

Challenging the digital divide?

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A literature review of community informatics initiatives

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1 Introduction

Background to the review

The increasingly widespread diffusion of new information and communication technologies (ICTs) into almost every aspect of our working and domestic lives is already a significant characteristic of British society. For some commentators this represents a profound social and economic trend heralding the emergence of a 'knowledge economy' or 'information society' (Reich, 1992; Castells, 1996, 2001), with concomitant personal implications for individuals acquiring the necessary awareness, skills and access to fully participate and take advantage of the anticipated benefits. Such digital dividends, however, are not currently uniform in their spread across the population. This has given rise to a continuing policy concern over the emergence of a 'digital divide' between those able to exploit the potential of ICTs and those who remain socially and economically unconnected to the 'network society' (NTIA, 2000).

Perhaps unsurprisingly there is a perceived correlation between the 'information poor' and those communities which are currently socially and economically isolated. The fear is that current trends in the acquisition, access and diffusion of ICTs may act to reinforce these existing inequalities. Consequently, as the new media and their adoption become increasingly important for educational achievement, employment opportunities, access to public and commercial services and other life choices, people living in deprived localities are likely to be significantly disadvantaged. The digital divide therefore refers to much more than the notion of access to technology. It is crucially bound up with debates about social exclusion, economic regeneration of deprived areas and the breakdown of social capital and community relations (Warschauer, 2003).

Policy responses to challenging the digital divide, both in the UK and elsewhere, have partly focused upon the role of the voluntary and community sector to develop local projects designed to provide public access and support for the adoption of ICTs by those currently excluded (PAT 15, 2000). Such an approach has drawn heavily upon a worldwide tradition of what in the UK, Canada and Australia is called 'community informatics' (CI). These are typically initiatives which have been designed to explore the potential transforming qualities of the new ICTs for community development, economic regeneration, democratic renewal and social support. Through its UK online programme the UK government has sought to utilise existing CI projects largely through the New Opportunities Fund (NOF). Its attempt to further develop community-based public access centres in order to achieve its target of providing 'universal' access to ICTs by 2005 (Office of the e-Envoy, 2001, p. 4) could only be met by a mixture of utilising existing public sector facilities and stimulating new projects. Consequently a large percentage of locations listed as UK online centres are libraries or colleges of further education rather than voluntary and community facilities.

UK online has acted to bring a wide range of policy initiatives and funding programmes into an impressive combination of government-sponsored activities. Since 1999, the UK government has invested some £400 million through NOF, the Capital Modernisation Fund and the People's Network to support over 6,000 ICT centres in deprived rural and inner city areas based in England (Office of the e-Envoy, 2003a, p. 8). The aim of UK online is to help make the UK 'one of the world's leading knowledge economies' (Office of the e-Envoy website).

More recently the Office of the e-Envoy has focused attention upon the potential of community and voluntary groups to act as *intermediaries* facilitating access to e-government services (Office of the e-Envoy, 2003b).

Aims of the review

Given the significant amount of public funding being devoted to challenging the digital divide it is timely to ask what we actually know about the effectiveness of public access centres and related CI approaches for tackling exclusion. This critical review provides policy makers and practitioners with an accessible and comprehensive examination of worldwide research conducted to date which identifies the potential strengths and weaknesses of a range of CI initiatives as a means of providing effective support for people living in predominantly disadvantaged areas. The review addressed the following questions:

- What do we already know? What evidence currently exists from around the world on electronically networked communities as a means to improve the life opportunities and support for people living in deprived communities?
- How robust is the empirical research which exists? Does it provide methodologically rigorous findings which can be used to inform the work and practice of policy makers, community groups, practitioners and researchers?
- What gaps exist in current research and how does it shape a future research agenda?

The approach to the review

The review involved a staged process and included published academic and scholarly articles and books, practitioner reports and documented case studies. The review strategy involved a scoping exercise to identify, locate and assess the amount of research evidence from CI projects in various developed countries currently in existence. On the basis of the scoping exercise a more in-depth search and analysis

was conducted on five key areas for investigation: education and training; civic participation; economic regeneration; regulation and connectivity; and culture and identity.

Defining the scope of the review

In this study, the main research question that informed the search of the databases was: 'What value do information and communication technologies (ICTs) have for community economic and social regeneration?'

The search strategy designed for the scoping review searches generated 1,616 abstracts. The extension of these searches during the full literature review generated an additional 156 academic publications. The abstracts were then categorised by examining those that specifically addressed issues of: education and training; civic participation; economic regeneration; regulation and connectivity; and culture and identity. The selection of material for inclusion in the review was based on the criteria outlined below.

In total, 49 references were selected for inclusion in the review. Their selection was on the following basis:

- The paper was concerned with an examination of the use of ICTs for community development or social and/or economic regeneration.
- The paper drew on empirical evidence that was critical rather than descriptive.
- The studies were primarily based in Europe or North America.
- The study was published in the last ten years.

The small number of papers included in this review indicates the paucity of hard evidence in the subject area. However, as would be expected in a review of this nature, we did have to make selective decisions on the focus of the literature. There is a growing body of literature on health and welfare support online (see, for example, Burrows *et al.*, 2000; Muncer *et al.*, 2000; Nettleton *et al.*, 2002), culture and identity online (see, for example, Miller and Slater, 2000; Primo *et al.*, 2000; Nip, 2004) and young people and ICTs (see, for example, Facer *et al.*, 2001, 2003; Livingstone, 2001) which, whilst falling outside of the remit of this review, is indicative of the growing related work in the area.

The place of community

Community relations continue to figure highly in policy debates to tackle social exclusion and deprivation. Despite the fact that the concept of community remains essentially contested in the eyes of academics (Plant *et al.*, 1980) its role as an 'intermediate space' between the individual/family and larger social structures, such as government, is important for fostering many life opportunities. At a time when there is concern that such community relations and intermediate spaces are declining (Putnam, 2000), it is perhaps unsurprising that new ICTs should be regarded both as a possible contributing factor in this demise and as a means for the regeneration of disadvantaged communities. Some of the literature points to ways in which the media reinforce disadvantage (Graham, 2002) and suggests that the emergence of online 'virtual communities' of interest may act to weaken local ties (Kraut *et al.*, 1998; Wellman, 1999). Conversely, other commentators are enthusiastic about the capacity of ICTs to empower community networks (Schuler, 1996; Kavanaugh *et al.*, 2000). The review suggests that such ambiguity within the literature needs further clarification through more systematic research to inform future policy objectives and implementation.

Community informatics: towards a new analysis?

Whilst the field of community informatics (CI) is a fairly recent addition to policy and academic circles its roots can be traced to the community networking movement in the USA (Farrington and Pine, 1992; Hauben, 1995; Kubicek and Wagner, 2002) and the Scandinavian telehouse experiments (Qvortrup, 1987; Cronberg *et al.*, 1991) of the 1980s. Moreover its reach is extending across the world where it is being adopted by other community activists, policy makers and researchers. Its distinctive contribution is twofold. First, it seeks to provide a multidisciplinary research platform to undertake rigorous and critical analysis which can develop our understanding and be of use to policy makers and practitioners. Second, CI approaches emphasise *communication* and *information* over technology as the primary factors shaping the relationship between the new media and community development. It thereby attempts to avoid those overly technical approaches which often present ICTs as a determining force for change and which give little opportunity for human choices, resistance, or mediation. Instead, CI places human agency as an essential component for the creative adoption, alteration and diffusion of the new technologies into community relations. It emphasises a grassroots perspective whereby community members are centrally involved in the application of ICTs for community development.

Setting the policy agenda

The report is divided into five domains which most typically represent the components of CI projects: physical access and connectivity; computer skills and literacy; economic regeneration; civic participation; and diversity, difference and social exclusion. Whilst helpful as a means to identify policy issues it is of course somewhat arbitrary as most projects cross many categories.

The key issues emerging from the review suggest that the ultimate success of the UK government's directive for challenging the digital divide is likely to depend upon the identification and availability of hard-learned lessons and research evidence for dealing with issues of sustainability, awareness raising, effective learning, access and community networking. Whilst there are isolated 'pockets' of research documenting some of the many CI initiatives emerging throughout the world (Schuler, 1996; Loader, 1998; Gurstein, 2000; Keeble and Loader, 2001; Day and Schuler, 2004), there has been no attempt to review this literature and draw out the key findings for the benefit of UK practitioners, policy makers and local community planners. This review is intended to remedy this situation and foreground the primary agenda issues for policy makers to consider.

2 Physical access and connectivity: regulating access to public spaces and privileged places

Perhaps the most obvious factor characterising the digital divide is the extent of physical access to ICTs and the Internet. The aim of many CI initiatives has been to provide a community location for those unable to access the Internet from work or home with free or low-cost connectivity. A primary objective of UK online was to establish a network of at least 6,000 public access centres and the new *Oxford Internet Survey* (2003) conducted by the Oxford Internet Institute showed that 96 per cent of the UK population were familiar with a location where they could go online. Together with lowering prices and providing varied channels for access through digital television and mobile technologies, the Office of the e-Envoy believes that the 'opportunities to physically access the Internet are now available to all' (Office of the e-Envoy, 2003a, p. 5).

Whilst this overall picture of increasing opportunities for access to ICTs appears as a significant step towards tackling the digital divide, the literature also suggests that it may act to disguise widening differential access and use of ICTs. In this sense the digital divide cannot simply be understood as an absolute measurement of exclusion from ICTs. What people use the Internet for and its perceived relevance to their everyday life experiences influence not only levels of access but also different types of access according to socio-economic origins (see, for example, Carvin, 2000b; BECTa, 2001; Perri 6 and Jupp, 2001; Mansell, 2002; Davison and Cotten, 2003). The Office of the e-Envoy itself makes a distinction between access and more sophisticated use of the Internet which is necessary for realising the social and material benefits of the new media (Office of the e-Envoy, 2003b). We will consider how educational policy may help address differential access and usage of ICTs in the next section. What follows here is a consideration of how differential access and usage may be shaped by government policy on regulation and provision of the telecommunications industry.

The main policy thrust for widening participation in the information society for the UK is primarily through market regulation and competition measures. Public access points, whilst making a valuable and important contribution to challenging the digital divide, are regarded by the UK government only as a 'valuable safety net' (Office of the e-Envoy, 2003a, p. 5). It is rather through the commercial competition between private sector providers of infrastructure and connectivity that online participation is seen to continue to become more affordable to almost everyone. This section of the review looks at research which suggests that market-orientated policies could actually produce more highly differentiated patterns of connectivity between different social groups and between geographical areas.

Privileging wired-up spaces?

Graham and Marvin (2001) and Graham (2002) use data from around the world to demonstrate that the diffusion of ICTs remains uneven at all scales and that, increasingly, big business and capital are dictating who has access to the new technologies and broadband and who does not. They demonstrate that dominant trends in ICT development are currently helping to support new extremes of social and geographical unevenness within and between human settlements and cities. In addition, they explore the prospect that 'urban digital divides' might be ameliorated through progressive and innovative policy initiatives.

Four key points emerge from the work by Graham and Marvin and Graham. First, there is a great deal of evidence that the dominant factors shaping the adoption of ICTs are serving to underpin and support processes and practices of intensifying what they describe as 'urban splintering'. The primary exploitation of ICTs has been overwhelmingly by the social, economic, cultural and geographically located groups and organisations that are already best connected, highly skilled and most able to organise and configure the shift online to their own advantage. Conversely, people without Internet access face extra costs and barriers because they tend to lack the skills, knowledge, equipment, infrastructure access, capital, money, electricity and telephone access necessary to enter, access and fully exploit online services.

The second key point is that the uneven growth of the Internet and other ICT-mediated systems represents a subtle, often invisible, but immensely powerful process of dualisation within and between cities and towns. As such, it is directly involved in the restructuring of those cities that drive their development. The authors argue that certain urban developments, especially in 'global' cities of the North, are emerging as dominant places of global Internet production. A new type of economic enclave, 'gentrifying cyber district' (Graham, 2002, p. 6), is emerging in these cities, leading to the influx of new media businesses which have changed some inner cities, pushing up rents and so effectively evicting low-income groups. Such 'premium-networked spaces' offer an increasing range of goods and services through their advanced connections with global economies of exchange. Burrows and Ellison (2004), provide an account of how such advantaged spaces are mapped through geographical information systems (GIS).

The third point is that ICTs also allow socio-economically affluent urban groups selectively to overcome barriers and constraints of local geography by extending and intensifying their access to distant spaces.

Finally, they stress that the dominant applications of ICTs and the resources which flow from them are currently heavily biased in a cultural sense. Graham (2002) identifies the growth of the 'electronic economic power' which he argues raises many questions about geo-political relationships, accountability, democracy, global citizenship, the ownership and control of digitised information and the means of cultural expression, and the relationship between the global and local cultures that surround global urbanisation.

Graham and Marvin suggest that potential policy solutions to the growing evidence of what they call the 'poverty of connections' require that attention be focused upon the need for greater accountability of transnational media and knowledge industries for their actions. The difficult challenge that needs facing is the regulating, governing and taxing of global ICT systems. Finally, they argue that we need to recognise the complex relations between ICTs and places.

Lentz and Oden (2001) discuss similar issues to those identified above. However, their research focuses on the area of the rural Mississippi Delta and examines how the presence of a telecom industry affects social and economic deprivation. The area is identified by the authors as being interesting as it is one that has traditionally been associated with some of the highest rates of rural poverty and unemployment in the USA whilst the cities that border the region host a number of major telecom service companies.

Improvement of the telecom infrastructure in the Delta region had been identified as a priority economic development issue for the decade previous to the research and yet no progress had been made. The authors argue that the presence of major technology-producing firms has made a difference in smaller and more isolated cities such as Austin, Texas or Colorado Springs, Colorado that rank high in various Internet use and connectivity measures due to the presence of a local high technology community; a similar point is made by Servon and Nelson (1999) in relation to Seattle. They maintain, however, that there are access gaps that exist which disfavour certain areas and regions.

Drawing on evidence from across the USA, the authors identify what they see as a vicious circle emerging whereby service providers continue to skip areas with limited demand for the technologies. Businesses do not move into areas with poor access to technologies and untrained workforces and the stimuli to improve local access and know-how fail to emerge because people are not exposed to new technologies at work or at home. Technology-rich areas get richer relative to technology-poor areas as a result of initial unevenness and the normal operation of market forces.

Lentz and Oden identify in a similar manner to Graham (2002) how the cost in poorly connected areas is prohibitive and so reinforces lack of connection. They argue that in richer, innovative urban areas where new technologies proliferate first, local expertise and support services develop and expand in response. This leads to an increase in learning and also generates demand for the products and services thus reducing costs; low-income communities and rural areas are left with inferior, more costly services. Thus, low-income and rural communities face severe barriers in developing local information, expertise and support services to effectively exploit new telecom technologies in local enterprises and institutions.

The authors conclude that the relatively weak presence of core telecom industries in the Delta counties is strongly correlated with low measures of access to and use of advanced telecom products and services; the virtual absence of these industries in the rural Delta is linked to poor access and adoption characteristics. The uneven pattern of the telecom industry in the Delta suggests that rural counties are likely to lose ground in the new 'knowledge' economy where innovative and large-scale policy interventions to improve know-how and use are absent.

Selwyn (2002a, 2002b) draws on research he has conducted into domestic and community use of ICTs in the South West of England. He identifies that those groups most likely to be digitally excluded are seen to be those already characterised as socially excluded in terms of low income and their socio-economic status. Selwyn reviews the policy adopted by the UK government and argues that its conceptualisation of access to ICTs is basically flawed as access goes far beyond physical access to a computer. Selwyn (2002b) suggests that access is hierarchical rather than dichotomous and, as such, introduces more complex questions of the capability and distribution of access. He suggests (2000a) that the government is not in a position to challenge inequalities in ICT use whilst the market drives the nature of technological access. In conclusion, Selwyn suggests that communities targeted by community access potentially become 'second class' technology users.

Broadening the connection

Davison and Cotten (2003) argue that most studies fail to account for the type of connection people use to access the Internet. They argue that broadband users experience the Internet differently and that in determining who is likely to spend more time online, the type of connection is far more important than other digital divide demographics such as education, race or gender.

Davison and Cotten express their surprise over the lack of academic research into the effect of different levels of connectivity by those researching the digital divide.

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From a study of Internet surveys, they found that only four of the ten data sets asked questions about connectivity. As such, Davison and Cotten suggest that there is a dearth of information on differences between broadband and dial-up users. They argue that increasingly we will expect to see those with slow dial-up connections being left behind.

Horrigan and Rainie (2002) do attempt to examine the impact of broadband connectivity on American users at home. From analysis of the Pew Internet and American Life Project, results showed that broadband Internet users spend more time online, do more things and do them more often than dial-up users. The authors identify three major ways in which broadband users distinguish themselves from dial-up users. First, they become creators and managers of online content. Second, they satisfy a wide range of queries for information. Third, they engage in multiple Internet activities on a daily basis. In conclusion, Horrigan and Rainie found that broadband users are more likely to report that their use of the Internet has had a positive effect on connections to family and friends.

Bennett (2003), in association with the Benton Foundation, writes about the continued efforts of the Foundation to identify innovative broadband applications and their impacts on communities. Bennett argues that highlighting applications and benefits of broadband use in community provision will help more people become aware of broadband's benefits and provide tools that can assist communities.

Drawing on a range of case studies from across the USA, Bennett argues that there is a constant need for continued training in using ICTs. In addition he recommends the need for the creation of a national broadband policy in the USA, adequate funding, the development of comprehensive data collection mechanisms for assessing broadband deployment and access in order to identify communities in need, support for innovative mechanisms to fund public interest uses of advanced technology, and, through public policy, incentives created for a robust and competitive broadband marketplace.

Tambini (2000) argues that the idea of universal access should not be treated as some idealistic notion based on somehow overcoming social exclusion; rather it should be pragmatically based on economic reasons for providing a skilled workforce. Whilst new ICTs could enhance basic freedoms and cultural life and make accessible a wealth of culture and information, meaningful universal Internet access should only be concerned with facilitating access to everyone from their own home (Tambini, 2000).

Concluding comments

Physical access to ICTs through public gateways may be regarded by policy makers as something now 'available to all' but such perceptions may act to disguise *differential access and usage*. Graham and Marvin (2001), Graham (2002) and Lentz and Oden (2001) illustrate the impact of commercial decisions upon the distribution of connectivity and the perpetuation of the digital divide by the location of the telecom industry. The benefits of broadband connectivity are highlighted by Horrigan and Rainie (2002), Davison and Cotten (2003) and Bennett (2003), with Bennett advocating such connectivity in all community access points. Tambini goes further in arguing that such connectivity should be made available through universal access to everyone's homes (2000). Negotiations between government and commercial providers over pricing and regulation are likely to make a significant contribution to challenging *differential patterns of access and usage*.

3 Computer skills and literacy

After physical access to ICTs, the development of computer literacy skills for those excluded from the 'information society' is generally considered to be the next priority for challenging the digital divide. Consequently, the role of ICT skills training and education is unsurprisingly central to most community informatics projects and a primary objective of British government policy. The DfES White Paper *21st Century Skills: Realising Our Potential* (2003) champions the importance of computer literacy as the third life skill alongside numeracy and literacy. Several key issues emerged from the literature reviewed which may influence the effectiveness of computer literacy practices: previous educational attainment and perceived relevance; community learning environment; and innovative pedagogy.

Previous educational achievement and perceived relevance

Despite the significant increases in the amount of resources intended to widen access to ICTs in schools, libraries and community settings, the research suggests that access and use of the Internet has been strongly associated with prior levels of educational achievement (Allen and Rainie, 2002; McLaren and Zappalà, 2002). The message that underpins most of the research into the introduction of ICTs is that those who find it easiest to visit community information centres and take courses are likely to be higher educational achievers (Carvin, 2000a; Hargittai, 2002).

Hargittai (2002) conducted an empirical study on Internet users' online skills. She argues that as the medium of the Internet spreads to the majority of the population, it is increasingly important not only to look at who uses the Internet but also to distinguish varying levels of online skills among individuals. Skill is defined by Hargittai in this context as being the ability to efficiently and effectively find information on the web.

Hargittai found a great deal of variance in individuals' abilities to locate content online. Thus she argues that merely offering people a connected machine will not ensure that they can use the medium to meet their needs.

McLaren and Zappalà (2002) argue that the implications of the lack of access to new technologies such as the Internet on children's education is growing in importance and that ways should be found to increase the home access of low-income families to the Internet.

The authors found that access to and use of the Internet are not just dependent upon income. In particular, they found that the level of parental education was most strongly associated with home access to computers and the Internet as well as computer and Internet usage.

Whilst the Office of the e-Envoy is aware of the 'motivational barriers' (2003a, p. 7) for many non-users of the Internet, the research suggests that it is necessary to explore the potential correlation between educational underachievement and low perceptions of the value of ICT skills.

The community learning environment

Enabling wider access to ICTs and developing appropriate computing skills for poor educational achievers and those who remain unconvinced of its relevance may be significantly influenced by the nature of the learning environment (Hellowell, 2001; Liff and Steward, 2001). Different people will be attracted or repelled by different aspects of the social and physical milieu of community technology centres. The location of computers in familiar non-threatening multi-purpose venues may be far more attractive for those with low confidence than brand new purpose-built high-tech buildings or colleges and libraries. Equally, existing social networks such as voluntary community groups, clubs and societies may provide a more supportive learning environment than traditional educational institutions. The social ties often to be found within these networks may enable the potential benefits of ICTs to become embedded more easily within the groups' everyday experience (Loader *et al.*, 2000). The importance of utilising existing social networks is borne out by the final Hall Aitkin evaluation of UK online centres which noted that 'community and voluntary sector centres attracted higher proportions of socially excluded and digitally excluded users' (2003, p. 8). The following cases highlight the importance of social and physical context for effective community learning.

Mark *et al.* (1997) examined the impact of community technology centres (CTCs) in the USA on individuals and their communities. The researchers identified that all of the centres in the study adopted a learner-centred approach to both formal and informal teaching. The centres were regarded by the staff as being fully supportive of all learners regardless of age, culture, background, skill levels and knowledge. Centre users commented that they felt motivated by staff, that their needs were being met and that they were excited to learn more.

Chow *et al.* (1998) extended the research of Mark *et al.* and found that the CTCs in the sample offered a range of opportunities to use computers and other technologies in classes as well as through self-directed activities. Of the sample, 76 per cent said that they had both taken classes and used centre resources during unstructured blocks of time. The survey also found that CTCs were a valuable resource for those looking to obtain job skills and learn about employment opportunities.

Chow *et al.* (2000) further extended their quantitative work with CTC users to conduct a longitudinal study on the impact of CTCs on 12 users. The authors argue that CTCs, as providers of low-cost or free access to computers and other technologies, enable people who are disadvantaged economically to cross the digital divide. The participants in the study had used the centres to develop their skills, prepare résumés and search the Internet for work. In the centres used by the participants, users were encouraged to develop their skills to such an extent that they would go on and volunteer at the centre and, in some cases, teach classes or maintain and upgrade the equipment. The paper concludes that CTCs help improve employability and improve individuals' idea of themselves as learners.

Cook and Smith (2002) conducted research into how UK online centres support informal learning defined as being 'rooted in community-based education and notions of "listening to the community"' (Cook and Smith, 2002, p. 8).

The study found that almost all of the centres surveyed indicated that some form of e-learning was taking place. However, it was noted that centres appear to differ over those activities that they define as e-learning. The key issue for the authors was that centre users, workers and managers had a very large number of 'goals' that they wished to achieve. The range of goals that motivated staff and users were for self-improvement and for the collective improvement of the community.

The final study here is that commissioned by the Office of Learning Technologies (1998) to examine models of community learning networks in Canada. The research found that whilst most literature discussed the potential of the technologies to facilitate learning at the students' own pace and the contribution of technology that builds networks which support more collaborative approaches to learning and changes in the learner–educator relationship, there was little evidence of this in the interviews of case study analysis. Whilst acknowledging that the impact of community learning networks is difficult to assess, as most of the case studies were relatively new, some of the case study sites have had visible results with increases in community learning and citizen participation. The research found that the number of learning activities and programmes has increased and developed.

Rethinking community teaching

A consistent message to emerge from the review was that ICT training aimed at excluded groups needed to be more informal and innovative than traditional models of training. Those who had previously gained a negative experience of education were not likely to be attracted by or complete courses no matter what the surroundings. Moreover, the need to raise awareness of the benefits of ICTs for

non-users suggested that learning had to be relevant to their own life experiences rather than to jobs and people with whom they could not identify. The most innovative cases examined typically focused upon the user as a potential 'content creator' and not merely a recipient of information (Hellawell, 2001).

Casapulla *et al.* (2001) describe the development and introduction of an educational game, Cyberhunt, as part of the Milan Community Network. The game was devised from growing acknowledgement that people needed support, help and motivation to go online. The first edition of the hunt happened in 1996, and by the last edition discussed in 2000, approximately 5,000 people had participated. Whilst always approached as a game, the authors argue that the underlying aim is to learn to use computers and to interact with others through the Net.

Casapulla *et al.* acknowledge that with such a large sample, it was hard to evaluate the impact of the hunt in respect of whether it achieved the educational goals of demystifying the Internet. At the time of publication, they were considering the development of specific tools to track players' behaviour and assess the game's impact.

Cody *et al.* (1999) discuss their attempt to design and evaluate a training model aimed at older people. The programme was intended to break down the apprehensions of using the new technologies for older people by establishing an appropriate 'pace' for their learning experience.

The course lasted approximately four months. Two hundred and ninety-two individuals began the programme but the drop-out rate of 48 per cent was high. Significantly however, 55 per cent of those dropping out did so because of the deterioration of their own health or that of someone for whom they were acting as a caregiver.

The research team measured computer anxiety, attitudes towards ageing, perceptions of health, social support, connectivity, the types of sites visited, the degree to which participants felt engaged and the participants' time online. The researchers found that those who stayed on the course were older, more confident about their skills and less anxious about computers, had a more positive attitude towards ageing and were more connected to the outside world. The groups who benefited most from the training were healthy women and men with health limitations.

The researchers conclude that the training programme was too challenging for some and not fast-enough paced for others. It was identified that some learners would

benefit from a course designed specifically to reduce anxiety before proceeding to learn to use the Internet.

Liff and Steward (2001) describe a community e-gateway, Project Cosmic, based at Ottery St Mary in Devon. The project was established as a youth-orientated project but as its funding was coming towards an end, the organisation had begun to develop other sources of revenue by running training courses and designing web pages.

The authors found that Project Cosmic had been highly successful at raising awareness of the scope and potential of ICTs in its local community. It had carried out a variety of activities including running introductory Internet courses for a range of participants and week-long website design courses for voluntary groups. The project had also introduced a significant number of small and medium-sized enterprises (SMEs) to the web, including establishing a website presence for them. However, the authors acknowledge that despite the work carried out by Project Cosmic, there was little evidence of those attending courses having engaged with the creative potential of the Internet. Indeed, many of the SMEs supported by the project did not have email themselves and had little understanding of the e-commerce potential on the Internet.

The authors suggest that the situation with regard to the voluntary sector was a little more positive in that as a result of their attendance at the week-long course designing their own websites, the participants had been forced to think about their organisation's identity. Unfortunately, however, at the final stage of the research, few seemed to be maintaining their sites or seeing them as anything other than an advertisement for their organisation.

Hamm (2001) explores how non-governmental organisations (NGOs) working in the area of violence against women have used ICTs to further their objectives and as an education tool. In particular the incentive for computer literacy arises from the relevance of electronic communication to their life experiences.

Hamm argues that access to timely and relevant information has enhanced the ability of NGOs to advocate and respond rapidly to specific cases of abuse. In addition, NGOs working against violence against women have been able to apply this knowledge to develop new approaches for capacity building for women. Hamm cites the example of the Forum for Women in Democracy in Uganda which helps female parliamentarians gain access to the Internet to gather information relevant to the legislative process. Hamm also describes how the South African Women'sNet website provides online training for individuals and organisations and provides ideas for getting help and descriptions of services available to support abused women.

Pinkett (2002) discusses the Camfield Estates–MIT Creating Community Connections Project which was located in a 102-unit, predominately African-American, low- to moderate-income housing development in Boston, Massachusetts. The aim of the initiative was to create a model demonstrating how individuals, families and a community can make use of ICTs to support their interests and needs.

A training programme was developed over the course of the project and was amended to suit the needs of users rather than the technology. For example, during the second round of training, when browsing the Internet, residents were encouraged to go on to the Camfield Estates website and post messages requiring technical help. This was regarded as a means of establishing message posting as a habit whilst familiarising the residents with the website and its facilities. The training encouraged interaction outside the classroom with the establishment of an email list for students and by putting in place a peer mentoring relationship. The success of the email list and peer mentoring relationship is however not discussed.

The second phase of the project led to the residents conducting their own audit of their community assets. Residents mapped all the associations, institutions and businesses within a specific radius of the development and gathered basic information. An outcome of this exercise was that residents' awareness of assets in their community was enhanced. This information was then made available on their website.

Wortley (2002) describes a different approach to community learning with the use of a radio show with pictures. A three-week pilot project was held in the Harborough District of the East Midlands in the UK to assess the potential of community radio combined with a virtual classroom technology to act as a tool for community engagement.

A series of 15 one-hour chat shows were programmed on the theme of the information society. Phone interviews were conducted with guests from around the world together with local guests in the studio. The content was archived and could be viewed within the virtual classroom.

Wortley acknowledges that a limited number of people logged on to the live broadcasts but cites a significant amount of access on the website with a hit rate in excess of 1,000 per day. Wortley suggests that the major visible benefit of the project was the interaction between special guests who were from diverse backgrounds and unlikely to meet face to face in other circumstances. Wortley claims that the project was extremely successful at facilitating knowledge sharing and relationship building.

Evidence and evaluation

Education and training was a theme in many of the publications included in the review. However, as identified by the Office of Learning Technologies (1998), there still remains too little evidence of the impact of community-based ICTs on learning. All of the projects described demonstrate different approaches to community learning and engagement. However, whilst in some cases the authors acknowledge the limitation of their data or the limited success of the projects, in most cases claims are made about success with little or no empirical data to support such claims. The project discussed by Cody *et al.* (1999) provides details of the numbers involved in the training together with drop-out rates. Such information is not available for the other projects with there being very limited discussion of the target population of the projects, numbers going through training and, indeed, the impact of such training.

Concluding comments

The research reported in this section identifies five key policy issues which need to be addressed to enable more effective and comprehensive computer literacy education within a community learning environment.

- First, policy makers need to recognise that the potential of ICTs to improve social inclusion may only be realised if more general functional illiteracy, occupational illiteracy, political illiteracy, information illiteracy and adaptive illiteracy are also addressed.
- Second, evidence suggests that consideration needs to be given to the appropriate location, physical environment, support and user access to social networks.
- Third, the effectiveness of 'informal' education over 'formal' training and accreditation as a means to attract, retain and provide relevant skills and awareness for those people with lower educational attainment appears frequently in the cases studied.
- Fourth, the innovative pedagogical adoption of ICTs and the sharing of best practice may enable the wider educational underachievement to be tackled in a more holistic and informal manner.
- Fifth, whilst providing a stimulating range of community-based education projects, the literature does not generally provide enough evaluation data which could help inform evidence-based policy deliberations.

4 Economic regeneration: employment opportunities, sustainability and building capacity

As noted at the outset, policies to combat the digital divide have been closely associated with the desire to make the UK a leading knowledge economy. Many CI initiatives have been developed in commercially deprived areas with the express intention of helping to regenerate their local economies by improving business and employment opportunities through ICTs.

The review exercise, however, found limited references to the issue of economic regeneration. There are numbers of papers and reports that discuss the regeneration potential of ICTs (see, for example, Shearman, 1999; PAT 15, 2000). However, there is not much evidence of examples of ICT centres contributing to economic regeneration, business opportunities and/or capacity building. A small number of papers discussed funding and there were specific examples of projects attempting to sustain themselves or generate business such as that described in Young *et al.* (2001) in Tasmania.

This section examines those papers that discuss funding and sustainability of community provision of technology.

The Morino Institute (2001) argues that we should not just be concerned with the issue of providing access to the technology; rather the focus should be on applying technology to achieve tangible and meaningful improvements in the standard of living of families who are typically excluded from economic activity. The report provides examples of case studies to demonstrate effective engagement with the technology. These include: a pilot telemedicine clinic, a project in rural Nebraska that worked with community leaders to develop young potential leaders, capacity building in New York City and community regeneration in the Appalachians. Unfortunately, the case study information is quite scant so the effectiveness of these projects is difficult to assess. The report does suggest that in relation to regeneration, the case studies do demonstrate that if long-term resources and support are provided, technology can help government agencies, community groups and other organisations to deliver services more effectively and at lower costs. In addition, they suggest that technology applications can help create and sustain online and offline networks that introduce and interconnect people who are working towards similar goals.

In conclusion, the report recommends that no more than one third of funding should go on the technology itself. At least two-thirds should go towards educating staff and developing programmes that help organisations tap into the technology's true potential.

Challenging the digital divide?

Southern (2002), in contrast, is less convinced about the ability of ICTs to regenerate deprived neighbourhoods. He argues that there is still a long way to go before the perception of what ICTs can achieve match the experience of local communities and suggests that the application of ICTs to support regeneration depends almost entirely on the vibrancy of local actors, their effort, community and opportunity to share developments.

Southern acknowledges the growth in the number of ICT initiatives in local areas but suggests that there is still no evidence base of real regeneration outcomes from ICTs. He argues that consideration needs to be given to three factors. First, attention should be given to the association between ICTs and regeneration. He argues that the rhetorical statements of how ICT skills can support better opportunities in the labour market and facilitate greater participation in mainstream society have yet to be proved. Second, he questions the evidence base used to evaluate local ICT initiatives. Whilst acknowledging that projects such as those funded through the Single Regeneration Budget (SRB) are subjected to strict evaluation procedures, the question of what net social and economic effect the ICTs have is rarely considered. Third, he argues that we do need to ask policy makers and planners how they know that there is a consensus for such ICT developments and initiatives.

Davinett (2000) draws on a series of case studies from the UK of community-based responses to introducing ICTs. He argues that whilst such initiatives might have the potential to address some of the issues associated with local regeneration, any benefits will have to go beyond a belief that such projects will automatically secure some form of competitive advantage or modernisation.

Davinett uses particular examples to support his arguments. The Manchester Electronic Village Halls (EVHs) were established to provide access to the Internet and training. Davinett views the Women's EVH and the Bangladeshi EVH (both established in 1992) as being two of the more interesting experiments in the project. Both EVHs have been successful in obtaining funding to continue work and both have diversified their services and training to ensure sustainable projects. In contrast, the Chorlton Workshop EVH (established in the mid-1980s) was based on an adult education workshop. The aim of the project was to offer the first step into education or training for unwaged adults who have been disadvantaged or discriminated against and have not previously had access to educational opportunities. However, the project has struggled to obtain secure funding and as such remains reactive to the needs of the immediate users and sources of money.

The Wiltshire Telecottage Network has also had problems. It actually failed because of external factors beyond its control, tensions between commercial and community

aspects of the network, poor communications, unrealistic expectations and conflicting agendas. However, similar rural-based projects such as ODEN (Open District Electronic Network) in Lincolnshire have been successful and established an electronic community information network and public access points for use by local businesses as well as residents.

Davinett concludes that past experiences of community technology initiatives and emerging practice to date indicate a need to engage in current policy initiatives and to question policy responses.

Liff and Steward (2001), in their discussions of Project Cosmic, illustrate how this project has developed a commercial aspect to its work by providing web design services. The income from these activities helps to train young people and contributes towards sustaining the project.

The final study considered in this section looked specifically at the potential of ICTs to provide better job vacancy information for unemployed people. McQuaid *et al.* (2003) found that in more remote communities where no facilities such as Jobcentres were immediately available, job seekers were more likely to use a range of ICT-based job search tools. However, there was a statistically significant association between higher levels of educational attainment and ICT skills and the use of the Internet as a job search tool. The authors conclude that those already disadvantaged in terms of skills, educational attainment and income are less likely to have the access and skills required to benefit from using ICTs as a tool for job searching.

Concluding comments

Generally, the issue of economic regeneration and sustainability of community-based provision requires continued research and exploration. Hall Aitken (2001), in their review of community ICT provision, found that ICT access projects tended to be funded by a multitude of different funding sources, rules and timetables. Such complexities in funding have led to confusion and duplication of provision and effectively hampered productive partnership working. The Office of Learning Technologies (1998), in their study of case studies of community ICT initiatives, found that the issue of sustainability is significant. It was argued that whilst the role of government was central to the start-up of many innovative approaches to community-based initiatives, the long-term support of government was also important. The lack of continuity in government investment was a concern identified for most of the case study projects and there is no evidence to suggest that these concerns have been or are being relieved.

5 Civic participation: e-democracy and e-government

Enabling the digitally excluded to adopt more advanced interactive uses of ICTs, which as we have remarked earlier is a defining feature of the digital divide, has also been a central aim of many CI projects. As we saw in the previous section, such objectives inform initiatives for economic regeneration and employment searches. In the domain of civic participation and democratic governance such sophisticated uses of the new media have been seen as a significant means of empowering communities and citizens, Minnesota e-democracy and Amsterdam's digital city (van den Besselaar, 2001) being two of the most widely discussed. Many of the research papers considered below focus upon the adoption of ICTs to enable civic networks to be created which may foster democratic governance through, for example, better deliberation on political issues, more informed citizens, high political participation and activism, greater citizen involvement in shaping legislation and stronger representational accountability (Tsagarousianou *et al.*, 1998; Hague and Loader, 1999).

Typically subsumed under the generic title of 'e-democracy', such endeavours have attracted interest for at least two main reasons. First, they have been seen by some as a way of combating the continuing decline in political participation (poor voter turnout, falling membership of political parties, disaffection of younger people with politics) in the UK and elsewhere. Second, more recently it has been recognised that voluntary and community sector informatics projects could play a significant role as a conduit for non-ICT users to utilise e-government services (Office of the e-Envoy, 2003b).

This chapter considers evidence for increased civic participation and social networking, citizenship education and deliberation.

Civic participation

One of the earliest and most famous e-democracy projects was the Public Electronic Network (PEN), Santa Monica, Southern California. Beamish (1995) outlines the development of PEN and focuses upon the often repeated story of community organisation which was the SWASHLOCK project. This was initiated by the PEN Action Group which met online as well as face to face at monthly meetings. Following postings from homeless people, the group discovered that the only public showers available for the homeless before noon were outdoor cold-water showers on the beach. Hot showers in public places were not open until noon. There was only one free laundry service and no lockers were available. The group, which included homeless people, was able to lobby the city government through the drawing up of a

proposal which led to the establishment of a laundry programme, installing 30 lockers and showers in restroom facilities and the opening of other public showers.

However, despite such successes, PEN has not been without its problems, not least of which were as a direct result of lack of censorship leading to participants having to contend with people who felt they could heckle people with whom they disagreed (Doctor and Dutton, 1998). This position was particularly problematic for women who reported experiencing problems with harassment, innuendos and even violent threats. In addition, a relatively small group began to dominate online exchanges which often degenerated into online fights. The situation was resolved to some extent by increasing the number of women online, introducing private conferences and sending email to those breaking with netiquette. Nevertheless, despite having over 3,000 people signed up for PEN and around 500 logging on each month, only a very small number ever contributed any comments to the discussions.

A further well-known case study from the USA is the Blacksburg Electronic Village (BEV). Kavanaugh (1999), Kavanaugh *et al.* (2000) and Kavanaugh and Patterson (2002) have analysed its impact on community networking and participation.

In the 1999 paper, Kavanaugh argues that community computer networks are not just reinforcing but expanding social networks within the geographic community of Blacksburg. Kavanaugh found that there were increases in the proportion of respondents who 'frequently' or 'sometimes' used the Internet for communication with members of their social networks. Each of the community leaders involved in the research noted the importance of Internet services (such as website, listserv or email) in strengthening social ties in the network and exchanging information among members.

Kavanaugh (1999) also analysed the use of a school board mailing list and found that a high proportion of the respondents joined the list to obtain more information about local schools, with the majority reporting that having school issues communicated to them via the list has made them feel more involved in school issues. Half of the respondents from the school list reported having written a letter to an elected official or school administrator as a result of communication via the list. The research also found that there were marked increases in the use of school web pages and email with teachers among Blacksburg parents from 1996 to 1999.

In 2000, from analysis of data collected over the period of the BEV, Kavanaugh *et al.* found that the concentration of local information and services, local newsgroups and

other locally focused materials on the BEV web pages provide the environment in which social networks and social trust can be developed and supported and even enhanced. From the outset of the BEV project Kavanaugh *et al.* (2000) reported that users expressed their interest and satisfaction in being able to be more connected to their community. A high number of BEV users reported that they expected the Internet to be helpful with civic affairs and were interested in bulletin boards and newsgroups. In 1997, 28 per cent of Blacksburg residents reported that they had been more involved in the local community since going on to the Internet. Thus, Kavanaugh *et al.* suggest that their research indicates that the Internet is associated with increases in community involvement.

In 2002, Kavanaugh and Patterson reported on the continued impact of BEV. Their paper and data analysis are underpinned by two hypotheses. First, that as the number of community computer network users increases, the greater the community involvement and attachment to the community. Second, as the number of community computer network users increases, the greater the use of the network to build social capital by communicating with other community members.

Kavanaugh and Patterson found from measuring community involvement and community attachment that there was no evidence to support the hypothesis that as access to the Internet increased so would community attachment and involvement. However, the authors do argue that the general pattern of the data does point to significant increases in the use of the Internet for social capital-building activities. Kavanaugh and Patterson (2002) agree with Putnam (2000) that social capital and civic engagement are linked, thus they remain optimistic about the levels of future engagement. The research found that by 1999, Blacksburg residents were significantly more likely than in 1996 to use the Internet to communicate with local family members, church members and members of informal social groups. In addition, whilst not statistically significant, there was an increase in communication via the Internet for more formal social groups. Kavanaugh and Patterson argue that while there were no appreciable differences in community involvement and attachment over time, there were significant differences in the use of the Internet for social capital and community-building activities.

From the longitudinal analysis of their data, Kavanaugh and Patterson argue that the longer people are users of the Internet, the more likely they are to use the Internet for a variety of social capital-building activities. The more involved they are in their local communities, the more likely they are to use the Internet to communicate with members of formal and informal social groups. They report that in 1999, there were significant positive associations between the length of time people have been using BEV and the extent to which they feel more involved and connected to their local communities.

Whilst Kavanaugh and Patterson are optimistic in their analysis of their data and the future potential of community participation by Internet users, they do note that the Blacksburg participants are of a relatively high socio-economic status and as such are not individuals who are traditionally disenfranchised or otherwise under-represented in civic and community life. Thus, the demographic background of the Blacksburg participants suggests that they probably would be more predisposed to be involved in their community and civic activities than those from lower socio-economic groups.

Pinkett (2002) discusses the role of the Camfield Estates–MIT Creating Community Connections Project and argues that their ongoing research indicated that as a result of the training that participants had taken part in and as they continued to use the Internet, they were found to have a heightened awareness of community resources. Pinkett argues that residents who are part of the Creating Community project are better informed about local issues and that there is an improved communication and information flow at the estate.

Virnoche (1998) draws on field research conducted from 1994 to 1996 on the Boulder Community Network (BCN) and LocalNet, an international online discussion group of community network advocates and organisers. The main point of the paper by Virnoche is to demonstrate the tensions involved in community networks. She argues that while community network activists espouse civic values and participation as underpinning their work and aims, without exploring the tensions between and within organisations (both profit and not for profit) such values might not be met.

Virnoche argues that in our efforts to establish access for everyone on the premise of democracy, we could have become blinded by the imperative of technological progress and democratic utopianism and have thereby neglected to question the implications of this. As she notes, there is a general assumption within community networking and the e-democracy movement that the infusion of Internet technologies for peripheral populations is inherently positive. However, if we do not take account of existing demographics, inequalities and lack of engagement, the introduction of ICTs might actually work against broad goals of democracy. Virnoche uses the example of the human service sector to illustrate her point. She found in her research that there is an assumption that Internet technologies will ease the strain of already highly bureaucratised and mechanical organisations. However, many people seeking human services have a hard time contacting the right people and getting information at the best of times, so what happens when the Internet does not change this situation?

Servon and Nelson (1999) present a range of case studies which demonstrate some of the lessons learnt from the Community Technology Center movement. In particular, they identify the success that Seattle, Washington, has had in engaging local residents in the technologies and using such technologies for civic participation. However, Seattle is described as a 'hotbed' of community technology activity and the reason for this is seen as being the influence of industries in advanced technology in the area which has led to a pool of skilled volunteers being available. In addition, the industry presence has raised awareness around IT issues and has encouraged local government to play an active role in narrowing the digital divide.

Servon and Nelson argue that many community technology activists in the area attribute the level of community technology activity to a traditionally strong neighbourhood-based approach to planning and service delivery and to a willingness on the part of community technology activities and community leaders to work with and engage with the technology.

Matei and Ball-Rokeach (2002), who are working on a study at the Annenberg School for Communication, University of Southern California, look at the relationship between online and offline social bonds. The study sample is drawn from seven different ethnically marked neighbourhoods in Los Angeles and is based on the hypothesis that the higher the level of belonging to a local community, the higher the likelihood of making new personal bonds online. From analysis of the data, Matei and Ball-Rokeach conclude that a higher level of belonging to real communities translates into a higher propensity for interaction online. However, they do note that the inclination to form and maintain lasting relationships on- or offline is dependent upon social and cultural resources and proclivities of people acting in their 'real' communities. Thus they argue that the technology has the potential to anchor people to their social and community groups rather than separate them in cyberspace.

Quan-Haase *et al.* (2002) analysed a survey of North American visitors to the National Geographic Society website. The analysis of the data found that despite a high level of email use amongst the participants, this is not associated with organisational involvement. Indeed, Quan-Haase *et al.* found that the more often people contact friends offline, the more they are involved with organisations. The research found that education is the strongest predictor of organisational participation. The most highly educated in the survey, 23 per cent with a graduate degree, were found to be the most organisationally involved. They also found that the frequency of Internet use and the number of months using the Internet are not related to organisational participation.

Citizenship education

The potential of e-democracy projects to facilitate citizenship education, whilst acknowledged, provides little evidence of actual projects. In the UK, two cases were identified.

Briony Oates (2003) examines the impact of an e-democracy project developed by CIRA (Community Informatics Research and Applications Unit) with a local school at the time of the mayoral election in the town of Middlesbrough.

The aim of the project was to engage young people in democratic processes using the Internet. Whilst Oates acknowledges that the sample in the research is too small to make any generalisations to the wider population of young people, their experiences and responses are relevant to suggesting areas for further work and lessons learnt.

The research involved researchers visiting the school four times to discuss democracy, citizenship and online participation, analysis of the website content, analysis of questionnaires completed by the young people at the end of the project and engagement with the mayoral candidates who participated in the project. Oates argues that the project was successful in using ICTs to explain democracy and e-democracy, in bringing pupils and election candidates together, and in providing an experience of electronic electioneering and e-voting.

The Hansard Society is currently running a website for younger people and teachers called HeadsUp and provides free online resources for citizenship teachers. At present we are not aware of any systematic evaluation of either the website or the effectiveness of the materials.

Deliberation

Coleman and Normann (2000) present their findings of an online consultation forum by the Hansard Society conducted in March 2000. Women survivors of domestic violence spent one month giving evidence via the Internet to an all-party domestic violence group. A total of 199 women took part in the consultation and 94 per cent felt it was a worthwhile exercise. The site was designed to ensure that women could simply access information about domestic violence or they could participate in a public or secure forum. Of the women participating, 92 per cent reported that they had learnt something from each other's contribution and the same number advised that they would be willing to participate in such an event again. Women valued the fact that their contributions to the site would form evidence feeding into the policy

forum, and 74.4 per cent said that this would make a difference to their participation. However, only 32 per cent thought that MPs were actually interested in what was said during the consultation and 39 per cent were not satisfied with the contributions from the MPs.

The intention was to root the online consultation within the real political world. Participants were advised that they were giving evidence to a parliamentary inquiry and as such could have some impact in the policy-making process. Coleman and Normann argue that to some extent this did happen with the messages to the secure forum being summarised by the Hansard Society, published by Women's Aid and presented to the then Minister for Women, Tessa Jowell. Coleman and Normann (2000) identify that some of the evidence given in the online consultation appears to raise government concerns about child contact arrangements where there are violent fathers.

Concluding comments

The studies discussed all start from the hypothesis that the Internet can improve civic participation and create stronger links within local communities. It does seem that the evidence from the BEV, BCN and Camfield Estates projects suggest growing interest and involvement in local community issues, although in the case of Camfield, it appears to be more of a growing awareness of community resources rather than active involvement. With regard to those accessing community-provided technology, there is again evidence of such places providing individuals with a sense of 'belonging' but no real evidence of increased active involvement in local issues and organisations.

The key to civic participation and community involvement continues to appear to be education. Kavanaugh, in her studies of the BEV, notes that the participants are of higher socio-economic groups and so more likely to be politically active. Quan-Haase *et al.* (2002) emphasise the importance of education and argue that the Internet supplements but does not change people's levels of involvement. The evidence from the case studies by Oates (2003) and Coleman and Normann (2000) emphasised the role of support and training given to the participants both in the issue of using the technology and in consultations and democracy (Coleman, 2004).

Quan-Haase *et al.* support Robert Putnam's findings in 1993 whereby he argued that being informed is positively associated with political participation. Educated information seekers can use the Internet to inform their beliefs and opinions and are more likely to be more interested in public debate, governmental decision-making and political change. Thus they are more likely to be politically active.

6 Difference, diversity and social exclusion

Perhaps too often the concepts of the 'digital divide' or 'community' are used in such a way as to denote homogeneous groups of people, simple binary divides between the information rich and the information poor. In reality, as many of the studies suggest, the picture is complicated by social and cultural differences arising from age, sexuality, gender, race and disability which mediate how people relate to ICTs. Many CI initiatives have focused upon particular social groups either as a part of the project or as its primary focus.

The papers in this section provide a profile of differential access and initiatives designed specifically to address how ICTs may be adopted by different social groups. The Office of National Statistics (ONS) provides data for UK Internet access, but the most comprehensive analysis of differential adoption comes from the Pew Internet and American Life Project (at the time of writing the Oxford Internet Institute has yet to present its new Oxford Internet Survey: <http://users.ox.ac.uk/~axis>). The US programme was created to generate and fund original, academic-quality research that explores the impact of the Internet on children, families, communities, the workplace, schools, health care and civic/political life.

Lenhart *et al.* (2003), examining changes in access and use of the Internet by American citizens, found that rates have hovered between 57 and 61 per cent since October 2001. Whilst access has increased, demographic gaps remain. Younger Americans are more wired than older ones, the employed are far more wired than unemployed, those with a higher income are more likely to be wired, white Americans are more likely to be wired than African-Americans and Hispanics, the well-educated are more likely to be wired and suburban and urban parents with children living at home are more likely to be wired. The disabled have the lowest levels of access to the Internet in America. The cost of technology and software solutions to various disabilities is expensive and with the high cost of adaptive technologies combined with the relatively smaller incomes of the disabled, Internet access remains prohibitive.

Lenhart *et al.* (2003) identify social differences between Internet users and non-users. They found that those who are socially content, trust others, have lots of people to draw on for support and believe that others are generally fair, are also more likely to be wired. Those who feel that they have control over their lives are more likely to be wired and those who read newspapers, watch television and use mobile phones and other technologies are more likely to use the Internet.

Fox *et al.* (2001) examined the use of ICTs by senior citizens. The authors found that whilst senior citizens are least likely to be online, those that are appear to have 'fallen in love' with the Internet and email. From analysis of their data, Fox *et al.* found that wired seniors are more likely to be men, married, highly educated and enjoying relatively high retirement incomes. However, Americans over 65, especially women, are coming online at faster rates than other age groups.

The research found that senior citizens are more likely to have access to the Internet from home than any other age group. Their motivation to go online tends to be personal reasons primarily connected to maintaining contact with their children and grandchildren. A high proportion of the senior citizens interviewed had been encouraged to go online by a family member. Email was found to be the most popular application used by seniors, with them being more likely to send an email on a typical day than average Internet users.

Spoooner and Rainie (2000) examined the use of the Internet by African-Americans. Their research found that although there have been growing numbers of African-Americans going online, they still lag behind white Americans. In addition, they found that African-Americans are more likely than whites to have their access to the Internet exclusively through work.

Spoooner and Rainie identify that online black people are more likely than white people to have used the Internet for activities that relate to economic advancement and significant quality-of-life issues. More online black people go online 'just for fun'. A higher proportion have listened to audio clips or video clips, played a game online and downloaded music from the web than their white counterparts. With regard to searching for information, behaviour is similar between online black people and white people, with the only major difference being searching for religious and spiritual information. Online black people are 65 per cent more likely to have sought religious materials online with such activity being particularly popular with African-American women aged over 30.

Spoooner and Rainie (2001) have also studied the access and use of technology by Hispanics in the USA. Again, as in the case of black Americans, the authors identify a growth in the numbers of Hispanics accessing the Internet but they are still not doing so in the same numbers as whites. As with African-Americans, more of the Hispanic new users of the Internet are women.

The majority of Hispanics online have access at home. A high proportion of Hispanics reported that the Internet has helped their connection to friends and family. However, language is an issue for Hispanic users with roughly half of Hispanic Internet users speaking Spanish as their first language. The limited amount of

Spanish content online was seen as a barrier to the use of the Internet by Hispanics. Spooner and Rainie found that Hispanic users are more likely to be very young compared to other Internet populations and that Hispanic senior citizens are less likely than older whites or African-Americans to be online.

The social context for ICT adoption

Drawing on two British studies conducted in the mid-1990s which involved in-depth qualitative studies of single parents and the young elderly over a year, Haddon (2000) focuses on examining the role of ICTs in relation to people's ability to participate in society.

What makes this study interesting is that in the mid-1990s, the ICTs that most of the participants identified as being key were audio-visual, such as stereos, basic broadcast media and telephony. Whilst acknowledging that much of the technology will have changed from the original study, particularly with the rise of mobile telephony and the introduction of the Internet to mass markets, Haddon argues that the strength of these studies is their depth and the fact that they provide a good deal of information about people's lives as a context in which to understand their relation to ICTs. As we argued in the introduction to the review, without understanding the context in which individuals and communities would use ICTs, their widespread adoption is constrained.

From the research with the single parents, Haddon identifies how the telephone had a high priority for most of the interviewees. The telephone served as a significant practical supporting technology, helping single parents to organise their lives. It was reported that telephones were useful for coordinating social networks and, perhaps more importantly, were essential in times of crisis as a technology for support. The research found that single parents could evaluate the benefits of technologies and their potential usefulness or desirability but many did not actually think about ICTs in their day-to-day life. This was both because of more pressing problems they faced and because of economic constraints.

The young elderly who were part of the study exhibited a conservatism regarding the acquiring of new ICTs or additional facilities. Generally, technologies adopted by the young elderly in the sample were perceived as extensions of what was familiar and useful in relation to their current activities. As with the single parents in the study, the young elderly had developed a certain dependency on the telephone. They used the telephone to maintain ties with friends and family and to organise their lives. The key factor that promoted the importance of the telephone related to physical deterioration. The telephone had for some of the young elderly sometimes replaced face-to-face contact and was seen as 'important' in staying in touch with friends.

Challenging the digital divide?

Haddon argues that the case studies show how telephony, an example of an interpersonal medium of communication, has increasingly come to play an important role in the lives of the single parents and young elderly. The research shows that the telephone has enabled the interviewees to maintain their social and familial networks and provides a tool for social support. The telephone has also become an important piece of technology to have in times of emergency and crisis and to help break down feelings of isolation. In relation to new ICTs such as the Internet, Haddon argues that the research shows that in general, most people first encounter ICTs in contexts outside of the home, which allows them to learn not only how to use them but also under what conditions they would be beneficial and useful. The groups studied often will not have access to new ICTs and the perceived costs of these technologies constrain the potential of either group obtaining them.

In 2003 Oftel (the UK regulator for the telecommunications industry) commissioned research into the telecommunications needs and usage patterns of low-income groups. In particular, the research focuses on the experience of people from different ethnic groups, recent immigrants and those with limited English. The research found that despite the low income of the households, the use of telecommunications to maintain family links formed a considerable portion of the household budget. However, it was found that access to the Internet was generally considered by the groups to be a luxury rather than a necessity. Asylum seekers made the most effort to seek out and use public Internet access which they used mainly for job hunting and sourcing news from their home countries.

Boneva and Kraut (2002) examine how women and men use the Internet, particularly email, to sustain their personal relationships. The authors found that women use email more often than men to sustain or invigorate personal relationships. Overall, women use email more than men in communicating with family and friends, and are more likely to start communicating regularly with a family member with whom they had lost touch.

The study suggests that women are using the new technology more than men in maintaining and expanding their social networks. However, both men and women are using email extensively to keep up with their siblings and parents and men seemed to be more encouraged to communicate with their children using email.

Whilst the data by Boneva and Kraut are useful in demonstrating some apparent differences between use of email by women and men, it should be noted that the data are not representative and the interviews were conducted predominantly with white, middle-aged, middle-class, married Americans. As Boneva and Kraut note, men and women from different backgrounds may have different patterns of personal relationship maintenance and styles of relating to each other.

Singh (2001) focuses on gender differences in the use of the Internet at home as seen from women's perspectives. Singh's research found that women use email and the Internet instrumentally for activities which range from work, study, personal communication, seeking information and helping their children with homework to buying and selling goods and services. The women in the study seldom associated their use of the Internet with the desire to play with, fix or master the technology. Singh found that women prefer personal and contextualised channels of communication and where they perceive email as such, they are more likely to use it as part of a mix of communication methods.

Singh concludes that the research shows that women are more likely to use the Internet when it serves as a tool for activities, rather than something to play with or master.

Connecting with the socially excluded

The next set of papers examines projects that are aimed specifically at providing access to groups who traditionally have been excluded from participating in the online world.

Bishop *et al.* (1999) conducted a study of community information exchange and computer access and use among low-income residents. The research was undertaken as part of the Community Networking Initiative which seeks to increase participation of low-income residents in Prairienet, a community network serving the Champaign-Urbana area since it began as a Free-Net in 1993.

The aim of the research was to identify problems facing low-income residents of several neighbourhoods in the area, and to learn what local information is useful in addressing these problems, how it is currently exchanged and experiences of computer use. The participants in the project tended to be African-American women in their thirties with some college or vocational education and earning an annual income that resulted in their eligibility for financial or other social assistance programmes. The data suggested that the participants were often single parents and were not likely to have a computer at home.

The research found that the community information needs most often cited related to health, parenting, education, leisure activities and employment opportunities. When questioned as to current channels for acquiring and exchanging information, they included informal word-of-mouth contacts with people in one's intimate social circle, contact with community institutions through print, telephone and in-person visits and use of mass media channels such as newspapers and televisions.

Challenging the digital divide?

The research found that low-income community members were well versed in the popular rhetoric of the benefits of the 'information age'. They were keen to participate in computer training and receive Internet access and were most eager to use the Internet for communication.

Bishop *et al.* found that low-income community members believed that home access was critical to becoming active computer users. They felt that public access sites might be difficult for some members to take advantage of, especially if they work or have children. The participants argued that home access provides a familiar, comfortable context. As Bishop *et al.* note, most of the everyday things that people wanted to use the Internet for, such as paying bills, writing to friends, finding a recipe or information searching, are activities traditionally done at home. The added attractiveness of access relates to being able to do things when the respondent wanted.

The authors conclude that computer use will not really take hold among low-income community residents until they are able to find a way around community access. Home access was viewed as critical for the full integration of computing resources into family, community, work and educational activities. The reality of public access computing is that it requires users to live by other people's rules, schedules and resources. Users often have to queue to use public access points, applications may be unavailable or their use blocked, and fees may be charged. Privacy is often impossible and many public access points are not comfortable. Nevertheless, the authors argue that public access remains an important complement to home access.

Rommes (2002) examines the need for developers and designers of virtual spaces like Amsterdam's Digital City to involve women's groups and individual women in design to ensure women's needs are met.

Drawing on Amsterdam's Digital City as a case study, Rommes demonstrates how during the first year of its existence, there was hardly any information for women and only 9 per cent of its users were women. Rommes traces the development of the space and notes that in the early days there were very few places for women to go, i.e. places that were particularly meant for women. Gradually over its development the number of places increased; these places are distinguished as being places to introduce women to the Internet, places intended for the empowerment of women and commercial places directed at women. Rommes questions why it took so long for such places to be established.

From her research Rommes argues that for women to have their own virtual space, women have to create it. In the case of the Amsterdam Digital City, a female user created the DDS.femail discussion group, two female users created 'Babes with Beards' and a group of women created the 'Women's Square' inside the city in which several women's organisations presented information about women's issues. Whilst acknowledging that the findings from the research suggest the need for women designers, Rommes notes that this did happen but finds that they were relatively few and were operating in a very masculine environment. Rommes found that the women designers of the city had to fight against stereotypes of being technologically incompetent because of their sex and, by paying attention to the user friendliness of the design or by arranging courses for female users, they were reinforcing the stereotypes they wanted to defeat.

Concluding comments

This section has identified a number of projects that work to encourage excluded groups to use the new technologies. However, it has also identified the growing evidence of the continued exclusion of groups and individuals as a result of age, ethnicity, disability and income. In addition, as discussed earlier, the likelihood of exclusion from participation with new technologies increases in relation to educational achievements. The evidence suggests that whilst excluded communities and individuals are unable or reluctant to use the technology, their identities and cultures remain invisible.

7 Policy lessons and future research agenda

There are many thousands of initiatives worldwide experimenting with innovative ways of adopting ICTs for community development. This review, however, suggests that the popularistic optimism of such approaches is not yet sufficiently matched by the same scope of research providing systematic lessons to be learnt from them. For community informatics to develop into a relevant field of investigation for policy makers, practitioners and scholars, it needs to provide a more critical evidence-based perspective. One which acknowledges that the relationship between the new media and community development is an ambiguous one which is shaped primarily through a complex interaction of social, political, commercial and political factors which can, and frequently do, produce a mixture of intended and unintended outcomes for their participants. A clearer understanding therefore of these environmental forces and interests is a necessary first step to both assessing the potential value of ICTs for community development, economic regeneration, civic participation and ICT literacy and providing more effective guidance for meeting programme objectives. Five common thematic ambiguities emerge from the review which critically influence policies designed to challenge the digital divide and require further investigation in the future. Each is considered in turn:

Communities fit for the information poor?

The journalist Polly Toynbee has pointed out that the term 'community' is most often invoked as a tool of social amelioration when applied to places where poor people live or areas in need of 'social regeneration'. Why is it, she asks, that the term is seldom used to describe wealthier, middle-class social relations? Looking at the research on community informatics one is certainly struck by the fact that these initiatives do indeed seem to take place primarily in disadvantaged localities or with excluded groups. So what do we make of this characteristic of community informatics? What does it tell us about the nature of these projects? Don't wealthy social groups constitute communities? Don't the middle classes need the same social benefits ascribed to community life?

In part, of course, the answer to this paradox arises from the fact, already identified, that the digitally excluded do primarily come from localities of high deprivation. But it also has its roots in the ambiguous meanings of 'community'. The term frequently appears to mean different things to different people despite the fact that the term is often used as if in common agreement. In one sense it is imbued with the aura of companionship and human warmth which derives from its linguistically related concept of 'communication'. Consequently any technologies which foster more and perhaps better communications between people contribute to a greater sense of

community. Often the term is also associated with communication and social support between people who share a common geographical location. This perspective is particularly strong in the UK sociological literature of the past which focused upon close-knit working-class communities in the East End of London, rural areas or those associated with particular industries such as coal mining. But more recently it has also been invoked as a measure of the 'breakdown' of communities at the end of the last millennium. Robert Putnam's widely discussed book *Bowling Alone* (2000) is perhaps the most popular example of the claim that community life in the USA is waning and that the social consequences are poorer health and psychological well-being, declining business opportunities and wealth creation, democratic inertia and political apathy, as well as falling educational standards. Ironically, Putnam points to an earlier communication technology – television – as the main culprit for this weakening of community ties.

But the message is clear. Social regeneration depends upon rebuilding community life. Informatics, the social adoption of ICTs, is regarded as a powerful set of tools with which to reconnect people and engage them in social relationships. Through community technology centres (in all their different guises such as telehouses, electronic village halls, telecottages, e-gateways, UK online centres or even cybercafés) where local people can meet and undertake computer courses, take advantage of the provision of community hosts and servers and undertake the development of community websites, the new media have become indispensable to community development in the information society (Day and Harris, 1997; Shearman, 1999).

Conversely, however, the optimistic notion of community life as an embodiment of the ideal way to live may not itself be shared by all citizens. Whilst many champion the positive benefits of strong communities, far fewer, it seems, express concerns over how community relations may act as a means of domination. For many women, for example, community may be the place where they are trapped and already overburdened with the roles of primary carer and social supporter. Moreover, communities can be characterised as one-dimensional and intolerant of differences and diversity. In this context the Internet may be the source of escape from a geographical community and liberation in a virtual community of people sharing similar interests.

Thus the new ICTs may be technologies of empowerment for community groups and members but also the means of their subjugation. Community can be a means of social control as much as a wellspring for social capital. Community activists and

development workers need to be aware of this ambiguity in their negotiations and deliberations with community members, public institutions, sponsors and the like.

Furthermore, the literature also suggests that we should not be so readily convinced of the demise of community social relations. It is equally possible that we are not witnessing the 'breakdown' of community so much as the transformation of community structures which may well be facilitated by the new media. Barry Wellman and colleagues suggest that it is more helpful to replace geographical notions of community with the concept of social networks (Wellman and Gulia, 1999; Wellman *et al.*, 2001). If we look at communities as networks of relationships, our picture of weakening social ties is replaced by a view of strong and weak friendships flourishing both within localities and between and across boundaries. People have a much richer set of relationships than simply those associated with neighbourhoods. In the age of the Internet it may be that CI is more important for stimulating and supporting cross-boundary relationships than for recreating a model of community which may be flawed and may have never existed in its ideal form in the first place. It may be characterised by the idea that CI initiatives should be more concerned with creating spaces than maintaining places.

Connecting community places to community spaces?

Much of the debate about the benefits of ICTs in the information age centre around the opportunities they offer for the 'information rich' to span geographical locations. Whilst much of the CI literature is concerned with deprived physical locations, far less is published on how virtual spaces could be utilised by the digitally excluded. Much work, for example, has been conducted on the use of websites, listservs, usenet groups and chat groups that enable virtual communities to provide social support (Smith and Kollock, 1999; Burrows *et al.*, 2000; Greer, 2000; Miller and Slater, 2000; Muncer *et al.*, 2000; Pleace *et al.*, 2000, 2001; Primo *et al.*, 2000; Hardey, 2001; Nettleton *et al.*, 2002; Nip, 2004). Research has identified that there is a broad consensus that social support can have a beneficial effect on health and well-being. Quite simply, people with good friendships, family relationships and sexual relationships are less likely to become ill and more likely to recover from illness than those lacking such relationships, other factors being equal.

A growing literature demonstrates the potential benefits to those accessing computer-mediated social support but when demographics of the participants are considered they again tend to be characterised by reasonably high levels of education and skills. As Burrows *et al.* (2000) and Hardey (2001) note, inequalities in accessing the technologies are not just as a result of income: a whole host of other reasons can contribute to individuals not being able to participate in such groups and

so not gain their benefits either in terms of support or information. Thus the potential for such support to become dominated by middle-class, articulate individuals who already are more likely to make more effective use and demands on welfare services is perpetuated.

This would suggest that a key challenge for policy makers may be to foster and sustain virtual community spaces developed and shaped by the perceived needs of excluded groups – spaces for interaction, information sharing and social support which are not shaped by the e-government agenda or commercial markets but instead provide an intermediate virtual space between the two.

Shaping the technology

The trajectory of CI projects also appears to be significantly influenced by the ambiguity of the technology itself, in particular the competing notions of how the technology may change social behaviour and transform social relations. On the one hand is the camp of techno enthusiasts who believe that the empowering capabilities inherent in the ICTs will enrich people's lives as soon as they come into contact with them. They point to the global reach of the Internet, available 24 hours a day, containing unimaginable amounts of information, enabling people anywhere to communicate and share resources, to the commercial opportunities and its potential for enhancing democratic deliberation (Barlow, 1996). For them all we need to do is show people the potential of the media, train them in computer skills and provide them with access to the Internet, and the 'information age' is born.

The alternative view, sometimes known as the 'social shaping of technology' perspective, is that the technology is of secondary importance to the social, political, economic or cultural objectives of a programme. Technology, this group claims, is not value neutral. It is designed by humans and does not exist in some parallel universe. Thus the adoption of ICTs is heavily influenced by the intentions of the designers, the perceptions and expectations of the users and the unintended uses which emerge over time. Again, this ambiguity is very important for CI practitioners to understand. The literature suggests that many projects are technologically led and flounder because of a mismatch between the communication needs and social structures of community networks and the presumed perspective of the techno enthusiasts. In many instances these groups simply don't even speak the same language let alone share a common vision. Moreover, since the technology is shaped by social circumstances it is more important that community groups are involved in that process if they are to 'own' and drive the initiative for themselves. Yet this 'bottom up' or grassroots approach may be at variance with the 'top down' policies which emphasise computer literacy targets, jobs created and inward investment.

Defining the digital divide

A fourth ambiguity emerges from the literature over how the digital divide is defined. Typically this refers to the social cleavage between the information rich and the information poor within countries. Consistent with top down policy models, the emphasis for many CI projects has tended to be placed upon the necessity of providing *access* and *training* for all citizens. As mentioned earlier, in the UK the e-Envoy, Andrew Pinder, and the e-Minister, Patricia Hewitt, have stated that the government is fully committed to ensuring 'that everyone who wants it has access to the Internet by 2005' (Office of the e-Envoy, 2001, p. 4).

This perspective, whilst consistent with a 'safety net' approach, falls short of the more pervasive features of the digital divide identified above. The research suggests that access may be important but it is not the only factor, or even the most important one, influencing the adoption of the Internet by disadvantaged groups (Mansell, 2002). Whilst the new media may be attractive to middle-class users already highly literate, well educated and keen to exploit the interactive potential of the media in their information- and communication-rich lives, such qualifications may act as significant barriers to take-up by the socially excluded.

Interactivity requires a self-confidence which is more important than technological ability as well as a relevance to the communication needs of the user's life experience. For CI projects to be empowering they must be socially contextualised. Simply showering communities with technology will not address the digital divide. Such communities may become wired, but their use may be very different from that of the information rich. Video on demand, shopping over the Internet or online gaming may be evidence of access (and one consistent with 'welfare direct' models) but it hardly constitutes empowerment through interaction. CI projects intended to bridge the digital divide need to address this ambiguity of access and empowerment in their design and practice.

Sustainability

The final ambiguity which provides a common theme in the review is that between the need for innovation and the need for sustainability. On the one hand, many CI projects are supported as innovative social experiments designed to shape the new media for diverse community objectives and support virtual spaces and networks. On the other hand, communities may need projects to be sustained for longer periods than short-term experiments. Historically, however, it is possible to discern life cycles of such projects whereby innovation is replaced either by extinction or colonisation by public or commercial interests. Notable examples include 'Community Memory' and PEN in the USA but the field is littered with past experiments. In one sense this

may be regarded as simply the role of CI initiatives (Kubicek and Wagner, 2002). Large media companies are becoming aware of the value of 'local' news and information and are often more effective at providing attractive, accessible and reliable platforms than the original CI project. But this also runs the risk of disempowering community groups by taking away their ownership of the content. Thus community activists and policy makers also need to be aware of this ambiguity and negotiate appropriate exit or sustainability strategies as a part of the original design.

Concluding comments

Three sets of questions outlined at the beginning were used to frame the review. They are used here to summarise the main findings.

- What do we already know? What evidence currently exists from around the world on electronically networked communities as a means to improve the life opportunities and support for people living in deprived communities?

The review covers CI projects from around the world which provide innovative, impressive and creative uses of the new ICTs for fostering a diverse range of social networks.

- The use and support of public access sites (e-gateways, information technology centres, UK online centres, electronic village halls) by those currently perceived as excluded from the benefits of ICTs are generally low.
- Many active CI projects are typically supported by those who are already better educated and more familiar with ICTs.
- Those individuals and groups benefiting from virtual social support networks again tended to be more affluent and computer literate.
- There is little existing evidence-based research which supports the contention that CI initiatives have yet made significant challenges to the social inequalities associated with ICT adoption.
- There are, however, both significant findings which point to the barriers to low take-up and cases of good practice which could inform future development.

Challenging the digital divide?

- How robust is the empirical research which exists? Does it provide methodologically rigorous findings which can be used to inform the work and practice of policy makers, community groups, practitioners and researchers?

Despite the optimistic claims made for CI initiatives as a means to challenge the digital divide, the foregoing review highlights the disappointing amount of evidence-based research with which to support such assertions. Whilst it may be argued that it is too soon to judge the impact of such programmes as UK online, the historical projects and models upon which it was based do, however, provide some significant lessons which lead us to be cautious about its likely success. But they also raise issues which could influence its more effective development for the future. Much of the research considered has suggested a number of possible reasons for this picture of limited effectiveness which both needs further research and has policy implications.

- The location of many public access sites in libraries, schools, further education colleges and the like may be a significant barrier for those who do not consider such institutions as 'a part of their lives'.
- Similarly ICT training and education which replicates earlier negative feelings of failure is unlikely to attract those who have been categorised as underachievers.
- Whilst the potential advantages of ICTs to those already immersed in electronic information and communication appear evident it is far less obvious from the literature how relevant ICTs are to the 'everyday life experiences' of people living in predominantly disadvantaged areas.
- What are the information and communication needs of people living in predominantly disadvantaged areas which enable the development of 'human centred' information systems of relevance to their life experiences?

CI policies intended to combat the unequal adoption of ICTs may need to be more sensitive to the different and diverse life experiences of citizens and how these will influence both the perceived relevance of ICTs to their lives and the nature of their interaction with the new media. To date the literature too often echoes the exclusive rhetoric of the information society relating to the lifestyles of the information advantaged. If CI initiatives and government programmes such as UK online are to connect with those outside of this wired vision the review suggests several areas which require further analysis to inform policy development.

- What gaps exist in current research and how does it shape a future research agenda?

The review identifies a number of significant gaps in our understanding of the effectiveness of CI initiatives which researchers and sponsors urgently need to address.

- What kinds of people and uses are made of ICTs in CI projects and public access centres beyond crude attendance numbers?
- What kinds of community intermediaries (local champions, social networks, physical and virtual spaces, informal education) can stimulate and maintain improvements in computer literacy?
- What kinds and levels of content creation and electronic interaction are to be expected from people living in disadvantaged areas?
- Can the commercial sector ensure more even access and adoption of ICTs across the population?
- Is the kind of connection (e.g. broadband) important for influencing the adoption and types of usage of ICTs?
- What are the most effective models for economically and socially sustaining CI initiatives?
- Is there a stakeholder role for public, private and voluntary sector agencies in pursuing sustainable strategies for challenging the digital divide (e.g. delivering e-government services, improving market shares, stimulating cost-effective voluntary organisation)?

A genuine desire on the part of policy makers to tackle the digital divide requires all the above questions to be seriously addressed. Whilst the review acknowledges that such issues have been raised, the extent and robustness of existing empirical research in CI is not currently sufficient to help policy makers and practitioners design and implement effective strategies and actions.

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Appendix: Studies included in review

Civic Participation

Author	Date	Title	Source	Methodology	Results
Oates B J	2003	ICTs, e-democracy and citizenship education	Information Technology, Education & Society, 4,1	Action research – case study – 23 pupils aged 13–14	Case study – example of how ICTs can facilitate in the conveying of e-democracy
Coleman S Normann E	2000	New Media and Social Inclusion	Report	Quantitative and qualitative – analysis of forum content and questionnaires	Case study – example of using ICTs to inform political decision-making and process
Kavanaugh A L Patterson S	2002	The impact of community computer networks on social capital and community involvement in Blacksburg	The Internet in Everyday Life – Wellman and Haythornthwaite (eds)	Quantitative – analysis of 1996 and 1999 telephone surveys	People who used the Internet to communicate with formal and informal social groups were highly involved in their communities
Beamish A	1995	Communities on-line: community-based community networks	Master's Thesis, Massachusetts Institute of Technology	Case studies	Describes a range of community initiatives including the Santa Monica PEN project and engagement with homeless
Kavanaugh A L	1999	The impact of community networking on community: a social network analysis approach	Telecommunications Policy Research Conference	Quantitative and qualitative – questionnaire, telephone survey and one-to-one interviews	Internet appears to facilitate increase in community involvement. However, tends to be those predisposed to be active
Kavanaugh A L Cohill A M Patterson S	2000	Use and Impact of Community Networking in Blacksburg	Report	Quantitative	Users expressed interest and satisfaction in being able to be more connected to their community – expected BEV to be helpful with civic affairs
Pinkett R	2002	Integrating community technology and community building: early results from the Camfield Estates–MIT Creating Community Project	DIAC 2002 Conference	Action research	Participants in project indicate heightened awareness of community resources
Virnoche M E	1998	The seamless 'web' and communications equality: the shaping of a community network	Science, Technology and Human Values, 23,2	Quantitative and qualitative – field research conducted 1994–1996 of participants of Boulder Community Network	Demonstrates tensions involved in community networks – calls for recognition of existing demographics and inequalities

Author	Date	Title	Source	Methodology	Results
Mark J Corneise J Wahl E	1997	Community Technology Centers: Impact on individual participants and their communities	Report	Qualitative – interviews with users and staff in 5 CTCs	Centres important resource for communities – seen as places to find out about community
Servon L J Nelson M	1999	Creating an Information Democracy: the role of community technology programs and their relationship to public policy	Report	Quantitative – 123 questionnaires and case studies	Distinctive trends shared by CTCs in relation to client/target groups. Strong emphasis on job training and education despite rhetoric of community involvement and participation
Matei S Ball-Rokeach S J	2002	Belonging in geographic, ethnic and Internet spaces	The Internet in Everyday Life – Wellman and Haythornthwaite (eds)	Quantitative and qualitative – multi-year study – telephone survey, focus groups and mail survey	People's basic community orientation equally strong on and offline. Higher level of belonging to real community translates into higher online activity
Quan-Haase A Wellman B Witte J C Hampton K N	2002	Capitalizing on the Net: social contact, civic engagement and sense of community	The Internet in Everyday Life – Wellman and Haythornthwaite (eds)	Quantitative – 1998 survey of North American visitors to the National Geographic Society website – sample size, 20,075 North American adults	The Internet supplements political activities but does not change people's levels of involvement

Difference and Identity

Author	Date	Title	Source	Methodology	Results
Lenhart A Horrigan J Allen K Boyce A Madden M O'Grady E	2003	The Ever-shifting Internet Population: A new look at Internet access and the digital divide	The Pew Internet and American Life Project	Quantitative – telephone surveys	Demographics on Internet users in the USA – more likely to be younger, employed, white and well-educated. Disabled have lowest levels of access
Fox S Rainie L Larsen E Horrigan J Lenhart A Spoonier T Carter C	2001	Wired Seniors: a fervent few, inspired by family ties	The Pew Internet and American Life Project	Quantitative – telephone survey	Senior citizens least likely to be online but those that are found to be enthusiastic users of email and the Internet. More likely to be white married men, highly educated with relatively high retirement income
Spoonier T Rainie L	2000	African-Americans and the Internet	The Pew Internet and American Life Project	Quantitative – telephone survey	Growing numbers of African-Americans going online but still lag behind whites. More likely than whites to have access to Internet limited to work
Spoonier T Rainie L	2001	Hispanics and the Internet	The Pew Internet and American Life Project	Quantitative – telephone survey	Growing numbers of Hispanics going online but still lag behind whites. More of Hispanic newcomers are women. More likely to be very young in comparison to other populations
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	Qualitative – two 1990 British studies – two interviews over one year and analysis of time-budget diaries	Provides an understanding as to the context in which ICTs are adopted by older people and single parents
Oftel	2003	Telecoms Usage amongst Low Income Groups and Identification of any Issues Specifically Related to Ethnicity	Income Report	Qualitative – 6 focus groups and 14 interviews with individuals from a range of minority ethnic communities on low incomes in the UK	Low-income groups with high use of telecommunications to maintain family links. Internet was an age-related activity generally considered a luxury. Asylum seekers more likely to use public access than other groups

Author	Date	Title	Source	Methodology	Results
Boneva B Kraut R	2002	Email, gender and personal relationships	The Internet in Everyday Life – Wellman and Haythornthwaite (eds)	Quantitative – Pew Internet and American Life 2001 survey and The HomeNet 1998–1999 survey Qualitative – 61 interviews	Women use email more than men to sustain or invigorate their personal relationships
Singh S	2001	Gender and the use of the internet at home	New Media and Society, 3,4	Qualitative – 30 middle-income Anglo-Celtic women in Australia	Women use the email and the Internet instrumentally for a range of activities. Women are more likely to use email when it is seen as a personal communication channel
van Zoonen L	2002	Gendering the Internet – claims, controversies and cultures	European Journal of Communication, 17, 1	Qualitative – interviews with 24 Dutch couples	Demonstrates how different family relations result in different articulations of gender and the Internet. The dimensions of gender that come forward vary across households
Bishop A Tidline T J Shoemaker S Salela P	1999	Public libraries and networked information services in low-income communities	Library and Information Science Research, 21,3	Action research	Research identifies problems facing low-income residents – participants unlikely to have a PC at home, and if accessing Internet, most likely to be at school or work. Cost seen as the main reason for lack of home access although home access seen to be critical for people to become active PC users
Rommes E	2002	Creating places for women on the Internet	The European Journal of Women's Studies, 9,4	Case study – Amsterdam's Digital City	Argues that designers and women's organisations should stimulate women's groups to get involved in the design of new technology at an early stage

Education and Training

Author	Date	Title	Source	Methodology	Results
Casapulla G de Cindio F Ripamonti L A	2001	Community networks and access for all in the era of the free Internet: 'discovering the treasure' of community	Community Informatics: shaping computer-mediated social relations – Keeble and Loader (eds)	Action research	Example of how a project devised as a game has engaged a range of people and led to the teaching of skills in accessing and using the Internet
Cody M J Dunn D Hopkin S Wendt P	1999	Silver surfers: training and evaluating Internet use among older adult learners	Communication Education, 48	Action research	Discusses the attempts to design a training model for older people. Course had high drop-out rate with authors identifying that attitudes to life in general affect older people's use of technology
Liff S Steward F	2001	Communities and community e-gateways: networking for social inclusion	Community Informatics: shaping computer-mediated social relations – Keeble and Loader (eds)	Qualitative – study of Project Cosmic, Devon	Describes the ways in which the project has delivered training in ICTs. Notes that despite training, little evidence of real engagement with the creative potential of the Internet
Hamm S	2001	Information communications technologies and violence against women	Development, 44,3	Qualitative – observation of use of ICTs by NGOs	Describes the ways in which NGOs have used ICTs to further initiatives and as an educational tool. Identifies how the Internet has improved NGO access to knowledge and so improved their capacity-building initiatives for women
Pinkett R	2002	Integrating community technology and community building: early results from the Camfield Estates-MIT Creating Community Connections Project	DIAC 2002 Conference	Action research	Describes the training programme developed for the project and illustrates how real-life examples were incorporated into training for greater understanding

Author	Date	Title	Source	Methodology	Results
Wortley D	2002	Community learning by radio and the Internet	Development, 45,4	Action research	Describes a project designed to use community radio and a virtual classroom. Argues that such projects bring to local communities experts with whom they could never have previously interacted
Mark J Corneise J Wahl E	1997	Community Technology Centres: impact on individual participants and their communities	Report	Qualitative – interviews with users and staff in 5 CTCs	Identified that the CTCs in the study adopted a learner-centred approach to training. Users reported being excited to learn more
Chow C Ellis J Mark J Wise B	1998	Impact of CTCNet Affiliates: findings from a national survey of users of community technology centres	Report	Quantitative – survey of 817 people at 44 centres	Identified the importance of CTCs as a resource for women and girls and members of ethnic minorities. Centres offered a range of opportunities to use computers in classes and self-directed. Majority of participants took part in classes to improve job skills
Chow C Ellis J Walker G Wise B	2000	Who goes there? Longitudinal case studies of twelve users of community technology centres	Report	Qualitative – two interviews with 12 users in 1998 and 1999	Users were encouraged to develop their skills to sometimes volunteer at centres or teach other users. Argues that centres can improve employability and improve idea of individuals as learners
Cook J Smith M	2002	Final Report for the Study of UK Online Centres	Report	Qualitative – interviews with 28 centre staff and users	Found that in almost all of the centres some form of e-learning was taking place. Self-improvement and improvement of the community seen as the main reason that individuals wanted to partake in the training

Author	Date	Title	Source	Methodology	Results
The Office of Learning Technologies	1998	Models of Community Learning Networks in Canada	Report	Qualitative – literature review and 16 interviews with stakeholders and examination of 5 case studies	Acknowledges the difficulty in assessing the impact of CTCs on learning as projects were quite new at time of research. However, found that the number of learning activities was increasing and developing
Hargittai E	2002	Second-level digital divide: differences in people's online skills	First Monday, 7, 4.	Qualitative – interviews with 54 Internet users from boroughs of New Jersey, autumn 2001, and observations during test project	Found variance in abilities to negotiate online information. Argues for more training to ensure that all can take advantage of the Internet
McLaren J Zappala G	2002	The 'digital divide' among financially disadvantaged families in Australia	First Monday, 7, 11	Quantitative – secondary data analysis of previous studies conducted into access and own survey into students on Smith Family's Learning for Life Programme – 7,226 young people completed survey	Examined the impact of the lack of access to the Internet on children's education. Found that levels of parents' education has strong bearing on whether child has access to the Internet at home and argue that access at home and school is equally important

Regulation and Connectivity

Author	Date	Title	Source	Methodology	Results
Graham S Marvin S	2001	Splintering Urbanism: networked infrastructures, technological mobilities and the urban condition	Book	Case studies	Describes and theorises on the way in which global urban forms and digital technologies of various sorts are fusing to produce networked metropolitan spaces that possess changing socio-spatial, cultural, political and economic dynamics. Examines the relationship between the application of ICTs and broader processes of social and geographical polarisation
Graham S	2002	Bridging urban digital divides? Urban polarisation and information and communication technologies	Urban Studies, 39,1	Case studies	Discusses the impact of the polarisation of connectivity on the digital divide
Lentz R G Oden M D	2001	Digital divide or digital opportunity in the Mississippi Delta region of the US	Telecommunications Policy, 25	Case study	Examines how the telecoms industry affects the social and economic problems of a region. Finds that despite existence of telecoms industry in urban area, in the surrounding rural area, region still characterised as the least connected
Selwyn N	2002a	'E-stablishing' an inclusive society? Technology, social exclusion and UK government policy making	Journal of Social Policy, 31,1	Policy documents	Explores the UK government's ICT-based social policy drive and provides a thorough review of policy in the area covering a range of initiatives. Argues that practically and ideologically community-based sites cannot equate to equality of access to ICTs

Author	Date	Title	Source	Methodology	Results
Selwyn N	2002b	Defining the 'digital divide': developing a theoretical understanding of inequalities in the information age	Occasional Paper 49, Cardiff University	Quantitative and qualitative – survey in four communities of UK and over 100 interviews	Paper presents a theoretical examination of the digital divide. Argues for need to move beyond the current dichotomous way at looking at digital divide to a more hierarchical approach
Davison E Cotten S R	2003	Connection discrepancies: unmasking further layers of the digital divide	First Monday, 8,3	Quantitative – analysis of UCLA Center for Communication Policy Internet Project data set collected in 2001	Argues that the digital divide is being reinforced as a result of differences in connectivity. As broadband expands, those with dial-up connections will be left behind
Horrigan J Rainie L	2001	The Broadband difference: how online Americans' behaviour changes with high-speed Internet connections at home	The Pew Internet and American Life Project	Quantitative – telephone survey	Report highlights how those with broadband connectivity tend to be online for longer periods and do more things online than those with dial-up connections
Bennett M D	2002	A Broadband World: the promise of advanced services	The Benton Foundation	Case studies	Report aims to identify innovative broadband projects to illustrate their impact on communities. Draws on a range of case studies and argues that highlighting applications will help more people become aware of the benefits of broadband

Economic Regeneration

Author	Date	Title	Source	Methodology	Results
The Morino Institute	2001	From Access to Outcomes: raising the aspirations for technology initiatives in low-income communities	Report	Case studies	Report focuses on applying technology to achieve tangible and meaningful improvements in low-income communities. Moves beyond discussions of access to technology and argues for real efforts in lifting people's ambition beyond that of technical literacy. Draws on case study evidence to illustrate how this could be done
Southern A	2002	Can information and communication technologies support regeneration?	Regional Studies, 36,2	Case studies	Questions the evidence that encourages policy makers to see ICTs as a way of regenerating deprived communities. Argues that the evidence suggests that there is still a long way to go before the perception of what ICTs can do matches the reality
Davinett G	2000	Regenerating communities in the UK: getting plugged into the information society?	Community Development Journal 35,2	Case studies	Drawing on evidence from UK community-based ICT project, paper argues that we must move beyond the belief that ICT initiatives will automatically secure some form of competitive advantage or modernisation
Liff S Steward F	2001	Communities and community e-gateways: networking for social inclusion	Community Informatics: shaping computer-mediated social relations – Keeble and Loader (eds)	Qualitative – study of Project Cosmic, Devon	Describes how one project has developed a commercial aspect to its work. Income from work contributes towards sustaining the project
McQuaid R W Lindsay C Greig M	2003	Wired for Work? ICT and job seeking in rural areas	Report	Quantitative and qualitative – comparative analysis of two pre-existing datasets. Interviews with a random sample of unemployed job seekers. Series of 12 focus groups with job seekers	ICT services more likely to be used in remote areas where no access to places like JobCentres. Statistically significant relationship to higher education attainment and use of ICTs

