Chapter 12

Through the Window or Through the Looking Glass: prospects for greater equity in development.

This book has argued that information and communication technologies underpin an emerging global system of production and consumption of material and human resources (Castells, 1996; Bello, 1999). Part I argued that information and communication technologies have transformed production chains into a networks linking the complementary comparative advantage of sets of physical locations (Dicken, 1998). Choices in development paths become in a large part determined by the relationship of an economy or region to the global system, which in turn depends upon an ability to acquire or appropriate the key technologies. In the past the terms of availability have been dictated by the originators. However, the shift from wired to satellite infrastructure has disrupted the top-down hierarchical management of the distribution of resources. While the wireless technologies appear to offer access to the "information economy" to peripheral areas, to be of use the technology also must be accessible in a mature and robust form capable of appropriate adaptation to specific situations and needs.

The extent to which "windows of opportunity" can be kept open and exploited becomes central to an understanding of exclusion and inclusion. The cost of acquisition of relevant technologies is a fraction of the cost of their design and development. The marginal cost of connection becomes affordable to groups that are remote, either geographically or economically from the source of the technology. The cost advantage of wireless technologies becomes obvious when compared with the cost of alternative conventional, fixed terrestrial structures. However, there remains the need for local understanding of the technology, and appropriate styles of use. Such understanding requires experiential learning (Sproull and Kiesler, 1991). Without this the limited resources at the margins may be channelled

into models that have been created in developed settings and which deliver comparatively little local benefit.

Here and now: time, space and exclusion

Part I of the book introduced the nature of the emerging global context formed in the post-Cold War period. The neo-liberal agenda which displaced Keynesian models of development offers little more benefit to the periphery than the direct colonial relationships of the past. However, the critical role of information and communication technologies does distinguish the present form of globalisation from earlier forms of internationalisation. The dynamic of the emerging global economy was characterised as a web which overthrows the traditional spatial hierarchy of colonial trade and sets core and periphery in a new form of adjacency.

Part I looked at the characteristics of an emerging global system. The ability to separate production from consumption through the new electronic adjacencies led Lipietz (1992) to argue that this signals the end of the "Fordist compromise". Production workers remote from the destination market are often denied access to the products of their own labour. Their partial inclusion in the system becomes an issue of control as much as of contribution; inevitably the infrastructure created to support this status is optimised to the requirements of the core of the dominant triad of developed economies, not its periphery.

Castell's (1996) *creative milieu* and *network enterprise* were discussed in Part I as models of the new forms of connectivity and collectivity. Arguments for the acknowledgment of complementary regional associations in contrast to national boundaries from Ohmae (1995) and Delamaide (1994) were also noted.

Part I concluded with an argument that prospective shifts in technology offer windows of opportunity for countries and regions disadvantaged by the current distribution of communication infrastructure to make up considerable ground by leapfrogging over the critical gap between the wired and unwired worlds.

An early example was the work of the Centre Mondial Informatique et Ressources Humaines in Saharan and sub-Saharan Africa discussed in Chapter 5 in which solar powered lap-top technology was deployed in Saharan Africa (Roper, 1983). Satellite linked, solar powered, hand-held technologies are now in use amongst the illiterate bushmen of South Africa (Little, Holmes and Grieco, 2001). The Cybertracker system enables the

bushmen of the Kalahari to instantaneously transmit information about their environment beyond their local boundaries.

At the turn of the twentieth century there was a shift of communications from geostationary Earth orbit (GEO) to medium Earth orbit (MEO) and low Earth orbit (LEO) satellites. This technical change leapfrogged over the chronic infrastructure deficit of less developed regions (Price-Waterhouse; 1998). Existing communications infrastructure became potentially obsolete and 3.9billion people judged to have no telecommunications access entered the same communication space as the most affluent users of mobile communications technologies.

The development potential of this technology has yet to be exploited fully, and it remains targeted at specialist and premium users. Nevertheless, the infrastructure has been put in place and a paradigm established. Other, simpler, incremental technologies have filled the critical gap in potential networks. WiFi (wireless high fidelity) networking technology was developed to allow flexible wireless computer networking within buildings and across compact sites. It has quickly been adapted to bridge the critical last link between unwired households and schools and the fast Internet. By replacing omni-directional aerials with directional antennae, significant distances can be covered[1]. In South Africa, the same level of ingenuity has bridged this gap with a physical courier system between schools and Internet access points[2].

Another key technology, complementary to satellite communication is the global positioning system (GPS) described in Part I. In commercial terms, this has fared better than the satellite phones which are competing with an extensive infrastructure and user-base for established technologies in the wealthiest regions. The European Union is committed to the development and deployment of the *Galileo* system, a high-resolution civil system, a contrast to the current U.S. provision of degraded military signals. Significantly China has chosen to buy into this system as a prime user (People's Daily, 2003), with a number of applications directed to the support of development in the remoter provinces.

The question of what can be achieved by marginal players in terms of influence over an emerging global "techno-economic paradigm" (Dosi, 1986) is crucial for both smaller nation states and sub-national regions. The "window of opportunity" metaphor from Part I can be used to evaluate the consequences of shifts in the definitions of centre and periphery in the global economy and shifts in the nature of exclusion from that economy. This concluding chapter re-examines physical and virtual access to resources and technology, and the ability of marginal players to adjust to changes in emphasis by mainstream players. Some characteristics of robust

networking and association are derived from examples of grass-roots virtual organisation and a guerrilla paradigm of access.

Frames and Paradigms – open and closed

Part II presented a design paradigm as a means of understanding the choices and trade-offs confronting individuals, groups and cultures wishing to define their relationship to the emergent global system. The closing chapter of Part II described the strong influence of military technology on the determination of such choices. Failures in complex military technology were used to characterise a technocratic top-down and convergent approach to design, both in development and application.

The consequences of a top-down positivist view of systems and processes is analysed by Johnson (2002). He argues that an approach to international relations driven by military superiority and capability has become self-defeating for the United States. It has created a situation of "blowback" in which interventions intended to resolve instability simply engender a further cycle of disruption in response. Once military capability is identified as a nation's unique advantage, the most complex situations appear to be amenable to solution through the threat or use of military force. Lindqvist (2001) demonstrates the persistence of a technocratic, positivist view of the efficacy of aerial warfare, in the face of all evidence to the contrary.

The approach of the military and civilian bureaucracies and technocracies described in Part II is reflected within the Bretton Woods universe of large international institutions. The potential and possibilities offered by the Internet have been framed within this mode. For example, the development gateway established by the World Bank contrasts with the peer-to-peer models of interaction emerging from the activities of non governmental organisations (NGOs), and others that share grass-roots origins. Criticism of the development portal has been in terms of its closed view and gate-keeping potential in a situation in which the diversity generated in the divergent stage of design (Jones, 1980) is needed.

National governments share a similar view of "e-government". The accessibility of the Internet has been seen as an interface between the citizen and the government, rather than a space in which negotiation and adjustment can take place. Some alternative, grass roots approaches to e-governance are described below, but there is one striking example of inclusion for a particularly remote community. As mentioned earlier, the bushmen of the Kalahari by touching an icon on the screen of the hand-

held set or by drafting of an animal form deliver important environmental management data to a receiving agency. The same technology could be used in the provision of services and extension of political participation for remote and otherwise un-connected communities.

Interestingly, open and inclusive models of intervention and development are being created by the developers of the core information technologies themselves. The rise of the Open Software Foundation (OSF) and its co-operative approach provides a contrast to the centralised Microsoft model of commercial software development. The OSF provides a paradigm of collective decision-making at the core of the global economy's enabling technology. For the Microsoft approach Raymond (2001) uses the metaphor of the cathedral in which a multitude of skilled workers pursue an integrated vision. He contrasts this with the metaphor of the bazaar in which an open community of developers trades experience and software for mutual and separate ends over the Internet. This collaborative model of shared practice and experience echoes the non-technical communities which have also made use of the web as a space in which to share collective experience and develop collective skills with which to engage a remotely determined status quo.

Open software development (OSD) means that the products are both affordable, and amenable to adjustment and development in line with local conditions and with local resources. Such adjustments allow services to be both more closely relevant to the end users, and more robust in terms of their cultural consonance with local practices. This is in marked contrast to the dominant Microsoft model of commercial development within the United States. Minority language communities may never be provided with a version of the software (and this is only ever likely to be a direct word-for-word translation of pre-existing menus). In some cases they have also been denied access to source code to fund and provide this adaptation for themselves. Communities of software developers committed to the open development of flexible and affordable technology have appeared in both developed and developing regions[3].

Designing places in the world – getting there from here

Part III opens with a comparison of two different historical paths of development, each representing the efforts of a country which was consciously trying to emulate the established industrialised nations. The accounts, covering the nineteenth and twentieth centuries show that no

single convergent pathway to development is likely to exist in the twenty-first century.

Current shifts in technology offer a window of opportunity for countries and regions disadvantaged by the current distribution of communication infrastructure. Those excluded from the benefits of the global economy are often those paying its greatest social and economic costs. In response the excluded are utilising the very information and communication technologies that facilitates the system under criticism. If, however, they are to make up significant ground, if not to catch up with the leaders, then the removal of the barrier of physical and technical infrastructure must be followed by engagement with the problems of social and institutional infrastructures.

The interaction between social space and technical infrastructure in the globalising economy produces new adjacencies which cut across the divide between included and excluded regions. These virtual adjacencies produce patterns of both divergence and convergence. Previously separate spheres of activity, such as the white collar work of Western Europe and South India have been drawn into contact, if not direct competition. Equally the distinction between public and domestic space has been eroded.

The current Western understanding of the nature of the household is a product of the relatively recent past, reflecting the intense effort put into orderly displacement of women from paid industrial labour at the conclusion of the Second World War. In the post-war period the nuclear family became the focus of an emerging consumer ethos and the role of female household members was associated with domestic consumption rather than public production.

In the Western economies, the process of the separation of the domestic and productive spheres began with the onset of the factory system during the industrial revolution. This was never completed. The modern household as understood in the West is a recent stage in a broad process of separation of paid employment and home life. The new electronic adjacencies have been brought into the household by connection to the infrastructure of globalisation. As a result the division between public and private spheres has become more permeable[4].

As a consequence in the West the post-industrial household is re-acquiring features of the pre-industrial household. With the post-Fordist loss of secure employment and the introduction of "portfolio" working the home becomes once again a locus of production, distinct from the public sphere of "work" which emerged with the onset of the industrial revolution. The state has taken a hand in this process with the option of

electronic tagging and home confinement to displace the task of imprisonment to the family[5]

The industrial home was presented as a support structure for paid male employment conducted elsewhere. The gendering of activity within the household, enshrined in the U.K. housing design guides, was reinforced by a gendering of the technical artefacts themselves. White-goods can be seen as gendered around "housework" and the female sphere, "brown goods" may be seen as associated with male recreational pursuits within the home.

This model of the industrial household has been largely adopted in the industrialising countries of East Asia. Current middle class developments around Shanghai would not look out of place in suburban California. In areas of weaker economic activity, however, the interpenetration of economic core and periphery described in Part I can be illustrated by the growth of outworking within the urban cores of cities such as London, Manchester, Melbourne and Sydney. The textile and clothing industry at the core of the first industrial revolution now relies upon outworking and home-working to compete with lower wage economies[6].

As electronic communication becomes an increasingly effective substitute for physical movement, the use of remoter locations increases, and the level and sophistication of work now relocated to South Asia or the Caribbean from Europe or North America continues to grow[7].

Marvin's (1988) description of the social learning curve associated with the introduction of new electrically-based technologies at the turn of the nineteenth century and the social learning identified by Sproull and Kiesler (1991) suggest that we are likely to see this practical learning process continuing for some time. What is clear is that an alternative paradigm in support of development will not emerge without input from the grass-roots.

Learning and Networking: a Vygotskiian view of the World Wide Web

In Part I the need for a process of organisational learning to move beyond the technical effects of direct substitution of information technology for manual processes was introduced (Sproull and Kiesler, 1991). Chapter 3 introduced a range of influences on design methods and understandings, including the socio-technical systems view which represented a significant change from the view that the introduction of technology was a neutral process leading to predictable outcomes.

In a global system of technical development, standards are necessary for interoperability at each level of interaction within and between organisations and locations. O'Hara-Devereaux and Johansen (1994) argue

that differences between work cultures, both professional and corporate, and the national or regional culture in which an organisation is embedded can be bridged in a "thirdspace". For them the synergy between levels is a potential resource, but the tendency towards a convergence determined by a dominant culture is seen as an obstacle to cross-cultural working.

Actor Network theory was introduced in Part I as an example of how this view might be incorporated into a design approach that could accommodate the parameters of "wicked problems" set out by Rittel and Webber. This offers a treatment of the human and technical components of a system in a way that avoids either technical determinism or a purely socially determined explanation.

Actor-Network Theory provides an analysis of extant systems to guide the design and development progress. An alternative, Activity Theory, is based on a theory of psychology that provides a framework for assessing the interaction between humans and technical systems through time. Kutti (1991) gives an account of the potential for this approach within information systems research and development.

Activity Theory is a Vygotskian framework for assessing the interaction between humans and technical systems. Its introduction into Information Research at the end of the 1980s represents a tangible aspect of the Cold War "peace dividend", when numbers of Soviet trained psychologists brought the methodology to the West via Scandinavia.

Activity theory has had greatest influence in the areas of learning and developmental psychology (e.g. Cole 1985). It also offers an insight into design and development. The key concept of value to issues addressed in this paper is the "zone of proximal development" that is a supportive framework for learning and development. In the case of IS design, such a framework may be provided by the technical solution to hand. In terms of "thirdspace" (O'Hara Devereaux and Johansen, 1994) this framework can be created in a virtual space within the ICT infrastructure.

Information and communication technology introduces new social practices and social patterns. The voice of the small social and political unit can now gain volume through co-operation and communication within the institutional capabilities of the new ICTs (Little, Holmes and Grieco 2000). Ensuring that technologies appropriate for small and remote locations emerge must be a priority. Such technologies require the engagement of other users and beneficiaries.

Developing new practices and new knowledge has required proximity or adjacency to others who hold a relevant set of skills and interests The physical adjacency necessary in the past can increasingly be supported or replaced by electronic forms of adjacency. The OSF model demonstrates

this is highly effective in a technically skilled professional community. However, the paradigm has a wider relevance. Sufficient skills for effective use of the Internet in support of advocacy and communication can be acquired relatively simply and collectively. This process of skilling can draw on extensive experience with electronically supported distance education and the "e-mentoring" techniques enumerated by Salmon (2000).

The support of Internet technologies allows the maintenance of community and identity described by Miller and Slater (2000) in the case of Trinidadians. The reliable remittance of funds through an efficient micro-banking system, such as the Grameen system in Bangladesh (Yunus, 1999) ensures that externally generated resources are returned to the home location for development purposes (Little Holmes and Grieco, 2000).

The Self Employed Women's Association in India, make use of the World Wide Web to promote its cause of advancing the interests and improving the situation of poor women[8]. The Grameen Bank has extended its activities to the support of communication technologies for poor village women as part of their empowerment[9]. This gives the women an ability to check on market prices and to better organise their finances and production. Elsewhere fishermen user the technology to check market prices before landing their catches.

In the case of Ghana, both cultural and commercial sites maintain the contact with home and provide a family-based reliable infrastructure for access to wealthy markets by Ghanaian[10] goods for the continuing support of that identity in North America. The benefits of a migrant link-up to the community net of the place of origin are many: with the establishment of an efficient micro-banking system linked to a community network funds can be readily transferred from migrants in the wealthier location back to their home site for development purposes.

The new electronic form of adjacency is critical to the development of new development practices and knowledge. The new technology creates the opportunity for individuals and agencies which are physically distant from one another to be in real time public contact with one another: it is a new collective form of social contact. Electronic adjacency permits instantaneous interaction between distant individuals: new forms of knowledge are generated in this new interactive practice, though social and political theorists have been slow to document and analyse this new social state (Carter and Greico, 2000). The speed and ease of new communication over distance enables the collecting together of views and opinions which were historically fragmented and disparate. Crucially, the transparency of this discourse permits the opportunity for those who were historically excluded from decision making to enter core domains. Such transparency

is crucial, for example in the defence of indigenous knowledge which is increasingly under threat from Western corporations seeking to create intellectual property rights over traditional practices (Chataway et al, 2003). Traditional practices are now being archived on the world wide web so that they can both be shared and protected[11].

Re-balancing Development: The Role of Information and Communication Technologies

This concluding chapter has drawn together examples and counter examples of struggles and achievements at the periphery of the globalising economy. These demonstrate the responses to the exclusion from the benefits of the global economy of those paying its greatest social and economic costs. They utilise the very information and communication technologies that facilitates the system under criticism. Examples of this access were used to challenge definitions of centre and periphery in the global economy and to identify shifts in the nature of exclusion from that economy. Physical and virtual access to resources and technology, and the vulnerability of marginal players to changes in emphasis by mainstream players were introduced in earlier chapters. Robust approaches to networking and association from extant examples of virtual organisation represent a guerrilla paradigm of activities. This is literally true in the case of the Zapatista movement, but equally applicable to the political mobilisation that has taken place around the very issues of globalisation[12].

The grass-roots response to top down prescriptions also provides an opportunity to close the loop of e-governance and to provide quality real-time feedback on the consequences of policy decisions made by governments[13] In North East England community groups have used both hand held communication and positioning devices to log the performance of public transport and to record performance on web sites close to real-time[14]. This closes the loop of e-governance and provides clear evidence of policy failure, or success to policy makers.

Such an action-based research approach offers new prospects for both the evaluation and development of information systems themselves, and the maintenance of support from across the affected community.

In the Indian sub-continent e-governance is being approached from both top level government and local community levels. These coalesce in Pondicherry, where a hub-and-spoke model of data and communication has been established for six villages[15]. The villages can communicate with each

other as well as to the Internet. Dial-up Internet connection is accessed by a variety of wired and wireless paths, utilising solar power. A major objective is ownership at the village level, with support available from the hub.

Elsewhere in India the issue of robust and affordable technical platforms suitable for such environments has been tackled through the development of the Simputer[16], a robust low-cost hand-held solar powered device suitable for non-literate users. Even this low cost device must be shared around a village community, and commercial smart card technology has been used to provide a cheap and robust means of securely storing individual data away from the device.

Early applications for the Simputer include the field collection of information on crops under cultivation for the government of Karnataka and the support of mobile applications for micro-finance institutions.

Even deeper into the margins of the global system SELF[17] is delivering photo-voltaic solar power and wireless communication to remote communities in the Amazon basin, following on from similar projects in East and South Asia and sub-Saharan Africa.

This concluding chapter gives some indication of the wide range of communities engaged in the design and development of new social-technical systems. These initiatives are evidence of the determination of a diverse coalition of activists to the collective design of a paradigm that eliminates the digital divide between centre and periphery in a still contested global system.

Notes

1 I am grateful to Alan Levy for drawing my attention to the wider significance of this robust and affordable technology. See his comments at http://www.bytesforall.org/9th/html/matching_wifi.htm
2 See http://www.wizzy.co.za for a description of the Wizzy Courier service
3 See www.bytesforall.org for a South Asian on-line community.
4 For a fuller discussion of the "networked household" see Little (2000).
5 See Aungles (1994) for a detailed account of the impact of this responsibility upon families.
6 See for example Greig (1991) for a description of the textile, clothing and footwear industry in Australia.
7 See Sheller (2003) for a detailed account of the impact of these relationships on the Caribbean.
8 See http://www.sewa.org/
9 See http://www.grameenfoundation.org/

10 See http://www.ghaclad.org for examples.
11 See http://www.unesco.org/most/bpikreg.htm
12 See http://www.nologo.org which acts as a portal to a wide range of on-line activism.
13 See http://www.newnet.org.uk/neat/monitor/ and http://www.geocities.com/north_east_age for examples of such real-time monitoring
14 See http://www.goneat.org
15 See http://www.mssrf.org/informationvillage/assessment.htm
16 See http://www.simputer.org
17 See http://www.self.org