

Dadansoddi ar gyfer Polisi



Analysis for Policy

Social research

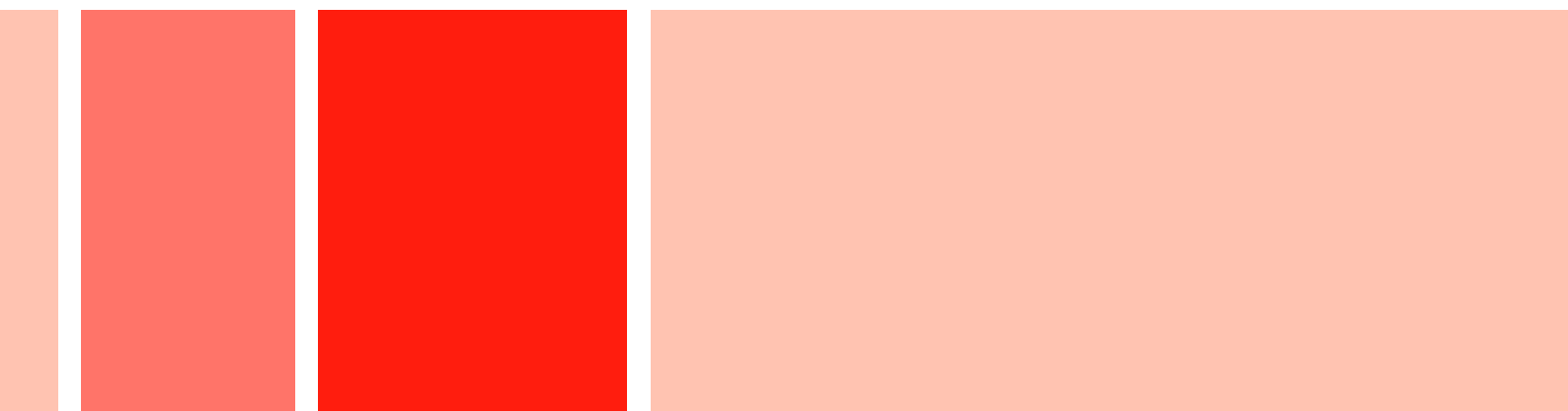
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Llywodraeth Cymru
Welsh Government

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Digital Inclusion: Analysis Package



Digital Inclusion:
Analysis Package

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Glossary

BCS	British Computer Society (also known as the Chartered Institute for IT)
BIS	Business, Innovation and Skills (UK Government department)
DCLG	Department for Communities and Local Government (UK Government department)
DCMS	Department for Culture, Media and Sport (UK Government department)
ICT / IT	Information and Communication Technology / Information Technology
LIW	Living in Wales survey
LSOA	Lower Super Output Area
ONS	Office for National Statistics
NSW	National Survey for Wales

Key messages

- To help inform the development of the Welsh Government's *Delivering Digital Inclusion* framework, this document presents a synthesis of available evidence on digital inclusion and engagement in Wales.
- A programme of analytical work was undertaken consisting of the following strands, all of which are closely interlinked and incorporated in this synthesis report:
 1. **Evidence review:** An assessment of available evidence regarding the advantages of digital inclusion, the implications of being digitally excluded, and socio-economic and demographic characteristics associated with digital engagement;
 2. **Statistical analysis:** Statistical analysis of Wales-level data to identify relationships between digital engagement and socio-economic and demographic characteristics. The evidence review helped inform which characteristics were included as variables in the subsequent analyses;
 3. **Small area mapping:** Analysis and mapping of digital inclusion and exclusion in Wales at small area level; and profiles of digitally included and excluded populations in all local authorities in Wales.
- The following key messages outline the most significant findings from the various elements of the research.

Internet use among adults in Wales

- Around **one third** adults in Wales (34 per cent) were digitally excluded in 2010. This figure is derived from reliable cross-referenced Wales-level data and calibrated using UK-level trends and analysis. The most recent

estimate from the Welsh Government's National Survey for Wales puts the proportion of adults who have never used the internet at 31 per cent. Despite the different methodologies and subtly different definitions of digital exclusion behind these figures, they both offer closely comparable estimates of the level of digital engagement in Wales.

Internet use among particular types of people

- Findings from analysis of Wales-level data align fairly closely with reports from elsewhere in relation to the types of people who are digitally engaged or disengaged.
- Between 2007 and 2010, the proportion of 18-25 year olds that use the internet remained steady at around nine out of ten, while internet use increased in all other age groups.
- The most striking increase in internet use was among those living in social housing. Between 2007 and 2010, the proportion of those living in social housing that use the internet increased from four out of ten, to six out of ten.
- Older people, those with lower socio-economic status, individuals with limiting disabilities and those with lower educational attainment are more likely to be digitally disengaged.
- An important distinction is made between digital disengagement through **personal choice** and through **socio-economic or health constraints**. Digital disengagement through personal choice is closely linked to age and life stage of an individual, with those who are not interested in using the internet tending to be older and retired people.
- Evidence from the ONS (2010) suggests that in Britain, personal choice is the most reported reason for not having household internet access, with **six out of ten** non-users reporting they had no need or desire to have

household access. In comparison, three out of ten non-users reported that equipment or access costs were too high, and two out of ten reported lack of skills as the main reason.

Consequences of digital exclusion

- There is a growing body of literature discussing the advantages of digital inclusion and the implications to individuals of being digitally excluded. While it is worth noting that not all of the following are substantiated by good quality evidence and evaluation, the issues commonly discussed in the literature are summarised below.

Cycle of deprivation

- Digital exclusion reinforces other existing forms of social and economic deprivation.
- As digital engagement becomes the norm, the disadvantages of being digitally excluded are likely to become more severe.

Employment

- Digital inclusion allows for more flexible working practices such as working from home, particularly in the knowledge sector.
- The unemployed and digitally excluded may be disadvantaged through not being able to search or apply for jobs online.

Education and information

- The digitally included can access information quickly online.
- The digitally excluded miss out on the improved educational prospects and outcomes associated with digital inclusion (although there is also evidence that suggests internet access may have modest negative impacts on educational attainment).

Consumer implications

- The digitally included can quickly carry out transactions online.

- Digitally excluded consumers do not benefit from the ability to shop around for more competitively priced goods and services online, or to access certain goods and services at all if they are only available online.
- However, households with low income may not have a direct net financial benefit from home internet access for many years.

Personal wellbeing

- The digitally included can better communicate and keep in touch with other people through email and social networking sites.
- There is emerging evidence that compared with the digitally excluded, internet users feel less lonely and their personal wellbeing is enhanced.

Patterns of digital inclusion in Wales

- In order to plan interventions to stimulate digital engagement, information on where digitally disengaged people live is important to policymakers. To this end, the Welsh Government commissioned Experian to undertake small area mapping of digital inclusion and exclusion in Wales. The findings from this strand of the research show that:
 - The local authorities with the highest levels of digital inclusion are **Cardiff, Vale of Glamorgan** and **Monmouthshire**, where more than seven in ten of the adult population are internet users.
 - The four local authorities with the lowest levels of digital inclusion are found in the **South Wales Valleys**: Blaenau Gwent, Merthyr Tydfil, Neath Port Talbot and Rhondda Cynon Taf.
 - At the local authority level, the relationship between digital and economic exclusion appears to be strong, with the Convergence Areas of West Wales and the Valleys tending to have the least digitally included local authorities. Notable exceptions to this are

Ceredigion and Bridgend – both are Convergence Areas but are the fourth and sixth most digitally included local authorities respectively.

- At LSOA (Lower Super Output Area) level¹, neighbourhoods with the highest levels of digital inclusion are characterised by having a **high proportion of students and young people** (such as the Cathays and Plasnewydd areas of Cardiff, parts of Treforest in Rhondda Cynon Taf; and Abersytwyth Canol/Central in Ceredigion).
- At the other end of the scale, LSOAs with low levels of digital inclusion tend to be those with relatively **older populations** and/or those with high levels of **social and economic exclusion**. These characteristics reflect the roles that personal choice (and its relation to age and life stage) and socio-economic exclusion play in digital engagement.

Evidence gaps

- Whilst a significant body of evidence and analysis has been brought together in this report, our understanding of digital inclusion is far from complete and the following areas have been identified as requiring further investigation:
 - As the evidence base for digital inclusion continues to grow, a greater focus is required on understanding if, and to what extent, causal relationships exist between internet use and educational, employment, economic and wellbeing outcomes. A better understanding of the causal links will present a more informed picture to policymakers and help to design the interventions they put in place and how these should be targeted.

¹ LSOAs are small geographic areas with populations of around 1,500 residents and a relatively high degree of social homogeneity.

- Analysis shows that, overall, individuals reporting limiting disabilities are less likely to use the internet. Current evidence suggests that visual impairment, dyslexia, and learning difficulties may present particular barriers to engaging with digital technology. However, the current evidence base does not allow for differentiation of disability types and consequently there is little scope for a meaningful assessment.
- There is little evidence around how different ethnic groups use the internet and the extent to which they are digitally engaged. The small populations of some ethnic minority groups in Wales means robust information is difficult and expensive to acquire. Consequently, the evidence base in this area is not currently sufficient to provide policymakers with an informed picture.
- While there is potential to make substantial efficiency savings through delivering more public services online, consideration needs to be given to the social justice implications this would entail. Indeed, the segments of the population in significant need of and likely to engage with public services are more likely to be digitally excluded, which potentially limits the reach of online services and restricts the potential for long-term financial savings.
- There is scope for our understanding of the economic impact of digital inclusion on individuals and wider society to be strengthened, which may in turn challenge for some of the underlying assumptions of the existing evidence base.
- It is unclear why such a large increase in internet use among social housing residents in Wales was observed between 2007 and 2010. How can this increase be explained? Have such increases been observed elsewhere?

1. Introduction

1.1 Background

The Welsh Government's vision for digital inclusion, as set out in *Delivering Digital Inclusion: A Strategic framework for Wales* (2010: 3), is 'to ensure that everyone who wants to be online can get online, do more online and benefit from the advantages of being online'.

The *Delivering Digital Inclusion* framework estimates that around **one third** adults in Wales (34 per cent) were digitally excluded in 2010 – which in this case means they are not regular users of the internet. This figure is derived from reliable cross-referenced Wales-level data and calibrated using UK-level trends and analysis. The most recent estimate from the Welsh Government's National Survey for Wales (a representative sample survey of adults in Wales) puts the proportion of adults who have never used the internet at 31 per cent. Despite the different methodologies and subtly different definitions of digital exclusion behind these figures, they both offer closely comparable estimates of the level of digital engagement in Wales.

In developing the evidence base to support the *Delivering Digital Inclusion* framework, the Welsh Government has undertaken three main strands of research, all of which are closely interlinked and incorporated in this synthesis report:

- 1. Evidence review:** An assessment of available evidence regarding the advantages of digital inclusion, the implications of being digitally excluded, and socio-economic and demographic characteristics associated with digital engagement;
- 2. Statistical analysis:** Statistical analysis of Wales-level data to identify relationships between digital engagement and socio-economic and

demographic characteristics. The evidence review helped inform which characteristics were included as variables in the subsequent analyses;

- 3. Small area mapping:** Analysis and mapping of digital inclusion and exclusion in Wales at small area level (including local authority and Lower Super Output Area); and profiles of digitally included and excluded populations in all local authorities in Wales. The Welsh Government commissioned Experian to undertake this strand of work.

1.2 Methodology

1.2.1 Evidence review

This strand consisted of a critical review of available evidence about digital inclusion and exclusion. The review was structured around identifying evidence of which socio-economic and demographic characteristics are associated with different levels of digital engagement; the advantages of digital inclusion and the implications of being digitally excluded; and the implications that a digital divide has for government policymaking and public service delivery. Evidence and analysis from academic, government and stakeholder literature were assessed. This helped identify relevant issues and appraise where evidence was strong or weak, and whether the extant evidence led to a consensus viewpoint or pointed towards a need for further research.

The evidence review identified characteristics considered to be associated with levels of digital engagement which, in turn, helped to inform which socio-economic and demographic characteristics would be included in the statistical analysis strand of the research.

1.2.2 Statistical analysis

Statistical analysis of data from the Welsh Government's 2010 pilot National Survey for Wales (NSW) was undertaken to identify relationships between

internet use and socio-economic and demographic characteristics. Where possible, comparisons were made with analysis of data from the 2007 Living in Wales (LIW) survey, which was the forerunner to the NSW.

The NSW interviewed a representative sample of adults (aged 16 years and over) in Wales. However, respondents aged 16 and 17 years were excluded from the analysis as policy interest lies in those aged 18 years and over. In total there were data for 5,658 adults in 2010. In order to account for different selection probabilities and response rates of sub-groups within the sample, weights were applied to make the data more representative of the adult population in Wales.

Respondents to the 2010 NSW and 2007 LIW survey were asked 'How often do you access the internet, whether at home, work or elsewhere?'

Respondents that answered 'on most days', 'at least once a week', or 'less often than once a week' were considered to be digitally included; respondents that answered 'never' were considered to be digitally excluded.

Regression analysis was undertaken to explore which characteristics remained significantly associated with internet use once the other characteristics in the model were held constant. The results presented in this report are considered to be statistically significant where the probability of obtaining the finding by chance is less than one in 20². The following socio-economic and demographic characteristics were chosen for the statistical analysis, based on a review of the extant evidence, comparability with the 2007 LIW data, and the data available from the NSW:

- Age
- Working status
- Disability status
- Housing tenure
- Educational attainment

² That is, statistically significant at the 95 per cent confidence level.

- Gender
- Welsh language ability

1.2.3 Small area mapping

Following a competitive tendering exercise, the Welsh Government commissioned Experian to undertake this strand of the research. A three-stage approach was adopted:

1. A digital inclusion model was built to score adults in Wales on their likelihood of using the internet.
2. Model scores were scaled up to quantify digital inclusion across three geographic units – local authority, electoral division and Lower Super Output Area (LSOA).
3. Profiles of digitally included and excluded populations were created to understand underlying demographics and characteristics.

A detailed account of methodology for this stage is attached at Appendix A.

1.3 Report structure

The rest of this report is organised into a further four chapters. Chapter 2 considers which factors influence digital engagement and assesses internet use among adults in Wales, bringing together findings from the evidence review, statistical analysis and small area mapping stages of the research. Chapter 3 evaluates the evidence regarding the consequences of digital exclusion and the implications this has for policy making and public service delivery. In Chapter 4, a more detailed picture of digital inclusion and exclusion in Wales is provided, presenting maps and rankings of digital inclusion levels at local authority and LSOA level. Concluding remarks are made in Chapter 5 and areas for further investigation are identified.

2. Characteristics of digital disengagement

The Oxford Internet Institute’s ‘Internet in Britain 2009’ report (Dutton et al 2009) makes an important distinction between digital disengagement through **personal choice** and through **exclusion**. The dominant characteristics associated with these different forms of disengagement are summarised below (Table 2.1).

Table 2.1: Dominant characteristics of digital disengagement

Disengagement through choice	Disengagement through exclusion
<p>Structured by cultural and social characteristics, in particular:</p> <ul style="list-style-type: none"> ▪ Age → use of the internet is lower among older people ▪ Life stage → students and the employed are far more likely to use the internet than the retired or unemployed 	<p>Enforced by social, economic and physical health constraints:</p> <ul style="list-style-type: none"> ▪ Low income / socio-economic status → socio-economic exclusion ▪ Low level of educational attainment → education and skills exclusion ▪ Disability or health issues → health exclusion

Accordingly, this chapter provides an analysis of digital inclusion and exclusion in Wales structured around personal choice (with a particular focus on age), and socio-economic, education and health factors.

2.1 Internet use among adults in Wales

Statistical analysis of data from the Welsh Government’s 2010 National Survey for Wales (NSW) was undertaken to identify relationships between internet use and socio-economic and demographic characteristics (premised on internet use being a good proxy for digital engagement, which is well established). Where possible, comparisons are made with analysis of data from the 2007 Living in Wales (LIW) survey.

The analysis showed that in 2010, **69 per cent of adults in Wales used the internet** on most days, at least once week or less often than once a week³. This compares with 61 percent in 2007. The remaining **31 per cent** of adults in Wales in 2010 did not use the internet, compared with 39 per cent in 2007.

Between 2007 and 2010, two notable findings are:

- While internet use increased in all other age groups, the proportion of 18-25 year olds that use the internet has remained steady, at around nine out of ten.
- The most striking increase in internet use is among those living in social housing. Between 2007 and 2010, the proportion of those living in social housing that use the internet increased from four out of ten, to six out of ten.

Table 2.2, below, summarises the characteristics significantly associated with internet use in 2010 and how they relate to Dutton et al's classifications.

Table 2.2: Characteristics significantly associated with internet use (2010)

All other factors held constant, internet use was significantly <i>higher</i> among adults ...	All other factors held constant, internet use was significantly <i>lower</i> among adults ...	Associated characteristic
aged between 18 and 44 years	aged 45 years and above	Personal choice
who were working	who were not working	Socio-economic exclusion
who lived in owner occupied housing	who lived in private rented or social housing	
who did not have a limiting disability	who had a limiting disability	Health exclusion
who had attained GCSEs A*-C (or equivalent) or above	who had attained GCSEs D-G (or equivalent) or below	Education and skills exclusion

³ Evidence from ONS (2010) suggests that in 2010, the proportion of internet users in Wales was similar to the UK average. According to Eurostat (2011), 66 per cent of 16-74 year olds in the UK in 2010 used the internet 'frequently', significantly higher than the EU average of 53 per cent. Therefore, while digital inclusion rates in Wales may be in line with the UK average, they would appear to be significantly higher than the EU average.

In our analysis of Wales-level data, gender and Welsh language ability were also explored as possible determinants of digital engagement but no significant relationship was found with either variable.

The four main characteristics associated with digital engagement in the literature (personal choice; socio-economic exclusion; education and skills exclusion; and health exclusion) are now considered in turn, presenting further analysis of data from the 2010 NSW and how the findings relate to other existing evidence.

2.2 Disengagement through personal choice

In Britain, personal choice is the most reported reason for not having household internet access, with **six out of ten** non-users reporting they had no need or desire to have household access (Table 2.3).

Table 2.3: Reasons for not accessing the internet

Reason	% ^a
Don't need or want to use the internet	59
Equipment or access costs too high	33
Lack of skills	21
Have internet access elsewhere	8
Privacy or security concerns	4
Physical disability	2

Source: ONS (2010)

(a) Table sums to more than 100 per cent as respondents were able to give more than one answer to this question

Similarly, the 2008 Living in Wales survey (Welsh Government) found that 79 per cent of households without a home computer (an intuitively reasonable proxy for digital engagement) stated they had 'no interest or don't need a computer'. Interestingly, a comparably small proportion (13 per cent) stated that a computer was 'too expensive'.

There is consensus in the literature that a major barrier to digital engagement is a lack of understanding of the potential benefits. The DCLG report (2008a: 7), *An Analysis of International Digital Strategies*, observed that the need to raise awareness of the benefits of digital technologies is an issue common to many countries. Perceptions of the relevance of digital technologies to individuals (van Dijk and Hacker 2003) and expectations regarding what types of interaction are possible (Cabinet Office 2004) have been shown to impact on levels of digital engagement.

An Ofcom study (2009) found that those who did not use the internet because they simply were not interested in doing so **tended to be older and retired people**. This corroborates Dutton et al's finding that digital disengagement through personal choice is closely linked to age and life stage of an individual. The relationship between age and internet use is now considered in more detail.

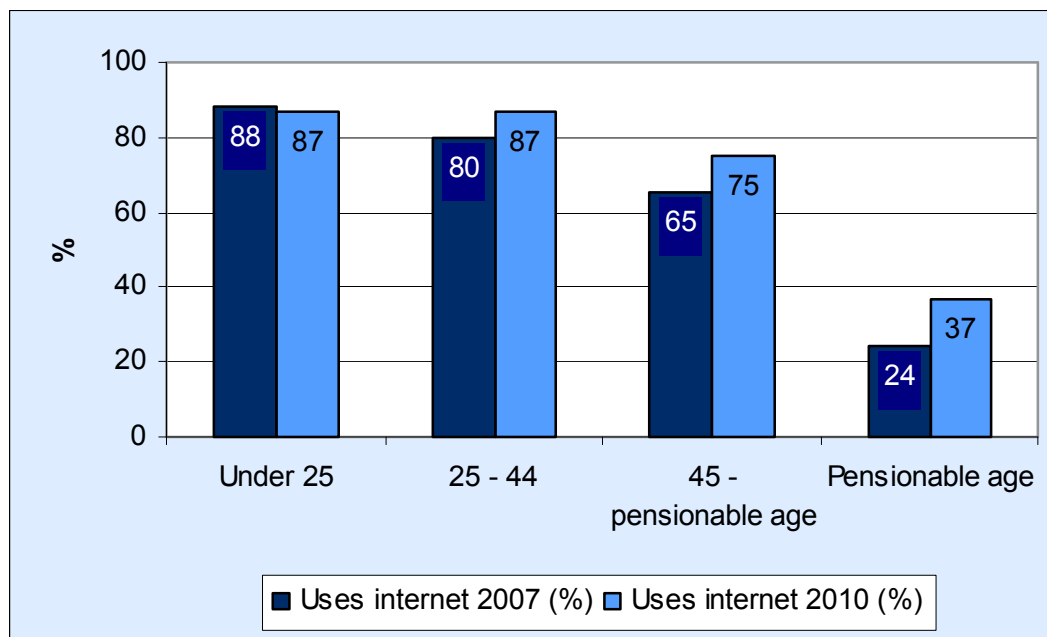
2.2.1 Internet use and age

In Wales in 2010, a greater proportion of respondents under 45 years of age used the internet than those aged 45 years and over (Figure 2.1).

The most striking difference is that, in 2010, while three quarters (75 per cent) of respondents aged 45 years to pensionable age used the internet, this proportion fell to 37 per cent of those of pensionable age.

Since 2007, the proportion of internet users has increased significantly in all age categories except the under 25s, where it has remained constant and very high. Although those of pensionable age recorded a 13 percentage point increase in internet use between 2007 and 2010, which closed the gap somewhat, pensioners still lag far behind younger age groups.

Figure 2.1: Internet use by age



Sources: Living in Wales Survey 2007 and National Survey for Wales 2010

With age clearly being such a significant factor, it is tempting to theorise that levels of digital exclusion among older people will naturally diminish as younger cohorts grow older. However, this simple assertion might not hold for the following reasons:

- **Increasing longevity** – as life expectancy continues to increase, the rate of demographic change slows.
- **Technological change** – as new cohorts enter old age, they may not have the ICT literacy, in relative terms to the younger cohorts, to keep up with ongoing technological changes.
- **Being old is not the only factor** – there are also a significant number of younger people that are not digitally engaged.

Ofcom's (2010) report on UK adults' media literacy makes the following points regarding age, which go some way towards supporting this argument:

- Those aged 65 years and over have a significantly lower level of ICT and media literacy⁴ than other age groups.
- Mobile phones are used differently depending on age. While older people tend to use mobile technology purely for communicative purposes, younger people have embraced the full functionality of the technology – including accessing the internet.
- Older people express a preference for informal learning (e.g. through help from relatives) than more formal ICT and media literacy training.

2.3 Disengagement through exclusion

Having assessed the relationship between digital disengagement and personal choice, with a particular focus on age, this section considers exclusionary factors. According to Dutton et al (2009: 55):

‘Digital exclusion is strongly related to other types of social disadvantage; those who are socially and economically excluded are also unlikely to access the internet for these purposes. [...] People who suffer deep social exclusion are four times more likely to be disengaged from the internet, compared to the socially advantaged.’

2.3.1 Socio-economic factors

According to ONS (2010), **one third** of households in Britain without internet access report that ‘equipment or access costs are too high’. Those who do not have internet access because it is considered too costly tend to be, intuitively, from socio-economic groups DE.

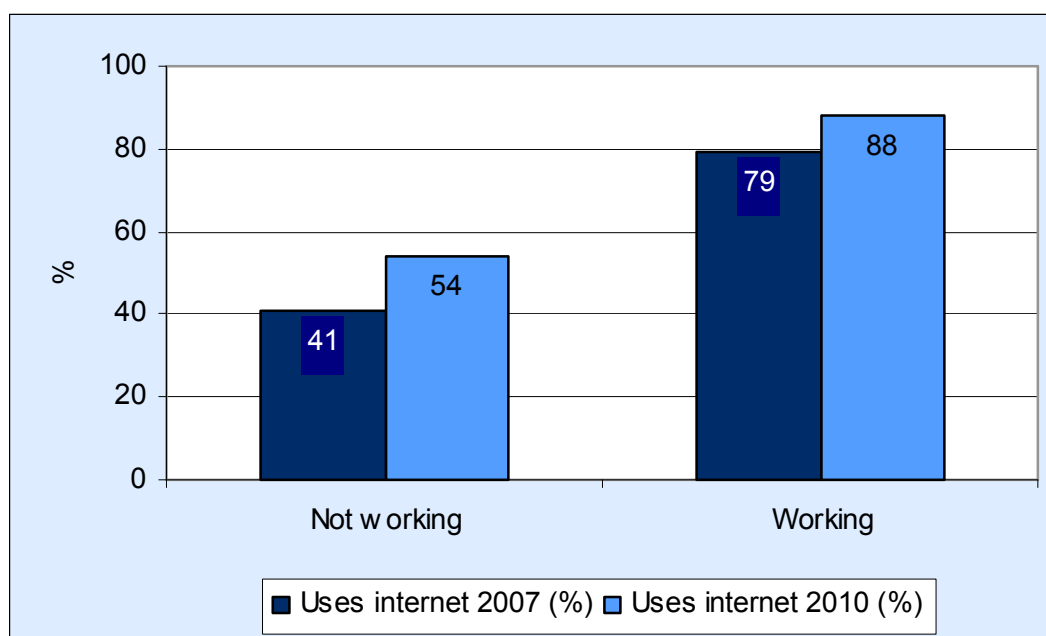
⁴ According to the Welsh Affairs Committee report *Digital Inclusion in Wales* (2009: 4), ‘Media literacy is a term which has been used to describe a wide range of technical and social skills for people with very different abilities and aspirations.’

Data from the 2010 NSW were analysed to assess the relationship between internet use and two characteristics closely associated with socio-economic status – working status and housing tenure.

Analysis confirmed that in Wales working status is significantly related to internet use. As Figure 2.2 shows, around nine out of ten (88 per cent) adults who were working used the internet compared with around half (54 per cent) of non-working adults in 2010.

Since 2007, the proportion of internet users has increased significantly in both categories – by 9 percentage points of those working, and 13 percentage points of those not working – suggesting that the gap in internet use between those working and those not working narrowed between 2007 and 2010.

Figure 2.2: Internet use by working status

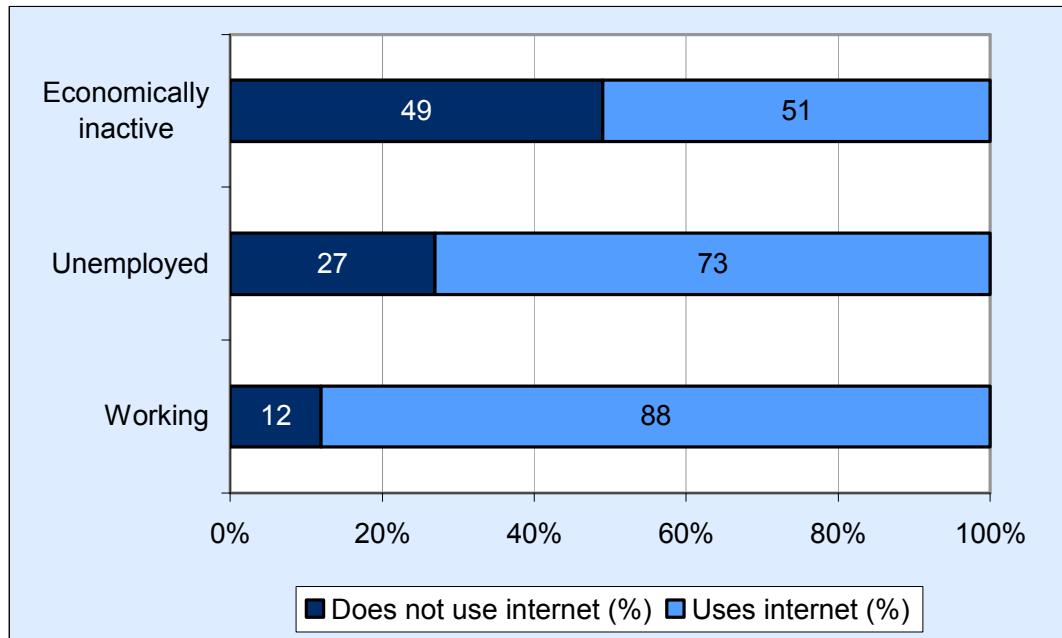


Sources: Living in Wales Survey 2007 and National Survey for Wales 2010

However, a subtly different picture emerges when the 'not working' category is split into 'unemployed' and 'economically inactive'. As Figure 2.3 shows, in 2010, internet use was significantly higher among the unemployed (73 per cent) than the economically inactive (51 per cent). Further analysis shows that almost eight out of ten of the economically inactive that are digitally excluded

are retired. Once again, this illustrates the impact that age and life stage has on internet use.

Figure 2.3: Internet use by working status (3 category)



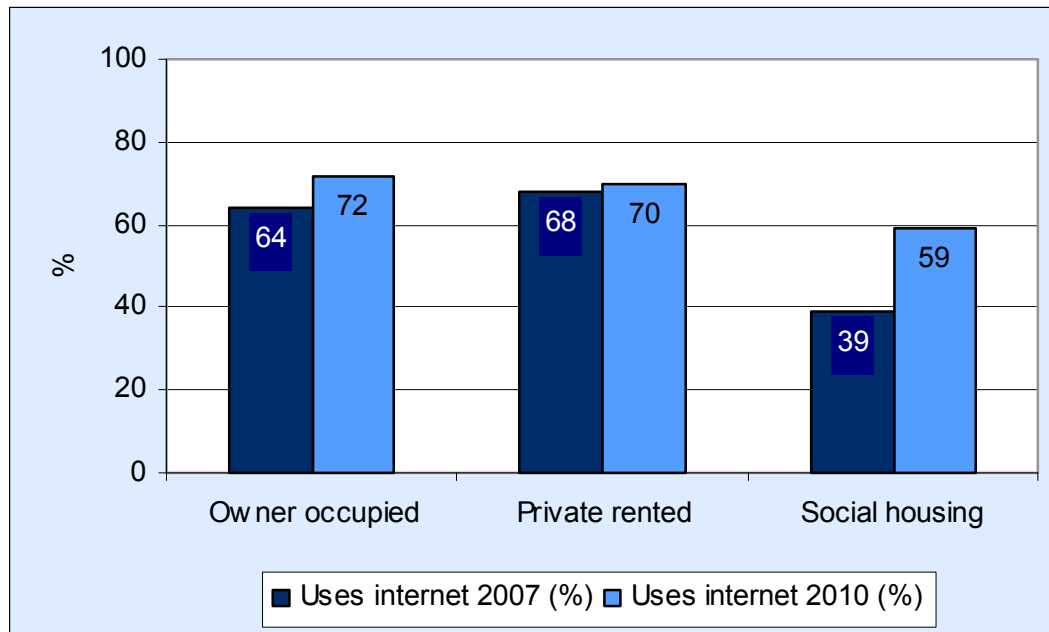
Source: National Survey for Wales 2010

The analysis also demonstrated a significant relationship between internet use and housing tenure in Wales, with 72 per cent of respondents living in owner occupied housing using the internet compared with 59 per cent in social housing (Figure 2.4, below).

Between 2007 and 2010, the most striking change is in the proportion of social housing residents using the internet, which increased by 20 percentage points. The data is unable to offer clues as to why such a large increase in internet use occurred among social housing residents, making this an area worthy of further investigation.

The proportion of owner occupiers using the internet also increased significantly. While the proportion of private renters that use the internet increased by 2 percentage points, the increase is not statistically significant.

Figure 2.4: Internet use by housing tenure



Sources: Living in Wales Survey 2007 and National Survey for Wales 2010

Although the proportion of internet users in private rented housing is similar to that for owner occupied, the regression analysis showed that, all other factors held constant, owner occupiers were significantly more likely to use the internet than those in private rented or social housing. This may be due to the possibility that those in private rented accommodation have other characteristics which are significantly related to internet use (such as age and educational attainment). When these other characteristics are held constant, owner occupiers are more likely to be internet users than those in private rented housing.

The findings from the statistical analysis support the evidence in the literature that people with lower socio-economic status are less likely to use the internet (UK Online Centres 2007; Anderson 2009; Bevan Foundation 2009; Longley and Singleton 2009)⁵.

⁵ A notable exception to this consensus is provided by Beynon-Davies and Hill (2007) who concluded that there were digital divides in Wales in terms of age and education but not income.

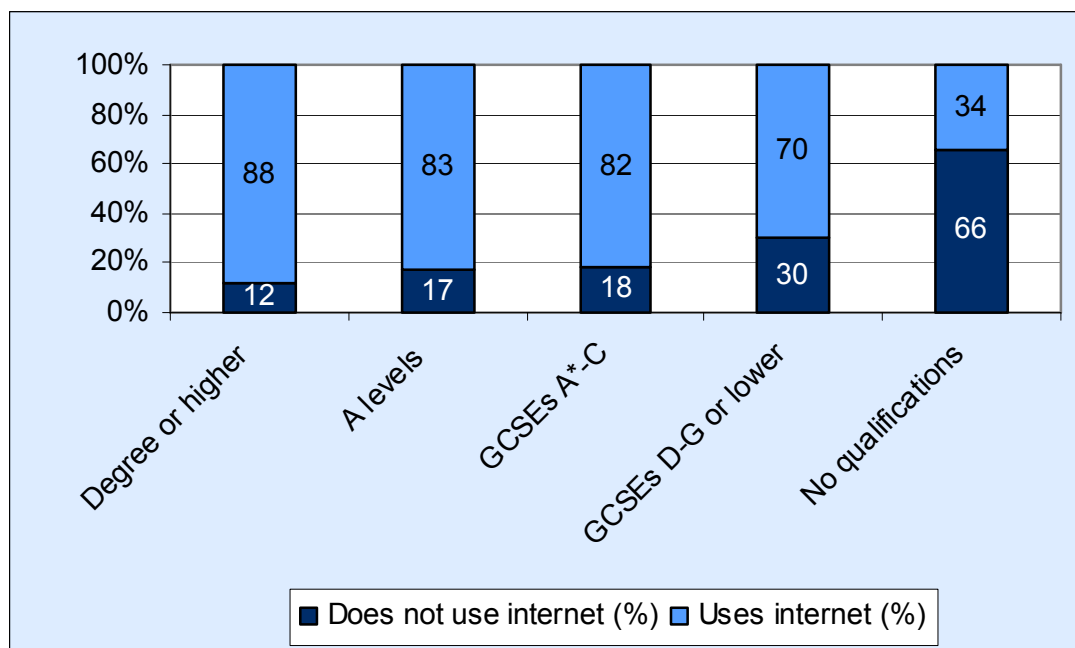
Evidence also suggests a relationship between socio-economic status and *how* the internet is used. Hargittai (2010) investigated factors that may explain the variation in internet skills uses among young adults, concluding that socio-economic status is a strong predictor of how young adults incorporate internet use in their lives. Individuals from higher social classes tend to use the internet in a more informed way and for a greater range of activities.

2.3.2 Education and skills factors

More than **one in five** households in Britain without internet access report that 'lack of skills' is a reason why they have no home internet access (ONS 2010). As Figure 2.5 shows, there was a clear relationship between educational attainment and internet use in Wales. In total, one third (34 per cent) of adults with no qualifications used the internet compared with around nine out of ten (88 per cent) adults with a degree (or equivalent) and higher.

No data on educational attainment is available from the 2007 LIW survey, so a comparison is not possible.

Figure 2.5: Internet use by educational attainment



Source: National Survey for Wales 2010

The relationship between internet use and educational attainment is also found at the UK level (UK Online Centres 2007; Anderson 2009).

Evidence suggests that a clear relationship exists between **general literacy and digital literacy**, with general literacy difficulties and a lack of confidence in skills contributing to the barriers of being digitally engaged (Foley et al 2003; DCLG 2008a). This relationship may exist across all age groups – as Hargittai (2010) argues, the labelling of young people as being the ‘net generation’ and ‘internet savvy’ can be misleading as wide variation of skills exists within the age group.

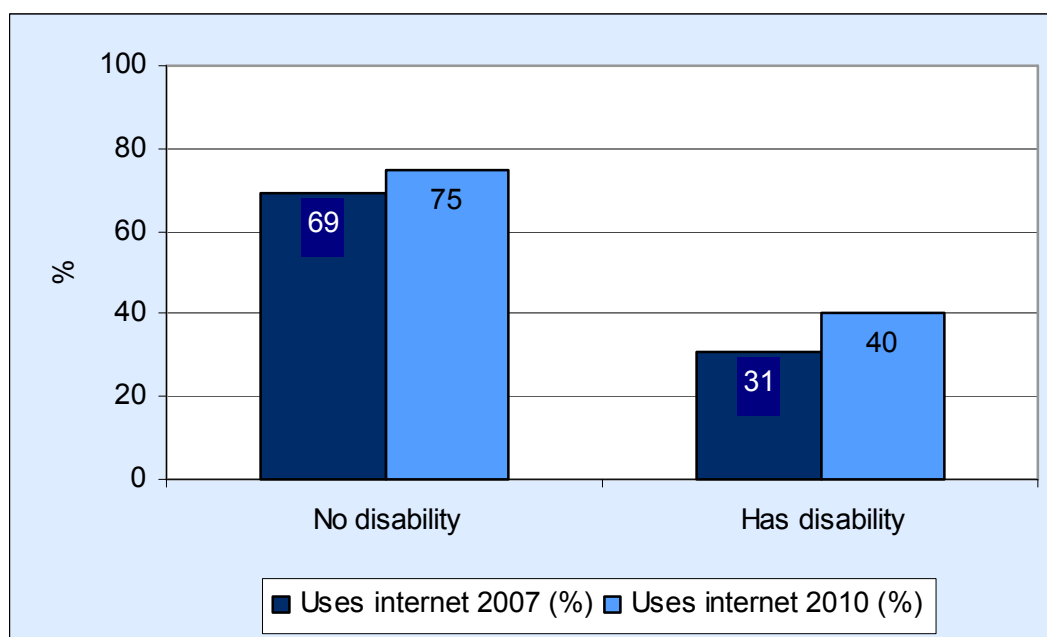
In terms of a response to this relationship, DCLG point to complimentary policies in some countries that helped tackle basic and digital illiteracy – for example, through using digital technology as an incentive for young people to engage in education and learning.

2.3.4 Health factors

Of the households in Britain that do not have home internet access, **2 per cent** report that physical disability prevents them from doing so (ONS 2010).

Analysis of NSW data shows a clear relationship between self-reported limiting disability and internet use in Wales. In 2010, while three quarters of respondents without a limiting disability used the internet, only four out of ten respondents with a limiting disability used the internet (Figure 2.6, below). The proportion of internet users in both categories increased significantly between 2007 and 2010.

Figure 2.6: Internet use by disability status



Sources: Living in Wales Survey 2007 and National Survey for Wales 2010

This finding corroborates other existing evidence that, overall, people with disabilities are more likely to be digitally excluded (Commission for Rural Communities 2005; Bevan Foundation 2009). According to UK Online Centres (2007), visual impairment, dyslexia, and learning difficulties present particular challenges to engaging with digital technology. However, the overall evidence base for distinguishing between different types of disabilities and their impact on digital inclusion is weak, representing a considerable gap in our current understanding.

2.4 Portraits of the digitally excluded in Wales

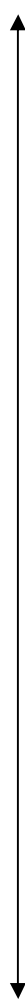
Corroborating much of the extant literature, the data analysis described above has shown that older people, those with lower socio-economic status, individuals with limiting disabilities and those with lower educational attainment are more likely to be digitally disengaged.

The cumulative effects of these characteristics are reflected in a profile of digitally excluded adults in Wales produced by Experian (commissioned by the Welsh Government). The profiles are based on a number of variables

including citizens' location, demographic and socio-economic characteristics, lifestyles and consumption behaviour.

The derived digital exclusion index shows how likely it is that an individual in a particular group or category is digitally excluded compared with the rest of the adult population in Wales (Table 2.4). For example, an 'elderly person reliant on state support' has an index score of 258 against the Wales average of 100. This means that an elderly person reliant on state support is **2.58 times more likely to be digitally excluded** than the average adult. At the other end of the scale, 'couples with young children in modern housing' has an index score of 23. This means that an adult in this category is 0.23 times as likely (i.e. less likely) to be digitally excluded compared with the average adult.

Table 2.4: Profile of digitally excluded adults in Wales

	Mosaic Public Sector Group	Digital Exclusion Index (Average = 100)
Most likely to be digitally excluded	Elderly people reliant on state support	258
	Active elderly people living in pleasant retirement locations	222
	Residents with sufficient incomes in right-to-buy social housing	130
	Owner occupiers in older-style housing in ex-industrial areas	124
	Residents of small and mid-sized towns with strong local roots	117
	Families in low-rise social housing with high levels of benefit need	91
	Residents of isolated rural communities	90
	Middle income families living in moderate suburban semis	65
	Successful professionals living in suburban or semi-rural homes	58
	Lower income workers in urban terraces in often diverse areas	56
	Young people renting flats in high density social housing	53
	Young, well-educated city dwellers	53
	Wealthy people living in the most sought after neighbourhoods	50
	Couples and young singles in small modern starter homes	31
Least likely to be digitally excluded	Couples with young children in comfortable modern housing	23
Source: Experian 2010		

Focussing on the two groups that have digital exclusion index scores exceeding 200, they break down into the following sub-categories (Table 2.5):

Table 2.5: Breakdown of most digitally excluded groups

Mosaic Public Sector Group and Type	Number of digitally excluded adults in group or sub-type	Total adult population in group or sub-type	Digital Exclusion Index (Average = 100)
Elderly people reliant on state support	82,356	93,951	258
Less mobile older people requiring a degree of care	7,640	7,825	287
Older people living on social housing estates with limited budgets	55,313	61,376	265
People living in social accommodation designed for older people	9,776	12,159	237
Old people in flats subsisting on welfare payments	9,627	12,591	225
Active elderly people living in pleasant retirement locations	69,254	92,042	222
Retired people of modest means commonly living in seaside bungalows	37,096	38,904	281
Communities of wealthy older people living in large seaside houses	9,890	14,947	195
Capable older people leasing / owning flats in purpose built blocks	6,438	10,812	175
Residents in retirement, second home and tourist communities	15,830	27,379	170
Source: Experian (2011)			

These groups help illustrate the cumulative effect of different characteristics associated with digital disengagement. For example, ‘less mobile older people requiring a degree of care’ exhibit the characteristics of old age, poor health and possibly low socio-economic status. Even if they wanted to get online (although being old, the evidence suggests that they are unlikely to be interested in doing so), they still face multiple barriers to digital inclusion from

poor health and/or disability, not possessing the skills or confidence, and possibly a problem of affordability.

In terms of highlighting population groups with high levels of digital exclusion, it is useful to consider the size of the population as well as their likelihood of being digitally excluded. For example, while 'older people living on social housing estates with limited budgets' may be less likely to be digitally excluded than 'less mobile older people requiring a degree of care', their different population sizes show that more of them are digitally excluded (the model suggests 55,313 of the first group, compared with 7,640 of the latter).

Other groups that are more likely than average to be digitally excluded are shown below in Table 2.6. It is worth noting the variation that exists within these groups. For instance, while 'owner occupiers in older-style housing in ex-industrial areas' are 1.24 times as likely to be digitally excluded than the average adult in Wales, within this group, 'residents in blue collar communities revitalised by commuters' are much less likely than the average adult to be digitally excluded. Again, it is useful to consider the actual numbers of digitally excluded within these population groups, as well as their likelihood of being digitally excluded.

Table 2.6: Breakdown of other digitally excluded groups

Mosaic Public Sector Group and Type	Number of digitally excluded adults	Total adult population	Digital Exclusion Index (Average = 100)
Residents with sufficient incomes in right-to-buy social housing	169,506	383,482	130
Low income older couples long established in former council estates	91,426	127,736	211
Middle aged couples and families in right-to-buy homes	36,411	91,965	117
Older families in low value housing in traditional industrial areas	21,220	59,715	105
Often indebted families living in low rise estates	20,449	104,066	58
Owner occupiers in older-style housing in ex-industrial areas	92,577	220,099	124
Comfortably off industrial workers owning their own homes	43,671	63,104	204
Low income communities reliant on low skill industrial jobs	42,479	114,851	109
Residents in blue collar communities revitalised by commuters	6,427	42,144	45
Residents of small and mid-sized towns with strong local roots	107,815	272,460	117
Better off empty nesters in low density estates on town fringes	42,498	67,047	187
Self employed trades people living in smaller communities	31,783	95,176	98
Mixed communities with many single people in the centres of small towns	10,923	35,814	90
Empty nester owner occupiers making little use of public services	22,611	74,423	89
Source: Experian (2011)			

2.5 Locations of internet use and activities

Results from the 2010 NSW show that around nine in ten adults that used the internet in the last three months did so at home; almost a quarter did so at work; while one in ten used the internet at another person's home (Table 2.7).

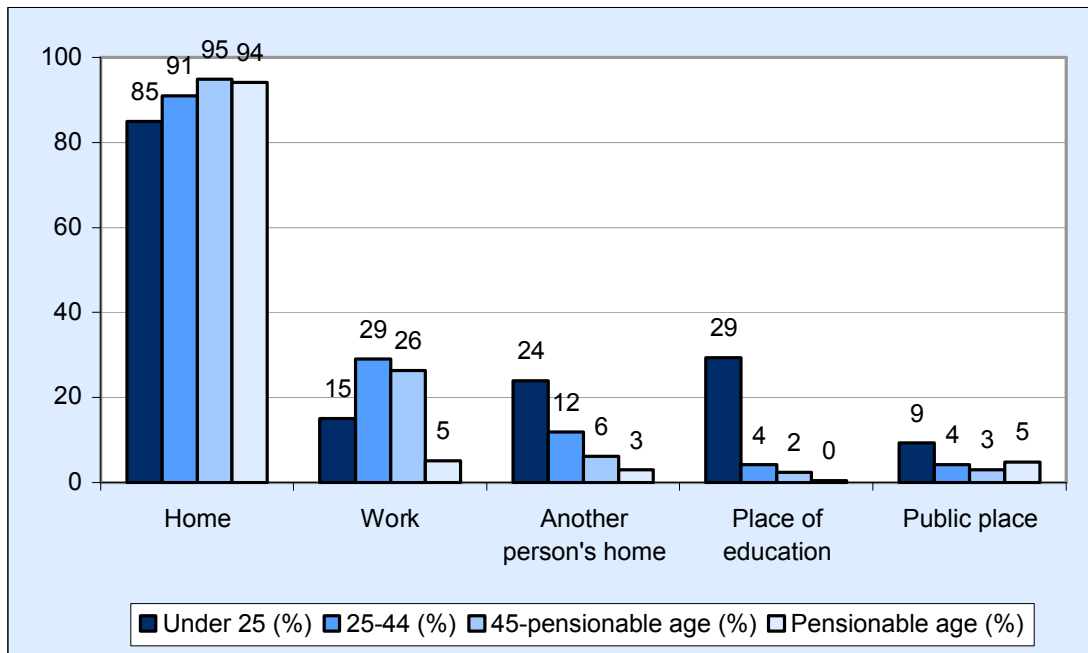
Table 2.7: Places where used internet in last three months

Place	% ^a
At home	92
At work	23
At another person's home	10
At place of education	6
Public place (e.g. library; community centre; internet cafe)	5
Source: National Survey for Wales 2010 (a) Table sums to more than 100 per cent as respondents were able to give more than one answer to this question	

According to Seetha Kumar (2009), who writes for the BBC's Internet Blog, 'A sizeable group of those not online at home are the young. Most access digital services at their friends' houses, schools, colleges, or universities.' Kumar's claim appears to be corroborated by the data. As Figure 2.7 shows, while the home is by far the most common place that the internet is used for each age group, 58 per cent of internet users under 25 years used the internet at home in the last three months – significantly less than other age groups. Around a quarter of internet users under 25 years used the internet at another person's home in the last three months. This proportion decreases as the age categories get older, with only 3 per cent of internet users of pensionable age having used the internet at another person's home recently. The proportion of internet users that have used the internet in public places (e.g. internet cafes or libraries) in the last three months is relatively small, with around one in ten of internet users under 25 years, dipping to only 3 per cent of those between 45 years and pensionable age.

As would be expected, internet use at a place of education is highest among younger age groups, while internet use at work is higher among the middle age categories.

Figure 2.7: Places where used internet in last three months by age



Source: National Survey for Wales 2010

Base: All adults that use the internet

Table 2.8, below, shows that the most popular activities the internet is used for included email (82 per cent), general browsing (74 per cent) and findings information about goods and services (59 per cent).

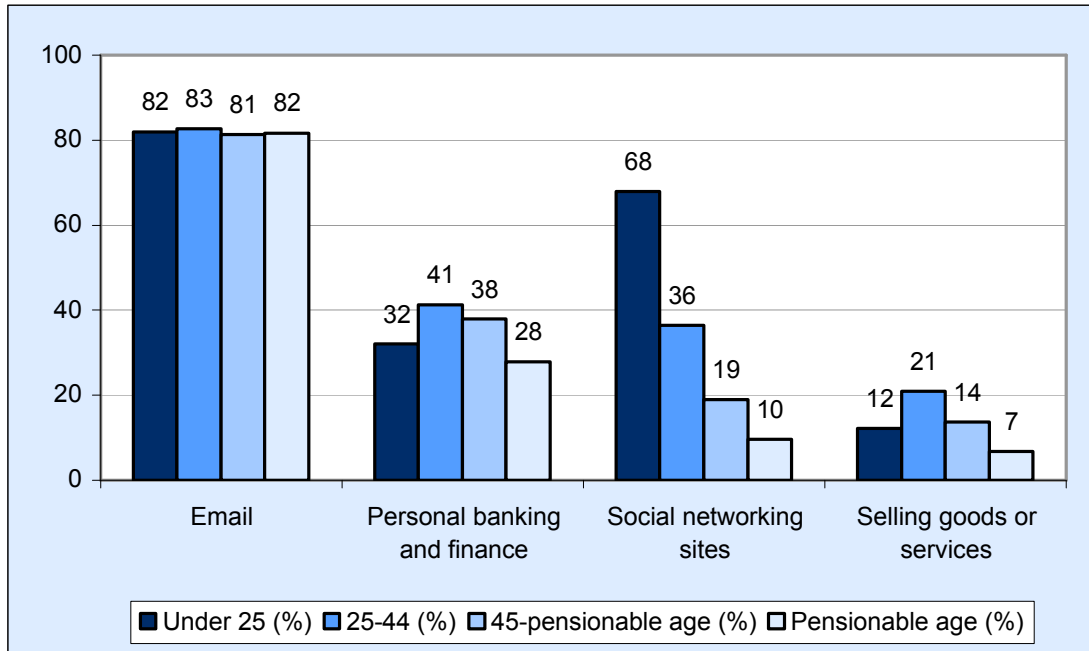
Table 2.8: If used internet in last 3 months, which activities has internet been used for?

Activity	% ^a
Email	82
General browsing	74
Finding information about goods or services	59
Buying or ordering tickets, goods or services	41
Personal banking and finance	37
Social networking sites	31
Finding information related to schoolwork or education course	28
Reading news	26
Playing or downloading music	22
Looking for jobs or work	17
Selling goods or services (e.g. through online auctions)	15
Listen to web radio / watch web TV	14
Downloading other software	14
Playing or downloading games	13
Telephoning over internet / video conferencing	10
Chat rooms	9
Source: National Survey for Wales 2010	
(a) Table sums to more than 100 per cent as respondents were able to give more than one answer to this question	

Figure 2.8, below, presents a selection of the above activities broken down by age category. Email is used equally among all age categories (the small differences are not statistically significant). Using the internet for personal banking and finance is more prevalent among the 25 years to pensionable age categories than the under 25's or those of pensionable age. Also, more internet users aged between 25 and 44 years (21 per cent) use the internet to sell goods or services (e.g. through eBay) than other age categories. There is a clear linear relationship in the proportion of internet users that use social networking sites such as Facebook, with around seven in ten of the under 25s doing so; around a third of 25 to 44 year olds; one in five 45 year olds to pensionable age; and one in ten of those of pensionable age.

In summary, this suggests that while age is not an important factor in terms of email use, it is significantly related to use of social networking sites (used more by the young). In addition, financial transactions, such as online banking or selling goods and services online appears to be more popular with the middle age categories than with the under 25s or those of pensionable age.

Figure 2.8: Activities internet has been used for in last three months by age



Source: National Survey for Wales 2010

Base: All adults that use the internet

3. The implications of digital exclusion

‘The 10 million people in the UK who have never been online are already missing out on big consumer savings, access to information and education. They will be even more isolated and disadvantaged as government and industry expand ever faster into digital-only services. We must change our mindset from one that shields people from using the internet to one that helps empower them to get online and enjoy all the benefits.’ **Martha Lane-Fox, UK Digital Champion, Race Online 2012 (July 2010)**

According to the UK Government *Digital Britain* report (DCMS and BIS 2009), access to digital technology is fast becoming an essential requirement for citizens in modern society – a claim reflected in the above quotation from Martha Lane-Fox. Digital technology provides the platform for a number of services that are increasingly taken for granted. This ‘quiet revolution’ in digital technology (DCMS and BIS 2009: 8) has allowed family-friendly working patterns, particularly in the knowledge sector of the economy. It has also revolutionised social networking through sites such as Facebook and Twitter.

The *Digital Britain* report argues that a tipping point is being reached with regards to digital engagement where there is a move from:

“conferring advantage on those who are [digitally engaged] to conferring active disadvantage on those who are [digitally disengaged], whether in children’s homework access to keep up with their peers, to offers and discounts, lower utility bills, access to information and access to public services.” **DCMS and BIS 2009: 11**

There is a growing body of literature discussing the advantages of digital inclusion and the implications to individuals of being digitally excluded. While it is worth noting that not all of the following are substantiated by good quality evidence and evaluation, the issues commonly discussed in the literature are summarised below (Table 3.1).

Table 3.1: Implications of digital exclusion

Issue	Description of implications
Cycle of deprivation	<ul style="list-style-type: none"> • Digital exclusion reinforces other existing forms of social and economic deprivation. • As digital engagement becomes the norm, the disadvantages of being digitally excluded are likely to become more severe.
Employment	<ul style="list-style-type: none"> • Digital inclusion allows for more flexible working practices such as working from home, particularly in the knowledge sector. • The unemployed and digitally excluded may be disadvantaged through not being able to search or apply for jobs online.
Education and information	<ul style="list-style-type: none"> • The digitally included can access information quickly online. • The digitally excluded miss out on the improved educational prospects and outcomes associated with digital inclusion (although there is also evidence that suggests internet access may have modest negative impacts on educational attainment).
Consumer implications	<ul style="list-style-type: none"> • The digitally included can quickly carry out transactions online. • Digitally excluded consumers do not benefit from the ability to shop around for more competitively priced goods and services online, or to access certain goods and services at all if they are only available online. • However, households with low income may not have a direct net financial benefit from home internet access for many years.
Personal wellbeing	<ul style="list-style-type: none"> • The digitally included can better communicate and keep in touch with other people through email and social networking sites. • There is emerging evidence that compared with the digitally excluded, internet users feel less lonely and their personal wellbeing is enhanced.

Based on issues summarised above, this section of the paper will look at the implications of digital exclusion based around the themes of the cycle of deprivation, employment, education and information, consumer implications and personal wellbeing. Following this, the implications for public service delivery and policy making are considered.

3.1.1 Cycle of deprivation

Whilst there is general agreement that a relationship exists between socio-economic exclusion and digital exclusion, there is little evidence to explain the direction of causality. A report by PricewaterhouseCoopers (2009) suggests that causality could run either way; social disadvantage in the form of lower skills or education could reduce willingness or ability to use digital technology, or, conversely, a lack of digital engagement could lead to social disadvantage via fewer employment and networking opportunities. In reality, the causation is likely to run in both directions.

The DCLG (2008b) report *Digital Inclusion: An Analysis of Social Disadvantage and the Information Society* argues that digital or technological deprivation should be considered as important as the more traditional forms of deprivation, such as low income, unemployment, poor health and low educational attainment. The report maintains that treating digital exclusion as less important than the more traditional forms underestimates the pace of technological change, the impact it has on our lives and also overlooks how it can deepen and reinforce social exclusion when combined with other forms of disadvantage. However, tackling digital exclusion can help to alleviate some of the problems caused by low income, disability and poor skills levels.

There is some discussion in the literature regarding the **tipping point** of digital technologies – as more people are becoming digitally engaged, digital technology becomes the norm and increasingly replaces the more traditional forms of communication or buying goods and services (UK Online Centres 2007; DCMS and BIS 2009). As the proportion of individuals that are digitally disengaged decreases, the severity of exclusion experienced by those remaining disengaged can be expected to increase. However, with personal choice being such a dominant characteristic associated with digital disengagement (ONS 2010), it would appear that many (mostly older) people would not recognise digital disengagement as a form as exclusion.

Warren (2007) examined the benefits and potential dangers of broadband and digital technology for rural areas. The barriers to interaction for remote areas, particularly distance, are increasingly removed through engagement with digital technology. The potential danger however, congruent with the other evidence that digital exclusion exacerbates other forms of deprivation, is that individuals left digitally excluded are likely to become progressively disadvantaged compared with the rest of the population.

From an international perspective, Ono and Zavodny (2007) investigated the relationship between digital inclusion and various demographic and socioeconomic factors in five countries – Japan, Singapore, South Korea, Sweden and the US – chosen to represent developed countries in different geographic locations with substantial differences in their economic and social institutional base. The data analysis revealed some common determinants of digital inclusion across the five countries, as well as some differences but the general conclusion was that **digital inequality reflected pre-existing social and economic inequalities** across all five countries. For example, IT use by men and women was found to be more equal in Sweden and the US than in the other countries investigated. This is mirrored by the finding that gender inequality is less prevalent in Sweden and the US than the other countries investigated. Similar conclusions were drawn for income and education.

3.1.2 Employment

PricewaterhouseCoopers (2009) concluded that individuals who are digitally engaged benefit from better employment outcomes. Age Concern and Help the Aged (2009) highlight that digital exclusion is a barrier for the unemployed over 50 years old. Since so many job vacancies are only advertised via the internet and/or must be applied for online, the lack of IT skills and confidence among this age group is viewed as a barrier to returning to work.

For individuals in employment, the internet is viewed as an enabler for being more productive at work (Dutton et al 2009). For example, physical journeys to visit clients may be replaced with liaising electronically from the workplace

and using the journey time saved more productively. In addition, internet access can lead to more inclusive working practices according to UK Online Centres (2007), such as flexible home working and improved access for disabled people.

3.1.3 Education and information

Dutton et al (2009) found that two thirds of adults in Britain use the internet first when searching for information on professional, school or personal issues. Internet access makes it easier to access information and learning opportunities but low educational attainment presents a barrier to accessing such resources (DCLG 2008b). In turn, lack of digital engagement among those with low educational attainment could further exacerbate inequalities in education and skills.

PricewaterhouseCoopers (2009) reported that household access to a computer and the internet improves educational performance of children. This illustrates how strategies for improving digital engagement may also improve educational outcomes and tackle other forms of deprivation. Analysis of British Household Panel Survey data conducted by Schmitt and Wadsworth (2004) found a positive relationship (controlling for relevant characteristics) between home PC ownership and children's educational attainment at GCSE and A-level. However, without data on the prior educational attainment of the children within the household, it not possible to conclude whether the relationship between home PC ownership and educational attainment is causal. There is also evidence to counter this, such as Vigdor and Ladd's (2010) study of maths and reading test scores in the USA which concluded that the introduction of home PC use was associated with modest negative impacts on students' test scores, particularly where internet access was high-speed. The explanation for this was that students with high-speed internet access would be more likely to substitute homework for leisure activities.

The evidence illustrates that while internet access is becoming the default option for finding information (Dutton et al 2009), further evidence is required regarding any causal relationships with educational outcomes.

3.1.4 Consumer implications

Digitally engaged consumers benefit from being able to shop around for more competitively priced goods and services online (UK Online Centres 2007; PricewaterhouseCoopers 2009). In addition, consumers can access a wider array of goods and services, including those that are available exclusively online.

The Communications Consumer Panel (2009) report that it is widely believed among consumers that not having internet access reduces consumption options, leading to negative financial implications. Since those most likely to be digitally excluded are also likely to suffer other forms of social and economic disadvantage, these different forms of deprivation may reinforce one another.

While most studies concerning the consumer implications of being online consider the average or typical household, it is worth considering the differences that occur across the income scale. Analysis by SQW (2008) concluded that the direct financial benefits of being online are greatest for households that spend the most (i.e. those with higher incomes). The analysis found that, on average, a household's investment in broadband access would pay for itself in direct financial benefits within 6.5 months. However, for households in the lowest income quintile, SQW concluded that there may be no direct net benefit after three years. In other words, the cost of internet subscription may outweigh the consumption benefits for households on low income for years. It is worth noting that these direct financial benefits do not account for potential indirect benefits such as improved employment opportunities, or access to public services.

3.1.5 Personal wellbeing

Research undertaken by the BCS Chartered Institute for IT (2010) concluded that access to IT has a 'statistically significant, positive impact on life satisfaction'. In particular, those on low incomes and with low educational attainment were found to benefit most.

According to the Dutton et al (2009: 30), the internet provides a resource for 'communicating with others, and being entertained in a way that could well advantage them over those who choose not to use the internet'. The 'Internet in Britain' survey (Dutton et al 2009) found that users of the internet, in comparison to non-users, were less likely to feel lonely, and view the internet **as an enabler for enhancing their personal wellbeing** – a finding that chimes with a study by Gross (2009) which found that online communication with unknown peers led to greater self-esteem among previously excluded adolescents and young adults.

Those who do not use the internet miss out being able to access information quickly and take part in social networking activities that are increasingly viewed as part of the 'social glue' for friends, families and communities (DCMS and BIS 2009: 32).

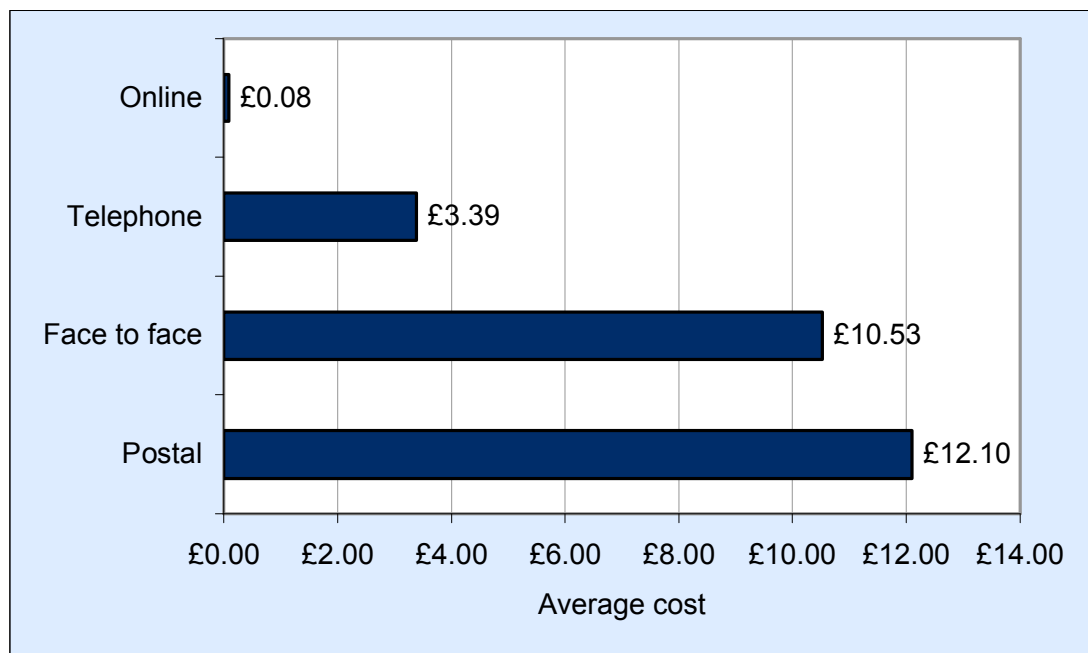
Contrary to this emerging evidence, Gracia and Herrero (2009) examined whether a relationship existed between internet use and self-rated health among older people in Spain. Their research found that internet use was not a significant factor in the health of older people once socioeconomic status was accounted for.

3.2 Implications for public service delivery

The internet has the potential to offer the public more efficient access to public services. This may allow for more interaction between citizens and government, thereby enhancing the citizens' voice. Furthermore, efficiency savings for public service providers stand to be made through a reduction in

transaction costs (PricewaterhouseCoopers 2009) by delivering more services online. Figure 3.1, below, shows the average transaction costs for local government services based on data from 19 UK local authorities. The transaction costs for delivering services online are a fraction of that for postal, face to face and telephone channels.

Figure 3.1: Average costs for local government service transactions



Source: McNish (2008) cited in PricewaterhouseCoopers (2009: 47)

Despite the advantages of moving more services online, there is a social justice issue where **those most in need of public services tend to be those most likely to be digitally excluded**. It is therefore vital that the benefits of being digitally engaged are communicated to this audience.

How can government and public service delivery bodies respond to this? Warren (2007) asserts that 'digital intermediaries' may play an important role in bridging the digital gap. Many digital intermediaries exist in an informal manner, such as a friend or relative helping an older person order online shopping. However, Warren suggests that formal digital intermediaries based in libraries or post offices would help those who do not already benefit from an informal intermediary. As the number of older people living alone increases, they will be less likely to rely on relatives for accessing services online. In

addition, the greater demand on public services made from an ageing population will mean that there are greater potential efficiency gains from encouraging more people to interact with public services online (HM Treasury 2006). This is echoed by Age Concern's guide *How to be a Silver Surfer* (Aldridge 2008), which states that older people stand to benefit most from the internet but they are also less likely to become digitally engaged compared with younger age groups.

3.3 Implications for policymaking

The implications for government policymaking discussed below are not intended as policy recommendations for Wales but reflect the content of the DCLG (2008b: 14-15) report *Digital Inclusion: An Analysis of Social Disadvantage and the Information Society*.

- **Social inclusion policies can also make a difference to digital engagement.** The main driver for this appears to be improving educational attainment.
- **Online government services should make extra effort to target the most socially excluded.** Online government services tend to be used more by those who are less socially disadvantaged, even though the most socially disadvantaged stand to gain more from these services.
- **Text messaging is a useful alternative to the internet for communicating with some socially disadvantaged groups.** This is due to economic and educational barriers faced by these groups.
- **More use should be made of using the internet to address social isolation and economic disadvantage.** This applies particularly to the role of online networking to tackle social isolation and also using government services to support the unemployed and those on low incomes, as well as providing access to education and information.

- As digital exclusion reflects existing social exclusion, **the targeting of deprived areas is a key issue.**

A Joseph Rowntree Foundation study (Loader and Keeble 2004) that set out to explore whether digital exclusion is a major factor influencing wider social and economic inequalities found that:

- The location of many public access sites in libraries, schools and further education colleges was seen as a barrier for those who do not view such institutions as being part of their lives.
- Training and education which replicate earlier negative feelings of failure were unlikely to attract those who have been categorised as underachievers.

With evidence that digital exclusion reflects existing social and economic inequalities in countries across the world, Ono and Zavodny (2007) conclude that only policies that address other forms of social and economic inequality can hope to narrow the digital divide. Likewise, it has been highlighted how promotion of digital inclusion represents a social and economic opportunity to those at risk of exclusion DCLG's (2008a).

The European Commission (2009) emphasise that **the promotion of digital inclusion is a societal issue, rather than a technological one**, comparable to environmental policymaking in this regard. Most of the public policy focus to tackle digital exclusion across the EU has been given to improving infrastructure. However, this has been to the detriment of other factors, such as articulating the benefits of being online and motivating citizens to become digitally included – or 'going after the reluctant' as it is termed by the European Commission (2009: 21).

Whitfield et al (2010: 47) argue that the UK has made good progress regarding citizen-focused provision of online government services (e.g. through the www.direct.gov.uk portal) compared to other EU countries but

remains somewhat behind the 'leading lights' of e-Government – Canada (www.servicecanada.gc.ca), the USA (www.usa.gov) and Singapore (www.ecitizen.gov.sg). While DirectGov in the UK allows users to access information and conduct a wide range of transactions online, Whitfield et al (2010) contend that it does not have the functionality of similar portals in Canada, the USA and Singapore.

4. Mapping digital inclusion in Wales

This section presents the findings from a geographical analysis of digital inclusion in Wales. Two levels of geography are examined:

- Local authority (22 local authorities across Wales); and
- LSOA or Lower Super Output Area (1,896 LSOAs across Wales).

4.1 Mapping digital inclusion at local authority level

Figure 4.1 and Table 4.1 present estimated levels of digital inclusion at local authority level across Wales.

The local authorities with the highest levels of digital inclusion are **Cardiff**, **Vale of Glamorgan** and **Monmouthshire**, where more than seven in ten of the adult population are internet users.

The four local authorities with the lowest levels of digital inclusion are found in the **South Wales Valleys**: Blaenau Gwent, Merthyr Tydfil, Neath Port Talbot and Rhondda Cynon Taf.

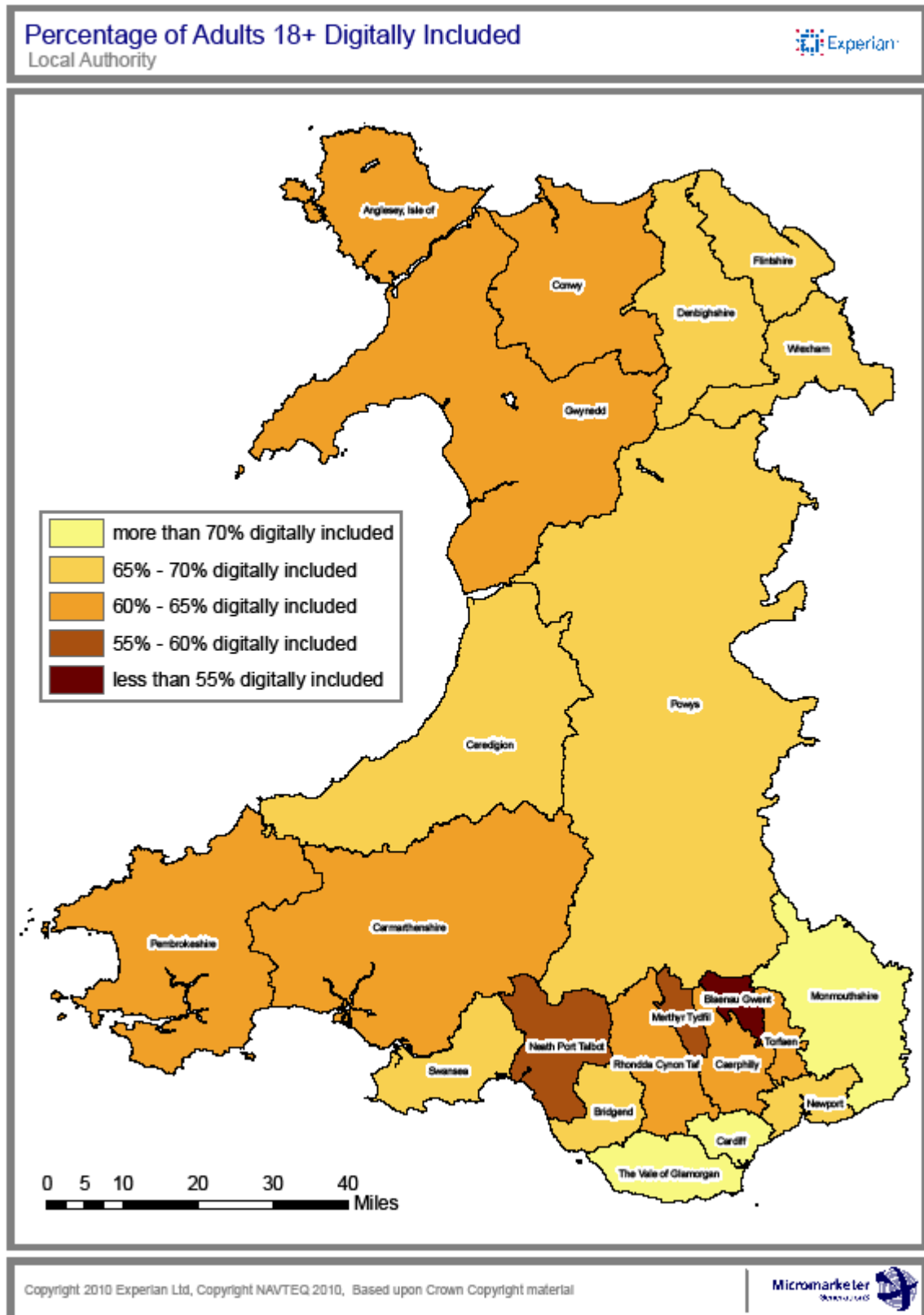
At the local authority level, the relationship between digital and economic exclusion appears to be strong, with the Convergence Areas⁶ of West Wales and the Valleys tending to have the least digitally included local authorities. Notable exceptions to this are Ceredigion and Bridgend – both are Convergence Areas but are the fourth and sixth most digitally included local authorities respectively.

⁶ The West Wales and the Valleys region, which covers 15 local authorities, receives the highest level of support from the European Union, known as 'Convergence'. This funding aims to stimulate economic regeneration, increase skills and reduce economic inactivity. For more information, see the Welsh European Funding Office website: www.wefo.wales.gov.uk.

Table 4.1: Digital inclusion rates by local authority (estimates as of March 2011)

Rank	LA Name	Convergence Area?	% of adults 18+ Digitally Included
1	Cardiff		74.45
2	Vale of Glamorgan		71.40
3	Monmouthshire		71.39
4	Ceredigion	✓	69.48
5	Flintshire		68.58
6	Bridgend	✓	68.45
7	Newport		68.42
8	Wrexham		67.48
9	Powys		67.46
10	Swansea	✓	66.33
11	Denbighshire	✓	65.34
12	Pembrokeshire	✓	64.62
13	Torfaen	✓	64.01
14	Conwy	✓	63.66
15	Caerphilly	✓	63.43
16	Gwynedd	✓	63.28
17	Carmarthenshire	✓	63.16
18	Anglesey, Isle of	✓	62.39
19	Rhondda Cynon Taf	✓	61.07
20	Neath Port Talbot	✓	59.09
21	Merthyr Tydfil	✓	58.38
22	Blaenau Gwent	✓	54.31
	Total		66
Source: Experian 2011			

Figure 4.1: Map of digital inclusion rates by local authority



4.2 Mapping digital inclusion at LSOA level

Figure 4.2 maps the estimated levels of digital inclusion at Lower Super Output Area (LSOA) level across Wales, while Tables 4.2 and 4.3 show the top and bottom 20 digitally included LSOAs. As small geographic units, with populations of around 1,500 residents and a relatively high degree of social homogeneity (ONS 2010), LSOAs are useful for identifying neighbourhoods with low levels of digital inclusion.

4.2.1 Where is digital inclusion highest?

The nine LSOAs with the highest levels of digital inclusion in the Experian model are all characterised by having a **high proportion of students and young people** (LSOAs in the Cathays and Plasnewydd areas of Cardiff; 'Treforest 2' in Rhondda Cynon Taf; and 'Abersytwyth Canol/Central' in Ceredigion). In the LSOAs 'Cathays 8' and 'Cathays 7', the model estimates that almost all adults are internet users. In all of the 20 most digitally included LSOAs, at least nine in ten adults are internet users.

Table 4.2: Most digitally included LSOAs (estimates as of March 2011)

Rank	LSOA name	Local Authority / LSOA code	% of adults 18+ Digitally Included
1	Cathays 8	Cardiff 032D	99.32
2	Cathays 7	Cardiff 032C	98.27
3	Plasnewydd 4	Cardiff 033C	97.54
4	Cathays 3	Cardiff 028C	96.46
5	Cathays 9	Cardiff 028E	96.26
6	Cathays 5	Cardiff 028D	95.76
7	Treforest 2	Rhondda Cynon Taf 022E	95.43
8	Aberystwyth Canol/Central	Ceredigion 002B	94.87
9	Cathays 4	Cardiff 032A	94.53
10	Bryntirion, Laleston and Merthyr Mawr 1	Bridgend 017A	93.92
11	Treforest 3	Rhondda Cynon Taf 022F	93.85
12	Menai (Bangor)	Gwynedd 001E	92.90
13	Killay North 1	Swansea 023A	92.05
14	Trowbridge 8	Cardiff 013D	91.98
15	Pontprennau/Old St. Mellons 4	Cardiff 003C	91.91
16	Pontprennau/Old St. Mellons 2	Cardiff 003A	91.23
17	Pont-y-clun 2	Rhondda Cynon Taf 031D	91.21
18	St. Martins 5	Caerphilly 024F	91.13
19	Uplands 6	Swansea 026C	90.99
20	Plasnewydd 9	Cardiff 030C	90.85
Source: Experian 2011			

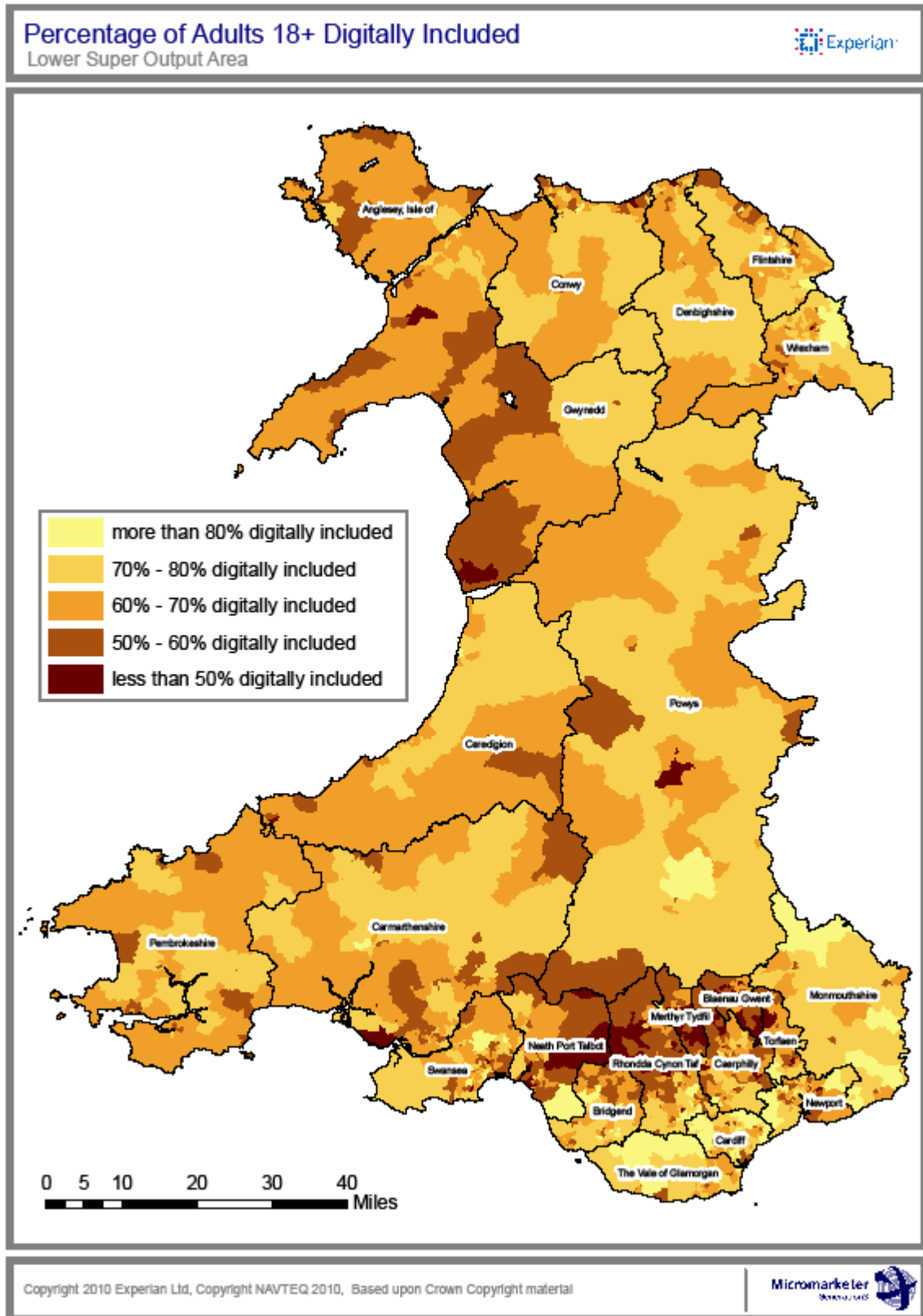
4.2.2 Where is digital inclusion lowest?

At the other end of the scale, 'Prestatyn North 3' in Denbighshire is estimated to have the lowest digital inclusion rate, with only three in ten adults being internet users. LSOAs with low levels of digital inclusion tend to be those with relatively **older populations** and/or those with high levels of **social and economic exclusion**. These characteristics reflect the roles that personal choice (and its relation to age and life stage) and socio-economic exclusion play in digital engagement.

Table 4.3: Least digitally included LSOAs (estimates as of March 2011)

Rank	LSOA name	Local Authority / LSOA code	% of adults 18+ Digitally Included
1877	Treherbert 1	Rhondda Cynon Taf 007A	45.71
1878	Neath North 2	Neath Port Talbot 008D	44.94
1879	Treherbert 3	Rhondda Cynon Taf 007C	44.91
1880	Cefn 2	Wrexham 017B	44.71
1881	Cwm 2	Blaenau Gwent 007B	44.62
1882	Penrhiwceiber 2	Rhondda Cynon Taf 008B	44.53
1883	Cymmer (Neath Port Talbot) 2	Neath Port Talbot 011B	44.30
1884	Aberteifi/Cardigan - Rhyd-y-Fuwch	Ceredigion 009D	44.03
1885	Badminton 1	Blaenau Gwent 004A	43.95
1886	Bedlinog 1	Merthyr Tydfil 006A	43.93
1887	Cymmer (Neath Port Talbot) 1	Neath Port Talbot 011A	43.93
1888	Sandfields East 1	Neath Port Talbot 017D	43.76
1889	Sandfields West 1	Neath Port Talbot 016C	43.27
1890	Burry Port 2	Carmarthenshire 021B	43.15
1891	Cwmbwrla 5	Swansea 015E	42.87
1892	Mountain Ash West 3	Rhondda Cynon Taf 006E	41.34
1893	Rhyl East 1	Denbighshire 004A	41.20
1894	Treherbert 4	Rhondda Cynon Taf 007D	40.80
1895	Kinmel Bay 1	Conwy 005A	36.68
1896	Prestatyn North 3	Denbighshire 001C	30.97
Source: Experian 2011			

Figure 4.2: Map of Digital inclusion rates by LSOA



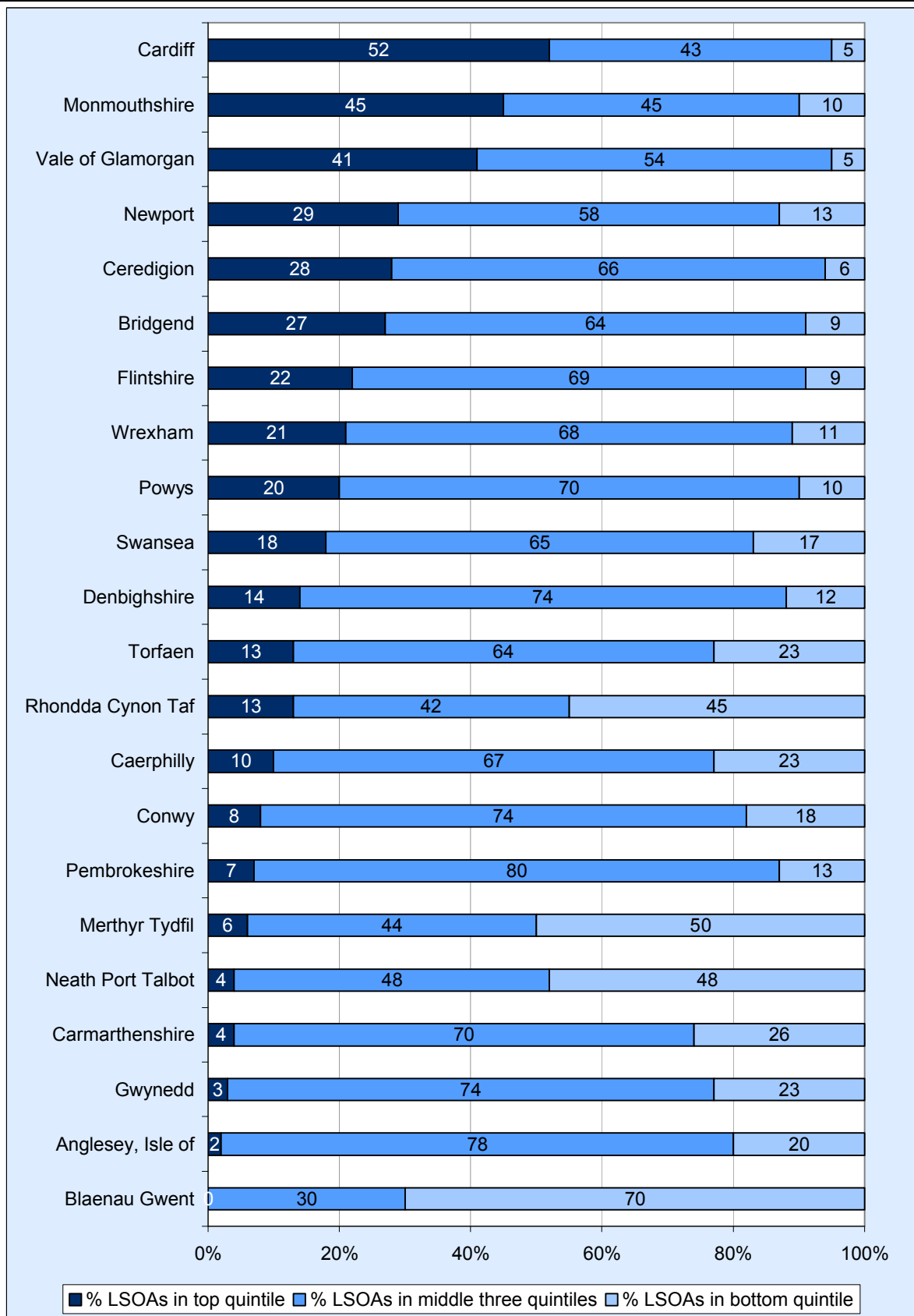
4.3 Variation within local authorities

To demonstrate the variation in levels of internet use within local authorities, Figure 4.3 (below) shows the proportion of LSOAs in each local authority that are in the top, bottom and middle three quintiles for Wales (the top quintile is the 20 per cent most digitally included LSOAs in Wales; the bottom quintile is the 20 per cent least digitally included LSOAs in Wales).

Around half of LSOAs in Cardiff are in the top (most digitally included) quintile for Wales. However, it is worth noting that 5 per cent of Cardiff's LSOAs are in the bottom (least digitally included) quintile. At the other end of the scale, none of the LSOAs in Blaenau Gwent are in the top quintile for Wales, while 70 per cent are in the bottom quintile. In between these extremes, Pembrokeshire has the highest proportion of LSOAs in the middle three quintiles (80 per cent).

By this measure, none of the local authorities exhibit an inequality in digital inclusion levels so high that they have more than 20 per cent of their LSOAs in the top quintile for Wales *and* more than 20 per cent in the bottom quintile for Wales. This tells us that while digital inclusion rates may vary widely within local authorities, it is not to the extent that comparisons of digital inclusion rates *between* local authorities are not reliable or useful.

Figure 4.3: Variation of digital inclusion rates by LSOA within local authorities



Source: Experian 2011

5. Concluding remarks

Corroborating much of the existing evidence, Wales-level data analysis showed that older people, those with lower socio-economic status, individuals with limiting disabilities and those with lower educational attainment are more likely to be digitally disengaged. However, an important distinction is made between digital disengagement through **personal choice** and through **socio-economic or health constraints**. Digital disengagement through personal choice is closely linked to age and life stage of an individual, with those who are not interested in using the internet tending to be older and retired people.

Within Wales, the local authorities with the highest levels of digital inclusion are Cardiff, Vale of Glamorgan and Monmouthshire. The lowest levels of digital inclusion are found in the South Wales Valleys (Blaenau Gwent, Merthyr Tydfil, Neath Port Talbot and Rhondda Cynon Taf). At LSOA level, areas with the highest levels of digital inclusion are characterised by having a high proportion of students and young people. LSOAs with low levels of digital inclusion tend to be those with relatively older populations and/or those with high levels of social and economic exclusion. These characteristics reflect the roles that personal choice (and its relation to age and life stage) and socio-economic exclusion play in digital engagement.

There is a growing body of literature discussing the advantages of digital inclusion and the implications of being digitally excluded. The issues commonly discussed include how digital exclusion can reinforce other forms of social and economic exclusion, including education, employment, economic and wellbeing outcomes.

Whilst a significant body of evidence and analysis has been brought together in this report, our understanding of digital inclusion is far from complete and the following areas have been identified as requiring further investigation:

- As the evidence base for digital inclusion continues to grow, a greater focus is required on understanding if, and to what extent, causal relationships exist between internet use and educational, employment, economic and wellbeing outcomes. A better understanding of the causal links will present a more informed picture to policymakers and help to design the interventions they put in place and how these should be targeted.
- Analysis shows that, overall, individuals reporting limiting disabilities are less likely to use the internet. Current evidence suggests that visual impairment, dyslexia, and learning difficulties present particular barriers to engaging with digital technology. However, the current evidence base does not allow for differentiation of disability types and consequently there is little scope for a meaningful assessment.
- There is little evidence around how different ethnic groups use the internet and the extent to which they are digitally engaged. The small populations of some ethnic minority groups in Wales means robust information is difficult and expensive to acquire. Consequently, the evidence base in this area is not currently sufficient to provide policymakers with an informed picture.
- While there is potential to make substantial efficiency savings through delivering more public services online, consideration needs to be given to the social justice implications this would entail. Indeed, the segments of the population in significant need of and likely to engage with public services are more likely to be digitally excluded, which potentially limits the reach of online services and restricts the potential for long-term financial savings.
- There is scope for our understanding of the economic impact of digital inclusion on individuals and wider society to be strengthened,

which may in turn challenge for some of the underlying assumptions of the existing evidence base.

- It is unclear why such a large increase in internet use among social housing residents in Wales was observed between 2007 and 2010. How can this increase be explained? Have such increases been observed elsewhere?

REFERENCES

- Age Concern, Help The Aged, CIPD and TAEN. 2009. *The Impact of the Recession on Older Workers*. London: Age UK.
- Aldridge, E. 2008. *How to be a silver surfer*. 4th ed. London: Age Concern.
- Anderson, B. 2009. *Memorandum submitted to Welsh Affairs Committee inquiry into digital inclusion in Wales*. Available at: <http://www.parliament.the-stationery-office.co.uk/pa/cm200809/cmselect/cmwelaf/memo/diw/ucdiw02402.htm>
- BCS, The Chartered Institute for IT. 2010. *The information dividend: Why IT makes you 'happier'*. Swindon: British Informatics Society.
- Bevan Foundation. 2009. *Digital Wales, Divide Wales*. Blaenau Gwent: Bevan Foundation.
- Beynon-Davies, A.P and Hill, R. 2007. Evaluating a digital divide in a regional context. *Journal of Systems and Information Technology* 9(1), pp.46-59.
- Cabinet Office. 2004. *Enabling a Digitally United Kingdom: A Framework for Action*. London: Cabinet Office.
- Commission for Rural Communities. 2005. *Beyond digital divides? The future for ICT in rural areas*. West Yorkshire: Countryside Agency Publications.
- Communications Consumer Panel. 2009. *Not online, not included: consumers say broadband essential for all*. London: Communications Consumer Panel.
- Department for Communities & Local Government. 2008a. *An Analysis of International Digital Strategies: Why develop a digital inclusion strategy and what should be the focus?* London: DCLG.

Department for Communities & Local Government. 2008b. *Digital Inclusion: An Analysis of Social Disadvantage and the Information Society*. London: DCLG.

Department for Culture, Media & Sport and Department for Business Innovation & Skills. 2009. *Digital Britain: Final Report*. London: The Stationery Office.

Dutton, W.H., Helsper, E.J. and Gerber, M.M. 2009. *The Internet in Britain 2009*. Oxford: University of Oxford.

European Commission. 2009. *eInclusion public policies in Europe: final report*. Publications Office of the European Union.

Eurostat. 2011. *Individuals frequently using the internet*. Available from: <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&plugin=1.&language=en&pcode=tin00092>

Foley, P., Alfonso, X., Brown, K. and Fisher, J. 2003. *Connecting people: tackling exclusion? An examination of the impact on and use of the Internet by socially excluded groups in London*. London: Greater London Authority.

Gracia, E. and Herrero, J. 2009. Internet Use and Self-Rated Health Among Older People: A National Survey. *Journal of Medical Internet Research* 11(4): e49.

Gross, E.F. 2009. Logging on, bouncing back: an experimental investigation of online communication following social exclusion. *Developmental Psychology* 45(6) p 1787-1794.

Hargittai, E. 2010. Digital Na(t)ives? Variation in Internet Skills and Uses among Members of the "Net Generation". *Sociological Inquiry* 80(1) pp. 92-113.

HM Treasury. 2006. *Long-term opportunities and challenges for the UK: analysis for the 2007 Comprehensive Spending Review*. London: The Stationery Office.

Kumar, S. 2009. *Online Access Forum: Why Digital Inclusion Matters*.

Available at:

http://www.bbc.co.uk/blogs/bbcinternet/2009/10/online_access_forum_why_digital_inclusion.html

Loader, B.D. and Keeble, L. 2004. *Challenging the digital divide? A literature review of community informatics initiatives*. York: Joseph Rowntree Foundation.

Longley, P. and Singleton, A. 2009. Linking Social Deprivation and Digital Exclusion in England. *Urban Studies* 46(7) pp. 1275-1298.

Ofcom. 2009. *Accessing the Internet at Home – A Quantitative and Qualitative Study Among People without the Internet at Home*. Available at:

<http://stakeholders.ofcom.org.uk/binaries/research/telecoms-research/bbathome.pdf>

Ofcom. 2010. *Media Literacy Audit: Report on UK adults' media literacy*.

Available at: <http://stakeholders.ofcom.org.uk/binaries/research/media-literacy/adults-media-literacy.pdf>

Office for National Statistics. 2010. *Internet Access: Households and individuals (Statistical Bulletin)*. Newport: ONS.

Office for National Statistics. 2010. *Neighbourhood Statistics: Super Output Areas Explained*. Available at:

http://www.neighbourhood.statistics.gov.uk/dissemination/Info.do?page=ness_geography/superoutputareasexplained/output-areas-explained.htm

Ono, H. and Zavodny, M. 2007. Digital inequality: A five country comparison using microdata. *Social Science Research* 36(3) pp. 1135-1155.

PricewaterhouseCoopers. 2009. *The Economic Case for Digital Inclusion*. PricewaterhouseCoopers LLP.

Race Online 2012. 2010. *Manifesto for a networked nation*. London: Race Online 2012.

Schmitt, J. and Wadsworth, J. 2004. Is there an impact of household computer ownership on children's educational attainment in Britain? *Centre for Economic Performance Discussion Paper No 625*. London: London School of Economics.

SQW. 2008. *Broadband in the home: An analysis of financial costs and benefits. Final reports to the Post Office*. SQW Consulting.

UK Online Centres. 2007. *Understanding Digital Inclusion*. Sheffield: UK Online Centres.

Van Dijk, J. and Hacker, K. 2003. The Digital Divide as a Complex and Dynamic Phenomenon. *The Information Society* (19) pp. 315–326.

Vigdor, J.L. and Ladd, H.F. 2010. Scaling the digital divide: Home computer technology and student achievement. *National Bureau of Economic Research Working Paper No 16078*. Cambridge, MA: NBER.

Warren, M. 2007. The Digital Vicious Cycle: Links between Social Disadvantage and Digital Exclusion in Rural Areas. *Telecommunications Policy* 31(6-7) pp. 374-388.

Welsh Affairs Committee. 2009. *Digital Inclusion in Wales*. London: The Stationery Office.

Welsh Government. 2008. *Internet Usage in Wales*. Cardiff: Welsh Government.

Welsh Government. 2010. *Delivering Digital Inclusion: A Strategic framework for Wales*. Cardiff: Welsh Government.

Whitfield, G., Perren, K., Stuart, D. and Norris, M. 2010. *Literature review to inform the future digitisation of Jobcentre Plus service delivery*. Norwich: DWP and The Stationery Office.

Appendix A: Methodology for mapping digital inclusion across Wales at small area level (Experian, March 2011)

Introduction & Scope of Project

In September 2010, Experian were commissioned by the Welsh Government to identify and map levels of digital inclusion across Wales. This analysis and mapping has been used to identify areas with the most digitally included and digitally excluded individuals and provide an understanding of underlying characteristics of these individuals.

In June 2010, the Welsh Government launched its draft Digital Inclusion Framework for consultation as a policy response to the large number of Welsh adults who were digitally excluded.

This framework identified the social groups most likely to be digitally excluded, i.e. older people, those living in social housing, those with lower socio-economic status, on lower income, the unemployed and economically inactive and the disabled.

Recent estimates suggest that 34 per cent of the adult population in Wales are digitally excluded (Welsh Government 2010) which equates to around 800,000 adults 18+.

The Welsh Government seeks to reduce the number of citizens who are digitally excluded through the alignment of policies; obtaining buy-in from stakeholders; and implementing specific activities and interventions 'on the ground'.

The intention of this paper is to detail the results from the analysis, highlight the key findings and to provide a detailed baseline picture of digital inclusion/exclusion across Wales.

Experian Approach

A three stage approach was adopted, summarised as follows:

1. Build a digital inclusion model to score adults in Wales on their likelihood of using the internet, and therefore being digitally included.
2. Model scores are scaled up to recognise and quantify digital inclusion across several geographic units – Local Authority (LA), Electoral Division (ED), Lower Super Output Area (LSOA).
3. Profiles of digitally included and excluded are created to understand underlying demographics and characteristics.

Model Build Process

The model is built and applied at individual level to identify those people who are more likely to use the internet and therefore be digitally included.

Data used for the model build has been extracted from the Experian Lifestyle Survey. The Lifestyle surveys include over 1,150 separate pieces of information about the lifestyle and purchasing preferences of over 10 million UK consumers. The Lifestyle Survey Programme uniquely utilises multiple consumer data collection methodologies including postal surveys, telephone interviews and online questionnaires.

150,462 Welsh survey records have been selected and verified on the Electoral Register within the last 12 months. Records are selected based on response to the questions “Have” or “Use” the Internet. A 10 per cent random sample was selected and used for the model build process.

Logistic regression model build techniques were used and all key Experian demographic and classification variables were considered, including Mosaic, Financial Strategy Segments, TrueTouch, Tenure, Income, Age and Lifestage. The model is then scored onto the remaining survey records for testing and verification.

The final model is then matched to the Welsh adult 18+ population allocating each individual a digital inclusion score.

Model Build Variables

The following variables have been selected as part of the overall model build and allocation. Descriptions of these variables can be found at the end of this document.

Households with Children	Mosaic UK Public Sector
FSS	Personal Income
Tenure	TrueTouch
Mosaic UK	Decision
Family Lifestage	Directorships
Household Composition	Mosaic UK Factors
Lifestage	NonLiquid Assets
Length of Residency	Outstanding Mortgage
FSS Factors	Affluence
Age	Residency Type

Geographic Allocation

In order to understand digital inclusion geographically, we have used the 34 per cent digital exclusion estimate. The adult population in Wales is sorted on the digital inclusion score and a 66 per cent cut off applied. The top 66 per cent are classed as digitally included. The lowest 34 per cent of the population are digitally excluded. The Welsh population is also split into deciles – most included to least included.

Penetration reports are subsequently created at LSOA, ED and LA levels to rank each geographic brick on the penetration of digital inclusion population.

The LSOA level ranking report is then split into quintiles to understand the variation across LA by looking at the number of LSOAs in each LA in the top and bottom quintiles for digital inclusion.

Output

Tables and Maps

A series of ranking reports and maps at LSOA, ED, and LA levels have been produced to show locations with a higher penetration of digitally included people.

Portrait Reports

Profile reports have been created to understand the digital inclusion and digital exclusion population. Profiles have also been split by digital inclusion decile. The profiles describe the people in terms of the following Experian variables:

- Gender
- Age
- Employment Status
- Income
- Tenure
- Mosaic Public Sector

Model Build Variables

Households with Children is a household level demographic variable that identifies whether there are likely to be children (aged 0–17 years) in the household.

Financial Strategy Segments (FSS) is a person-level analytical tool classifying individuals into distinct financial lifestyle types that comprehensively describe their typical financial product holdings, behaviour and future intentions, as well as summarising their key socio-economic characteristics.

Tenure is a household level demographic variable that identifies whether a property is owner occupied, council/housing association or privately rented.

Mosaic UK / Mosaic Public Sector

Mosaic is a geo-demographic classification that paints a rich picture of consumers in terms of socio-demographics, lifestyles and behaviour, and provides a detailed understanding of society.

Mosaic UK classifies all consumers into 67 distinct lifestyle types and 15 groups which comprehensively describe their socio-economic and socio-cultural behaviour.

Mosaic Public Sector classifies all consumers into 69 distinct lifestyle types and 15 groups which comprehensively describe their socio-economic and socio-cultural behaviour.

Family Lifestage is a household level demographic segmentation that shows the combined stage of life and family status, including children.

Household Composition is a household level demographic variable that identifies the type of family living at an address.

Lifestage is a household level demographic segmentation that shows the combined stage of life and family status.

Length of Residency identifies the length of time that an individual has been at the same address.

Financial Strategy Segments Factors are a distillation of the core data used to build Financial Strategy Segments. This data is summarised into 6 continuous non-correlated variables that are ideal for statistical modelling.

Age identifies the likely age of each individual living at an address.

Personal Income identifies an individual's likely income. An average Personal Income is also available for each postcode.

TrueTouch classifies all UK consumers into 22 types and 6 groups based upon their channel preferences, motivation and promotional orientation.

Decision Maker Type is a household level demographic variable that identifies the type of person or persons who are likely to make decisions for the whole household.

Directorships identifies individuals at an address who are company directors.

Mosaic UK Factors are a distillation of the core data used to build Mosaic UK. Over 350 variables are summarised into 6 continuous non-correlated variables which are ideal for statistical modelling. Mosaic UK Factors are available at postcode level.

Non-liquid Assets identifies the value of assets which cannot be immediately accessed, such as stocks and shares, ISAs and Unit / investment trusts.

Outstanding Mortgage identifies the value of the outstanding mortgage at an address.

Affluence is a person level variable that identifies an individual's affluence based on a number of key variables.

Residence Type is a household level demographic variable that identifies whether a property is terraced, semi-detached, detached, a flat or a bungalow.