	-0.01	-0.02	-0.02	-0.02	-0.02
Age	-0.16***	-0.13**	-0.10*	-0.15***	-0.14***	-0.11***	-0.27***	-0.25***	-0.20***
Single	0.13***	0.10**	0.10**	0.17***	0.15***	0.15***	-0.00	-0.00	-0.01
Children in HH	0.00	0.01	0.01	-0.03	-0.04	-0.03	0.04	0.03	0.02
Social contact	-0.01	-0.02	-0.06	0.13***	0.12***	0.09**	0.18***	0.16***	0.15***
Civic groups	-0.03	-0.03	-0.02	-0.00	-0.01	-0.02	-0.02	-0.03	-0.03
Digital support	0.04	0.03	0.06*	0.03	0.02	0.05	0.03	0.02	0.04
HH dig. included	0.08*	0.06	0.06	0.08*	0.07*	0.07*	-0.02	-0.02	-0.02
Disability	-0.04	-0.04	-0.04	-0.01	-0.01	0.00	-0.00	-0.00	-0.00
Home access									
Home & mobile		0.08*	0.07*		0.11***	0.08*		0.06	0.03
All access types		0.13***	0.08*		0.14***	0.08*		0.12**	0.05
Home & institutional		-0.05	-0.09*		0.03	0.01		0.01	-0.00
Skills (ability)			0.16***			0.16***			0.17***
Centrality			0.11**			0.14***			0.08**
Constant	***	***		*	*	**	***	**	
Adjusted R^2	0.09	0.12	0.16	0.09	0.10	0.15	0.15	0.16	0.19
BIC	1946.8	1937.3	1891.6	2527.9	2525.0	2462.5	3558.4	3569.6	3523.1
N	1013	1013	1010	1203	1203	1200	1167	1167	1163

Entertainment & leisure

	2005			2007			2011		
	M1 β	**M2 β**	**M3 β**	**M1 β**	**M2 β**	**M3 β**	**M1 β**	**M2 β**	**M3 β**
Income	-0.03	-0.05	-0.05	-0.02	-0.05	-0.07*	-0.06*	-0.08**	-0.09**
No education									
Secondary ed.	-0.14**	-0.14**	-0.12*	-0.00	-0.03	-0.06	0.09*	0.08*	0.06
Further ed.	-0.09	-0.09	-0.08	0.01	-0.02	-0.05	0.09*	0.07*	0.05
Higher ed.	-0.09	-0.10*	-0.10*	0.01	-0.03	-0.10**	0.15***	0.12**	0.08
Employed									
Student	0.02	0.02	0.00	0.04	0.02	-0.00	-0.01	-0.02	-0.03
Retired	-0.02	-0.02	-0.02	-0.13***	-0.10**	-0.08*	0.01	0.03	0.01
Unemployed	-0.01	-0.01	-0.01	-0.02	-0.00	0.02	-0.04	-0.03	-0.02
Female	-0.32***	-0.31***	-0.26***	-0.29***	-0.28***	-0.26***	-0.39***	-0.38***	-0.34***
Non-white	0.07*	0.07*	0.06*	0.02	0.03	0.01	-0.10***	-0.10***	-0.09***
Age	-0.32***	-0.29***	-0.25***	-0.18***	-0.16***	-0.14***	-0.38***	-0.35***	-0.30***
Single	0.07	0.05	0.03	0.11***	0.09**	0.09**	0.08**	0.08*	0.07*
Children in HH	-0.04	-0.04	-0.04	-0.04	-0.05	-0.04	-0.00	-0.00	-0.02
Social contact	-0.03	-0.04	-0.10***	0.13***	0.12***	0.08**	0.19***	0.17***	0.15***
Civic groups	-0.01	-0.01	0.00	0.01	-0.00	-0.01	0.01	0.01	0.01
Digital support	0.11***	0.10***	0.13***	0.02	-0.01	0.03	0.03	0.02	0.05
HH dig. included	0.10**	0.09**	0.08*	0.06	0.06*	0.07*	0.01	0.01	0.01
Disability	0.00	0.00	0.00	-0.02	-0.02	-0.00	-0.02	-0.02	-0.02
Home access									
Home & mobile		0.06*	0.04		0.06*	0.03		0.07*	0.04
All access types		0.13***	0.05		0.25***	0.18***		0.14***	0.06
Home & institutional		-0.02	-0.06*		0.06*	0.04		-0.00	-0.02
Skills (ability)			0.17***			0.18***			0.19***
Centrality			0.22***			0.17***			0.09***
Constant	***	***	**	***	***		***	***	*
Adjusted R^2	0.23	0.24	0.34	0.18	0.22	0.29	0.36	0.36	0.41
BIC	2217.9	2213.8	2079.0	2657.0	2616.0	2509.2	2273.2	2275.5	2202.9
N	1013	1013	1010	1203	1203	1200	1169	1169	1165

Notes: * p<0.05 ** p<0.01 *** p<0.001. Omitted categories: No educational qualifications; Male; White; Married/with partner; No children in household; Not a member of any civic group; No other Internet users in household; No disability. HH="household"; dig.="digitally".

B.6 Ubiquity: Total amount of use, Unstandardised regression coefficients and standard errors (Table 7.5)

	2005 Model 1	2005 Model 2	2005 Model 3	2007 Model 1		2007 Model 2		2007 Model 3		2009 Model 1		2009 Model 2		2009 Model 3	
	b/(SE)	**b/(SE)**	**b/(SE)**	**b/(SE)**	**beta**	**b/(SE)**	**beta**	**b/(SE)**	**beta**	**b/(SE)**	**beta**	**b/(SE)**	**beta**	**b/(SE)**	**beta**
Income	1.05**	0.26	0.27	1.38***	0.11***	0.27	0.02	0.12	0.01	1.50***	0.14***	0.54	0.05	0.04	0.00
	(0.38)	(0.36)	(0.32)	(0.39)		(0.37)		(0.33)		(0.37)		(0.35)		(0.33)	
No education															
Secondary ed.	-3.34*	-4.01**	-3.17*	1.86	0.06	0.84	0.03	-0.54	-0.02	2.38	0.07	1.00	0.03	0.33	0.01
	(1.56)	(1.46)	(1.28)	(1.29)		(1.19)		(1.07)		(1.60)		(1.50)		(1.37)	
Further ed.	-1.53	-3.20	-2.64	5.36***	0.14***	3.18*	0.08*	1.93	0.05	7.08***	0.17***	3.68*	0.09*	3.29*	0.08*
	(1.78)	(1.68)	(1.47)	(1.44)		(1.34)		(1.20)		(1.81)		(1.71)		(1.57)	
Higher ed.	2.10	-0.97	-0.64	7.19***	0.17***	4.47**	0.11**	0.78	0.02	11.09***	0.33***	7.12***	0.21***	5.62***	0.17***
	(1.75)	(1.66)	(1.45)	(1.56)		(1.45)		(1.33)		(1.74)		(1.66)		(1.54)	
Employed															
Student	2.09	0.91	-0.23	4.96**	0.08**	0.44	0.01	-0.27	-0.00	6.80**	0.10**	4.76*	0.07*	3.29	0.05
	(1.93)	(1.82)	(1.59)	(1.78)		(1.67)		(1.50)		(2.08)		(1.95)		(1.78)	
Retired	-2.19	-1.99	-1.37	-6.91***	-0.13***	-4.48**	-0.08**	-3.48*	-0.06*	-1.32	-0.02	-0.21	-0.00	-0.35	-0.01
	(1.60)	(1.50)	(1.31)	(1.73)		(1.61)		(1.45)		(2.01)		(1.88)		(1.71)	
Unemployed	-2.48	-1.77	-1.32	-2.57*	-0.06*	-1.73	-0.04	-0.51	-0.01	-1.27	-0.03	-0.04	-0.00	-0.04	0.00
	(1.30)	(1.22)	(1.07)	(1.28)		(1.18)		(1.07)		(1.29)		(1.21)		(1.10)	
Female	-5.99***	-4.75***	-3.05***	-5.26***	-0.17***	-4.06***	-0.13***	-3.20***	-0.10***	-6.35***	-0.20***	-5.34***	-0.17***	-4.72***	-0.15***
	(0.85)	(0.81)	(0.71)	(0.84)		(0.78)		(0.70)		(0.92)		(0.86)		(0.78)	
Non-white	5.51**	4.43**	3.69**	3.08*	0.06*	3.71**	0.07**	2.47*	0.05*	2.23	0.04	1.72	0.03	2.04	0.03
	(1.71)	(1.60)	(1.42)	(1.40)		(1.30)		(1.16)		(1.69)		(1.57)		(1.44)	
Age	-0.22***	-0.18***	-0.14***	-0.13***	-0.12***	-0.12***	-0.11***	-0.08**	-0.07**	-0.20***	-0.18***	-0.15***	-0.13***	-0.07	-0.06
	(0.04)	(0.03)	(0.03)	(0.03)		(0.03)		(0.03)		(0.04)		(0.04)		(0.04)	
Single	1.01	-0.43	-0.52	3.62***	0.11***	2.30*	0.07*	2.36**	0.07**	4.97***	0.15***	3.72***	0.11***	3.35***	0.10***
	(1.05)	(0.99)	(0.87)	(1.04)		(0.97)		(0.87)		(1.12)		(1.05)		(0.96)	
Children in HH	-0.67	-0.54	-0.62	-0.97	-0.03	-1.90*	-0.06*	-1.29	-0.04	0.73	0.02	0.47	0.01	0.11	0.00
	(0.93)	(0.87)	(0.77)	(0.91)		(0.84)		(0.76)		(0.99)		(0.93)		(0.84)	
Social contacts	2.29**	1.53*	-0.38	4.53***	0.17***	3.66***	0.13***	2.43***	0.09***	3.80***	0.15***	3.07***	0.12***	2.27***	0.09***

	(0.74)	(0.70)	(0.62)	(0.70)		(0.65)		(0.59)		(0.72)		(0.67)		(0.62)	
Civic groups	1.46	0.86	1.32	1.45	0.04	0.92	0.03	0.46	0.01	2.93**	0.09**	2.54**	0.08**	3.13***	0.10***
	(0.88)	(0.82)	(0.72)	(0.93)		(0.86)		(0.77)		(0.93)		(0.86)		(0.79)	
Digital support	1.37***	0.97**	1.52***	-0.24	-0.01	-0.85*	-0.05*	0.03	0.00	0.14	0.01	0.27	0.02	0.28	0.02
	(0.38)	(0.35)	(0.32)	(0.45)		(0.42)		(0.38)		(0.47)		(0.44)		(0.40)	
HH in dig. included	2.81*	1.03	0.86	3.44**	0.08**	2.09	0.05	2.16*	0.05*	2.41*	0.07*	1.12	0.03	1.59	0.04
	(1.24)	(1.17)	(1.03)	(1.29)		(1.19)		(1.08)		(1.07)		(1.01)		(0.92)	
Disability	0.24	0.01	-0.42	0.24	0.00	-0.15	-0.00	1.54	0.03	1.79	0.03	1.21	0.02	-0.68	-0.01
	(2.28)	(2.14)	(1.87)	(1.65)		(1.53)		(1.37)		(1.59)		(1.49)		(1.35)	
Ubiquity of access		3.55***	2.16***			3.90***	0.39***	2.72***	0.27***			2.73***	0.35***	2.23***	0.29***
		(0.30)	(0.27)			(0.27)		(0.25)				(0.23)		(0.21)	
Skills (ability)			4.28***					5.17***	0.27***					3.05***	0.15***
			(0.51)					(0.49)						(0.56)	
Centrality			2.27***					1.51***	0.22***					2.04***	0.26***
			(0.21)					(0.16)						(0.20)	
Constant	25.75***	20.57***	-10.34**	17.21***	***	11.86***	***	-16.52***	***	17.56***	***	12.67***	***	-18.25***	***
	(3.50)	(3.32)	(3.41)	(3.11)		(2.89)		(3.08)		(3.57)		(3.35)		(3.78)	
Adjusted R^2	0.19	0.29	0.46	0.20		0.32		0.45		0.31		0.40		0.50	
BIC	8454.9	8327.6	8035.0	10179.4		9990.6		9697.1		7798.4		7670.1		7455.7	
N	1053	1053	1050	1239		1239		1235		958		958		953	

Notes: * $p<0.05$ ** $p<0.01$ *** $p<0.001$. Omitted categories: No educational qualifications; Male; White; Married/with partner; No children in household; Not a member of any civic group; No other Internet users in household; No disability. HH="household"; dig.="digitally".

	2011 Model 1		2011 Model 2		2011 Model 3		2013 Model 1	2013 Model 2	2013 Model 3
	b/(SE)	beta	b/(SE)	beta	b/(SE)	beta	b/(SE)	b/(SE)	b/(SE)
Income	0.12	0.01	-0.58	-0.05	-0.62*	-0.06*	2.01***	1.07***	0.99***
	(0.32)		(0.31)		(0.29)		(0.33)	(0.32)	(0.30)
No education									
Secondary ed.	3.52*	0.10*	3.58**	0.11**	2.35	0.07	6.80***	4.84***	4.00***
	(1.39)		(1.33)		(1.23)		(1.37)	(1.29)	(1.19)
Further ed.	7.22***	0.16***	6.37***	0.14***	4.21**	0.09**	6.28***	4.07**	3.69**
	(1.59)		(1.52)		(1.41)		(1.60)	(1.51)	(1.40)
Higher ed.	11.14***	0.32***	9.47***	0.27***	6.93***	0.20***	9.56***	6.02***	3.82**
	(1.50)		(1.44)		(1.35)		(1.50)	(1.42)	(1.33)
Employed									
Student	4.43*	0.06*	2.19	0.03	1.07	0.01	2.18	-1.47	-0.50
	(2.00)		(1.92)		(1.77)		(2.03)	(1.92)	(1.79)
Retired	-2.27	-0.04	0.36	0.01	-0.92	-0.02	0.20	1.95	1.18
	(1.67)		(1.62)		(1.50)		(1.61)	(1.51)	(1.40)
Unemployed	-3.26**	-0.07**	-1.74	-0.04	-1.42	-0.03	-1.39	0.34	-0.14
	(1.18)		(1.14)		(1.05)		(1.18)	(1.11)	(1.03)
Female	-7.63***	-0.23***	-6.78***	-0.20***	-5.02***	-0.15***	-5.03***	-4.34***	-3.14***
	(0.84)		(0.80)		(0.75)		(0.83)	(0.78)	(0.72)
Non-white	-0.73	-0.01	-1.98	-0.03	-1.26	-0.02	-0.71	-0.07	-1.07
	(1.46)		(1.40)		(1.30)		(1.37)	(1.28)	(1.18)
Age	-0.32***	-0.29***	-0.28***	-0.25***	-0.19***	-0.17***	-0.32***	-0.25***	-0.15***
	(0.04)		(0.04)		(0.04)		(0.04)	(0.04)	(0.04)
Single	0.54	0.02	-0.37	-0.01	-0.24	-0.01	1.49	0.09	-0.16
	(1.08)		(1.03)		(0.96)		(1.04)	(0.98)	(0.91)
Children in HH	0.83	0.02	0.36	0.01	0.21	0.01	0.30	-0.44	-0.58
	(0.90)		(0.86)		(0.80)		(0.94)	(0.88)	(0.82)
Social contacts	6.69***	0.24***	4.99***	0.18***	4.59***	0.17***	5.63***	4.21***	4.04***
	(0.69)		(0.68)		(0.63)		(0.66)	(0.62)	(0.58)
Civic groups	1.34	0.04	0.52	0.02	0.67	0.02	6.00***	4.67***	4.72***
	(0.83)		(0.80)		(0.74)		(0.84)	(0.79)	(0.73)
Digital support	0.43	0.03	0.32	0.02	0.87*	0.05*	1.36***	0.78*	1.42***
	(0.41)		(0.39)		(0.36)		(0.39)	(0.37)	(0.35)
HH in dig. included	0.96	0.02	-0.07	-0.00	0.61	0.01	1.04	-1.75	-1.97
	(1.35)		(1.29)		(1.19)		(1.28)	(1.22)	(1.13)
Disability	-1.03	-0.02	-1.42	-0.02	-1.09	-0.02	2.68*	1.81	1.70
	(1.49)		(1.42)		(1.31)		(1.30)	(1.22)	(1.13)
Ubiquity of access			2.21***	0.30***	1.36***	0.19***		2.69***	1.89***
			(0.20)		(0.20)			(0.20)	(0.20)
Skills (ability)					6.13***	0.30***			5.34***
					(0.52)				(0.54)
Centrality					0.73***	0.10***			1.28***
					(0.17)				(0.18)
Constant	24.99***	***	20.58***	***	-9.15*	*	18.47***	13.40***	-20.61***
	(3.41)		(3.28)		(3.73)		(3.44)	(3.24)	(3.81)

Adjusted R^2	0.34	0.40	0.49	0.35	0.44	0.52
BIC	9612.5	9507.1	9297.8	10052.8	9895.1	9651.7
N	1182	1182	1178	1229	1229	1222

Notes: * p<0.05 ** p<0.01 *** p<0.001. Omitted categories: No educational qualifications; Male; White; Married/with partner; No children in household; Not a member of any civic group; No other Internet users in household; No disability. HH="household"; dig.="digitally".

B. 7 Ubiquity: Types of use, Standardised regression coefficients (2007, 2009, 2011) (Table 7.6)

This appendix contains standardised beta regression coefficients for six types of use for waves 2007, 2009 and 2011. Due to space limitations, full results tables (unstandardised regression coefficients and standard errors) are not included and are available from the author.

Commercial & financial

	2007			2009			2011		
	M1 β	**M2 β**	**M3 β**	**M1 β**	**M2 β**	**M3 β**	**M1 β**	**M2 β**	**M3 β**
Income	0.16***	0.11***	0.10***	0.24***	0.19***	0.16***	0.10**	0.04	0.04
No education									
Secondary ed.	0.17***	0.15***	0.12**	0.08	0.05	0.04	0.08	0.08	0.05
Further ed.	0.22***	0.18***	0.16***	0.15***	0.10*	0.09*	0.18***	0.16***	0.13***
Higher ed.	0.17***	0.13***	0.07	0.29***	0.21***	0.19***	0.31***	0.27***	0.21***
Employed									
Student	-0.09**	-0.13***	-0.14***	-0.05	-0.07*	-0.09**	-0.04	-0.07*	-0.08**
Retired	-0.09**	-0.07*	-0.05	-0.02	-0.01	-0.02	-0.06	-0.02	-0.04
Unemployed	-0.08**	-0.07*	-0.05	-0.12***	-0.10**	-0.10**	-0.12***	-0.09**	-0.08**
Female	-0.06*	-0.04	-0.02	-0.06*	-0.04	-0.03	-0.06*	-0.04	0.01
Non-white	-0.01	-0.00	-0.02	0.01	0.01	0.02	-0.02	-0.04	-0.03
Age	-0.04	-0.03	-0.00	-0.07	-0.05	-0.00	-0.11**	-0.07	-0.01
Single	-0.05	-0.07*	-0.07*	0.03	0.01	0.00	-0.08*	-0.10**	-0.11**
Children in HH	-0.01	-0.02	-0.01	-0.01	-0.01	-0.02	0.02	0.01	0.01
Soc. contact	0.11***	0.10***	0.06*	0.12***	0.10***	0.08**	0.16***	0.11***	0.10***
Civic groups	0.05	0.04	0.03	0.11***	0.10***	0.11***	0.02	-0.01	0.00
Digital support	-0.06*	-0.08**	-0.04	0.00	0.01	0.01	-0.01	-0.02	0.01
HH dig. included	0.03	0.01	0.01	0.08**	0.06	0.07*	0.00	-0.02	-0.01
Disability	0.01	0.01	0.03	0.05	0.04	0.02	0.00	-0.00	0.00
Ubiquity of access		0.23***	0.14***		0.23***	0.19***		0.28***	0.17***
Skills (ability)			0.19***			0.09**			0.23***
Centrality			0.19***			0.16***			0.12***
Constant	**	*	***			***	***	**	**
Adjusted R^2	0.14	0.18	0.25	0.25	0.29	0.33	0.17	0.22	0.28
BIC	2490.5	2436.3	2316.0	1789.2	1743.3	1695.5	2296.0	2230.2	2141.3
N	1239	1239	1235	958	958	953	1182	1182	1178

Information & learning

	2007			2009			2011		
	M1 β	**M2 β**	**M3 β**	**M1 β**	**M2 β**	**M3 β**	**M1 β**	**M2 β**	**M3 β**
Income	0.10***	0.04	0.03	0.00	-0.06	-0.10**	-0.03	-0.07*	-0.08*
No education									
Secondary ed.	0.03	0.00	-0.03	0.06	0.03	0.01	0.11**	0.11**	0.09*
Further ed.	0.15***	0.11**	0.09*	0.17***	0.11*	0.09*	0.17***	0.16***	0.13***
Higher ed.	0.21***	0.16***	0.10**	0.42***	0.33***	0.28***	0.39***	0.36***	0.31***
Employed									
Student	0.17***	0.12***	0.11***	0.21***	0.19***	0.18***	0.12***	0.10***	0.09***
Retired	-0.12***	-0.09**	-0.07*	-0.08*	-0.07	-0.07*	-0.07*	-0.04	-0.05
Unemployed	-0.02	-0.01	0.01	0.00	0.03	0.03	-0.03	-0.01	-0.00
Female	-0.07*	-0.04	-0.02	-0.07*	-0.04	-0.03	-0.13***	-0.12***	-0.09***
Non-white	0.19***	0.20***	0.18***	0.05	0.04	0.04	0.07**	0.06*	0.07**
Age	-0.05	-0.05	-0.02	-0.03	0.00	0.06	-0.13***	-0.10*	-0.05
Single	0.11***	0.08*	0.08**	0.09*	0.06	0.05	0.02	-0.00	0.00
Children in HH	0.00	-0.02	-0.00	0.05	0.05	0.04	0.04	0.03	0.03
Soc. contact	0.08***	0.06*	0.03	0.07*	0.05	0.03	0.18***	0.14***	0.14***
Civic groups	0.04	0.03	0.03	0.07*	0.06*	0.07*	0.03	0.02	0.02
Digital support	-0.00	-0.03	0.01	0.00	0.01	0.01	0.02	0.02	0.04
HH dig. included	0.04	0.02	0.02	0.12***	0.09**	0.10***	0.07*	0.05	0.06*
Disability	0.01	0.01	0.02	0.05	0.04	0.02	-0.04	-0.04	-0.04
Ubiquity of access		0.26***	0.18***		0.27***	0.23***		0.20***	0.14***
Skills (ability)			0.19***			0.13***			0.19***
Centrality			0.14***			0.16***			0.02
Constant	**		***	**		***	**	*	
R^2	0.22	0.28	0.33	0.27	0.32	0.37	0.27	0.29	0.32
Adjusted R^2	0.21	0.27	0.32	0.26	0.31	0.36	0.26	0.28	0.31
BIC	2966.6	2886.1	2786.5	2245.9	2180.3	2098.0	2870.4	2835.7	2792.3
N	1239	1239	1235	958	958	953	1181	1181	1177

Creative & productive

	2007			2009			2011		
	M1 β	**M2 β**	**M3 β**	**M1 β**	**M2 β**	**M3 β**	**M1 β**	**M2 β**	**M3 β**
Income	0.08*	0.04	0.03	0.05	0.01	-0.02	-0.00	-0.04	-0.04
No education									
Secondary ed.	0.02	0.00	-0.01	-0.01	-0.03	-0.04	-0.05	-0.05	-0.07
Further ed.	0.09*	0.06	0.05	0.04	0.00	-0.00	0.05	0.04	0.01
Higher ed.	0.14***	0.11**	0.08	0.05	0.00	-0.03	0.02	-0.00	-0.05
Employed									
Student	0.12***	0.09**	0.08**	-0.02	-0.04	-0.04	0.08*	0.06	0.05
Retired	-0.03	-0.01	0.00	0.02	0.03	0.03	0.05	0.08*	0.07
Unemployed	0.03	0.04	0.05	-0.00	0.01	0.01	-0.05	-0.03	-0.03
Female	-0.06*	-0.04	-0.03	-0.11**	-0.09**	-0.08*	-0.08**	-0.06*	-0.03
Non-white	-0.01	-0.00	-0.01	0.03	0.03	0.02	0.02	0.01	0.02
Age	-0.04	-0.03	-0.02	-0.15***	-0.13**	-0.09*	-0.24***	-0.22***	-0.17***

Single	0.13***	0.11**	0.11**	0.14***	0.12**	0.11**	-0.02	-0.03	-0.03
Children in HH	-0.02	-0.04	-0.03	0.04	0.04	0.04	0.01	0.00	0.00
Soc. contact	0.10***	0.09**	0.07**	0.03	0.01	-0.01	0.11***	0.07*	0.06*
Civic groups	0.05	0.04	0.04	0.07*	0.06	0.07*	-0.04	-0.05	-0.05
Digital support	-0.04	-0.06*	-0.04	0.06	0.06	0.07*	0.02	0.02	0.04
HH dig. included	0.04	0.02	0.02	-0.00	-0.02	-0.01	-0.01	-0.02	-0.01
Disability	-0.03	-0.03	-0.02	0.01	0.00	-0.01	-0.01	-0.02	-0.01
Ubiquity of access		0.20***	0.16***		0.16***	0.14***		0.17***	0.10**
Skills (ability)			0.08*			0.10**			0.19***
Centrality			0.09**			0.10**			0.03
Constant	***	***					***	**	
Adjusted R^2	0.08	0.11	0.13	0.06	0.08	0.09	0.09	0.11	0.14
BIC	2806.0	2771.2	2759.8	2773.1	2760.9	2719.6	3419.8	3402.5	3365.5
N	1230	1230	1226	956	956	952	1180	1180	1176

Communication & interaction

	2007			2009			2011		
	M1 β	**M2 β**	**M3 β**	**M1 β**	**M2 β**	**M3 β**	**M1 β**	**M2 β**	**M3 β**
Income	0.14***	0.05	0.03	0.20***	0.11**	0.07*	0.11***	0.04	0.03
No education									
Secondary ed.	0.01	-0.02	-0.07	0.08	0.04	0.01	0.05	0.05	0.01
Further ed.	0.08	0.02	-0.02	0.13**	0.05	0.03	0.09*	0.07	0.02
Higher ed.	0.18***	0.11**	0.01	0.28***	0.16**	0.11*	0.20***	0.15**	0.07
Employed									
Student	0.04	-0.04	-0.05	0.06*	0.03	0.01	0.07*	0.03	0.02
Retired	-0.07*	-0.02	-0.01	0.01	0.03	0.03	-0.07*	-0.01	-0.04
Unemployed	-0.07*	-0.05	-0.03	-0.04	-0.01	-0.01	-0.08**	-0.04	-0.03
Female	-0.08**	-0.04	-0.01	-0.08**	-0.05	-0.03	-0.12***	-0.09***	-0.04
Non-white	0.04	0.06*	0.04	0.02	0.02	0.03	0.09***	0.06*	0.08**
Age	-0.07*	-0.06	-0.02	-0.13***	-0.09*	-0.03	-0.14***	-0.09*	-0.01
Single	0.11**	0.06*	0.06*	0.10**	0.06	0.06	0.02	-0.01	-0.01
Children in HH	-0.04	-0.07*	-0.05*	-0.02	-0.03	-0.05	-0.00	-0.02	-0.02
Soc. contact	0.16***	0.12***	0.09***	0.17***	0.14***	0.11***	0.22***	0.15***	0.13***
Civic groups	0.01	-0.01	-0.02	0.05	0.04	0.06*	0.08**	0.05*	0.06*
Digital support	-0.01	-0.05	0.00	0.00	0.01	0.01	0.00	-0.01	0.03
HH dig. included	0.08*	0.04	0.05	0.02	-0.01	0.00	-0.01	-0.03	-0.02
Disability	0.03	0.02	0.05*	-0.02	-0.03	-0.07*	-0.00	-0.01	-0.00
Ubiquity of access		0.41***	0.30***		0.35***	0.28***		0.35***	0.23***
Skills (ability)			0.31***			0.18***			0.31***
Centrality			0.13***			0.25***			0.11***
Constant	***	*	***	***	**	***	***	***	***
Adjusted R^2	0.13	0.26	0.37	0.21	0.30	0.40	0.22	0.30	0.39
BIC	3702.7	3511.7	3309.2	2612.7	2503.3	2350.4	3198.0	3078.2	2910.9
N	1236	1236	1232	958	958	953	1182	1182	1178

Participation & engagement

	2007			2009			2011		
	M1 β	**M2 β**	**M3 β**	**M1 β**	**M2 β**	**M3 β**	**M1 β**	**M2 β**	**M3 β**
Income	-0.03	-0.07*	-0.07*	0.02	-0.02	-0.06	-0.09**	-0.13***	-0.13***
No education									
Secondary ed.	-0.11*	-0.12**	-0.15***	-0.01	-0.03	-0.04	0.05	0.05	0.03
Further ed.	-0.06	-0.09*	-0.11**	0.04	0.01	0.01	0.03	0.02	-0.01
Higher ed.	-0.05	-0.08*	-0.13***	0.07	0.02	0.00	0.13**	0.11*	0.07
Employed									
Student	0.02	-0.01	-0.02	0.03	0.01	0.01	0.07*	0.05	0.04
Retired	-0.04	-0.02	-0.01	0.02	0.03	0.02	0.00	0.03	0.01
Unemployed	-0.01	-0.00	0.01	0.03	0.04	0.04	-0.02	-0.01	0.00
Female	-0.11***	-0.10***	-0.08**	-0.14***	-0.13***	-0.11***	-0.07*	-0.06*	-0.03
Non-white	-0.01	-0.01	-0.02	0.01	0.01	0.00	-0.02	-0.03	-0.03
Age	-0.16***	-0.15***	-0.13***	-0.20***	-0.18***	-0.13**	-0.26***	-0.24***	-0.20***
Single	0.16***	0.14***	0.14***	0.19***	0.17***	0.15***	0.00	-0.01	-0.01
Children in HH	-0.04	-0.05	-0.04	0.04	0.04	0.04	0.04	0.03	0.02
Soc. contact	0.13***	0.12***	0.09***	0.08**	0.07*	0.04	0.18***	0.15***	0.14***
Civic groups	0.01	0.00	-0.01	0.06	0.05	0.06	-0.02	-0.03	-0.03
Digital support	0.02	0.01	0.04	0.00	0.01	0.00	0.03	0.02	0.04
HH dig. included	0.10**	0.09*	0.09**	0.02	0.01	0.01	-0.01	-0.02	-0.01
Disability	-0.01	-0.01	0.00	-0.03	-0.03	-0.05	-0.00	-0.00	-0.00
Ubiquity of access		0.18***	0.11***		0.17***	0.15***		0.16***	0.09**
Skills (ability)			0.15***			0.06			0.16***
Centrality			0.14***			0.19***			0.07*
Constant	*		**	*	*	*	**	**	
Adjusted R^2	0.09	0.11	0.16	0.12	0.14	0.18	0.15	0.16	0.19
BIC	2585.8	2556.8	2495.3	2880.7	2863.9	2801.1	3595.3	3580.1	3539.9
N	1239	1239	1235	956	956	952	1180	1180	1176

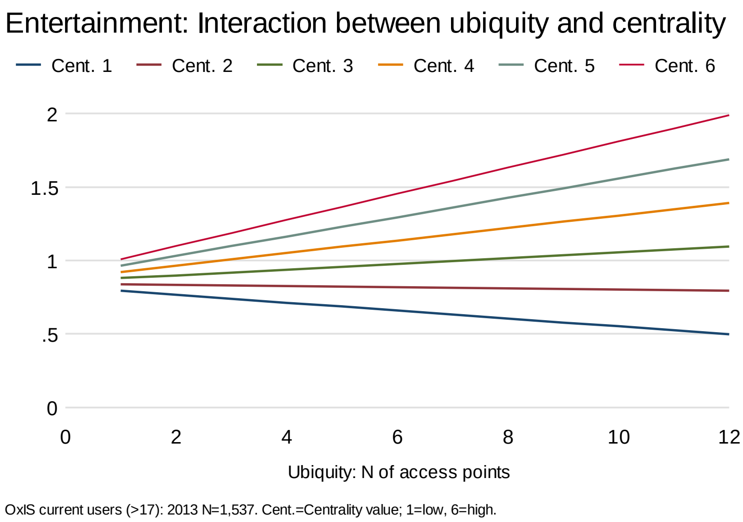
Entertainment & leisure

	2007			2009			2011		
	M1 β	**M2 β**	**M3 β**	**M1 β**	**M2 β**	**M3 β**	**M1 β**	**M2 β**	**M3 β**
Income	-0.01	-0.07*	-0.08**	0.07	0.01	-0.04	-0.06*	-0.10**	-0.10***
No education									
Secondary ed.	-0.01	-0.04	-0.06	0.02	-0.01	-0.01	0.09*	0.09*	0.07
Further ed.	0.01	-0.03	-0.05	0.09*	0.04	0.04	0.09*	0.08*	0.05
Higher ed.	0.01	-0.04	-0.09*	0.09	0.01	-0.00	0.15***	0.12**	0.08
Employed									
Student	0.04	-0.01	-0.02	0.07*	0.05	0.04	-0.01	-0.03	-0.04
Retired	-0.11***	-0.08*	-0.07*	-0.01	0.01	0.00	0.01	0.04	0.02
Unemployed	-0.03	-0.02	-0.00	0.00	0.02	0.02	-0.03	-0.01	-0.01
Female	-0.29***	-0.26***	-0.24***	-0.34***	-0.32***	-0.31***	-0.39***	-0.38***	-0.34***
Non-white	0.02	0.03	0.02	0.03	0.02	0.03	-0.10***	-0.11***	-0.10***
Age	-0.19***	-0.18***	-0.16***	-0.21***	-0.18***	-0.13***	-0.37***	-0.35***	-0.30***
Single	0.10**	0.07*	0.08*	0.18***	0.15***	0.14***	0.08**	0.07*	0.07*

Children in HH	-0.05	-0.07*	-0.06*	-0.01	-0.01	-0.02	-0.01	-0.02	-0.02
Soc. Contact	0.13***	0.10***	0.07**	0.13***	0.11***	0.09**	0.18***	0.15***	0.14***
Civic groups	0.02	0.01	-0.00	0.05	0.05	0.06*	0.02	0.00	0.01
Digital support	0.01	-0.02	0.02	-0.02	-0.01	-0.01	0.03	0.03	0.05*
HH dig. included	0.09**	0.07*	0.07*	0.04	0.01	0.02	0.02	0.01	0.02
Disability	-0.02	-0.03	-0.01	0.03	0.02	-0.00	-0.02	-0.02	-0.02
Ubiquity of access		0.27***	0.19***		0.25***	0.21***		0.17***	0.09**
Skills (ability)			0.17***			0.05			0.18***
Centrality			0.17***			0.22***			0.08***
Constant	***	***		***	***		***	***	
Adjusted R^2	0.18	0.24	0.30	0.26	0.30	0.35	0.35	0.37	0.41
BIC	2742.7	2658.9	2556.4	1901.3	1848.9	1772.4	2307.5	2279.6	2212.7
N	1239	1239	1235	958	958	953	1182	1182	1178

Notes: * p<0.05 ** p<0.01 *** p<0.001. Omitted categories: No educational qualifications; Male; White; Married/with partner; No children in household; Not a member of any civic group; No other Internet users in household; No disability. HH="household"; dig.="digitally".

B.8 Ubiquity: Model 4, interaction effects 2013 (Table 7.6)



	Total amount of use	Commercial & financial	Information & learning	Creative & productive	Communication & interaction	Participation & engagement	Entertainment & leisure
	Model 4	Model 4	Model 4	Model 4	Model 4	Model 4	Model 4
	β	β	β	β	β	β	β
Income	0.08***	0.12***	-0.02	0.14***	0.06*	0.09**	0.05
No education							
Secondary ed.	0.12***	0.16***	0.14***	0.09*	0.02	0.10*	0.04
Further ed.	0.09**	0.16***	0.13***	0.06	0.04	-0.01	-0.01
Higher ed.	0.11**	0.16***	0.25***	0.05	0.07	-0.06	-0.05
Employed							
Student	-0.01	-0.10***	0.21***	0.00	-0.07**	-0.11***	-0.08**
Retired	0.02	0.00	-0.01	-0.01	0.01	0.01	0.06*
Unemployed	0.00	-0.10***	0.06*	0.00	0.00	-0.02	0.02
Female	-0.09***	-0.02	-0.02	-0.06*	0.02	-0.02	-0.24***
Non-white	-0.02	-0.04	0.01	0.03	0.02	-0.01	-0.05*
Age	-0.14***	-0.01	-0.04	-0.04	-0.09**	-0.18***	-0.25***
Single	0.00	-0.09**	0.00	0.01	0.00	0.01	0.05
Children in HH	-0.01	0.05	0.02	-0.04	-0.03	-0.09**	-0.03
Soc. contact	0.15***	0.03	0.11***	0.14***	0.16***	0.09***	0.15***
Civic groups	0.14***	0.09***	0.12***	0.05	0.09***	0.11***	0.11***
Digital support	0.08***	-0.02	0.11***	0.12***	0.01	0.11***	0.07**
HH. dig. included	-0.04	-0.06*	-0.06*	-0.01	-0.02	-0.02	0.00
Disability	0.03	0.02	0.05	0.03	-0.02	0.02	0.02
Ubiquity of access	0.25***	0.22***	0.19***	0.04	0.29***	0.13***	0.16***
Skills (ability)	0.25***	0.18***	0.20***	0.14***	0.26***	0.16***	0.17***
Centrality	0.18***	0.13***	0.08**	0.11***	0.15***	0.13***	0.20***
Ubiquity X Skill	0.02	-0.05	0.06*	0.07*	-0.01	0.05	0.02
Ubiquity X Centrality	0.04	0.02	-0.01	0.04	0.00	0.09**	0.08**
Skill X Centrality	0.04	0.00	0.00	0.07*	0.04	0.05	0.05*
Constant	***	***	***	*	***	***	***

Adjusted R^2	0.52	0.31	0.39	0.16	0.46	0.23	0.4
BIC	9660.1	2200.9	2714.8	3147.9	2933.3	3595.8	2343.3
N	1,222	1,222	1,221	1,220	1,222	1,220	1,222

Notes: * p<0.05 ** p<0.01 *** p<0.001. Omitted categories: No educational qualifications; Male; White; Married/with partner; No children in household; Not a member of any civic group; No other Internet users in household; No disability. HH="household"; dig.="digitally". X denotes interaction effect.