Urban Studies

Bridging Urban Digital Divides? Urban Polarisation and Information and Communications Technologies (ICTs)

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Summary. The societal diffusion of information and communications technologies (ICTs) remains starkly uneven at all scales. It is in the contemporary city that this unevenness becomes most visible. In cities, clusters and enclaves of 'superconnected' people, firms and institutions often rest cheek-by-jowel with large numbers of people with non-existent or rudimentary access to communications technologies. In such a context, this paper has two objectives, reflected in its two parts. The first part of the paper seeks to 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 both the North and the South. The paper's second part aims to explore the prospect that such stark 'urban digital divides' might be ameliorated through progressive and innovative policy initiatives which treat cities and electronic technologies in parallel. It does this using a range of illustrative exemplars from a variety of contexts.

1. Introduction

Two dominant trends help to define our age: the most momentous process of urbanisation in human history and an extraordinarily rapid (but highly uneven) application of digital information and communications technologies (ICTs). Close inspection reveals that these two trends are actually closely interrelated. Against the widespread assumption in the 1970s and 1980s that electronic communications will necessarily work to undermine the large metropolitan region, all evidence suggests that the two are in fact mutually supporting each other. Both are constitutive elements of contemporary processes of modernisation, internationalisation, globalisation and industrialisation. In the global North and the global South, as well as in newly indus-

trialising and post-communist states, the application of ICTs within and between cities, whilst an intensely uneven process, thus constitutes a critical nexus underpinning the development of our societies, human settlements and, indeed, our civilisation.

Why, then, are ICTs helping to facilitate processes of intensifying global urbanisation? Three main reasons can be highlighted

(1) ICTs allow specialist urban centres, with their high-value-added services and manufacturing, to extend their powers, markets and control over ever-more distant regional, national, international and even global hinterlands. ICTs support the accelerating and spiralling contacts, trans-

actions, communications flows and interactions that help to bind, integrate and add economic dynamism to the vast, extended and multicentred urban settlements, corridors and regions of our age (Wheeler *et al.*, 2000).

(2) In an intensely volatile global economy, the growing speed, complexity and riskiness of innovation in all sectors—even those that can theoretically be pushed entirely on-line—seem to demand a parallel concentration in those cities with the assets and 'innovative milieux' to sustain on-going competitiveness. This explains why the greatest planning problems in many emerging 'multimedia clusters' and digital growth centres in cities of the North and South are transport and car parking. Workers still need to move their physical bodies to be 'in the thick of' the digital innovation process, even though their products are then instantaneously sent on-line to distant markets and users (Castells, 1999a).

(3) Demand for ICTs—mobile and land line phones, satellite TVs, computer networks, electronic commerce, Internet services—is overwhelmingly driven by the growth of metropolitan markets. Large 'global' cities, especially, are of disproportionate importance in driving all aspects of ICT investment and innovation (Graham and Marvin, 1996). This is because of the speed, complexity, dynamism, mobility—and, in the case of mobile phones, sometimes immobility!—of cities and urban settlements. It is also because of cities' cultures of modernisation, their concentrations of capital, their relatively high disposable incomes and their high concentrations of internationally oriented firms and institutions. As much of the economic productbase of cities becomes mediated by flows of electronic information and symbols, with the progressive digitisation of money, services, media, information, education and logistics, this critical nexus between cities and ICTs can only strengthen.

The complex intersection of human settlements and ICTs, which Castells captures as the complex dialectic between the 'space of flows' and the 'space of places', is helping to forge new landscapes of innovation, economic development, cultural interactions, political dynamics and social inequalities within cities and urban regions (Castells, 1996, 1998, 1999a, 1999b) The fabric of many cities and human settlements is becoming so intimately mediated with ICTs and other technological systems that some now characterise them as 'cyborg cities' (Picon, 1998). Others talk of the 'infinite city', made up of transnational urban corridors. In this, traditional monocentric cities give way to an 'all-pervasive and ever-present urbanisation' and urban culture, strung together by vast complexes of technological and communications systems (Skeates, 1997).

The societal diffusion of ICTs remains starkly uneven at all scales. It is in the contemporary city that this unevenness becomes most visible. In cities, clusters and enclaves of 'superconnected' people, firms and institutions, with their increasingly broadband connections elsewhere (Internet, mobile phones, satellite TVs) and their intense access to information services, often rest cheek-by-jowel with large numbers of people with non-existent or rudimentary communications technologies and very poor access to electronic information. The social and economic cores and peripheries of the global information 'age', rather then being continents apart, now often lie geographically adjacent to each other within individual cities. Often, they are literally a few feet apart, separated by gates, walls and highly uneven access patterns to the crucial portals that support participation in electronic domains. Thus, whilst dominant domains of the economic, social and cultural fabric of the planet are now being mediated with ICTs at an astonishing pace, between 60 per cent and 70 per cent of the world has never made a phone call (UNDP, 1999). And, whilst it is growing very rapidly, the Internet remains the preserve of a small global élite of between 2 per cent and 5 per cent of the global population.

The complex interconnections between cities and ICTs are evolving within a broader context set by political and economic liberalisation, volatile technological change, the changing nature of nation-states and an internationalising political economy. Together, these processes of change throw up enormous challenges to traditional ways of understanding cities. They particularly challenge those oriented towards land use, physical form, urban design and transport—ways of thinking about industrial-age cities that have long neglected the importance of electronic communications and technologies in urban life (see Graham and Marvin, 1996, ch. 2).

Many questions emerge at the intersection of ICTs and human settlements which still remain largely unaddressed by urban researchers. How, for example, do digitally mediated economic flows articulate with city economies and urban systems in different places and sectors within developed, developing, newly industrialising and post-communist economies? What are the relationships between the application of ICTs and broader processes of social and geographical polarisation that have recently been observed within and between cities? How can urban analysis and policy-making grapple meaningfully with invisible and intangible domains of electronic flow and real-time international exchanges at multiple geographical scales? And how can the policy worlds of the city be brought together with those of cyberspace and ICTs to foster creative policy initiatives that harness the power of new technologies for positive urban social and economic development?

In such a context, this paper has two objectives, reflected in its two main parts. The first part of the paper seeks to 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 both the North and the South. The paper's second part aims to explore the prospects that such stark 'urban digital divides' might be ameliorated through progressive and innovative policy initiatives which treat human settlements and electronic technologies in parallel. It does this using a range of illustrative exemplars from a variety of contexts to back up the argument.

2. Not the 'Death of Distance'! Not the 'End of Geography'! ICTs and Urban Polarisation

Why might the application of ICTs be supporting social and geographical polarisation within and between the world's cities? This seems an especially apposite question as, at first sight, it might appear that new computing and communications technologies offer tantalising possibilities for *transcending* traditional social and geographical barriers?

Advertisements and magazine articles, certainly, endlessly suggest this, with their portrayals of ICTs, and especially the Internet, as some value-free technological panacea offering instant, limitless access to some entirely separate and disembodied on-line world. In this 'death of distance' or 'end of geography' scenario, an intrinsically equitable, decentralised and democratic world is seen to be emerging. Within this, everything within the global economic, cultural and social space becomes equally accessible or 'one click away' (Graham, 1998). 'Cyberspace' is cast as a single, unitary and intrinsically unifying electronic space. It is a space, moreover, which has somehow overcome the familiar social, economic, cultural and geographical segmentations and inequalities of the 'off-line', urbanising world.

The reality, however, is both very different and a good deal more worrying, for there is now a great deal of evidence that the dominant trends surrounding the application of ICTs are serving to underpin and support processes and practices of intensifying urban polarisation. This is occurring at every scale across the globe. Dominant logics of ICT-based change seem to be underpinning urban polarisation, the 'disembedding' of dominant economic, social and cultural activities, and the social and technological distancing of the powerful from the less powerful. There are

four reasons why this is so. In what follows, we shall highlight the ways in which ICTs, as currently applied by dominant users, tend to

—Extend the power of the powerful;
—underpin intensified unevenness through tying together international divisions of labour;
—allow socioeconomically affluent groups selectively to bypass the local scale; and
—be culturally and economically biased, especially in terms of the wider development of what we might term the emerging 'international information marketplace'.

2.1 The Uneven Geography of ICTs: How New Technologies Tend to Extend the Reach of the Economically and Culturally Powerful

The first key point to stress is that, at least currently, the explosion in the use of ICTs overwhelmingly represents an extraordinary extension in the social, economic, cultural and geographical powers of those groups and organisations who are best connected, most highly skilled and most able to organise and configure the shift on-line to their own advantage. It is those particular groups, organisations and places that are orchestrating the instantaneous and often international mediation of money, work, service distribution, transport, leisure and media access, as these sectors are reconfigured as flows of electronic signs. So far, they are thus the key beneficiaries of the 'information revolution'. As Erik Swyngedouw puts it, far from being a universally liberating stampede on-line, "the changed mobility, and hence, power patterns" associated with new information technologies "may negatively affect the control over place of some while extending the control and power of others" (Swyngedouw, 1992, p. 322). It is worth exploring some examples of this process.

Urban polarisation and the Internet. Our first example is the relationship between the extraordinary growth of the Internet and global urban polarisation. Whilst it is the fastest diffusing medium in history, the UNDP still characterises the Internet as a "global ghetto" encompassing only 2 per cent, or 250 million, of the most privileged and powerful of the global population—over 80 per cent of whom live in OECD nations (UNDP, 1999, p. 63). This global 2 per cent—expected to rise to 700 million by 2002—tends to be overwhelmingly relatively wealthy. (In Latin America, 90 per cent of users came from upper-income brackets; in the UK, 30 per cent had salaries over $60 000.) They were highly educated (globally, 30 per cent had at least one university degree; in China, the equivalent figure was 60 per cent, in Mexico, 67 per cent, in Ireland, almost 70 per cent). Male users dominated (62 per cent in the US, 75 per cent in Brazil, 84 per cent in Russia, 93 per cent in China and 94 per cent in the Arab states). Internet users tended to be young (under 30 years as an average age in the UK and China; 36 years in the US). Finally, dominant ethnic groups tended to dominate Internet use, as did English-speakers. (In 1999, 80 per cent of all global websites were in English, whilst only 10 per cent of the world's population spoke the language (UNDP, 1999, p. 62).

The key concern is how the global medium of the Internet relates to the cultures, civil societies and landscapes of local spaces, cities and regions. This relationship tends to be one of extending the power of the powerful whilst further marginalising the less powerful within the same geographical spaces—a logic of intense polarisation. As the UNDP suggests

the Internet is creating parallel communications systems: one for those with income, education and—literally—connections, giving plentiful information at low costs and high speed; the other for those without connections, blocked by high barriers of time, cost and uncertainty and dependent on out-dated information. With people in these two systems living and competing side-by-side, the advantages of connection are overpowering. The voices and concerns of people already living in human poverty—lacking incomes,

education and access to public institutions—are being increasingly marginalized (UNDP, 1999, p. 62).

People without access to the Internet are disadvantaged by not having access to the services and applications that run on it. This is especially so as electronic means of organising access to services grow progressively more dominant, leading to the downgrading or curtailment of traditional, face-to-face, paper-based ways of delivering them. People without Internet access can therefore face extra costs, hurdles and barriers when attempting to improve their social and economic positions. This is because they tend to lack the skills, knowledge, equipment, infrastructure access, capital, money, electricity and telephone access necessary to enter, access and fully exploit the exploding on-line universe, and the working, service and communicational flows available within it.

Thus 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 human settlements. Urban societies become separated into the 'on-line' and the 'off-line' in complex tapestries of inclusion and exclusion which work simultaneously at multiple geographical scales. Such trends are multiple, superimposed and complex—but they are clearly starting to affect layers of the physical, technological, social and economic architecture of cities and systems of human settlements in very important ways. Consider, for example

—The position of people who remain stranded in the worlds of physical cash or the informal economy, whilst dominant service providers and consumers in many cities migrate into an electronic cash or formal economy (often withdrawing or restructuring their networks of physical offices and service-points in the process).
—The ways in which highways and roads in cities like Toronto, Melbourne and Singapore are starting to be commodified, rendering them accessible only to those who have bank accounts and electronic transponders in their cars.
—The landscapes of booming high-tech cities in the South, like Bangalore (India) and Bintan Island (Indonesia). In such cities, huge efforts are being made to configure industrial and technology parks and élite housing areas with the best possible infrastructural connections to distant places. At the same time, many informal settlements struggle to access a pay-phone, metalled roads, sewerage or electricity.

The Internet and the restructuring of US cities. In the cities of the North, it tends to be low-income and ethnic minority communities that are most excluded from the Internet (Goslee, 1998). In the US, for example, in 1997, 24 per cent of whites had on-line access in major cities, whilst only 7 per cent of blacks did. Fifty per cent of city residents earning over $75 000 a year had Internet access, but only 6 per cent of those earning less than $10 000 did so (NTIA, 1999). It should be remembered that telephone access, too, remains highly uneven, even in the USA. Only 50 per cent of female-headed households living at or below the poverty line, and 43.5 per cent of families who depend totally on public assistance, have access to even this basic technology (NTIA, 1999).

Thus, even in advanced industrial nations with rapidly maturing Internet markets, whole sections of the urban population fail to benefit from the skills, education, equipment, infrastructure, capital, finance and support necessary to go and remain 'on-line'. This is so at precisely the time when being on-line is becoming ever-more critical to access key resources, information, public services and employment opportunities. Goslee estimated that, by the year 2000 in the US,

60 percent of jobs will require skills with technology. Moreover, 75 percent of all transactions between individuals and the government—including such services as delivery of food stamps, Social Security benefits, and Medicaid information—will take place electronically. People without

technology skills or access to electronic communications will be at a considerable disadvantage (Goslee, 1998, p. 3).

As James Katz, a community activist in the US, argues, it is certain that

> the rich are going to be getting richer in terms of information ... the information poor will become more impoverished because government bodies, community organisations, and corporations are displacing resources from their ordinary channels of communication onto electronic ones (Katz; quoted in Goslee, 1998, p. 6).

Inner-city communities, especially, face a situation that the now defunct US Office of Technology Assessment (OTA) described the effect as "the concentration of poverty and the deconcentration of opportunity"— that is, the ghettoisation of non-connected groups within central cities at the same time as ICTs help to support the decentralisation of growing information industries to (peripheral) 'edge cities' (OTA; quoted in Goslee, 1998, p. 7).

The Internet is therefore much more than an unevenly diffused and polarised medium of communication and expression. It is directly involved in the restructuring of those cities that drive its development. Certain urban spaces, especially in 'global' cites of the North, are emerging as dominant powerhouses of global Internet production. A new type of emerging economic enclave is emerging in such cities: the gentrifying 'cyber' district. Such spaces are now driving the production of Internet services, websites and the whole digitisation of design, architecture, gaming, CD-ROMs and music. The cities that are developing such enclaves tend to be those with very great strengths in the arts, cultural industries, fashion, publishing and computing: New York, San Francisco and London, to name but three (see Braczyk *et al.*, 1999).

San Francisco's 'Multimedia Gulch' district is a classic example. This district is a fast-growing media and Internet cluster in the city's 'SOMA' area. Here, downtown urban neighbourhoods have been refurbished and gentrified to sustain the clustering demands of interlocking micro, small and medium-sized firms in digital design, advertising, gaming, publishing, fashion, music, multimedia, computing and communications. Over 2200 firms now provide over 56 000 jobs in these sectors, up 105 per cent created between 1996 and 1998, as massive capital moved north from Silicon Valley (Rothstein, 1998). Such processes, however, have set off spirals of gentrification, attracting considerable investment from restaurants, retailers, property firms, 'loft' developers and infrastructure companies and leading to the exclusion of lower-income groups from the newly 'high-end' space. Rents have exploded and, somewhat ironically for an industry whose products can be sent on-line anywhere on earth, parking shortages have become critical. Major urban social and political conflicts have emerged as 'dot.commers', with their extraordinary wealth, have—along with real estate speculators—colonised selected districts.

This influx, not surprisingly, has dramatically driven up rents, leading to the eviction or exclusion of many poorer residents. Under the banner "the Internet killed San Francisco", Paul Borshook (1999) outlines the symptoms of what he calls the 'Internetting' of San Francisco: commercial real estate rates went up by 42 per cent between 1997 and 1999; the median-priced apartment cost $410 000 in August 1999; median rental for an apartment was $2000 per month; and homelessness rates were rising fast. Landlords, backed by the relaxation of rent controls and tenant protection laws by the City Council in the 1990s, have instigated a huge rise in evictions. The result is a severe housing crisis, the expulsion of poorer people from the downtown core of the city (as many simply cannot afford to remain) and the accentuation of landscapes of social and geographical polarisation, as pockets of the city are repackaged as places of work, leisure or living for Internet-based businesses and entrepreneurs.

2.2 ICTs as Supports to the Restructuring of Human Settlements: Integrating International Divisions of Labour

> Digital capitalism is now free to physically transcend territorial boundaries and, more importantly, to take economic advantage of the sudden absence of geopolitical constraints on its development. Not un-coincidentally, the corporate political economy is also diffusing more generally across the social field (Schiller, 1999, p. 205).

The second key point that we need to stress here is that there is a close connection between ICTs, global urban polarisation and the extending power of transnational corporations to shape urban development. Against the rhetoric that 'cyberspace' is a purely virtual and disembodied world, the radical growth of ICTs is closely related to the restructuring of real geographical places at all geographical scales.

ICT networks and the exploitation of geographical differences. ICTs offer unparalleled choice and flexibility to mobile firms and socioeconomic groups to exploit differences between places and people. This is done through the construction of highly elaborate divisions of labour which can then be intimately integrated in 'real time' through ICTs. Currently, international telecoms tariffs are collapsing, capabilities are growing exponentially and mergers, alliances and acquisitions in telecom and media industries are beginning to offer global 'one-stop shops' for international corporate ICT systems (Sussman and Lent, 1998). Such capabilities enhance the ability of corporations to separate out or 'unbundle' elements within their operations to geographically dispersed cities and settlements, whilst maintaining intimate control and co-ordination.

Thus, transnational companies and their affiliates can benefit from the seamless and instant integration of plants located in global networks of specialist and very different urban places, with very different labour conditions and costs. Broadly, ICTs are being used to tie together the following ranges of production sites (see Graham and Marvin, 2001, ch. 7)

— research and development centres in suburban technopoles of the North and, to a lesser extent, the South (Castells and Hall, 1994);
— corporate headquarters and financial service houses in select 'global' cities (Graham, 1999);
— cultural, media and multimedia sectors in the emerging 'digital clusters' of some Northern and a few Southern cities;
— cheap, mobile manufacturing plants in the peripheries of the North and the newly industrialising cities of the South;
— decentralising call-centres, data-processing and e-commerce management centres in newly emerging e-commerce enclaves across the world (the Caribbean, the Phillipines, Ireland, India, northern and western UK) (Wilson, 1998);
— electronically integrated resource extraction activities in minerals, forests, oilfields and fisheries; and
— the logistics, seaport and airport hubs that serve as the transshipment and export processing zones that lubricate internationalisation.

As Jean-Marc Offner (1996, p. 26) puts it, rather than somehow causing 'territory to disappear', as in the cyberspace dreams of so many IT utopianists, "it is precisely *the fact that a multitude of places exist* that creates the need for exchange" based on ICT networks (emphasis added). The construction of ICT systems to support intensifying divisions of labour is further supported by the growth of local efforts to 'package' spaces and zones with the subsidies, labour forces, infrastructure, services and security to tempt in mobile investment. As urban development agencies struggle entrepreneurially to configure their spaces with the right local–global (or 'glocal') infrastructural connections to allow them to emerge (hopefully) as a valued node on international corporate networks, a close nexus emerges between the local production of infrastructure and urban space and global-

ising networks of electronic (and physical) flow.

The global liberalisation of telecommunications and the 'cherry picking' of urban markets. In liberalised telecommunications regimes such as the US and UK, it has been shown recently that city regions are now marked by mosaics of intensifying unevenness, as providers seek to cherry pick only the most lucrative business and professional customers from across the urban landscape (Woodbury and Thompson, 1999). Upper-income spaces and buildings with high computer ownership and communications expenditure are targets of vast, competitive investment in broadband infrastructure and services. These allow 'always on' Internet with full streaming multimedia, dedicated 'T-1' Internet trunk backbones, cable Internet, digital subscriber lines and the rapidly decreasing costs of international communications. In mid 1999, about 86 per cent of all broadband Internet delivery capacity in the US was concentrated in the prosperous suburbs and business areas of the 20 largest cities (Lieberman, 1999). It is becoming clear that, under conditions of infrastructural liberalisation

> The private sector builds where the high volume and the money is. In most communities the fiber-optic rings circle the business district. If you're in a poor suburban neighborhood or the inner city, you're at risk. What's more, providers that have spent years building their infrastructures don't come back and fill in the underserved neighborhoods. That may be a shrewd financial strategy. But the social impact could be devastating (Lieberman, 1999, p. 1).

Such dualisation is underpinned by the widespread shift from standardised marketing by emerging telecom and media conglomerates (within regulated monopolies), to marketing targeted precisely at socioeconomically affluent groups and areas (within competitive oligopolies). AT & T, for example, has now recognised that it makes 80 per cent of its $6

billion annual profits from 20 per cent of its customers (Schiller, 1999, p. 54). The targeting of innovation and investment towards richer groups and spaces is also supported by the attempts of cross-media alliances to take advantage of technological 'synergies' in offering high-value customers whole baskets of services on a single-contract basis across international spaces (land line and mobile phones, cable TV, broadband Internet and corporate networks). In the US, for example, the CEO of MCI (now part of the WorldCom group), John Donaghue, recently stated that

> We're going to change our focus from being omnipresent to the entire market to talking to the top third of the consumer market that represents opportunities in cellular, Internet and entertainment (quoted in Schiller, 1999, p. 54).

Dan Schiller calls these consumers the "power users". These he defines as

> high value residential customers who spend lavishly on a basket of telecommunications and information services, typically including (on an annualised basis) $650 on cellular; $500 on local wireline phone service; $400 on long distance telephony; $375 on cable, pay-per-view and video-on-demand; $250 on paging; as well as hundreds of additional dollars on online access, newspapers, magazines, and fiction (Schiller, 1999, p. 54).

As profit-driven mergers between telecommunications and media transnationals start to define and direct the global roll-out of ICT infrastructure, investment tends to concentrate on 'cherry picking' the market 'hot spots': the downtown business districts, high-tech spaces, media clusters and upper-income residential districts of prosperous, internationally oriented and 'global' cities. The concentration of all information, communications and knowledge infrastructures and industries creates an astonishing pool of demand in the business cores of such cities: in 1999, both New York and Tokyo had more telephones than the whole of Africa (14 million) (Smith, 1999). This concentrated de-

mand drives a frenzy of competitive activity and investment by communication and media suppliers of all types. The centres of global cities like New York and London now have six or more separate optic-fibre grids, offering the most capable, reliable, competitive and cost-effective electronic connections on the planet.

Driven by new start-ups who do not want to serve whole cities, regions or nations, many of these new city-level fibre networks are precisely limited to demand-rich parts of the main business cities. Such networks are connected seamlessly to each other via new transoceanic and transcontinental fibre and satellite networks, creating a global–local logic which conveniently bypasses both poorer parts of global cities and the intervening and often peripheral spaces between them.

Reflecting and reinforcing the 'global archipeligo' of glocal city cores, small high-capacity networks can start to mediate large portions of global economic flows. By 1998, the metropolitan fibre network of World-Com/MCI built recently in London, for example, had only 180 km of fibre, but it had already secured fully 20 per cent of the whole of the UK's international telecommunications traffic (Finnie, 1998). As they build similar networks in the major cities of the US, Europe, Asia and Latin America, along with the dedicated transoceanic fibres to connect them, WorldCom/MCI and other firms like them, are able to bypass incumbent carriers. As Schiller states

> on both sides of the Atlantic, newly established transatlantic submarine cable facilities and urban business networks will allow it to link directly some 4,000 business buildings in Europe with 27,000 such buildings in the United States (Schiller, 1999, p. 63).

However, developing cities like Mexico City, Beijing and São Paulo, often now face a lack of competitiveness in global telecommunications links. They tend still to face monopolistic, state-owned providers who are more expensive, less innovative and offer a more limited bundle of services. Global liberalisation, however, is rapidly changing this situation and cities like Mexico City are rapidly, but unevenly, being wired by Western telecommunications firms (Finnie, 1998; Graham, 1999).

Meanwhile, poorer parts of cities of the North—for example, low-income, African–American and blue-collar neighbourhoods in US cities—are increasingly prone to underinvestment and deteriorating service quality as the universal service regulations that applied to telephony fail to be translated to regulate broadband investment. Such spaces are also being disproportionately affected by the rising relative costs of local communications (Schiller, 1999, p. 55). Within liberalised markets, in the context of entrepreneurial planning, and with the withdrawal of local monopolies, infrastructure providers are unlikely to target new investment, marketing and innovation in poor communities and marginalised neighbourhoods—places which also tend to face stark exclusion from formal financial services, insurance, retailing investment and other services (Speak and Graham, 1999). As Hallgren, a US community activist, has found,

> many communities and areas are not perceived as having a large enough customer base to attract a [telecommunications or Internet] company to offer a service, let alone multiple companies (M. Hallgren, personal communication, 17 March 1999).

As marketing and infrastructure development strategies tend to reflect ever-more the patchwork geographies of fragmented cities, the situation of Bell Atlantic in New Jersey, reported in the *Cybertimes* in 1997, is typical. By then, the company, the report argued, had rolled out high-capacity optic-fibre links and broadband Internet services to "suburban business parks and large corporations" as well as "setting a schedule for suburban neighbourhoods". But it had "not yet made specific plans for the thousands of poor people who live in the state's largest cities". Nor had it wired the Enterprise Zones that New Jersey City council were developing in the

hope of attracting in new corporate invest-
ment. Worse still, it had "let its network
deteriorate in parts of Brooklyn and the
Bronx, where corroded wires led to scratchy
lines and service outages" (Schiller, 1999,
p. 56). Physical offices, used by many poor
people without bank accounts to pay bills,
have also been routinely closed by US
telecommunications firms, whilst rates for
directory assistance and local call charges
have been dramatically raised to reflect 'cost-
reflective pricing' and the withdrawal of so-
cial cross-subsidies (Schiller, 1999, p. 57). In
a context where bandwidth and connectivity
are, quite literally, the lifeblood of electronic
commerce businesses, these processes work
very directly to prevent new on-line and
e-commerce-oriented small businesses from
competing within less prosperous, peripheral
towns and marginalised inner-city spaces.
Quite simply, 'the phone line is too small'
(Woodbury and Thompson, 1999).

2.3 ICTs, Urban Polarisation and the Selective Bypassing of the Local

New communication technologies, and a
metropolitan transport system, allow peo-
ple to stay selectively in touch with those
individuals/groups that they want to,
whilst disconnecting from the city at large
(Castells, 1999b, p. 15).

The third key point to stress is that ICTs also
allow socioeconomically affluent urban
groups selectively to overcome the barriers
and constraints of local geography by ex-
tending and intensifying their access to dis-
tant spaces. Increasingly, such groups can
use ICTs to bypass the immediate constraints
and the real or perceived risks of place in the
process (especially those surrounding crime
and the fear of crime). Thus ICTs like the
Internet help their users to connect without
risk or fear to services, social groups and
people across local, national or international
distances. At the same time, ICTs can be
used to support the selective disassociation
of affluent groups from exposure to the dif-
ferences, contrasts, risks and social mixing

traditionally associated with co-habitation in
urban streets and spaces. Other technologies,
of course, such as the automobile, the priva-
tised mall, the mobile phone, the CCTV sys-
tem and the gated condominium complex,
can be configured further to support this
process, especially within suburban and post-
suburban urban landscapes (Graham and
Marvin, 2001).

For some residents in all cities, then, in-
stant electronic connection to all geographi-
cal scales is becoming more and more
important. But, from the point of view of
cities, fracture and social polarisation seem
to be the pervasive logic of the intensification
and liberalisation of a global capitalist sys-
tem within which ICTs play such a facilitat-
ing role. As Manuel Castells (1996, 1998)
has demonstrated, intensifying global con-
nections between the valued and powerful
parts of cities, and the groups and organisa-
tions who control and inhabit them, are tend-
ing to be combined with a growing sense of
partitioning and disconnection at the local
scale within cities.

The uneven growth of ICTs and 'cyber
spaces' thus become closely embroiled in the
restructuring of real urban space. Walls, ram-
parts, security fences, electric fences, armed
guards and defensive urban design are the
physical manifestations of this process in
both Northern and Southern cities, as glo-
bally connected and ICT-saturated social and
economic groups and enclaves strive to insu-
late themselves from the surrounding land-
scapes where poverty and exclusion often
concentrate. Once again, ICT systems can be
configured to help to support the power of
the well-off to extend their actions in time
and space (with 'smart' home technologies,
intelligent utility metering, electronic finance
and consumption systems) whilst also bol-
stering the powers they have to maintain safe
and secure local spaces (through closed cir-
cuit TV-equipped homes, malls and office
spaces, electronic alarms, movement and
face-recognition sensors, electronic gates and
electronically tolled 'smart' highways which
filter out the vehicles of the poor).

As cities across the world are restructured

within an increasingly international and liberalised capitalist system, it seems that the common development model of the South—of high-value enclaves surrounded by landscapes of marginalisation—is, in a sense, being 'exported' to the North, as post-industrial cities face deindustrialisation, social polarisation and the patchy growth of digital and service industries and affluent spaces (Chomsky, 1993). Cities, then, at least dominant or 'global' cities, are the power-houses and innovation and transactional hubs of the internationalising knowledge-based economy. But they are also the places where the huge contradictions of ICT-mediated economic, social and cultural change are most salient and stark. In fact, the explosion of cyberspaces may actually reinforce the starkness of very real geographical barriers for many people.

Telecommunications and restructuring in developing cities. Broadly similar logics of global connection and local disconnection can be observed in developing, newly industrialising and post-communist cities. Personal Internet and telephone access tends to be much more circumscribed in such cities than in the global North. Such personal connections are likely to remain beyond the reach of the majority of households in most mega-cities and urban regions in the developing world, in the medium term at least. Infrastructure networks, too, are much less well developed, with many national phone systems falling into a state of disrepair and obsolescence. Even in late 1998, in over 70 developing nations, no Internet access existed at all; in many more, text messages were the limit of the systems and multi-media and even Web access was impossible (Everard, 1999, p. 33).

When they do exist, services tend also to be relatively much more expensive than in the North. In Lima, for example, Fernandez-Maldonado (1999) found that, despite increased rates of diffusion following the liberalisation of telecommunications in 1990, less than half of all households have a telephone and less than one-fifth of the poorest

20 per cent of the city's households have access to the telephone. When it comes to computer access, the overall average is 7 per cent, with great differences between the richest (50 per cent) and poorest (1 per cent) fifths of households. With Internet costs at over US$40 a month, the diffusion of the Internet is restricted only to the very rich. Thus the issue of public Internet booths becomes critical.

More broadly, in many developing cities, high-quality ICT infrastructures are being packaged together into enclaves and industrial parks for internationally oriented firms and socioeconomic élites. In such spaces, entrepreneurial planning, public subsidies, defensive urban design and liberalised, market-driven infrastructure development come together in the production of 'high-tech' production and back-office enclaves, and 'Euro-American'-style gated residential spaces. Consider the following examples:

Bangkok, Thailand. Thailand is a rapidly developing nation which has more cellular telephones than the whole of Africa (UNDP, 1999, p. 62). In Bangkok, the installation of fibre optics in the 'intelligent corridor' along the major outer arterial ring road is reinforcing the linear expansion of the city into exurban areas (Hack, 1997, p. 11). A 'leap-frog' strategy is being encouraged "providing households and firms with fibre optics services in high-income, educational, knowledge and high value industrial areas" at the expense of the wider city (Kaothien *et al.*, 1997, p. 14)

São Paulo. In São Paulo, Brazil, patterns of investment in advanced telecommunications are starkly uneven. Fortified enclaves have grown up around the Murumbi district of the city that are designed to meet the demands of growing middle- and upper-income groups for perceived security, so supporting their withdrawal from the public street and infrastructure system (Caldeira, 1996). Offering integrated spaces for residence, work and consumption to middle- and upper-income groups, these inward-looking

spaces simultaneously turn their backs on the public street whilst relying on veritable armies of service personnel, on the time–space flexibility of the automobile, on dedicated energy and water connections, and on the most sophisticated telecommunications links available in Brazil. With the collapse of public planning for energy, water and telecommunications infrastructure, and the concomitant withdrawal of cross-subsidies, such spaces have established "high concentrations of infrastructure services—particularly telematics, optic fibre, cable TV and mobile telephone central stations", as broader investment regimes have concentrated on the "supply of sophisticated infrastructural services for top income groups in São Paulo" (Ramos Schiffer, 1997, p. 10).

Johore, Batam and Bintan. In the export-oriented 'flagship' manufacturing enclaves in Johore (Malaysia) and the Riau islands of Batam and Bintan (Indonesia), Singaporean capital is equipping each new development with the requisite packages of infrastructural connections:

> The parks are conceived as self-contained industrial township … each of these investment enclaves offers linkage to the Singaporean economy whilst minimising dependence on the wider Indonesian environment (Grundy-Warr *et al.*, 1999, p. 310).

For example, direct links are being made into Singapore's state-of-the-art telecoms infrastructure, allowing Indonesia's poor-quality telecommunications infrastructure to be completely bypassed. As a result, telephone calls from the enclaves across the national border to Singapore are classed as 'local' calls; those beyond the enclave walls to the rest of Indonesia, however, are classed as 'international'.

Malaysia. Giant among the emerging generation of urban planning initiatives that attempt to engineer new industrial and multimedia spaces is the $20 billion Multimedia Supercorridor in Malaysia. Here, in

effect, at the heart of the ASEAN block in south-east Asia, a whole national development strategy has effectively been condensed into a single, grandiose urban plan for a vast new urban corridor. The aim of the MSC is nothing less than to replace Malaysia's manufacturing-dominated economy by a booming constellation of services, IT, media and communications industries by turning a vast stretch of rain forest and rubber plantations into 'Asia's technology hub' by the year 2020. The MSC starts at the centre of the capital, Kuala Lumpur. The MSC project ends 30 miles to the south at an immense new international airport strategically placed on the routes to Singapore. As well as tax incentives, favourable cost structures and high-quality customised infrastructure for the space, Malaysia has even developed customised laws for the MSC. Incoming transnationals will have free in-migration for 'knowledge workers' from all over the world. A special set of new 'cyber laws' surrounding intellectual property rights has been created to make sure that firms can recoup the investment costs of providing things on-line.

However, there are dangers that the MSC will engender a two-tier society with Malaysian workers providing the low-value-added support for hermetically sealed corporate zones operating on global networks. There are also major question-marks over the fate of Malaysia's peripheral regions and Kuala Lumpur's marginalised urban spaces, outside the MSC. Despite the implication in the prevailing discourse that the whole of the national space will benefit equally from the MSC, its construction is displacing plantation communities whilst configuring new spaces overwhelmingly for the élite corporate and IT professionals and their families who will be able to afford the new privately developed 'wired' homes. Low-skill, low-wage service staff—cleaners, security guards, gardeners—are being brought in from outside the corridor. Such concerns over the construction of a privatised, hyper-clean city for socioeconomic élites, gated-off from the chaotic and polluted worlds of the

rest of Kuala Lumpur, have emerged in criticism in the national press.

Bangalore. Within Bangalore—'India's Silicon Valley'—the heightened wealth inequalities resulting from high-tech growth have created an extremely fragmented and polarised urban structure. This is based on "participation in the information-intensive global economy by a core élite, and non participation by the masses" (Madon, 1998, p. 232). At the Electronics City complex, for example, several hundred acres of 'offshore' technology campus have been configured to house companies like Texas Instruments (undertaking circuit design), IBM, 3-M and Motorola. The Indian firm Wipro, another major presence, exploit advanced communications to use India's cheap software programmers to service many of the world's computers remotely from Bangalore. All these firms

> are insulated from the world outside by power generators, by the leasing of special telephone lines, and by an international-style work environment (Madon, 1998, p. 232).

Singaporean capital has also constructed an Information Technology Park on the outskirts of Bangalore, equipped with dedicated satellite ground stations, broadband telecommunications, uninterrupted power supplies, back-up generators and international-standard, private water, sanitation and waste-disposal services. Because of the poor quality of the regional telecoms infrastructure, the park also serves a regional role as a hub link to global markets

> companies within 30 km of the park can simply point their microwave antennae and connect by satellite link to clients anywhere in the world (Rapaport, 1996, p. 105).

This park is integrated with highly luxurious residential and leisure facilities, separating them even further from the prevailing poverty in the shanty towns which still house the bulk of the city's in-migrant population (over 50 per cent of whom are illiterate). "You won't see many Horatio Algers leaping from the shantytowns to workstations in Bangalore's infotech firms" (Wetzler, 2000, p. 16).

Initiatives like Bangalore's technology parks tend to compound the polarisation which arises from the gradual withdrawal of the practices of social and geographical cross-subsidy that tended to underpin the (admittedly often unreliable and inefficient) public telephone monopolies of the past (Schiller, 1999). "The present trend toward privatisation is likely to end all such subsidies", according to Kalbermatten (1999, p. 15):

> In the absence of effective regulation (a real risk in most developing countries), privatisation is likely to result in efficiency gains and better service for those who already have service or who can afford to get connected to the existing system. The urban poor will again be overlooked (Madon, 1998, p. 232).

In Bangalore, whilst the bulk of public and infrastructural investment centres on linking the new parks globally and securing them locally, the local municipality has actively worked to bulldoze 'illegal' self-built housing areas in the name of a civic modernisation 'clean up' programme. Thus, it is clear that "the recent internationalisation of Bangalore has had a negative impact on the poor" (Madon, 1998, p. 232). The condition of shanty-town areas is deteriorating and many have very poor access to mains water, communications, energy or metalled roads and motorised transport—a sharp contrast to the modern landscapes of the new technopolis parks, with their international electronic and physical links, that they surround. In fact, a broader infrastructure crisis is emerging for the poorer majority in the city: shortages and interruptions of power are common; water shortage is looming; and the city authorities are desperately trying to attract private-sector investment into the poorer parts of the City.

2.4 ICTs and the Cultural and Economic Biases of the International Information Market-place

Our fourth and final key point to stress is that dominant applications of ICTs, and the things that flow on them, are currently heavily biased in a cultural sense. The consolidation of digital multimedia conglomerates—fuelled by the Internet, the shift towards digital media (CDs, DVDs, digital television, web TV, digital magazines, etc.), along with the volatilities of stock markets and global liberalisation—is supporting global trends towards the centralisation of electronic power on a smaller number of people, institutions and places. These increasingly dominate the global flows of technology, capital, infrastructure and intellectual property rights, transcending the traditional powers of (some) nation-states (Everard, 1999).

The world is thus facing increasing global concentrations of what we might call 'electronic economic power'. This process 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. This is especially so given the extreme asymmetries of North–South relations that surround this process. In many developing nations and cities, for example, TV and Internet media provide an overwhelmingly Anglo-Saxon content as US culture in particular is extended through the growth of electronic connections. As Everard (1999, p. 38) suggested, in a telling example,

> it is far easier for a Russian language speaker with a computer to download the works of Dostoyevsky translated into English to read than it is for him to get the original in his own language.

The capital, technology, skills and finance of the North are taking a dominant role, encouraged by the WTO, in supporting the international liberalisation and consolidation of telecommunications, media and technology. These processes are encouraging the 'opening up' and integration of trade and finance systems. They are leading to the privatisation and internationalisation of scientific research. And they are supporting the imposition of tight systems for allowing corporations to extend their control over intellectual property rights (everything from media content through software, information, knowledge, to human genetic sequences and bio-engineered life-forms). The industrial strategy of the US, in particular, as the world's only 'information super-power', is essentially to extend and intensify its dominance in telecommunications, Internet backbone infrastructure, e-commerce, multimedia, biotechnology, education, R&D and digital content, within widening, liberalising, global markets. With many nations having better and lower-cost Internet connections to the US than to adjacent nations and regions, Kenneth Neil (1999) calls its strategy one of 'bandwidth colonialism'.

This interrelated array of processes of change tends overwhelmingly to benefit Northern corporations, the affluent socio-economic metropolitan élites of key Northern 'information cities' and the metropolitan firms and socioeconomic groups in developing cities, who benefit from the growing articulation between developing nations and the global economy. As Dan Schiller (1999, p. 205) suggests

> A couple of thousand giant companies—as employers of workers, laboring on networked production chains, as advertisers, and, increasingly, as educators—today preside, not only over the economy but also over a larger web of institutions involved in social reproduction: business of course, but also formal education, politics and culture.

As a result, the (parts of) the largely Northern 'global' cities where such corporate finance, research, decision-making and technology are orchestrated seem to be further concentrating wealth and power. The clear

worry here, as the French communications scholar Armand Mattelart has written, is that

> the dynamic of the economic model of globalisation now unfolding risks leading to a 'ghettoized' world organised around a few megacities in the North, but occasionally in the South, called on to serve as the nerve centres of worldwide markets and flow (Mattelart, 1996, p. 304).

Ricardo Petrella (1993), an ex-EU commissioner, is even more bleakly pessimistic. To him, current logics on the centralisation of wealth and power in key cities in the technological core of the global economy risk little less than a "new Hanseatic phase in the world economy" ridden by a stark "techno-apartheid".

The worry is that the gradual consumerisation of digital media by a dominant group of global media conglomerates will actually shape the use and configuration of the ICTs that most consumers use in very real ways. Many people, even when they do gain access to digital networks, may only be able to consume passively the media and retail products produced by the media and communications transnational that serves them. They will tend to be in a position of relative powerlessness towards the configuration and roll-out of digital media and communications systems to support greater 'horizontal' communication rather than 'vertical' communication back to the supplier and the associated e-commerce affiliates. If current trends continue, many peoples' experience of electronic interactivity—especially as narrowed Internet functionality is integrated with interactive TV and home consumption for mass markets—is likely to be 'press now to purchase' buttons rather than the potentially more liberating interactivity of the full, unconstrained Internet (Calabrese and Borchert, 1996).

Thus, the growth and geographical and social diffusion of the Internet to lower-income users may be associated with its restructuring as a corporately configured consumption conduit with limited capacity for upstream and horizontal communication to the full range of free information sources. In fact, a new range of Internet protocols—the software codes and algorithms that route 'packets' of information around the system—are now emerging to replace the previous notion that all information flowing on the Internet has equal priority. These new routers actively discriminate between different users' packets, especially in times of congestion when 'smart' routers can sift 'priority packets', allowing them passage, whilst automatically blocking those from non-premium users. Thus, high-quality services can now be guaranteed to premium users irrespective of wider conditions. This further supports the corporatisation of Internet services as different qualities can be packaged and sold at different rates to different markets. As Emy Tseng suggests,

> the ability to discriminate and prioritise data traffic is now being built into the system. Therefore economics can shape the way packets flow through the networks and therefore whose content is more 'important' (Tseng, 2000, p. 12).

3. Challenging Urban Digital Divides: Harnessing ICTs to Address Urban Polarisation

Above, we have explored four aspects of how dominant applications of ICTs are currently tending to support urban polarisation at all geographical scales. These dominant trends are crucially important. They set the context against which efforts to use ICTs to support more equitable urban processes of development will need to work.

However, it is crucial to emphasise that the picture is by no means all gloomy. Certainly, ICTs and their effects are currently strongly shaped by the ways in which they are being mobilised to extend the powers of the powerful and socioeconomically powerful. We cannot doubt that dominant uses of ICTs currently support the deepening of geographical unevenness at all scales. But it is crucial to remember that ICTs are inherently flexible technologies. The ways in which they are configured, diffused and applied are

not set in stone. The remarkable powers of ICTs for supporting new types of information flow, communication, transaction and cultural experience can be mobilised and shaped in other ways which can help to make effects on cities and human development much more progressive and positive:

> It is this enabling capacity of ICTs—the fact that it allows the user, whether individual or community, to take advantage of it in ways that the individual or community chooses—that gives these technologies their democratic and empowering potential (Souter, 1999, p. 412).

As the communications scholar Graham Murdock has written

> The history of communications is not a history of machines but a history of the way the new media help to reconfigure systems of power and networks of social relations. Communications technologies are certainly produced within particular centres of power and deployed with particular purposes in mind but, once in play, they often have unintended and contradictory consequences (Murdock, 1993, p. 536)

Beyond the dominant application of ICTs, many efforts are now emerging at the local, urban, regional, national and international scales, which seek to exploit their capabilities to support models of development which are more equitable, democratic and sustainable than the cases explored above. As diffusion of ICTs widens, many more efforts to work 'against the grain' of commodification and polarisation are emerging: crucially, the 'space of flows' is starting to be tied to the 'grassroots'. As Manuel Castells argues

> creative cacophony and social diversity, with their plurality of values and interests, and given the linkage between places and information flows, transforms the logic of the space of flows, making it a contested space. And a plural and diversified space … Through a blossoming of initiatives, people are taking on the 'Net without uprooting themselves from their places (Castells, 1999a, p. 301).

In what follows, we explore some of the huge range of initiatives and experiments that are emerging within this "creative cacophony". This is done in a way that stresses that these often-experimental efforts offer us insights into how ICTs might be used more widely to work against urban polarisation through sustained policy intervention which integrates them fully into development strategies for human settlements. Three broad types of effort can be highlighted.

3.1 Addressing Market Failures and Unmet Demand for Digital Infrastructure

First, new challenges are emerging to dominant neo-liberal approaches to the development and regulation of ICT infrastructures. Recognising that new market-based and international regimes of telecommunications development are not going to deliver equitable social and geographical access, a range of non-profit and municipal agencies across the world are developing strategies that address these new 'market failures' in creative ways. More broadly, new regulatory efforts are emerging in poorer developing nations where public monopolies were slow, inefficient and poorly financed, to meet the unmet demands for phones and ICT services in relatively equitable ways.

In the UK and Australia, campaigns have mobilised coalitions of non-profit agencies and lobbyists to argue that concepts of universal service developed for the age of telephone monopolies need to be expanded for the age of multiple, private ICT providers. In the US, federal and state-level programmes like the E-rate programme are emerging which provide discounts on telecommunications services to underserved schools and libraries. The European Union has worked hard to overcome the US dominance in Internet topologies, establishing partnerships and regulatory regimes aimed at forging pan-European Internet trunks which do not relate primarily to the US, as did earlier genera-

tions of Internet infrastructure. And municipalities, especially in the US and Europe, have started to intervene directly in telecommunications infrastructures to ensure equitable roll-out of ICT infrastructures and services to all citizens in their areas. Such a process is reminiscent of the 'gas and water' socialism of the 19th century, where municipal intervention, regulation and ownership in critical networked infrastructures were seen as powerful antidotes to the fragmenting and polarising logic of market-based approaches and broader forces for economic modernisation.

Take some examples. Glasgow, Kentucky, has extended its own internal broadband network to offer high-speed Internet services to the wider population. Municipalities in California (Alameda, Anaheim, Palo Alto and San Bruno), Oregon (Eugene, Springfield), Washington (Tacoma) and Florida (Lakeland) have worked in partnership with utility and telecoms firms to install trunk optic-fibre networks to overcome the uneven geography of market investment (Strover and Berquist, 1999). In some cases, municipalities have built the conduits and then opened them up to telecoms providers with conditions for maximising access. In others, they actually built and leased out the fibre networks themselves. Such initiatives are usually developed through legal agreements which oblige carriers to connect libraries, schools, health services and community facilities, in exchange for the rights to use the conduits and rights of way. Meanwhile, cities in Europe such as Amsterdam (Netherlands), Roubaix (France) and Bochum (Germany) have also installed municipally operated fibre backbones across their urban spaces. Like their counterparts in North America, these are being used to offer high-quality and competitive broadband telecommunications to entire urban areas much more quickly and more equitably than would have emerged through the market.

In many developed and developing nations, broad public–private partnerships are developing so-called 'national information infrastructure' (NII) strategies that attempt to harness ICTs to national social and economic

development (Mansell and Wehn, 1998). Many stress the need to wire up all schools and public institutions. But it remains unclear whether the goals of equity and ubiquity in access can be reconciled with those of liberalisation, privatisation and heavy investment to secure the investment of transnationals, as recommended by the recent (1999) World Bank report *Harnessing Information for Development*.

3.2 Widening the 'Net: Efforts to Extend Access to ICTs

Secondly, a wide rage of efforts by non-profit agencies, social movements and municipalities have emerged in the past decade which aim to extend access to ICTs to poor or marginalised groups and communities— precisely the people that dominant trends are tending to by-pass. This is not to imply the simplistic idea that delivering ICTs to people facing poverty and marginalisation will act as some 'silver bullet' to the complex problems of poverty and marginalisation, as implied by the US speaker, Newt Gingrich's patronising 'laptops to the ghettos' rallying cry in 1996. Indeed, sometimes, the very relevance of Internet access can be questioned for those facing the most severe social crises.

> Just giving someone time at a terminal with Internet capabilities—or, by extension, at a kiosk in a public place—will not benefit anyone who feels confronted with a seemingly insurmountable problem, or who has no idea where to begin (Rockoff, 1996, p. 59).

Jones argues that

> connection to the Internet does not inherently make a community, nor does it lead to any necessary exchanges of information, meaning and sense-making at all (Jones, 1995, p. 12).

Instead, it is clear that ICT connections, service, skills and spaces of expression, need to be built up within wider strategies of economic, social and cultural development. Be-

yond basic access to ICT networks and services, supportive training and community-oriented physical spaces are required to help people to overcome the fears and reservations they might have about using the technologies. A wide range of such experiments are now developing across many urban contexts.

Public Internet booths. These offer one direction. In Europe, Amsterdam is installing public Internet booths across the city's fabric as part of an integrated media strategy for the city. In Estonia, public Internet access points are being planned across the entire nation (UNDP, 1999, p. 64). In developing cities, public booths are even more crucial because of extremely low household access to the Internet. In such cities, public Internet booths have been deployed in libraries and small rented rooms in many informal districts, backed up by all-important training and support.

In Lima, Peru, for example, over 200 such booths, funded both privately and by municipalities, have been complemented by many informal ones set up by entrepreneurs. Such booths now mean that "the average resident of Lima can have access to computer and Internet services at relatively low cost." (Fernandez-Maldonado, 1999, p. 13). These booths are also part of a wider cluster of informal ICT-based economic growth in poorer parts of the city which is improving the prospects of economically upgrading informal settlements. This offers the tantalising prospect that low-cost electronic means of communication, information retrieval and transaction might offer major economic boosts to the tight clusters of small and micro-firms in informal settlements. Just as with ICTs and formal firms, Internet kiosks might help to develop major growth potential based on organising new routes to markets, new ways of supporting interfirm relations and new routes into training and work for surrounding populations.

Wireless and mobile communications. The second emerging range of initiatives centre on exploiting the relatively low 'roll-out' costs of wireless and mobile communications to allow previously excluded people and spaces to gain access. In Tanzania and Ghana, for example—where land-line telephony is the preserve of small economic élites—the US firm Adesemi has developed wireless systems to bring personal telecoms services to unserved poor urban and remote rural areas. Individuals can carry around low-cost pagers which notify them of incoming calls; these can be picked up at a network of wireless pay phones (see www.adesemi.com). With the right marketing, even rural wireless systems offering payphones and phone shops to rural developing areas at reduced costs have been shown to generate profits. Rolling-out wireless networks is often most effective when wireless phones are offered with pre-payment cards, so avoiding the fear of debt which understandably inhibits many people on low incomes from investing in phones with periodical bills.

'E-gateways': community telecentres. In both developing and developed cities*, community telecentres*—a third policy avenue—are proliferating, often linked with existing community centres or schools. Community telecentres strive to deliver the 'street-level' interface between ICTs and the Internet and marginalised populations. Most offer training, support, drop-in services and access to fax, computers and the Internet; some are moving into e-commerce and telemedicine. In the UK, some are geared towards specific ethnic or disadvantaged groups (the Bangladeshi or Chinese communities, and women in Manchester, young people in Newham—see www.youth.newham.org.uk/; and Twist, 1999). This reflects the wider neglect of the needs of such groups by mainstream ICT providers. As Souter argues, for example,

few telecommunications projects have targeted women, noted the impacts on women of telecommunications systems and technologies, or explicitly incorpor-

ated their perspectives and needs (Souter, 1999, p. 412).

In response, the Indira Ghandi Open University in India has explicitly targeted key women decision-makers in its efforts to develop community distance education centres in poor Indian villages (Souter, 1999, p. 412).

In the US, centres like the computer clubhouse in Boston and the national network of community technology centres (CTCs) are emerging. These focus on building technological 'fluency' in poor communities—the ways in which "new types of social interaction, new types of activities, new areas of knowledge, and new attitudes towards learning" can be constructed culturally on top of the provision of access to technologies (see www.computerclubhouse.org; and Resnick *et al.*, 1999, p. 267).

Community Telecentres in Sharkeya, Egypt, meanwhile, are planned to integrate with women's health centres to offer appropriate telemedicine applications. Such centres, to succeed, need to "become hubs for skills training and capacity building" (UNDP, 1999, p. 65). They also require strategies for continuous fund-raising beyond the initial support, to pay for on-going costs of trainers, key social entrepreneurs and continuing generations of new software and technology.

3.3 Efforts at Asserting Local Control over Content

Finally, efforts are now emerging to pluralise and democratise the content of electronic media—a crucial step within broader efforts to rebalance international systems of biased cultural and economic power in this technologically mediated and increasingly commercialised and internationalised age. As the UNDP suggest

the information highway cannot be a one-way street. Web sites need to be created locally, adding new voices to the global conversation and making content relevant to communities (UNDP, 1999, p. 65).

Alongside broader international movements to urge for global regulation of unfettered global markets in ICTs and digital media, many local instances are emerging to support the incorporation of excluded voices into electronic domains. In Tamil Nadu, India, for example, keyboard standardisation and software in Tamil, the local language, are being promoted. In the US, the Seniornet project is providing applications, discussion space, services and support to the older population, usually so underrepresented in ICTs. And across the complex *diasporas* of the world, dedicated community networks such as Vietnet are emerging to allow cultures to survive in the context of extreme dispersal and cultural volatility. Such networks are crucial as they can bring together the scattered people, resources and cultural media of fragmented linguistic or national communities. Beyond the overall dominance of English, the Web offers opportunities for speakers of minority languages to access remotely

government information, educational materials, scientific journals, and, ultimately, the digitized collections of major national libraries. No less important, the 'Net creates new forums for informal exchanges among the members of geographically dispersed communities. At present, there are discussion groups in more than 100 languages (Nunberg, 2000).

Developing local content and spaces for local expression can also feed into wider efforts at incorporating marginalised voices into urban and local governance and the mainstream economy. This is important because the first efforts by most cities to use ICTs are for marketing and promotion aimed at tourists and potential investors (Graham and Aurigi, 1998; Nunn and Rubleske, 1997). In the US, the civic networking movement, a 20-year-old groundswell of community IT initiatives organised by non-profit agencies, has now matured into a powerful support for citizen mobilisation and action (Schuler, 1996; Beamish, 1999). In Santa Monica, California, for example, the public electronic network (or PEN) system has enabled homeless and

street people to have their own e-mail addresses, allowing them spaces of expression and contact-points to support access to jobs, services and democratic rights (Doctor and Dutton, 1998). The Neighborhood Knowledge Los Angeles initiative is directly challenging the privatisation of local social, demographic and economic data in the city of Los Angeles. Integrating previously fragmented knowledge about the condition of at-risk neighbourhoods in the city, NKLA offers bilingual services which help responses to social and economic deterioration, support community awareness about the problems faced by neighbourhoods, help to challenge and expose 'red-lining' by major firms and institutions, and democratise access to digital and geographical information. Similar efforts to use web-based geographical information systems to help to support new ways of viewing and visioning places are also emerging in the Mexican-American Chicago suburb of Pilsen (Al-Kodmany, 2000).

Across Europe, finally, 'virtual' town halls, community intranets and community telecentres—from Amsterdam and Berlin to Athens, Bologna and Barcelona to east London—are starting to allow some marginalised communities to assert democratic rights within structures of governance, often for the first time (Tsagarousianou *et al.*, 1998). Perhaps the best-known example here is De Digitale Stadt ('the digital city'), an Internet space in Amsterdam, which now has over 100 000 'residents' (both locally and globally). Using an explicitly urban metaphor of themed 'town squares' and 'cafes', DDS supports a vast range of specialised political, social, environmental and interest-based communities and discourses which, within the constraints of biased social access to the Internet, support a "gigantic alternative and underground world" as well as "an official city on the surface and in the open" (Lovink and Riemens, 1998, p. 185; see http://www.dds.nl). To its founders, tellingly, "the city metaphor" used as the web interface for DDS, "stands for diversity … What we have in mind are all those different 'places' and

localities that are possible in a real as well as a virtual city" (Lovink and Riemens, 1998, p. 185). Other web initiatives, like Bologna Iperbole, have involved the distribution of free e-mail accounts to municipal populations, as attempts to develop direct forms of electronic interaction and democratic governance between citizens and municipalities (Tambini, 1998). The central challenge here is to design local ICT systems which are equitable in terms of access as well as supportive of genuine community and civic dialogue. Too often, municipal and local government websites amount to little more than 'government shops' which simply 'broadcast' information about services to consumers.

Far too few such initiatives genuinely exploit the potential of ICTs, backed up by community development and training, to generate the sorts of interaction, participation and debate necessary to help invigorate local democracy (Steyaert, 2000). Above all, though, such efforts to build up ICT, social and institutional capacity in parallel in local communities need to build on knowledge and understanding of how people and communities communicate, obtain information and transact at present. Too often, all people and groups within a settlement or community are forced into some imposed and standardised 'top-down' model which neglects the huge diversity of communicational cultures between them (Shanmugavelan, 2000).

4. Conclusions

Dominant trends surrounding the current extension of ICTs are far from being socially, geographically or culturally neutral. Closely bound up with wider processes of globalisation, urbanisation and the concentration of corporate power, they tend to extend the powers of the powerful over space, time and people. At the same time, because social power is always a relative experience, the explosive growth and extension of on-line worlds and cyberspaces (note the plural) can actually compromise and erode the social,

economic and cultural powers of those groups and spaces that are rendered off-line or marginal.

Consequently, as the UK think-tank Demos (1997, p. 6) put it, in contemporary network-based societies and cities it could be argued that "the poverty of connections" is now as important as traditional poverty which comes from the lack of housing, food, water, work and essential services. Such a 'poverty of connections' limits a person's or a group's ability to extend their influence in time and space, often condemning them to local, place-based ties and relationships. It undermines group, neighbourhood and individual ability to tap into and benefit from dominant technological and economic processes. And it means that people and groups will be in a subordinate position when it comes to controlling and adding value to their information, and their expressive and symbolic worlds, within extending domains of digitisation and electronically based economic appropriation.

The key question, then, is clear and stark: can we generalise and democratise the opportunities that come with the high-tech urban revolution? Can we found more equitable ways of developing cities and settlements in an electronically mediated age?

It remains too early to say. Certainly, the massive global diffusion process of the Internet and mobile phones is serving to bring electonic connectivities to much wider sections of urban, national and international populations and spaces. Costs of hardware and access are going down in many cases, fuelled by maturing markets. And the 'club effects' of network externalities do mean that network diffusion tends to work as a cumulative process; as more users join the networks, so too the utility of those networks grows. Also encouraging is the upsurge in grass-roots experiments and innovations which are attempting to harness ICTs to equitable and empowering models of development. The problem is that the latter are clearly weak, underfunded and fragmented, whilst the former threaten to be 'digital steamrollers' of globalisation and com-

modification which flatten, destroy and overwhelm all resistance and undermine the prospects for developing viable alternatives.

It is also clear that the essentially egalitarian nature of the early Internet is increasingly being replaced by 'smart' corporately controlled systems which sift users precisely according to their profitability and allocate them different functionalities accordingly. In the medium-term future, the question of whether or not 'Net access is available will gradually diminish as an issue, at least for middle-income groups and spaces in many contexts. At the same time, though, the question of what *type* of Net access one has—free and uninhibited broadband connectivity with equal upsteam and downstream links, or commodified and dominated by 'press now to purchase' buttons—will become evermore important. The corporate commodification of the Internet as a set of integrated electronic consumption spaces will be parallelled by a diversification of users' positions and experiences within converging market-places for electronic connectivity, commerce and media.

What are needed, first, are new models of social innovation within which transnational media and knowledge industries are made accountable for their actions. We require processes and structures of governance within which the vast economic and financial gains being made from the shift to global digital mediation are actively redistributed away from the powerful people and organisations who currently tend to monopolise them. Here, we face the very difficult challenge of regulating, governing and taxing truly global ICT systems like the Internet in order to introduce systems of cross-subsidy like those that characterised other infrastructures in the post-war period (and which were essential in democratising access to the telephone and other utilities during the post-war period in the West). Achieving a workable approach here is crucial, as the Internet itself is allowing many corporate players to reduce radically their tax obligations to all territorially defined jurisdictions (municipalities, regional governments and national and supranational

states and bodies). In the age of the Internet, the extreme difficulties of achieving real corporate regulation and transparency at the transnational scale are likely to make tax-avoidance an ever-more central element of corporate operations. For, increasingly, transnational corporations are likely to install their

> web servers where taxes are lowest, disguise their trade in goods as a trade in services, and even launch their own virtual currencies. The tax burden, in other words, is shifting to those who are unable to move their assets off-shore or out of the old economy into cyberspace. With little else to offer, poor countries [and settlements] end up giving everything away in a desperate attempt to attract 'investment'. If taxation is not to become wholly regressive, we will have to revolutionise the means to which the rich are charged (Monbiot, 2000).

Secondly, we also desperately need to replace the ideas that ICTs are intrinsically liberating and that cyberspace is some singular domain, with more sophisticated approaches which recognise the biases that are currently wrapped up in the ways in which a whole variety of cyberspaces (note the plural again) are currently being constructed, largely by, and for, the more powerful. We need to recognise the complex relations between ICTs and places. We need quickly to incorporate ICTs into our core thinking about contemporary human settlements. And we need policy models within which the tendencies towards urban and social polarisation, inherent within current models of development, are substantially addressed by new approaches to governance. These must tie together local, urban, national and international scales in ways that explicitly seek to match the dominant development logics of our time.

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