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## Cross-national broadband digital divides

## Book section

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## Introduction

The digital divide debates, originally focused on the era when the internet was narrowband, provided a comparative analysis in both senses considered in this book: within societies and cross-nationally. The aim of this chapter is to understand emerging digital divides in the era of broadband and more contemporary services and practices online.

One theme from the digital divide literature was the argument that it was based on existing, offline inequalities and was often replicating those divisions online, entailing relative advantage for some and disadvantage for others. While many of the commentaries about the contemporary internet, especially the web 2.0 services discussed in earlier chapters, are very positive it is nevertheless important to ask if new divisions are emerging within internet users: between narrowband and broadband. This becomes particularly salient in the light of claims that broadband enables richer experience, activities, and practices. Hence one goal of this chapter is to explore the extent of any such gaps (and indeed whether broadband experiences appear to be richer).

The second goal is to introduce the cross-national comparative perspective. Over the years quite complex society measures of broadband, indeed indices of the experience of broadband, have been developed enabling us to make more nuanced distinctions as regards any digital divide between countries. But this comparative perspective may also provide further clues about the processes leading to some of those narrowband and broadband differences.

The rest of the chapter proceeds as follows. It introduces some of the original digital divide debates. It then reflects on some of the claims made about the experience of broadband, especially web 2.0 services. It outlines some of the methodological considerations in the analysis that follows. And it provides a secondary analysis of Eurostat data of selected services in five European countries: Cyprus, Ireland, Portugal, Slovenia and the UK.

## Digital divides

On the one hand the promise of the internet - web use, for example - means tapping new 'digital opportunities' to support the inclusion of socially

disadvantaged people. As Hargittai (2008) points out, from the perspective of social mobility, digital media could offer people, organisations and societies the opportunity to improve their positions regardless of existing constraints. Yet the potential of ICT to overcome social exclusion, enabling the growing social inclusion of individuals, should not be exaggerated. From the early days of the digital divide debates, Menou (2001), van Dijk (1999) and Norris (2001) maintained that – from the point of view of social reproduction – the explosive growth of the internet actually exacerbated existing inequalities between the information-rich and information-poor, both within certain countries and between them. In contrast to the more optimistic views noted earlier, various uses of the internet thus have the potential to increase the inequalities that result from the accumulation of advantages provided by wealth:

> "benefiting those who are already in the advantageous positions and denying access to better resources to the unprivileged." (Hargittai, 2008, p. 943).

Merton's (1973) identification of the Matthew effect - 'Unto every one who hath shall be given, and he shall have abundance' - applies to this position.

Irrespective of these contradictory understandings of the phenomenon in academia, a consensus nevertheless exists that the concept of the digital divide is somehow tightly linked to the concept of social inequality (e.g. Attewell, 2001; Bonfadelli, 2002; DiMaggio, et al., 2004; Mason & Hacker, 2003; Menou, 2001; van Dijk, 2005; Warschauer, 2003). Parayil's (2005) reasoning that the digital divide presents both processes, being a symptom and a cause of broader social and economic inequality, seems most reasonable. Hence, for the purposes of this chapter, the digital divide is both seen as a result of social exclusion (those who suffer from a lack of financial resources, skills or capabilities will have trouble accessing ICTs and handling information that is accessible through ICTs) and as a factor that will aggravate the other dimensions of social exclusion.

## Broadband and new practices

There is a claim that the diffusion of broadband has stimulated more interactive and participative uses of the Web, encouraging users to become more creative content producers (e.g. Ewing & Thomas, 2008; Tolbert & Mossberger, 2006). In support of this, various empirical studies have suggested that the affordability of broadband is enabling changes in user behaviour. One OECD study showed that:

> "New content-rich broadband applications and new forms of usage have become a key driver of broadband demand and uptake. The availability of broadband has reinforced existing activities (e.g. e-mail, news and information, shopping online), but this has also

brought about new forms of usage and innovation (e.g. video streaming, podcasts, high-definition television over broadband)." (OECD, 2008, p. 89).

A related study showed that broadband users tended to contribute more content to websites, keep online diaries and blogs, and share photos, videos and artwork (OECD, 2007). Similarly, an Australian World Internet Project study (Ewing & Thomas, 2008) revealed a close positive relationship between the diffusion of broadband services and creative uses of the technology, where users of broadband were more likely to post videos and photos, to download music and to listen to podcasts and radio online, for example.

But the secondary data analysis conducted for this chapter also suggests that different components of broadband may be more important for different activities; while in some activities the 'always-on' feature is more relevant, for others speed comes more into play.

## Measuring the broadband experience over time and cross-nationally

As examined in some depth in the previous chapter by Haddon and Heinzmann, the fast changing ICT environment and constant new technological achievements and developments demand the continuous (re)changing of our understanding of broadband. The term broadband is today used to describe almost any always on, high speed connection to the internet. Broadband is often associated with a particular speed or set of services, but in reality the term 'broadband' is like a moving target, with internet access speeds increasing all the time.

What is it about current broadband that makes a difference to the broadband experience? The recent study of the quality of broadband connections experienced by individuals in 42 countries (in Europe, North America, OECD and BRICs – Brazil, Russia, India and China)[1] included several performance parameters, which were grouped into three major categories: download and upload throughput and latency. These factors appeared to change substantially the way in which the internet is used in domestic environments, opening up new possibilities for what may be done online. However, one could expect that not all features of broadband are (equally) important for specific online activities. While in the case of some activities high bandwidth may be very influential, in case of others the speed of the narrowband might be sufficient, but the impact of

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1   The press release of the study is available online at: http://www.saeurope.com/newscenter/downloads/CiscoBroadbandQualityrelease.pdf [Accessed 26 February 2009]

the always on aspect of broadband makes the involvement in specific web uses more appealing.

Turning now to the issues involved in comparing broadband cross-nationally, the broadband gap between countries should not be based on mere access measured by penetration rates, but should include quality and capacity divides, as well as differences on the range of services people can access and use. In the above mentioned study of the quality of broadband connections, for example, the Broadband Quality Score (BQS) for each country was determined using a formula that weighted each category according to the quality requirements of a set of popular applications available now and in the future. Typical applications for today include web browsing, social networking, music downloads, basic video streaming and video chatting, standard definition IPTV (the internet on the TV), and enterprise-class home offices. But we must remember that, once again, the very components of these indices may evolve. Future applications that may feed into countries' scores for broadband quality may include consumer telepresence for communications, healthcare and education, high-quality video file sharing and streaming, high-definition IPTV, cinema-quality live event broadcasts and advanced home automation.

Finally, there are the parameters of the particular secondary analysis conducted for the chapter. We are interested in the potentially richer online experiences brought about by the content-rich broadband applications, but at this point we are limited by the secondary data that are available. So we can only present the data regarding the number of different activities that individuals participate in online (comparing narrowband and broadband). Since we are confined to the data available in the Eurostat database it is also not possible to examine the relationship between, for example, e-skills and broadband availability. Our empirical results thus deal exclusively with the indicators that measure online activities related to communication, creation of content, peer-to-peer file sharing practices and software downloading. As evident from the results that follow, it is valuable to explore all the activities mentioned, because each of these practices can be contextualised nationally.

Regarding the time range of the data, the change examines only the latest available data, i.e. 2007. Even though the earlier time series data are important, there is a significant amount of potential data and this could bring about information overload. In addition to this, our interest lies more in revealing cross-country and within-country asymmetries than in the way that they evolve over time.

## Cross-national broadband divides

Let us first introduce a brief overview of the infrastructure conditions and level of access by households in each of the countries (Cyprus, Ireland, Portugal,

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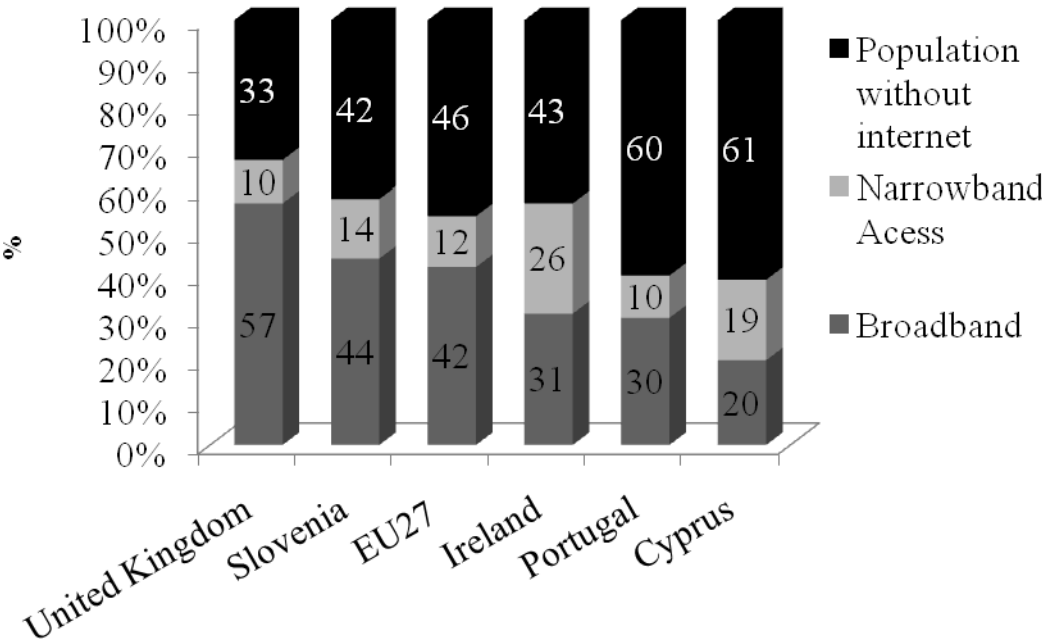Slovenia and the UK), dichotomised between narrowband and broadband in Figure 1.



*Figure 1: Internet access by households, 2007 (% based on total national population).*
*Source: Eurostat*
*Base: 16-74 year olds*

Of all the countries studied, the United Kingdom shows the highest level of overall internet access and broadband penetration rate. Slovenia comes in second place and Ireland in third place. However, a better ratio of broadband versus narrowband access exists in Slovenia. Portugal occupies the fourth position, closely followed by Cyprus; although, Portugal shows a superior share of broadband households.

The issue of cross-national differences can be explored in more depth using the Broadband Performance Index (BPI) (Commission staff working document, 2008). The BPI seeks to compare the performance of broadband in member states according to a range of factors: broadband coverage (reflecting developments in rural areas), competition by coverage (reflecting countries' innovative capacity, propensity to invest and consumer choice); speeds (reflecting quality developments), prices (reflecting affordability), use of advanced services (reflecting the propensity of individuals and businesses to take up innovative services and the perception of trust), and socio-economic context (reflecting preferences, skills and capital equipment that influence the propensity to use advanced communication technologies and services).

The above work concludes that as regards the countries under study the UK performs well according to most indicators but lags behind in terms of speed and take-up of advanced services, in particular by businesses (although trust in the online environment is generally positive). Portugal and Slovenia have a weaker 'socio-economic context' (see above), in particular in terms of ICT expenditure and skills, with limited use of advanced services as well as relatively high prices. Cyprus' and Ireland's performances are limited along most dimensions by the socio-economic context. Cyprus is also limited by high prices but in contrast has good broadband coverage in rural areas.

So this more nuanced approach to cross-national comparisons shows us that it is important to take into account not only the basic penetration rates (reflected merely by the percentage of households that have broadband access), but also other factors, that indicate the qualitative aspects of the internet experience. By considering these factors one can avoid drawing one-sided and partial conclusions about the role of the internet in specific contextual environments. Let us take the Slovenian example to illustrate this: while Slovenia shows high internet coverage (as depicted in Figure 1), the abovementioned Broadband Performance Index reveals that Slovenia performs worse in most of the broadband attributes, particularly those related to more skilled and advanced use of broadband services and applications (which is due in particular to trust-related indicators).

These (mostly structural-level) factors that have an impact on the take-up of broadband services in general are also very useful for our further analysis of people's involvement in specific online activities within different countries.

## *Broadband versus narrowband online practices*

At the most general level, our data analysis points to a positive correlation between the availability of broadband at home and people's engagement in a variety of online activities. Within the observed countries, on average approximately 80% of individuals with a broadband connection use the internet regularly, while only around 60% with a dial-up connection do so (Commission staff working document, 2007). Similarly, citizens in countries with the highest broadband penetration rates make more intensive use of high bandwidth demanding services.

When we turn to specific services it is useful to establish some of the principles of analysis with older applications before looking at the newer ones. Therefore, the first specific application we review is one of the most basic and long established uses of the internet: sending an email with attached files. Since

the majority of these short messages usually only require limited bandwidth, it is not surprising that we find only minor differences between narrowband and broadband users (Figure 2[2]). As will become clear later, there is always some variation between the narrow versus broadband gaps in different countries, but here the range is relatively small, 6-14% (the latter in Cyprus). The small gap between broadband users and narrowband users might be explained by some technical differences i.e. the fact that sending emails with (larger) attachments using a broadband connection might be (slightly) faster. But it may be due to the fact that broadband users have a different profile from narrowband ones, and simply send slightly more emails because of that. Lastly, the overall differences (across the countries considered) between the percentages of broadband users that send an email with attached files are generally small. The relevant percentages range between 80% and 89%, as observed in Figure 2. The small differences can be attributed to the fact that sending emails with attachments is a widespread practice among internet users.
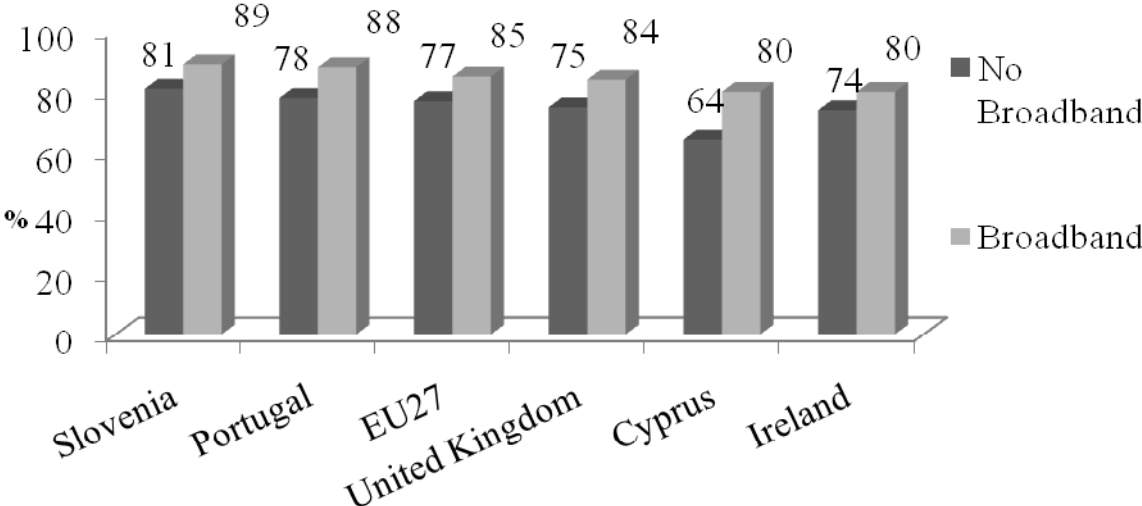


*Figure 2: Percentage of internet users who have sent an email with attached files, 2007.*
*Source: Eurostat*
*Base: 16-74 year olds*

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2 The data illustrated in Figures 2-7 relate to the percentage of individuals who have ever used the internet. The category 'Broadband' indicates individuals living in a household with broadband access and category. 'No broadband' indicates individuals living in a household with internet access but with no broadband access. The population considered is aged 16 to 74 years.

The next step is to look at the less widespread but still established textual communicative practices – posting messages to chat rooms, newsgroups and online discussion forums. This is generally more relevant to discussions of whether the internet leads to more forms of social participation since these all count as various forms of online participation.

In Figure 3 we can see both a gap between narrow versus broadband users and also differences between countries – and both are greater than in the case of email. This is illustrated in the case of the cross-country divide by the fact that half of broadband internet users in Portugal have posted messages as opposed to less than a quarter in Ireland. Moreover, there are national differences whether one compares broadband or narrowband, so there must be some social reasons for national variation in these practices.

As regards the technological differences in terms of posting messages to chat rooms, newsgroups and online discussion forums, in all the countries, the differences between narrowband and broadband are much more dramatic than in case of sending emails, and the range of gaps is greater than for email, being largest in Slovenia (23%) and smallest in Cyprus (8%). As in the case of email, the bandwidth should make very little difference to the speed of posting such short messages. There might still be some technical influences on this pattern, such as the always-on connectivity associated with broadband. But once again, it may be that the type of people who adopt broadband are ones more likely to participate online – in this case, the difference between the profile of narrowband and broadband users might be larger in Slovenia and smaller in Cyprus.
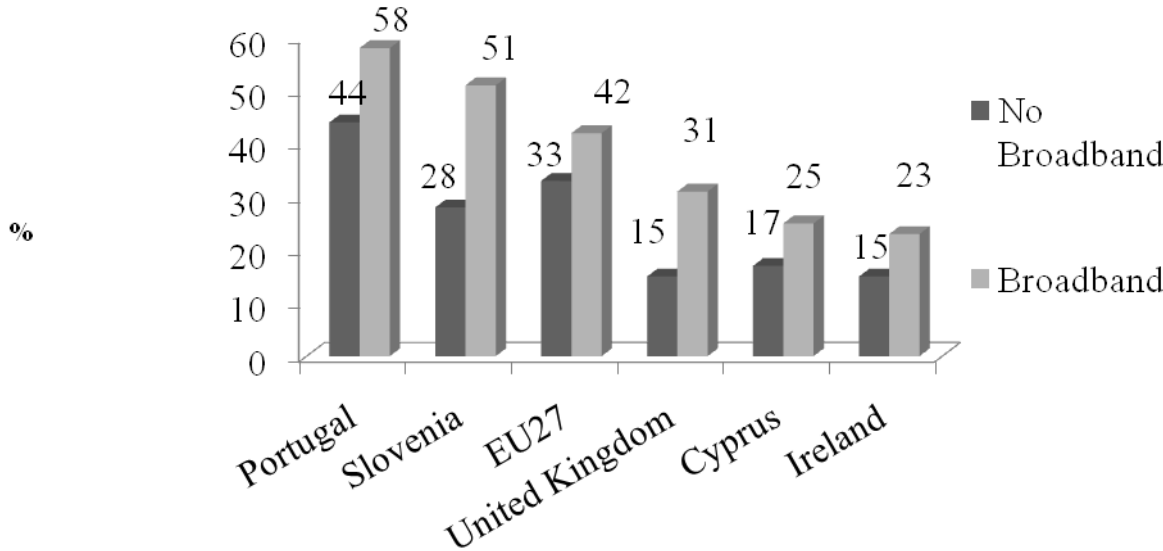


*Figure 3: Percentage of internet users who have posted messages to chat rooms, newsgroups or an online discussion forum, 2007.*

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Before considering the newer services, it is useful to think about the ways in which we know how older services have been affected by broadband. Downloading software is a long established practice, pre-dating web 2.0. But those living in a household with broadband access are also more likely to have found, downloaded and installed software. This is understandable in light of the growth of software file sizes, as shown in chapter five, which almost assume broadband access – i.e. it would take a long time to download them with narrowband. In other words, the act of downloading may not be new, but changes in file sizes have an impact on the nature of this process, making broadband significant. That said, some narrowband users say they download software, although this in part may reflect the fact that they may be referring to software downloading in the past when files were smaller.

As in the previous services, the gap (including broadband downloading) between countries, especially Cyprus and Ireland versus the other countries, suggest some social factors influencing this practice. These factors may be related to those affecting online participation, since once again, Portugal is at the top and Ireland at the bottom.
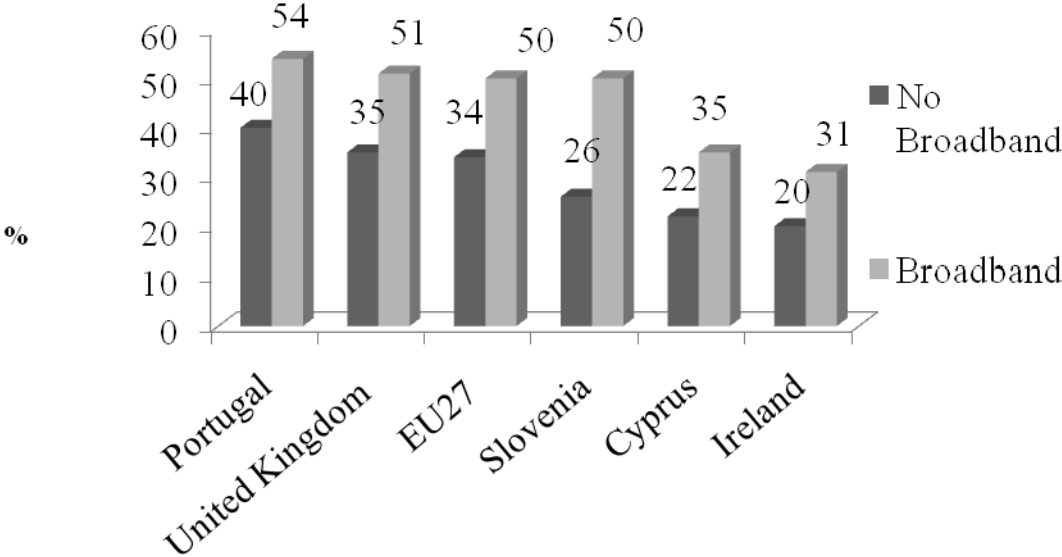


*Figure 4: Percentage of internet users who have downloaded and installed software, 2007.*

Having established that differences exist between countries and narrowband versus broadband users even in the case of older practices, we can now consider the newer ones. We start with verbal communications online (e.g. via Skype),

where we expect broadband to make a difference because high bandwidth is of great importance for making phone calls. Figure 5 shows that in all countries, those who have broadband access are more likely to have made internet phone calls. In all countries where we have data available the gap is quite large. Looking across countries, Portugal and Cyprus have the highest rates for both narrowband and broadband access while the United Kingdom has the smallest proportion of individuals who have used the internet to make phone calls[3]. But we can introduce a new element of cross-national analysis here - the two countries otherwise lagging in terms of internet (and also specifically broadband) penetration (as illustrated in Figure 1) rank among the top countries. In contrast, the UK, the otherwise leading country in terms of internet adoption rates, is last. Moreover, in the case of services where broadband should make a difference, variation in the use of these services is also influenced by cultural, social and economic issues and not just by the broadband penetration rate in a particular country. It might be, for example, that in Portugal and Cyprus (non-internet) phone calls are more expensive (in absolute and/or relative terms).
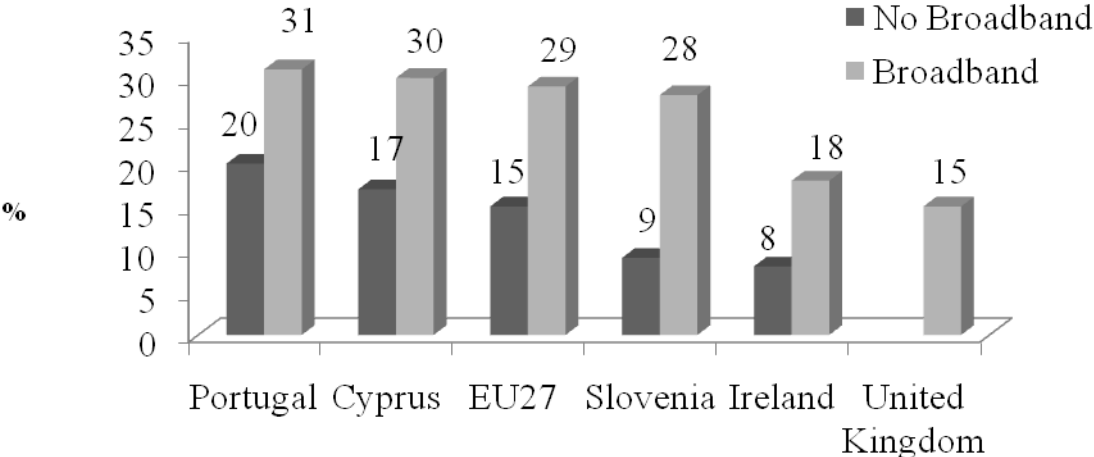


*Figure 5: Percentage of internet users who have used the internet to make phone calls, 2007.*
*Source: Eurostat*
*Base: 16-74 year olds*

We can now look at some potential creative practices associated with web 2.0. As in the case of downloading software, there are in practice continuities between old and new applications in this field. As an example of a creative practice, it has long been possible to create webpages, even with narrowband.

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3 There are no UK data for those with no broadband access.

But the development of social networking sites (SNSs) over recent years made a difference, leading to far more webpages; for example all profiles on Facebook and MySpace. While SNSs do not require broadband per se, always on connectivity makes it easier to constantly check other people's online profiles and potentially contribute to these sites and high bandwidth is useful for supporting audio-visual elements (e.g. music, animations) - features admittedly used by a minority.

So does broadband make a difference? At face value, yes, since in Figure 5 one can clearly distinguish a gap in all countries between those living in households with broadband access and those with no broadband access. But is this entirely caused by the nature of broadband as a form of access? To develop our arguments about the profiles between narrowband and broadband users, we know that SNSs are most popular with youth and young adults, and these are the ones most likely to have broadband – so once again, the factor causing the difference in the figures may well relate to the type of people using broadband.

Looking across countries, the largest difference within countries occurs in the one that also shows the highest percentage of webpage creators, Slovenia, while Ireland has the smallest difference but also the lowest percentage of webpage development. Lastly, the same principle occurs as in the case of internet phone calls - amongst the five countries, Slovenia is not foremost in broadband penetration nor Ireland last (see Figure 1), so social factors and not just technological development must be playing a role.
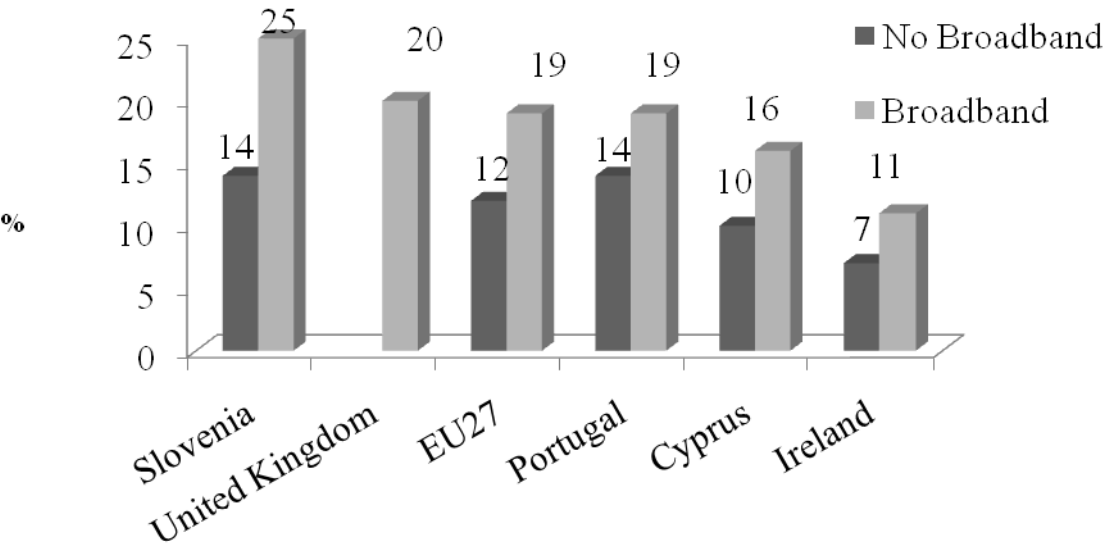


Figure 6: Percentage of internet users who have created a webpage, 2007.
Source: Eurostat
*Base: 16-74 year olds*

Finally, an important emerging internet use is online media sharing practices, enabled by peer-to-peer sharing sites (and software). As demonstrated in chapter 5 in this book, this benefits from high bandwidth because of the size of the files, and indeed in Figure 7 we find that more broadband users participate in this practice in all countries where data is available. But 'benefits' is clearly the appropriate word, since it can be managed with narrowband if one is willing to wait, and indeed Figure 7 also shows that there are narrowband internet users willing to do this.

Looking cross-nationally, the data shows that Slovenia has the highest rate among those with broadband access, followed by Portugal while Ireland has the lowest rate. As in the case of previous figures, this underlines the importance of social factors at work – in particular the case of Portugal with low broadband penetration, while the UK with the highest penetration rate is towards the bottom on this graph.
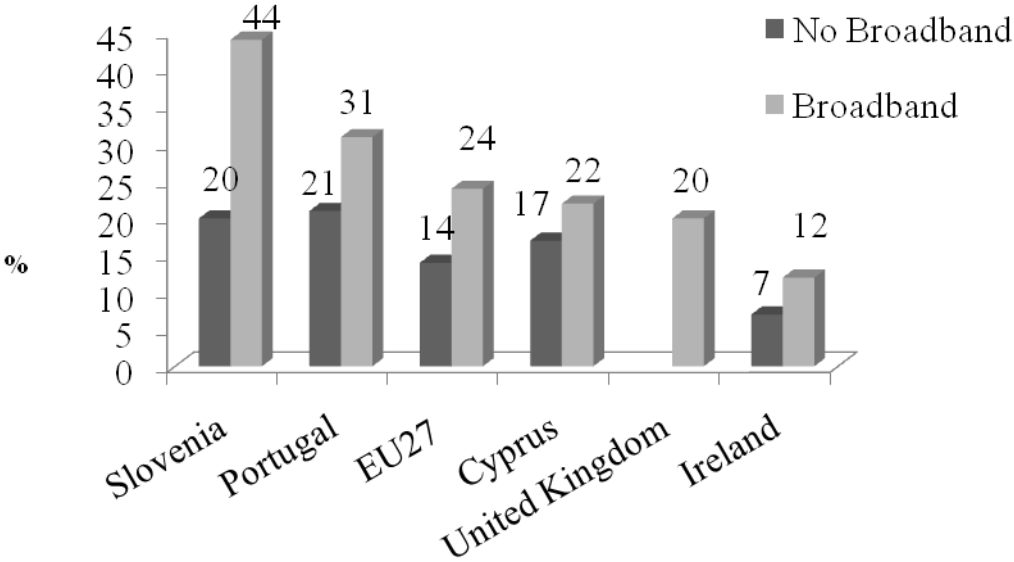


*Figure 7: Percentage of internet users who have used peer-to-peer file sharing for exchanging movies, music, etc., 2007.*
*Source: Eurostat*
*Base: 16-74 year olds*

The above data analyses point to a relation between the availability of broadband at home and people's engagement in multiple online activities. It is clear that broadband is not only correlated with an increase in the share of the population conducting different online activities, but also relates to more frequent and longer internet use. As regards basic internet activities (like sending emails with an attachment) one can note minor differences between

narrowband and broadband users; but in activities related to applications that work best with more bandwidth (e.g. peer-to-peer file sharing) the gap is wider.

## Discussion

It is important to start with a qualification. At the moment, the statistics that are available show us correlations, but that cannot prove causality. To take the example of sending emails, we suggested that the correlation with broadband use might exist because the latter enables one to send larger attachments more quickly. But it may be the case that people who were previously more active on narrowband are the ones more likely to adopt broadband in the first place. Being active might have involved more communication, hence they are the type of people who send more emails. This same logic could apply to all the indicators studied. Indeed, we can imagine that there were differences in the degrees of activity between users of narrowband, and the migration of more active users to broadband has made that distinction more visible in the figures that compare narrowband and broadband.

However, from various studies, as well as our knowledge of technological affordability we also know that it is probable that some of the difference between narrow and broadband arises because the latter technology makes certain applications easy or in some cases viable (e.g. telephone conversations via the internet). Hence we suspect that while several processes may be simultaneously at work, broadband may in part have a bearing upon internet user choices and practices. In sum, while these potential processes have been emphasised, we recognise that the picture behind the statistics may be more complex and deserves further investigation than can be managed in this paper using the data available.

Based on the data studied one could conclude that the diffusion of broadband is correlated to more interactive and creative uses of the internet, including the development and sharing of creative content. In fact, these findings are in line with other empirical research conclusions, most of which have suggested that the affordability of broadband is enabling change in user behaviour (i.e. ignoring the potential complications about causality noted above).

In terms of differences across the five countries, these are more evident in some activities more so than others. In general, Cyprus and Ireland show the lowest online participation regarding the reported activities. In Ireland many people still prefer to have face-to-face contact with others rather than meeting (new) people online. Hence, in their free time, people living in Ireland prefer to meet others face-to-face and socialise offline. This could in part explain why some people living in Ireland use the internet less for recreational purposes, i.e. exchanging movies and music online or to post messages to chat rooms (see Figure 3), in comparison to the other countries studied. It is somewhat surprising

that individuals in Slovenia and Portugal (which are not countries with the highest broadband internet penetration) are more involved in many of the activities investigated. This is particularly evident in case of two of the activities that arguably require more time and effort, i.e. peer-to-peer file sharing and sharing thoughts by posting messages within different online environments. These differences might be explained by referring to a wide variety of (and complex relationships among) social, cultural, political and economic factors. The way in which (local) communities shape access to ICTs as they respond to changing policies, market dynamics, technological advances, and issues of social exclusion in the digital age may vary across different countries. While investigation of these determinants is not the focus of this paper, we will nevertheless turn to some of these with the purpose of showing how these factors can help our attempts to understand at least some of the (cross-and within-country) disparities revealed by the findings of the secondary analysis presented above.

In the example of making phone calls via the internet (see Figure 5), it is evident in terms of this activity that Portugal has the highest rate and the UK the lowest rate. From one point of view, this could be seen as a surprising finding because (considering economic factors) previous UK research involving day-in-the-life-of diaries and interviews, for example, suggests that although it was by no means the only factor, the costs involved in using different channels of communication were a major consideration shaping British people's choices between channels (Haddon and Vincent, 2005). In a similar vein, Telecom Italia survey data relating to Britain (but also France, Germany, Italy and Spain) suggested there was widespread sensitivity to the price of telecoms costs in general and that this was a constraint influencing calling decisions (Haddon, 2004)[4].

Furthermore, due to the UK's diverse population (official statistics show that immigration has contributed to half of Britain's population growth in the last 10 years) it might be expected that immigrants would be attracted to free-of-charge international calls. For example, ethnographic research on West Indian immigrant communities and their use of ICTs, as well as of immigrants' communications in the Netherlands and in France (Calogirou & Andren, 1997 in Thomas, et al., 2005) studies show that ethnic background strongly influences the intensity, social composition and geographical reach of social networks and

4 Here it should be noted that while the cost structures provide the 'supply' part of the equation, the willingness of people to pay different costs, in the language of economics their 'marginal utilities', may nonetheless be influenced by a range of cultural factors, by the circumstances of people's daily lives and by the values related to them (Haddon, 2004).

how these networks are maintained over distance by use of the telephone, mobile phone or e-mail.

However, it seems that the low interest by the British for making (free) internet phone calls could be at least partially explained by the technological framework conditions in terms of the quality of the broadband services and infrastructure in the UK. Namely, both of the above mentioned indices – i.e. Broadband Quality Score (BQS) and Broadband Performance Index (BPI) show that the UK lags behind in terms of broadband quality. According to the BQS, for example, the UK "does not have good enough broadband to consistently deliver high quality Web access, falling behind not only the usual leaders, but coming in the bottom half of ranking"[5]. Since internet phone service is a typical data intensive web application, the smaller interest in this online activity in the UK might be also a result of lower broadband quality.

Another indication of the impact of technological infrastructure (in terms of the quality of both narrowband and broadband) on different internet uses is that the greatest difference between those with narrowband and those with broadband access is seen - for almost all the cited activities and particularly for those that require high bandwidth – among Slovenian internet users. This finding could be explained by the fact that (even though broadband penetration rate is still relatively low) good latency and speeds gives Slovenia a high BQS (it is ranked as tenth among the 42 countries). Namely, solid broadband connections might encourage individuals to get more involved in (and benefit from) the content-rich internet services and applications.

## Conclusions

The point is that a cross-country perspective can tell us more than the fact that there are international digital divides – which has been the focus of previous studies. Taking a cross-cultural perspective can also add to our understanding of the processes shaping digital divides within countries, showing that some processes are not universal, but strongly dependent on the different country-specific conditions. Within this context, one of the paths of our future research could follow the social construction of technology (SCOT) approach, which provides a helpful framework to explore the diffusion of high-speed, advanced communications (Dutton, et al., 2004) and is concerned with the ways in which social forces impact the design, adoption, and uses of technology (see e.g. Lievrouw, 2002).

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5 See http://www.itpro.co.uk/606138/uk-lags-in-broadband-quality [Accessed 26 February 2009]

Possible future research could also investigate in more depth how other user characteristics, their social environments (including social networks) and online abilities influence the types of uses and also how different uses might have significant implications for (improved or impeded) life outcomes. We should note here that the phrase 'social inclusion' captures this sense of avoiding social isolation. The implication is that we need to consider not just what we possess but also what we can do, the extent to which we can fulfil various social roles – or be constrained in doing so. Approaching the role that ICTs play in relation to social inclusion in this way would enable us to explore in more detail how ongoing developments in the nature of the internet, and by extension the newer and future services and facilities online, can not only facilitate connection with the wider society but also enhance certain divisions (Haddon, 2000). Future research and policy making agendas should address this issue of new kinds of (in)equalities, arising from the various uses of ICT.

## Bibliography

Attewell, P., 2001. The first and the second digital divides. *Sociology of Education*, 74, pp. 252-259.

Bonfadelli, H., 2002. The internet and knowledge gaps – a theoretical and empirical investigation. *European Journal of Communication*, 17 (1), pp. 65-84.

Commission staff working document, 2007. Accompanying document to the communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. *i2010 - Annual Information Society Report 2007*. [Online] Available at:
http://ec.europa.eu/information_society/eeurope/i2010/docs/annual_report/2007/sec_2007_395_en_documentdetravail_p.pdf [Accessed 26 February 2009].

Commission staff working document, 2008. Accompanying document to the communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. *Future networks and the internet - Indexing broadband performance* [Online] Available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SEC:2008:2507:FIN:EN:PDF [Accessed 26 February 2009]

DiMaggio, P. Hargittai, E. Celeste, C. & Shafer, S., 2004. Digital inequality: from unequal access to differentiated use. In: K. Neckerman, ed. *Social inequality*. New York: Russel Sage Foundation, pp. 355-400.

Dutton, W. H. Gillet, S. E. McKnight, L. W. & Peltu, M., 2004. Bridging broadband internet divides: reconfiguring access to enhance communicative power. *Journal of Information Technologies*, 19, pp. 28-38.

Ewing, S. & Thomas, J., 2008. Broadband and the 'creative internet': Australians as consumers and producers of cultural content online. *Observatorio (OBS*) Journal*, [Online] 2, pp. 187-208. Available at: http://www.obs.obercom.pt/index.php/obs/article/view/215/190 [Accessed 26 February 2009].

Haddon, L., 2000. Social exclusion and information and communication technologies: lessons from studies of single parents and the young elderly. *New Media and Society*, 2 (4), pp. 387-406.

Haddon, L., 2004. Cultural differences in communication: examining patterns of daily life. *Mobile Communication and Social Change*. Seoul, South Korea 17-18 October 2009 [Online] Available at: http://www.lse.ac.uk/collections/media@lse/whosWho/LeslieHaddon/KoreaPaperCulture.pdf [Accessed 26 February 2009].

Haddon, L. & Vincent, J., 2005. Making the most of the communications repertoire. Choosing between the mobile and fixed-line. In: K. Nyíri, ed. *A sense of place. The global and the local in mobile communication*. Vienna: Passagen Verlag, pp.231-40.

Hargittai, E., 2008. The digital reproduction of inequality. In: D. Grusky, ed. *Social stratification*. Boulder: Westview Press, pp. 936-944.

Lievrouw, L., 2002. Determination and contingency in new media development: diffusion of innovations and social shaping of technology perspectives. In: L. Lievrouw, ed. *Handbook of new media: social shaping and consequences of ICTs*. London: Sage, pp. 183-199.

Mason, S. M. & Hacker, K. L., 2003. Applying communication theory to digital divide research. *IT&Society*, 1 (5), pp. 40-55.

Menou, M. N., 2001. Digital and social equity? Opportunities and threats on the road to empowerment. *LIDA (Libraries in the Digital Age) 2001 Annual Course and Conference*. Dubrovnik, Croatia, 23-27 May 2001. Zagreb: Faculty of Humanities and Social Sciences, University of Zagreb.

Merton, R. K., 1973. *The sociology of science: theoretical and empirical investigations*. Chicago: University of Chicago Press.

Norris, P., 2001. *Digital divide: civic engagement, information poverty, and the Internet worldwide*. Cambridge, MA.: Cambridge University Press.

OECD, 2007 *Participative Web and user-created content: web 2.0, wikis and social networking*. [Online] Available at: http://213.253.134.43/oecd/pdfs/browseit/9307031E.pdf [Accessed 26 February 2009].

OECD, 2008. *Broadband growth and policies in OECD countries*. [Online] Available at: www.oecd.org/dataoecd/32/57/40629067.pdf [Accessed 26 February 2009].

Parayil, G., 2005. Digital divide and increasing returns: contradictions of informational capitalism. *The Information Society*, 21 (1), pp. 41–51.

Tolbert, J. & Mossberger, K., 2006. *New inequality frontier: broadband internet access*. EPI Working Paper 275. Economic Policy Institute.

Thomas, F. Haddon, L. Gilligan, R. Heinzmann, P. & de Gournay, C., 2005. Cultural factors shaping the experience of ICTs: An exploratory review. In: L. Haddon, ed. *International collaborative research. Cross-cultural differences and cultures of research*. Brussels: COST, pp. 13-50.

Van Dijk, J., 1999. *The network society: social aspects of new media*. London: Sage.

Van Dijk, J., 2005. *The deepening divide: inequality in the information society*. Thousand Oaks: Sage.

Warschauer, M., 2003. *Technology and social inclusion: rethinking the digital divide*. Cambridge (MA): MIT Press.