Chapter 1

Design and Determination: overcoming exclusion in an emergent global system

Exclusion and determination: the need for a direct engagement with design

The relationship between new information technologies, globalisation and social exclusion has become a focus for discussion amongst the major social theorists of the contemporary period (Castells, 1996, 1997, 2000; Giddens, 1999, Ohmae, 1995). Most take the shape of the technology and its social organisation within a neo-liberal economic framework as unproblematic[1]. Concern is expressed about the distributive spread of the technology and the level of access of low income groups and areas. This is typically discussed under the heading of the Digital Divide, for example the World Economic Forum's Digital Divide Initiative is aimed at international projects, while the U.S. Department of Commerce Department's National Telecommunications Information Agency (NTIA) coordinates information on federal government initiatives. The U.S. IT industry has sponsored the Digital Divide Network[2.] to address issues of access both domestically and internationally.

The "big design" of high technology systems determines the audience and the terms of access to a global discourse. The developed economies dominate the direction of development in these technologies. However, within the new connectivities and adjacencies delivered by the same technologies, small, collective, distributed design is providing a voice from those left outside the formal hierarchy of distribution. High technology – in a literal sense in the case of satellite based communication – is providing the last crucial link in connectivity. Global access is provided by a technology originally associated with top down surveillance and the Cold

War military history of the space race and satellite development. The wired world can now be joined to the unwired world in a way which removes the significance of spatial separation, through access to the information infrastructure critical to the functioning of the emerging global economy.

This book provides examples of the use of big technology by and for those assumed to be the objects of an electronic panopticon (Foucault, 1979; Sewell and Wilkinson, 1992). It examines how "small design" has in some cases reversed that panopticon.

The digital divide has become a recognised issue of development precisely because it is bridgeable, indeed some observers claim that the appropriation of technology through imaginative improvisation by excluded players has already reduced the impact of any divide.

Issues of development policy have become aligned with issues of exclusion from the infrastructure necessary to development. However, there are issues of the design of technology and the development of a design perspective which interact with the known contours of social organisation that have fallen through the bottom of this debate.

In contrast, this book deals directly with the social nature of design and the implications for the social design of new information technology. It is particularly concerned with ensuring that both form and content of the technology is appropriate for productive material (Harasim, 1993, Lamberton, 1995) and cultural use (Little, Holmes and Grieco, 2001) in low income neighbourhoods and regions. It draws together the results of primary international research into current and prospective developments in information and communication technologies and their impacts on the continuing process of globalisation. It moves beyond the binarism which separates the design of technology from the conditions and context of its use. The over-determination of ICT within a framework of Western or northern design is directly addressed. The materials collected together in this work are the product of joint research with colleagues in both developing and developed world: Britain and Australia, Ghana and South Africa - these are the locations for a journey into a pathway of alternative technology design.

This book is concerned with the role of information and communication technologies (ICTs) in globalisation and the global and local implications of the development inequities arising from this process. Globalisation, in the sense of the integration of production and consumption into an extensive world economy, has increased the significance of intellectual capital leveraged by information and communication technology. Historically the bulk of this intellectual capital has been located outside the developing countries. The distinction between products and services has been blurred by new forms of locational and functional differentiation

which operate across a globalised network of invention, innovation and implementation. In the closing decades of the twentieth century this blurring was evidenced by the shift in focus of companies such as IBM from capital equipment manufacturers to an information service and support provider (Delamarter, 1988; Klingbiel, 2002). This transformation continues and is richly characterised by Dicken (1998, 2003). It will be discussed in the next chapter.

A number of authors (Perrow, 1984; Vaughn, 1996) have drawn attention to the problems created by the over integration of technical systems and the associated intellectual resources of design, scheduling and distribution. This discussion can be thought of in terms of the tight coupling of global systems. The routine integration of previously distinct and separate national and regional resources into self-evidently global resources has produced a precariously tight coupling of the global system of material production. The argument has been made that this results in the loss of the necessary buffers or slackness of resources to protect regions against global impulses emerging elsewhere. The stresses inherent in the emerging global system have been highlighted by the recent difficulties of the East Asian economies (eg Ernst, Ganiatsos and Mytelka, 1998). In the case of East Asia precisely this tight coupling resulted in the diverse and different problems which emerged across the range of individual Asian nation states in the nineties. These problems generated economic difficulties for distant and not directly connected states across the globe.

The imperatives of the emerging global market have led developed economies to shift their focus towards the end of the production chain where product differentiation and customer support can maintain demand for goods and services in a global chess game of resources and capabilities. This means that smaller players require geographic leverage. This book explains why this can be delivered through new forms of adjacency inherent in the current generation of information and communication technologies (ICTs).

While there are opportunities for new entrants at various points in the production and consumption chain, segregation and exclusion are producing an unevenness of development within and between economies. The consequences can be seen in sub-nationalist responses to the consequent inequities of development. The emergent dimensions of micro (city scale) meso, (country/state scale) and macro (international) regional scales of exclusion from the core of the global economy are complexly interactive. This situation contrasts with the orderly flows of technology from the economic centres to peripheral regions assumed by earlier models of multinational development and technology transfer. Exclusion whether

socially or geographically based, threatens any prospect of achieving economic, environmental or social control and sustainability.

Three paradigms are introduced across the three parts of this book:

- a concept of "community without propinquity" from the nineteen-sixties, in effect an early formulation of virtual organisations, which foreshadows the dynamics of the "virtual adjacency" delivered by current information and communication technologies;
- a design paradigm drawn from the dynamics of high technology innovation that aids analysis of position and potential within a global production context and which demonstrates the socially and institutionally embedded nature of technical development;
- a notion of windows of opportunity through which access to the key technologies of the socio-economic paradigm might be gained on terms that can be determined by the adopters, rather than the originators of these technologies.

Taken together these paradigms can reveal how the global ICT landscape has shifted into a pattern of new adjacencies and opportunities for the less developed countries. The emerging global system does not reflect the unproblematic "end of history" posited by Fukayama a decade ago (Fukayama, 1992). It is composed of a partial and uneven set of processes which have created complex ebbs and flows of material and intellectual resources and of people around the planet. At the same time a significant proportion of humanity has been consigned to the margins of what has become an essentially neo-liberal project.

Meaningful inclusion in such a system is taken to include the ability of the marginalised to determine their own destinies through the development of appropriate and localised technologies. To achieve this situation the dynamics of the emergent system, and of the technical development that drives the system must be understood. This book offers a detailed view of the interior of the technical design process, and a paradigm for the selective use of the resulting technologies beyond the context of their development. Whether such use is undertaken to join or to challenge the nature of the emergent system is the prerogative of the users.

Understanding the Dynamics of Globalisation

The first task of this book is to provide an overview of the emergent global system of design and development. The traditional view of global production and consumption has been of a developmental view of international trade as a series of flows between centre and periphery, followed by the development of multi-domestic production close to

markets. (eg Hirsch, 1967; Wells, 1972). However, the emergence of production webs and networks has blurred the distinction between centre and periphery. Information technologies have driven these changes through the reduction of transaction costs and the alteration of the relative advantages and economies of size and disparate national and regional cultures have become increasingly interlinked within networked and globalised organisations. Labour markets, both internal and external to the developed economies driving this process are increasingly interconnected, leading to complex movements of both resources and people.

The end of the Cold War and the removal of the political and economic barriers arbitrarily created at the cessation of hostilities in World War II accelerated global economic integration. It also allowed the re-emergence of geo-historical linkages suppressed for half a century or longer (Delamaide, 1994).

The current level of internationalised trade itself is no novelty. Hirst and Thompson (1996) demonstrate that on many significant measures the world economy was at least as internationalised in the period prior to the First World War. However, the application of information and communication technologies (ICTs) to the globalisation of financial markets, has been coupled with the removal of the policy constraints laid down by the Bretton Woods institutions established in the concluding stages of World War II. This subsequent shift from a Keynsian to a neo-liberal frame has internationalised private economic decision-making and transformed the volume and flow of resources. At the same time a deeper understanding of the role of knowledge and intellectual capital in the production and value chain has emerged.

Peter Dicken (1998, 2003) and Manuel Castells (1996, 1997) locate information and communication technologies at the centre of recent developments in the global economy. They also emphasise the partial nature of the emerging world system and place it in a broader historical context. Graham and Marvin (2003) demonstrate the partial nature of inclusion even within the emerging global megapolitan regions. For them the impact of Ohmae's "zebra strategies" at the urban level is a "splintered urbanism" of interpenetrated exclusion and inclusion.

Development has been far from uniform, despite the more simplistic declarations of a coherent new world order and later chapters examine the elements and implications of this present mode of globalisation. However, it is useful to look at the prevailing models of global processes at this point.

Peter Dicken uses a basic production chain to map a geographical hierarchy involving resources, manufacturers and consumers (Dicken, 2003, p.15). In common with Porter's (1990) representation of the value chain, a range of critical support activities are identified for each stage of

these generic models. The models provide a thread running from primary production to quaternary post-delivery support of goods and services. A variety of service activities wrap around the core thread of the production chain. Dicken demonstrates the traditional view of the service sector as evidence of a "post-industrial" or advanced economy.

A quaternary sector is seen as the logical consequence of the ascendancy of intellectual capital over physical capital. The rapid growth of deregulated financial services and the broadly perceived shift from manufacturing to service industries supports such a view. The prestigious U.S. engineering company General Electric has moved into highly successful financial services. These now generate more income that the engineering divisions, and seem to confirm services as a replacement for primary, secondary and tertiary activities. However it can be argued that such a division of economic activities are unnecessarily simplistic.

The chain metaphor is being superseded by the idea of global production networks. Research and development, routine manufacturing, final assembly and after-market support may all be present in the same location, yet each may be contributing to different product chains and sectors. The re-distribution of these activities during the product life cycle further undermines the traditional concepts of centre and periphery. Development is not uniform, specific markets and specific technologies are at different points in their life-cycles of growth, maturity and decline. Rapid growth at locations favoured by "zebra strategies" also creates serious developmental imbalances within regions and nation states. The implications for the organisations and alliances which act across the global production system are discussed at more length in the following chapters. Essentially the leading players in this game must deliver continuous innovation at the cutting edge while managing the diffusion of more mature technologies in order to maintain their position.

Mature economies are shifting focus towards the end of the production chain where product differentiation and customer support can maintain demand for goods. There is evidence of an increasing focus on the end of the "value chain" (Porter 1990) to increase competitive advantage, for example, by ICL, a former British "national champion" computer manufacturer. This company is now a wholly owned subsidiary of a Japanese company, Fujitsu. It has moved further from its original manufacturing hardware base to position itself as an information services provider that can support the specificities of a European business environment. This end of the chain is more culturally sensitive and success requires some specific local or regional knowledge. Later in the book the impact of a value chain approach in the very different chemical industry will be described.

Hirsch (1967) describes the orderly transfer of key functions from core to periphery across the product lifecycle. As a product or a technology matures, it may be passed to a less advanced manufacturing location for routine production and reproduction. This orderly pattern has been replaced by an interpenetration of core and periphery in which market and raw materials source, production and consumption are increasingly co-located. For example, James and Howells (2001) examine the use that Asian companies are making of the research and development facilities they are establishing or acquiring within the United Kingdom. Evidence suggests that these firms are seeking both knowledge for adjustments to markets and broader intellectual capital for their home operations. The British government and the European Commission encourage companies to seek similar alliances and opportunities in the opposite direction. Such contacts can serve both as a means of accessing the market potential of Asia's growing economies and as a means of improving offshore manufacturing resources in relation to both home and export markets (eg EC/UNCTAD, 1996). Within the urban cores of advanced economies, low wage and low capital activities continue in the form of outworked and home based labour in industries such as textile, clothing and footwear (Greig & Little, 1996). For the self-employed trader or the small company, the Toyota van, cell-phone and fax, deployed across the conurbations mimic the use of equivalent technologies by large corporations at a global scale.

Design and Development: the worlds we live in

Five chapters form the first part of this book which explores our current situation. They deal with the nature and opportunities of a network form of globalisation which places information and communication technologies at the centre of the process.

The current role of information and communication technologies can be traced to decisive events of the Pacific War. In 1941 the large scale deployment of naval aviation in the attack on Pearl Harbor represented the assimilation of Western technology and strategy - military and industrial - by Japan. The Imperial Japanese Navy had already demonstrated its competence in the Russo-Japanese war of 1904, but military success against the United States and Britain in 1941 and 1942 came as a shock. The subsequent U.S. victory at Midway was engineered through the use of information technology - code-breaking of intercepted communications. These two events foreshadowed two shifts in the centre of gravity of global development. The first was the shift of attention to the Pacific Basin for the remainder of the twentieth century. The second shift was that of

information and communication technologies to their central role. Derived from the requirements of the Second World War these became and remain the key technologies of economic globalisation.

The military determination of the development paths of advanced technologies in the crucial Second World War period and beyond is returned to later in the book.

Chapter 2 examines the continuities and discontinuities inherent in the current dynamics of global development.

Shifts in the prevailing view of the global chain of production and consumption are discussed. The development of international trade as a series of flows between centre and periphery, followed by the development of multi-domestic production close to markets is discussed. The subsequent emergence of more global strategies involving trans-national production networks is described.

The shift in characterisations of the multinational company by both proponents and critics is plotted from the seventies to the nineties. The characteristics of the "new" multinational corporations and the emergence of production webs and networks are described. These have blurred the distinction between centre and periphery. Current relationships are contrasted with the more orderly flows of technology from centre to periphery associated with earlier models of multinational development and technology transfer.

The dominant role of the "triad" formed by the developed regions of North America, North West Europe and North East Asia within the world economy is introduced. The locational consequences for investment and economic activity are examined, along with the new forms of "periphery", no longer necessarily physically separated from the core. New forms of exclusion are examined, in particular, the problematic promotion of what Kenichi Ohmae terms zebra strategies. These are directed at only the strongest parts of a regional economy, in order to create sufficient levels of formal economic activity for inclusion in the wider system. The consequences of such strategies for both inclusion and exclusion and for economic and social equity are raised.

Chapter 3 links the emergence of computer-based information systems with the theoretical underpinnings of modernism and bureaucracy and offered a non-place definition of community and association. Modernism and related theories from architecture and planning are examined and an alignment between the information infrastructure of the current form of globalisation and both the physical infrastructure of urban development and industrialisation and the institutional infrastructure of the nation state is described.

The integral role of information and communication technologies in

current changes is emphasised through reference to earlier work. The continuity of technocratic positivism, from the first half of the twentieth century to the first decade of the twenty-first is traced. The "wicked" nature of socio-technical problems as defined by Horst Rittel and Webber is used to enter the debates around the social shaping of technology. A path which avoids the post-modernist cul de sac is sought through critical information systems design methods.

Chapter 4 The diffusion of state power through agreement to and participation in multilateral regulation in areas such as trade, security and environment has been matched by the emergence of trans-national corporations operating in internationalised financial and labour markets. These changes impact not only at national and sub-national levels, but increasingly flow through to the individual household. This chapter considers the impact on the household and local community of the increasing porosity of national boundaries.

The coalescence of communication and computing technologies has transformed government attitudes to communication infrastructure. The national missions of the traditional common carriers of goods and information, focussed on equity of access, have been replaced by the pursuit of commercial opportunities. The informal replacement of national broadcasters by extraterritorial organisations using direct satellite broadcasting has taken place in parallel with telecommunications deregulation. Acceptance of a neo-liberal frame eclipses the ability of national governments to form and control key areas of policy for technologies which impact on both urban and rural infrastructure and has created a new tension between space and place.

Non-place definitions of community and of citizenship are introduced as a means of understanding the challenge presented by these changes.

Chapter 5 introduces the concept of "windows of opportunity" and the possibility of the appropriation of technologies by the mariginalised. It has been demonstrated that a process of organisational learning is needed to move beyond the technical effects of direct substitution of information technology for manual processes (Zuboff, 1988; Sproull and Kiesler, 1991). The social learning curves associated with the introduction of new electrically-based technologies at the turn of the last century have been described by Marvin (1988). Consensus over the value and application of these technologies emerge only after considerable debate. An agreed paradigm for the rapidly succeeding generations of information and communication technologies being deployed in the current wave of globalisation cannot be expected to emerge without equivalent debate and contestation. Developing regions need some window of opportunity through which to gain access to and influence in such debates.

The metaphor originated in a study of the impact of relatively simple bulletin board technology on a group of users with disabilities whose special needs highlights the need of peripheral users to appropriate features of mainstream technical developments as far as possible (Earls, 1990). Nineteen-eighties bulletin board technology allowed these users to participate in an electronic community which was unaware of their considerable physical disabilities. The volunteer student cohort who participated developed fruitful and co-operative relationships with a number of individuals, without the preconceptions that would have influenced face to face interaction.

Despite the falling costs and growing flexibility of computer technology there remains a need to identify and exploit equivalent windows of opportunity presented by mainstream technology. Current examples of the use of web-based technologies show that the paradigm remains relevant. It will be argued that access to state of the art technology is necessary for full participation in the global economy, but access alone is no guarantee of its appropriate or effective use. The use of technology, rather than the technology itself is the key to appropriateness, and to sustainable voices from the margins in virtual social and political spaces. However, the huge and diverse range of potential users is inevitably segmented organisationally and culturally. It requires an adequate fit to a wide variety of specific needs and the capacity for adjustment to continuing developments. These need to be informed by social and organisational learning, over considerable time.

Determination and Design: frames and paradigms

The second part of this book provides a detailed analysis of the technical design and development process. It takes as its starting point the increased significance of intellectual capital leveraged by information and communication technology in a globalising world economy. Access to both knowledge and material resources determines the policy and design choices available to decision makers beyond the core triad of the global economy described in Chapter 2.

To understand how global flows of information are undermining the distinction between manufacturing and service activities and the distinction between products and services new forms of locational and functional differentiation across a globalised network of invention, innovation and implementation must be examined.

In Part II design is defined as an activity which unifies product, process and organisation across geographical and cultural boundaries, as an aid to

understanding the process of technological shaping within the globalising economy. The value of a design perspective is explained in relation to the literature on the social shaping of technology (Mackenzie and Wajcman, 1995).

Part II is concerned with the dynamics of "big design" – the complex and tightly coupled high technology innovations that have allowed the emergence of a global society. The military determination of the development paths of advanced technologies in the crucial Second World War and Cold War periods is evident in the examples used here.

The "small design" of the disintermediated local initiatives aimed at entering the global production system can be mapped on to a generic model of the design process presented here. This model identifies the distinctive intellectual and physical resource requirements of the invention and initial innovation stages of the project and product life cycle and the very different requirements of the mature manufacturing phases of the cycle.

Design as an activity links the service and manufacturing activities of the production chain. Rather than the replacement of manufacturing by service activity, we are witnessing the enhancement of the value of manufactured goods by their incorporation into services. As the distinction between products and services blurs we must examine new forms of locational and functional differentiation across a globalised network of invention, innovation and implementation. Design, defined as an activity which unifies product, process and organisation across geographical and cultural boundaries, can play a critical role in placing the strategies presently pursued in both manufacturing and services in a global context.

However, a nexus of conflicting and competing interests determines the outcome of complex design and development processes

Chapter 6 introduces a design paradigm as an aid to understanding this process of technological shaping within the globalising economy. This builds on the shift in manufacturing from established core to emerging periphery which was presented in Chapter 2. This shift reflects the success of the newly industrialising countries at the convergent stage of the design model presented here. It involves efficient production utilising mature technologies. However, the very different cognitive requirements of each design stage are a measure of the challenges facing countries like Malaysia and Taiwan, both of which have developed policies intended to take them from the essentially convergent tasks of global production to transformative and divergent activities.

The difficulties encountered by the East Asian economies in the nineteen-nineties highlighted the stresses inherent in the emerging global system. The tight coupling of the system propagates the diverse problems of these individual nation states across the globe. This chapter examines the

emergence of strategies and alliances across regional and organisational boundaries with a model derived from design management.

Arguments around incremental versus systemic innovation in design, the literature on innovation, and implementation, and on the necessity of innovative milieux are introduced.

Chapter 7 develops one aspect of incremental development: time-frames. Conflict between time-frames at different levels within a decision space may conflict with or frustrate the intentions of designers. The chapter looks at three cases of technology driven development strategies spanning several decades and the impact of conflicting time-frames. of the decision making on design and management processes.

Chapter 8 describes an overall *metatechnical* framework to encompass the perplexing range of influences on individual design projects. It presents a framework of analysis which allows socio-technical concerns to link national and wider cultural and institutional contexts with the decision-making levels of the individual firm, or network of firms, and with the technical dynamics of the techno-economic paradigm.

Often designers appear to make or acquiesce to decisions which frustrate their own professional objectives. From a systems perspective, such results may be seen as suboptimization resulting from a conflict between the evaluative criteria appropriate to institutional and task environments. To be successful the design activity must address both. The alternative is to allow the conflict between technocratic consciousness originating at a technical level and overconformity attributable to the institutional level to give rise to pathological outcomes. The development of the space shuttle - the NASA Space Transportation System (STS) - is one illustration of this argument, and a *metatechnical* framework is advocated as necessary to the successful linking of task and institutional orientations.

The implications are that the technical environment of design decision-makers must be appropriately linked to the institutional environment in which their organisations as a whole must operate

Chapter 9 explores a means of linking from the technical level to the wider cultural environment. The notion of “design cultures” provides an explanation of distinctive outcomes from processes addressing essentially the same technology in different social and cultural settings.

Established practices and expectations within organisations contain a cultural component. This imparts its own dynamic to the diffusion and adoption of socio-technical systems across cultural settings. The key technologies underpinning the present mode of global development have been modified by cultural orientations and preferences which are in turn incorporated into popular accounts of difference in organisational practices.

Such accounts themselves may carry a significant emotional charge reflecting anxieties played out at a national level, especially in North American accounts of North East Asian developments prior to the downturn of the nineteen-nineties in that region.

The design process itself can be seen to reflect its cultural setting. However, reference to culture should not become a means of avoiding further explanation of difference. National associations of style and capability are both a form of stereotyping and a source of value, for example in the marketing of German or Italian automobiles with their respective associations of engineering reliability and design flair. They also reflect distinctive outcomes based on differing priorities among designers in different settings. Culture must therefore be disaggregated into a constellation of tradition, ethnicity, organisational and institutional frameworks. Ironically, the military technology which dominated much innovation transferred to the "third world" during the Cold War period offers clear examples of differences between artefacts which reflect institutionally varied frameworks of invention and innovation. The performance driven extremes of military technologies reveal characteristics that are less clearly exposed in more mundane and robust technologies and this chapter plots changes in the distinctive design cultures of the Cold War protagonists.

From Geography to History: designing a place in the world

The final part of this book examines the practical consequences of the dynamics of the emerging global system and the technology that underpins it for decision making in development.

Design itself is a process of compromise to find acceptable solutions within large potential solution spaces. The notion of bounded rationality was propounded by Herbert Simon to explain the limits of human capability in such situations (Simon, 1957). He coined the word *satisficing* to explain the compromise strategy of arriving at an acceptable solution rather than pursuing of an unattainable optimised solution.

One consequence of the inevitable compromise in achieving a design solution in the face of complexity is that any non-trivial solution also contains unanticipated characteristics and consequences. An increasingly well known example is the consequences of robust characteristics designed into ARPANet, the precursor to the Internet. In order to enhance survivability during a possible nuclear war, the core of the system was able to relocate itself between host computers depending upon availability and

capacity. As a result the current global network is in no way amenable to centralised control.

Lawson (1982) has demonstrated that design students develop additional rules and constraints as one means of further reducing solution spaces. In some respects this more constrained problem offers easier routes to solution than the less bounded one. At a meta-level the end of the Cold War has removed one clear set of constraints on decision making. As a result it seems that the attention span of developed nations is incapable of dealing with the unconstrained complexity of Ohmae's "multi-polar" world. As a consequence, for better or worse, vast areas lying beyond the core economies of the triad introduced in Chapter 2, merit only intermittent attention from the centre.

The pursuit of greater added value has led to the recognition of the emerging global system as an "information economy" and this relegates developing countries to the peripheral areas beyond the triad core. Information and communication technologies have enabled the disaggregation of the production chain into a network by locating each activity specifically at its point of greatest comparative advantage. The ability to disaggregate the intellectual capital produced by the divergent stage of the design process from the convergent, focused discipline of the production process has been enhanced by the ability to control production lines from across national boundaries. In some instances complementary manufacturing takes place at both ends of such relationships, however, Lipietz (1992) argues that the ability to separate production from consumption signals the end of the "Fordist compromise", his term for the Keynesian social-democratic paradigm which was accepted during most of the Cold War period. In the neo-liberal view, employers need not pay the production workers remote from intended markets sufficiently well to consume the products of their own labour[3].

Part III looks at past attempts to design development pathways into the industrialised world of the nineteenth and twentieth centuries in order to emphasise the path dependence of such strategies and the complexity of outcomes.

Chapter10 compares two nations which made a conscious effort to achieve "modernisation" in the terms created by Western industrialisation and colonisation. Turkey and Japan aimed for the same outcome from different starting places and achieved different outcomes. However, comparison of their different trajectories of development reveals the importance of the opportunities and constraints to development set out in the previous sections of this book.

Chapter 11 examines the re-establishment of geo-economic alliances suppressed by recent history, and the emergence of new forms of

association facilitated by current communication technologies.

The early nineties saw the unequivocal end of the Cold War and the removal of barriers arbitrarily created at the cessation of hostilities in World War II. Subsequent political and economic re-alignments have been problematic. In the Balkans they have allowed the resurrection of earlier conflicts, placed in stasis by external threats. Elsewhere in Europe, Darrell Delamaide has identified these linkages in terms of what he describes as "super-regions" across Europe. From this perspective we are witnessing the re-emergence of older international alignments. For example, an emergent Scandinavian bloc within the EU is linking with the Baltic republics, recalling both the Hanseatic League, and the days when Shakespeare's plays opened in Gdansk within months of their London debuts. The resilience of such links reflects a degree of cultural consonance. This is evident in the relationship between Turkey and the Turkic republics of the former USSR, where linguistic and cultural ties preceded the emergence of the Russian empire in the nineteenth century.

Chapter 12 examines the technical and social synergies of the current and prospective generations of information and communication technologies. It engages with the consequences of the paradigm shift from hierarchical information and communication technologies to the disintermediated world of solar powered satellite-based technologies with which the planet becomes a single communication space.

The chapter looks at responses to the opportunity for countries and regions disadvantaged by the current distribution of communication infrastructure to enter the communication space of the wealthy. The "window of opportunity" metaphor is applied to the consequent shifts in definitions of centre and periphery in the global economy and shifts in the nature of exclusion from that economy. From critical information systems research, a paradigm through which windows can be kept open is described, and illustrated with some current initiatives from a variety of locations.

Notes

1 Ohmae's conception is of a "borderless world" in which direct foreign development seeks areas of highest GNP regardless of political boundaries - his "zebra strategies". The tensions implicit in Ohmae's concept are discussed at some length in Chapter 2

2 See http://www.digitaldividenetwork.org/

3 See Bello (1999) and Klein (2000) for detailed discussions of the social and economic consequences of such policies.