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# Introduction

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## 1. INTRODUCTION

What does it really mean to live and work inside the ongoing communication revolution? Our focus in this book is on the nature and significance of newly emerging patterns of social and technical interaction as digital information and communication technologies (ICTs) and services become more pervasively present in our lives. We also examine how these new patterns overlap with and are often very closely connected to existing patterns of social and technical interaction. We challenge the idea that using digital technological tools is necessarily associated with improvements in society or in an individual's experience of his or her interactions within society. The new technologies offer vast potential for improvements, but there may, in some instances, be good reasons for not privileging the technological mediation of human experience over other forms of mediation. This book brings together a set of investigations into the places and spaces where the use of digital technologies is likely to be socially or economically advantageous. It also examines instances where privileging of the use of these technologies may, in fact, be resisted in favour of achieving social outcomes through communication in other ways.

We draw upon cognitive, economic, management, political, and sociological theories and the results of empirical studies to offer insights into emergent forms of interaction that are being mediated by the new technologies. We investigate the consequences of these interactions for a variety of different kinds of social, economic, and organizational structures and processes. We suggest that a stance of informed ambivalence is most appropriate with respect to the growing number of roles that ICTs are playing in our economy and society. The principal focus of the chapters in this book is on how, and in what ways, interactions between social actors are altered when digital technologies become available. The empirical studies that are brought together here are concerned with the learning processes associated with on- and offline interactions between individual actors. They are also concerned with collective attempts to govern and manage new forms of interaction through corporate strategy and government policy developments, which are examined at the institutional level of analysis. The research in these chapters, therefore, includes micro-level studies of how the new technologies are intertwined with changing social relationships and studies designed to

illustrate how learning within firms and within policy and regulatory organizations produces expected and unexpected social and economic outcomes in parallel with the development and use of the new technologies.

We argue that a degree of ambivalence towards the new technologies is important because the social and economic development of societies that are infused with digital systems is far from certain. This uncertainty impels us to give a high priority to investigating the scope for social actors to alter the way humans will interact with each other in the future within the contours of the evolving information and communication revolution. We suggest that continual rapid changes in digital technologies are creating a growing need for assessments of the potential for incremental and very radical changes in people's lives.

The research in this book is located broadly within the framework of studies of techno-economic and socio-political change (Boden and Miles 2000; Freeman 1988, 1994a; MacKenzie 1996a) and specifically within those traditions that seek to explain the dynamics of developments at the sites of interaction between social and technical systems (Bijker 1993; Castells 2000; MacKenzie 1996b). Section 2 of this chapter indicates briefly how this book addresses the dominant discourses on the social issues arising from the growing use of ICTs. Section 3 explains why we have elected to study these dynamic processes through the lens of mediation. Section 4 provides the theoretical and empirical agenda for the book by highlighting the importance of the concept of paradigmatic change in understanding the social and economic environment in which technological innovation occurs. We draw particularly on arguments developed principally by Christopher Freeman and Carlota Perez (1988). Much of their work examines the economic determinants of the ICT revolution. Our work is intended to complement theirs by giving greater emphasis to the social processes that seem to be sustaining specific 'trajectories' of change within an overall framework of paradigmatic transformation that is increasingly being dominated by new ICTs. By developing insights into the particularities of the social processes at work within the communication revolution, we hope to demonstrate that there is remarkable scope for social actors to encourage the selection of alternatives to the predominant uses of the new ICTs.

Finally, Section 5 provides an overview of the structure of the book by highlighting the research themes and issues that have been addressed as a result of our research programme on the social and technical interactions embedded in the communication revolution. A principal feature of this research programme is its emphasis on the complementarity of the social processes that influence our lives in off- and online environments. This emphasis is intended to correct the prevailing tendency in many studies of the communication revolution predominantly or exclusively to consider the potential for online interactions to substitute for offline interactions.

## 2. ADDRESSING THE DOMINANT DISCOURSES ON INFORMATION AND COMMUNICATION TECHNOLOGIES

The selection of the topics that are addressed in this book was originally made in the light of two observations about the predominant characteristics of much of the

research that has been and continues to be undertaken on the implications of digital ICTs for the economy and, more generally, for society. The first was that the majority of work is confined to single social science disciplines and there are few opportunities for the accumulation of insights based upon systematic empirical studies. The second observation was that a substantial amount of research offers a snapshot of various features of the ways that social systems are interacting with technical systems, but provides very little insight into the dynamics of the processes that are giving rise to widespread and continuous change.

With respect to the first issue, there are now a few interdisciplinary examinations of the social and technical features of the so-called communication or 'digital' revolution.<sup>1</sup> We are beginning to see the publication of studies that are grounded in systematic empirical research and that are informed by consideration of theoretical insights into developments within the communication revolution that are drawn from two or more disciplines (Gauntlett 2000; Jonscher 2000; Woolgar forthcoming). This is important in the light of the fact that the plethora of reports on the 'new economy' or on 'knowledge' economies or societies offer essentially descriptive accounts of the changes that are presumed to be underway.<sup>2</sup> They rarely entertain questions derived from theory; neither do they offer critical reflections or analyses that are informed by received theory. The studies in this book address questions about the nature of the transformations that appear to be associated with the new technologies in a way that is informed both by social science research methodologies, which enable a more systematic account of these changes, and by an effort to build upon or to critique existing theoretical perspectives on the digital revolution. For example, we consider questions derived from a reading of received theory in the growing field of knowledge management and several other disciplines. In each chapter we seek empirical verification of the claims that have been made about the nature of many different types of 'virtual' organization of social and economic life.

With respect to the second issue, we take the view that a dynamic perspective is essential for an informed analysis of the transformations in human behaviour that may be associated with the application of digital technologies (Castells 2000; Gibbons *et al.* 1994). Our focus on the underlying dynamics of change—that is, the social processes associated with learning and new knowledge creation and the settings in which these processes occur—is the foundation for assessing the potential for alterations in the information exchange process and in the processes that contribute to the generation of new meanings. Although the empirical research reported in this book is, of necessity, time-bound, each of the authors makes an effort to locate his or her work within a conceptual framework that acknowledges the emergent (and in some cases evolutionary) characteristics of the interactions between the social and technical systems that provide the focus for his or her work.

<sup>1</sup> See e.g. Boisot (1995, 1998), Castells (1996, 1997, 1998), Ciborra (1996, 2000), Dutton (1996, 1999), Mansell and Silverstone (1996), and Mansell and Steinmueller (2000).

<sup>2</sup> There are many examples of such work—e.g. Department of Commerce (1999, 2000), Dizard Jr. (1997), and Duff (2000).

### 3. BINDING NETWORKS THROUGH MEDIATED INTERACTION

The conceptual canvas of this book is located in the traditions of social science research that are concerned with mediation—or intermediation. Intermediation is to be understood for our purposes as a dynamic relational process that binds (or unbinds) networks of individual actors or institutions (Coleman 1994; Cooley and Nam 1998; Cosimano 1996; Meyrowitz 1994; Morris and Hopper 1980; J. Sarkar 1998; White 1995; Yanelle 1989). The term ‘intermediary’ is generally defined as an intermediate person or thing, or one who acts as a mediator, and is derived from the Latin word *intermediatus* (*inter* + *medius* (middle)) (Pearsall and Trimble 1996). The term can also refer to a medium or means and to acting between persons such as an intermediate agent or agency (Flexner and Hauck 1996).

This definition implies the presence of at least three parties with some entity or person providing a link between the other parties. Intermediation processes involve ongoing interactions within and between the social, political, economic, and technical realms. Social science research has addressed the way these interactions produce, reproduce, and transform the social and economic order when they occur in the physical presence of others (Goffman 1963; LeFebvre 1991; Levinson 1997; Meyrowitz 1985, 1994). An increasing number of studies focus on why social interactions might be expected to change significantly when they involve mediation by the new digital technologies and services (Bolter and Grusin 1999; Mitchell 1996; Shapiro and Varian 1998).

Bolter and Grusin (1999) argue that the ‘re-presentation’ of one medium in another should be referred to as ‘reintermediation’. They justify this argument in the following way. ‘We have adopted the word to express the way in which one medium is seen by our culture as reforming or improving upon another’ (Bolter and Grusin 1999). From the Latin *remederi* (to heal or restore to health), this term draws attention to the increasingly common expectation on the part of many commentators that the use of the ‘new’ or ‘digital’ media is unquestionably an improvement upon earlier generations of technologies in terms of their impacts. These authors recognize that this view needs to be examined critically—and empirically—to discern the specific features of innovative technologies and their implications for mediated interactions of all kinds.

In our work, we have sought to acknowledge that there may be fundamental (and positive) changes in individuals’ preferred modes of social interaction when digital technologies are available. However, there may be no change, or only relatively little positive change, in individuals’ preferred modes of social interaction. There may be change that is regarded as being regressive or harmful. These possibilities are central features of the insights offered by the authors of several of the chapters in this volume.

It is acknowledged by many contributors to studies of innovation in the science and technology field that behavioural and cognitive outcomes associated with the use of new technologies often diverge substantially from those that were ‘planned’ or ‘intended’ by participants in the technological design process or by those implementing digital applications and services (Bijker, Hughes, and Pinch 1987; Hughes 1987; Mansell and Silverstone 1996). This may occur because individuals resist the initially ‘intended’ uses of the new technologies and services. People may find unexpected ways

of integrating the new technologies and services into their daily activities, or they may opt for non-use. Alternatively, even when the technologies are used in ways that appear to be consistent with initial expectations, the users themselves may have a variety of interpretations of their own behaviour and its consequences for themselves and others (Silverstone 1994, 1999; Silverstone and Haddon 1996).

When intermediation occurs through software, computing, or telecommunications systems, it involves much more than changes in the structural linkages between people and the technical interfaces supported by digital ICTs (A.J. Kim 2000; Kollock 1994, 1999; Mitchell 1996, 1999; Rheingold 2000; Zerdick *et al.* 2000). Intermediation in both physical and electronic space is giving rise to many new patterns and modes of communication and information exchange. Some observers claim that these new developments contain the seeds for revolutionary changes in all aspects of social and economic life, including the processes of knowledge creation and application (Brown and Duguid 1998; Gibbons *et al.* 1994; Shapiro and Leone 1999). Innovations in business processes and organizations, innovations in governance systems, and changes in perceptions of social status certainly do seem to be closely allied to the spread of ICT applications (Mansell and Wehn 1998). These technologies offer the potential for forming new types of network relationships that are not tied to physical places and that are not time-bound in the same ways as in the past (Cairncross 1998). However, the extent and implications of such changes are the subjects of much speculation (Leadbeater 1999; Negroponte 1995; Tapscott 1995; Tapscott, Ticoll, and Lowy 2000).

By focusing on what the coupling of social networks in the physically present world with the virtual world means for social actors in a variety of organizational and institutional settings, we provide insights into why people may resist certain types of technically mediated communication in some instances while, in others, they may seek to accommodate or shape the uses of these new technologies. Thus, for example, we examine the conditions that may sustain or limit the development of virtual communities (networks of individuals choosing to interact using the Internet and other forms of network technologies). We consider the distinctive perceptions of social ordering that seem to exist among very experienced Internet-users, but that do not necessarily inform their offline interactions. The dynamics of certain forms of electronic business (in the newspaper and banking industries and in the insurance market) are also examined in terms of their distinctive features and their similarities with social processes that are present in both online and conventional offline business settings.

We examine features of the learning processes that are involved in designing and using the new technologies. These learning processes can give rise to rejection of or accommodation to new technological systems. They appear to be closely related to the politics of interpersonal interactions and their associated power relationships, but this may have little to do with the characteristics of the new technologies themselves. Politics are also implicated in the interactions between social and technical systems that we examine in this book at the institutional level. At this level we consider changes in regimes for the governance of the new technologies and for sustaining new forms of virtual organization.

The studies in the chapters that follow are concerned with many of the determinants of the coupling processes between social and technical networks and their outcomes as

interpreted by their developers and users. Most of the empirical data have been collected via in-depth interviews and through the design and application of original survey instruments administered either in face-to-face settings, by post, or via the World Wide Web. Our overriding goal is to go beyond many conventional accounts of the features of the communication revolution to assess why some ICT applications are being used and adapted enthusiastically while others are meeting with resistance or rejection. Section 4 explains how the research agenda that links the studies collected in this book was formulated.

#### 4. FRAMING THE THEORETICAL AND EMPIRICAL RESEARCH AGENDA

We refer to the ‘communication revolution’ in this book.<sup>3</sup> We use this phrase as shorthand for the ‘information and communication technology revolution’. Christopher Freeman and his colleagues have examined the profound significance of the changes that appear to be associated with an emerging techno-economic paradigm that rests upon innovations in ICTs (Freeman 1988). This tradition of analysis of the relationships between technological change, innovation processes, and the economy is based, in part, upon Joseph Schumpeter’s examination of the causes and consequences of technological change for the economy (Schumpeter 1947, 1961). Schumpeter suggested that periodically a specific ensemble of enabling technologies emerges around which, through selective attention by economic actors such as entrepreneurs, a type of lock-in begins to develop. A new economic model or paradigm emerges that challenges the hegemony of the former predominant ways of organizing economic life. The replacement of one techno-economic paradigm by another involves pervasive and all-encompassing shifts in social and economic organization and these must be expected to affect every aspect of the economy (Schumpeter 1961).

The ‘new economy’ has been coined as a label that captures some of the features of the shifts associated with the communication revolution. This label directs attention to the increasing salience of services and immaterial transactions in the global economy. However, it provides little assistance in directing attention to the need to probe how the ‘old’ economy is likely to change as the ‘new’ economy expands and as the new technologies are used within ‘old’ economy sectors. Nor does it assist in highlighting the nature of the new forms of face-to-face social relationships that emerge alongside the more conspicuous developments in virtual relationships.

Christopher Freeman and Carlota Perez suggested that, as the application of these technologies becomes a key factor in economic and social development, the efficacy of existing ways of organizing both economic and social life is called into question (Freeman and Perez 1988; Freeman and Soete 1997; Perez 1983). And, as innovations

<sup>3</sup> The framing of the research agenda for the studies reported in this volume arose out of discussions among the contributing authors over an extended period of time. As editor, Robin Mansell has compiled this synthesis and bears principal responsibility for it. She acknowledges the contributions of all the chapter authors, and particularly David Neice for his contribution to this section of Chapter 1.

in technologies and social and economic organization occur, they argue that there are likely to be substantial costs in social, organizational, and political adjustment.<sup>4</sup> One adjustment scenario foresees that governance institutions that hitherto have provided the sites of social and economic power and societal control will be radically reshaped with very uncertain outcomes for groups within society including citizens, owners, workers, and managers. Another adjustment scenario envisages an accumulation of incremental changes in the technical, social, and economic spheres of activity as the new technologies are accommodated and, in some instances, resisted (Freeman 1994*b*, 1995; Freeman and Soete 1997; Mansell and Steinmueller 2000).

The new techno-economic paradigm that is at the heart of the communication revolution is characterized by a growing emphasis on the production and distribution of knowledge (Cohendet and Steinmueller 2000; Cowan and Foray 1997; David 1995; Eliasson 1990; Foray 1995; Neef 1998; Nonaka and Takeuchi 1995; OECD 1996; Shapiro and Varian 1998; Steinmueller 2000; World Bank 1998). This new paradigm is linked to the widespread use of microelectronics technologies. These technologies are achieving a position as *the* dominant factor influencing the latitude for social and economic development. As Freeman argues, “Intangible” investment in new knowledge and its dissemination are the critical elements, rather than “tangible” investment in bricks and machines’ (Freeman and Soete 1997: 3). Romer (1995) has also suggested that hardware, software, and ‘wetware’ or human capital are becoming replacements for capital, raw materials, and production and non-production workers, in terms of their importance in the economy.

According to many recent accounts of the development of so-called knowledge economies, human capital, human organization and management, and human interaction, whatever the purposes of the agents, are increasingly informed by, or mediated by, some combination of hardware and ‘wetware’. In some parts of the management studies, marketing, and technical trade literatures, managing knowledge is regarded as a process involving the ‘harnessing’ of advanced ICTs (Norris and West 2001; Ruggles 1997). Successful ‘harnessing’ is expected to produce many positive results including improved decision-making and problem-solving capabilities on the part of human and technological agents (OECD 1997). Thus, the analysis of effective strategies for knowledge management and for the deployment of the new technologies, for example, to support electronic commerce, is often fused in the research that underpins many of the studies on the social and economic implications of the communication revolution (Anderson 1997; Garcia 1995; Information Infrastructure Task Force 1997; Kalakota and Winston, 1997; Kalakota, Robinson, and Tapscott 2000; OECD 2000; Timmers 1999). There are frequently very strong assumptions in such studies about the synergies between social and organizational processes and the specific designs and architectures of the new technological systems. They are expected jointly to deliver improved decision-making and problem-solving capabilities (OECD 1997).

<sup>4</sup> European research in this vein has been complemented in Canada and the United States by the work of Richard Lipsey (1991, 1994) and others associated with new growth theory (Helpman 1998; Romer 1990, 1993, 1994; Stiglitz 1999).

Some proponents of the idea that the new paradigm will bring automatic benefits to all people argue that a global information society is on the verge of enveloping us all (Dizard Jr. 1997). This process, it is claimed, in which the world's social and economic order will become largely immaterial, will favour a vast number of virtual associations and networks from which no one will be excluded (Rheingold 2000; Romm, Pliskin, and Clarke 1997; Sarkar, Butler, and Steinfield 1998). This is a very positive view of an inclusive 'new economy' and global information society. Immaterial life is expected to favour ever-closer encounters between social and economic actors. These intensive networks of social and economic interaction, enabled by ICTs, are expected to become sources of long-term sustainable growth and development and a more inclusive social order.

In the social science community, the rapturous claims about the potential of the 'new economy' have been met with dissent (Garnham 1994, 1996; Mansell and Silverstone 1996; Robins and Webster 1999; Webster 1995). Some of these dissenters argue that there is an embedded bias towards exclusion and disadvantage for certain people as the paradigmatic shifts involving the application of digital technologies become more deeply integrated within the social and economic order (Angell 2000; Garnham 2000; Webster 2001). Others argue that the technological foundations of our social order do appear to be changing substantially and that there are both significant benefits and substantial risks (Mansell and Wehn 1998). The extent of the benefits and the risks and their distribution throughout the social and economic order is a matter for empirical investigation. Empirical research does in fact suggest that there are opportunities to shape and manage these changes in line with a broad range of preferences of technology designers and users (Mansell and Steinmueller 2000; Silverstone 1999), but that so far we have made very little progress in formulating what preferences are becoming predominant and embedded in the new technologies or in assessing whether these are socially desirable.<sup>5</sup> We suggest that these issues must be investigated and our research agenda has provided a small step towards that goal. The results of our research are intended to provide a basis for encouraging measures that may influence the deployment of the new technologies in ways that promote greater social inclusion and social and economic well-being. The benefits and the risks associated with the transformations that are giving rise to a new paradigm of techno-economic and socio-political organization, which seems to privilege virtual forms of communication, are also the focus of a relatively small number of detailed empirical studies about what the implications of the communication revolution are likely to be in practice (Dutton 1996, 1999; Woolgar forthcoming).

Some analysts have asserted that the implications of the communication revolution for the social, political, and economic organization that served in an earlier time to mediate between individual actors and other institutions including the market are that they will be swept away by the creative destruction of the 'new economy' (Armstrong and Hagel III 1996; Easterwood and Morgan 1991; Sarkar, Butler, and Steinfield 1998). The coordinating roles performed by intermediaries of many kinds will no longer be needed in an environment where direct electronic links can be established between

<sup>5</sup> To an extent this argument is similar to that offered by Lessig (1999).

social actors. However, these ‘end-of-intermediation’ proponents are now in retreat. This is largely because individual and organizational intermediaries can be observed to be redefining their roles and very few instances of sustained ‘disintermediation’ can be seen. The empirical challenge now is to determine which specific new forms of intermediation, or indeed reintermediation, are emerging and with what consequences for individuals and groups and their practices (Hawkins, Mansell, and Steinmueller 1999; Mansell, Schenk, and Steinmueller 2000; Verhoest and Hawkins 2000).

As indicated above, the conceptual framework that informs the research reported in this volume extends insights into the social features of recent paradigmatic transformations by building on the work of Freeman and Perez.<sup>6</sup> Their work on technological innovation has sometimes been criticized for its ‘determinist’ viewpoint (MacKenzie 1996a; Williams and Edge 1992; Williams and Slack 1999).<sup>7</sup> We suggest, however, that their work on the nature and determinants of technological revolutions and their implications for the economic and social order makes no claim that there cannot be resistance to the predominant forms of paradigmatic change. In fact, Freeman (1992b) advocates actions that will promote efforts to refashion the emergent ICT paradigm so that it is more consistent with generating economic prosperity and with social benefits (including environmental sustainability) for all. Freeman and Perez’s argument that is set out in their numerous works also makes no claim that the application of digital ICTs will lead, for example, to the complete dematerialization of social and economic conduct. Nor do they argue that virtual social interactions should be privileged. In fact, Freeman and Soete (1994) advocate continuing emphasis on social interaction in the physically present moments of life in order to ensure that the goal of equity in social and economic development is achieved.

In this book, our position with respect to the role of innovative digital technologies and services is as follows. We argue that it is not technology *per se* that is responsible for a shift in the techno-economic paradigm. Rather, it is the interactions between emerging technological forms and human beliefs, perceptions, and choices that, together, comprise a techno-economic paradigm. A techno-economic paradigm involves ‘a new set of guiding principles’ or common-sense practices (Freeman 1992a: 165). These evolve as a result of the dynamic interactions or mediations that occur within social and technical networks. These networks are forged mainly within the contours of the digital communication revolution but also within the contours of networks of relationships that have not been touched by this revolution except perhaps by the consequences of their exclusion.

The emerging techno-economic paradigm rests on a new material factor of production—that is, relatively inexpensive microelectronics technologies and their associated digital embedding of codified knowledge. The declining price of both microchips and digital information means that the earlier paradigm, based principally on cheap oil and the movement of things, is giving way to a paradigm that privileges the rapid movement

<sup>6</sup> Other important contributors to these insights include Cawson, Haddon, and Miles (1995), Miles and Thomas (1995), Miles *et al.* (1999).

<sup>7</sup> And see Freeman (1987) himself on the theme of technological determinism.

of information. The expectation is that this will lead to the application of knowledge in ways that will generate sustained and global social and economic development, and especially poverty reduction (KPMG 2000; Primo Braga 2000). There is no doubt that the ascendancy of this new ICT paradigm is taking hold of the imaginations of entrepreneurs, managers, and engineers. It is beginning to grip the collective social psyche and to invade popular consciousness in the industrialized countries and, increasingly, in many parts of the developing economies. The new technologies and their associated services are being regarded by some people as a new means of achieving the long awaited 'catch-up' of many of the developing countries with the wealthy industrialized countries (Goldstein and O'Connor 2000; Mansell 2001). However, little is understood as yet about the detail of how such developments—and their potential for eliminating poverty—might be realized in practice. It is clear that the simple availability of the new digital technologies and services is no elixir for a 'catch-up' process. The prospects for a global economy, and for a more socially inclusive global information society, depend on a vast number of non-technical processes and developments.

In recent years, greater emphasis in the social science research community has been given to examining these non-technical features of the communication revolution. Researchers are investigating the social, cultural, political, and economic issues associated with this revolution in considerable detail (Castells 2000; Dutton 1999; Kling *et al.* 1999; Silverstone 1999; Woolgar forthcoming). The results of this work are beginning to reveal why it is important to challenge the initial exuberance and hype surrounding 'dot.coms' and assumed benefits of the 'e-society' that spring from largely undocumented and unsubstantiated claims about the role of ICTs in generating improvements in knowledge management processes (Davenport and Prusak 1998; Ruggles 1997). The accumulation of new empirical evidence suggests that a tempered view of the positive and negative features of change is appropriate (Woolgar forthcoming). This work also indicates that there is a major research agenda to be pursued to provide systematic analyses of how people's lives and livelihoods are being affected by the introduction of the new systems and services.

The future of the communication revolution is very uncertain. It might be argued, therefore, that social scientists can do little more than wait for its outcomes to examine the implications. We take a different view, however. The accumulation of theoretically grounded and empirically informed social science investigations of these developments can be an important component of the necessary foundation for deliberations on the social and economic value of developments in the social and technical realms and about whether they are consistent, or at odds, with the values of the social actors whose lives they are affecting. Social action can then be mobilized to guide and, in some instances, to reshape the character of the emergent technological order.

Each of the studies in this book investigates an aspect of the 'guiding principles' that seem to typify the new forms of interaction between social and technical systems that are mediated to some extent by the new ICTs. The authors consider whether or not these relationships, as perceived from the vantage points of different social actors, are encouraging social and economic relationships that are valued. There are indications of beneficial contributions from some of the new ways of organizing business and

social relationships, but there are also problems with adjustment to the new ways of working and living. The potential for significant disruptions is also a possibility, as Christopher Freeman and Carlota Perez have suggested. Such disruptions are likely to be perceived by social actors as being inconsistent with emerging social values in various locations throughout the world. In our research, we try to be sensitive to an important distinction: that between the wide range of potential characteristics of the emerging techno-economic paradigm and the main features of the dominant technological and institutional regime. Many of the potential features of the ICT techno-economic paradigm are unlikely to become predominant in the absence of analysis of current trends and independent reflection on the implications of these trends. The possibilities for alternative regimes and choice within the broad contours of the emergent paradigm create opportunities for mobilizing social action to achieve a greater variety of means of mediating social and technical interactions.

The scope for choice and variety within the ICT revolution is influenced by the way that the technological innovation processes interact with humanly constituted selection factors. A given paradigm may come to be perceived as a dominant regime when it appears to have become very strongly entrenched (Dosi 1982; Dosi and Malerba 1996; Freeman 1988; Freeman and Perez 1988; Freeman and Soete 1997). This may happen when political and social actors come to have little or no capacity to imagine alternatives or to act upon them. Given the uncertainty even among the most ardent proponents of the benefits of the communication revolution about what the predominant features of the new paradigm will be, it is important to examine the interplay of power and of resistance to alternative outcomes that involve social actors with many different interests (Mansell and Steinmueller 2000). The results of this approach to the analysis of the potential and risks of the communication revolution may create opportunities for the selection of new pathways and alternative dominant technological regimes or perhaps permit greater latitude for smaller diversions.

The latitude for social actors to make choices about the design and use of ICTs is considered in a wide variety of contexts in this book. Castells (2000: 16) argues that:

networks, as social forms, are value-free or neutral. . . . They process the goals they are programmed to perform. All goals contradictory to the programmed goals will be fought off by the network components. . . . once the network is programmed, it imposes its logic on all of its members . . . To assign different goals to the programme of the network . . . actors will have to challenge the network from the outside and in fact destroy it by building an alternative network around alternative values.

In this book, we focus on the distinct processes of mediation within the 'old' and the 'new' social and technical networks to discover the contours of the new patterns of social and technical interaction and to suggest a basis for policy action to correct features that appear to be inimical to the goals of achieving equitable and inclusive information societies. To an extent, therefore, our research begins from the premiss that there is potential for alternatives to the emergent dominant networks' 'logics' or regimes, but we suggest that these must be revealed through analysis of the dynamics at work within the communication revolution. Thus, we depart from Castells's

admonition as we seek in many instances to inculcate alternative values by investigating the inside of the emerging network societies.

## 5. STRUCTURE OF THE INVESTIGATION

The book is organized in two main parts. The first focuses mainly on how digital technologies are increasingly implicated in mediating social and technical relationships. The second part is concerned mainly with the learning processes, both individual and collective, that seem to be essential to the building of capabilities for using new technologies to promote new forms of information exchange that contribute to wider processes of knowledge exchange.

### 5.1. *Part One. Mediating Social and Technical Relationships*

Part One offers six perspectives on mediation processes that infuse and inform interactions within increasingly complex social and technological networks. These chapters illustrate the diversity of these mediation processes. The authors draw upon theoretical perspectives on the nature of human choice, the articulation of ICT developer and user preferences, and the way that power relationships come to be embedded within emergent social and technical relationships. Empirical research on the social perceptions of intensive Internet-users and the developers of electronic commerce shows how both technical and social mediation processes are influencing perceptions of social status in the virtual world without necessarily destroying existing perceptions in the offline world. This research also illustrates how changes in the organization of work are exploiting certain features of technically mediated communication, but that, at the same time, these changes rely upon many kinds of non-virtual working practices. Building trusting relationships to support electronic business transactions also requires a detailed understanding of why users select certain information and communication systems to support or augment their decision-making or problem-solving capacities, and yet reject other technological systems. We explain such choices over technologies and organizational practices in the light of features of the mediation process itself.

Edward Steinmueller begins the exploration of these issues in Chapter 2 with a challenge to conventional views about the formation and sustainability of virtual communities in the ‘new economy’. He focuses specifically on the ‘technology’ of social organization—that is, on whether virtual-community members who interact through the use of computer-mediated communication are likely to offer a major opportunity for organizational innovation or whether they simply represent a technological novelty that will not really succeed in generating major changes in the way society engenders the institutional and procedural authority that is necessary to sustain the economy. The aim of his chapter is to assess whether the new technologically mediated forms of communication can be expected to support innovative means of production and exchange in the ‘new economy’ that is regarded by many as being at the heart of the communication revolution.

In Chapter 3, David Neice focuses on the potential for intensive interactions between users of the Internet to give rise to new perceptions about social distinction and about appropriately mediated social interactions on- and offline. This chapter offers insights into how access to digital technologies is interwoven with perceptions of social status in society. His research was designed to elicit perceptions and interpretations of the social distinctions that really matter to experienced users of the Internet in their interactions online. This work reveals the very complex interactions between the technical and the social in the online and offline worlds. It suggests, for instance, that the attribution of social esteem occurs through systems of rules and values that amplify peer reciprocity and social exchange. The potential for Internet use to amplify certain values and behaviours associated with reciprocity does not appear, however, to be inconsistent with commercial forms of exchange that are colonizing the Internet, as has been suggested by some authors (Goggin 2000). Neice argues that policy-makers and entrepreneurs will benefit from further exploration of the complementarity of social systems in the on- and offline worlds. Given the high stakes for investors in new digital technologies—and the vicissitudes of the stock market—Neice's strategy for the analysis of social and technical mediation processes and the way they limit possibilities for human agency on- and offline offers a valuable foundation for further research.

In Chapter 4, we move to a consideration of how meanings are created by those who are requested to perform at least a portion of their work virtually, using different combinations of ICTs. Jennifer Gristock contests the oversimplified suggestion that there is a trend towards the emergence of completely virtual organizations. She suggests that too much effort has been devoted to formulating definitions of *the* 'virtual organization'. Instead of attempting to define the key features of an emerging organizational form, she analyses how the possibilities for organizing work activities across space, time, and organizational boundaries are actually being extended through the use of a variety of combinations of ICTs. In this chapter, the empirical evidence comes from a web-based survey of virtual teamworkers and detailed case studies of the UK newspaper industry. Gristock investigates the way that face-to-face meetings and the use of communication media are combined by virtual teams who write editorial copy and sell advertising space. She argues that insights into the varying degrees of 'virtual-ness' associated with different facets of work are vitally important for understanding how this kind of teamworking differs from the kinds of work in non-technology-enabled organizations. She demonstrates that the mere possession of a particular set of technologies does not guarantee their efficient use, nor does it ensure that they are put to effective use for any particular purpose. Knowledge creation in virtual teams is shown to vary with the extent to which team members are separated by geographical, temporal, and community barriers and the extent to which they are able to create shared contexts of meaning through their physically present and electronically mediated relationships.

Electronic commerce is one of the fastest-growing services to be supported by ICTs. It is gaining in status as it comes to encompass a wide range of electronically mediated commercial practices. In Chapter 5, Ingrid Schenk provides an analysis of how private- and public-sector actors are attempting to replicate trusting relationships that exist in

offline commercial environments in support of their electronic commerce endeavours. The empirical study for this chapter focuses on whether the forms of mediation embodied in digital certificates that are used to authenticate the identities of those participating in electronic transactions are likely to create a sound basis for the expansion of business-to-consumer electronic relationships. Drawing on interviews with representatives of firms and policy-making organizations in the United Kingdom, the United States, and Canada, Schenk illustrates how alternative technical choices are contributing to the perceived legitimacy of traders who become involved in electronic transactions. She argues that the technical interfaces for electronic certification are interwoven with commercial practices and that this has major implications for the growth potential of the new electronic markets. This is because these interfaces influence, not only whether people will be attracted to cyber-trading, but whether they will persist in this form of commercial exchange.

Electronic commerce is also the focus of Chapter 6 and the sector examined is the insurance industry. Gordon Rae challenges a predominant set of ideas about how markets should function when they are linked to a rapidly evolving technical environment. In most cases, electronic commerce is expected to transform or refine business processes by helping purchasers to make better decisions. ICT systems are expected to allow them to amass, analyse, and control large quantities of specialized data. Rae suggests that it is important to consider the influence of the cognitive frames of electronic commerce developers and users to understand the situations in which the availability of the new technologies will be perceived as a positive development by their potential users. Rae investigates the phenomenon of 'presence', a concept that encompasses cultural and social perceptions, to draw attention to the processes whereby users seek and find social meanings, whether or not they were intended by electronic commerce system designers in the insurance services market. Rae shows just how different the construction of such meanings can be for participants in the same information system design process. He also offers a glimpse of the extent to which people in the London insurance market accept computerized systems as invisible intermediaries and as social agents capable of competent performance.

Social perceptions and the attribution of meaning to certain kinds of information that must be exchanged in the banking industry in the course of credit assessment is the subject of Andreas Credé's contribution in Chapter 7. He investigates the process of knowledge production and the role of ICTs in commercial banks. His examination of bank employees' selection of both older and newer ICTs confirms that the sector has experienced continuous technological change and major investment in computer hardware and software. Nevertheless, banks remain highly labour-intensive service organizations that are dependent on skilled staff. Banks are said to exist because they are efficient information processors and the use of ICTs in this sector is often expected to make information processing more efficient and less costly. Information can be digitized so that it can be readily stored, communicated, and processed through progressive automation. Credé's research suggests, however, that the principal role of the new technologies is to 'repersonalize' human communication rather than to process information. He examines how information is actually produced and exchanged within the banks in his sample

for the purpose of credit evaluation. He finds that ‘repersonalization’ is an important mediation process, because bank employees depend on confidential, proprietary information that is made available to them by their clients. Bank employees, therefore, can be regarded as savings intermediators, performing their roles by adding validity, relevance, and significance to information so that it can be used for credit evaluation. Credé suggests that this social process has important implications for how information is exchanged and for the selection or rejection of different types of ICT systems.

## 5.2. *Part Two. Building Capabilities for Knowledge Exchange*

Part Two turns to investigations of the formation of capabilities for knowledge exchange when some part of the information exchange processes involve the use of ICTs. This section of the book focuses on how these capabilities are accumulated through a variety of social mediation or learning processes. It includes studies of learning processes at the micro-level within firms and at the institutional level. Empirical work undertaken in the United Kingdom, South Africa, and Brazil provides the basis for this section of the book. The emphasis is on the importance of organizational contexts in shaping learning outcomes associated with the design and use of information and communication systems. These organizational contexts influence social perceptions of barriers to the use of information systems, the social values that become embedded in technological systems such as the Internet, and whether social actors can acquire the necessary range of capabilities for the production of advanced information and communication systems.

In Chapter 8, Jane Millar compares the experiences of information systems developers and users within two firms in the United Kingdom to examine how different organizational contexts can influence perceptions of the effectiveness of information system design and organizational change processes that employ identical techniques and software tools. The analysis focuses on the relationships between efforts to stimulate knowledge sharing and learning among participants in the design process and perceptions about the usefulness of the learning outcomes. Collaborative involvement of technical and business specialists in the design of business processes and information systems—or co-design—requires the mobilization of employees’ and systems designers’ knowledge. Millar suggests that, when knowledge sharing and learning seem to occur, the specific characteristics of the organizational context influence the way that the new knowledge will be exploited and whether it will become embedded in new technical systems. This chapter highlights the importance of analysing the processes of knowledge production within firms that are situated in particular contexts.

Perceptions of barriers and resistances to using ICT systems in ways that developers envisaged are often investigated using research methods that elicit individuals’ recognition of their effectiveness using participant observation or in-depth interviewing techniques. Barriers to the effective use of new systems are often attributed to technical problems, to skill deficits, or to a lack of user awareness of the potential benefits of adopting certain technologies and practices. In Chapter 9, Uta Wehn de Montalvo draws on the results of a comprehensive survey of users of geographic information

systems (GIS) in South Africa to identify some of the reasons for resistance on the part of users to the use of these systems in ways that GIS developers argue would reduce their costs and encourage their wider use in developing countries. The complexity of GIS users' perceptions about the advantages and disadvantages of sharing spatial datasets, a practice that could extend the application of GIS, is investigated in this case. Wehn de Montalvo's analysis reveals a rich portrait of users' attitudes and intentions with respect to data sharing. She shows that the promoters of data sharing need to take account of the social and psychological determinants of data sharing if they are to succeed in reducing the users' resistances to developing a data-sharing culture, thereby facilitating the greater use of this ICT application, which could potentially support social and economic development goals.

Daniel Paré offers another consideration of the non-technical or social dynamics that influence the specific formation of ICT systems. In Chapter 10 the focus is on the political processes that influence the organization of the Internet's governance framework. Paré examines changes in the way the Internet Domain Name System is organized based on an analysis of the viewpoints of those who participated in the creation of a new governance regime in the United Kingdom. This chapter shows that the restructuring of the management and administration of the *.uk* name space was informed by technical features and by the way the Internet Service Providers (ISPs)—the new intermediaries—intermediated relationships between those wishing to register domain names and the domain name registry organization itself. Paré shows that the process of constructing new capabilities for governance of the Internet involves the management of values and choices. Political processes played a very important role in whether organizational innovations were perceived as a success or as a failure by different actors. The analysis demonstrates the value of coupling an investigation of the determinants of the technical architecture of the Internet and its governance arrangements with an analysis of the interests of its designers and users.

In Chapter 11, Ana Arroio examines the variety of capabilities that appear to be necessary for developing a new technological system, in this case, a domestic low earth orbiting satellite (LEOS) network. An analysis of the proposals of public and private actors in Brazil to develop their own LEOS system is used to demonstrate that social actors must accumulate certain specific capabilities if they are to succeed in developing and implementing new technological systems. Many of these capabilities are essential in order to strengthen the resolve of members of national governments and employees of firms to take actions that may enable them to produce an advanced technological system. Arroio traces the informal and formal learning processes over an extended period. She shows that, although LEOS were championed in the 1990s as a means of improving the communications infrastructure in the middle-income countries, and despite the accumulation by actors in Brazil of key technical and regulatory capabilities, substantial mismatches between stakeholder objectives in government, in the satellite manufacturing industry, and among the proposed communications service suppliers produced high levels of uncertainty and failure to construct an indigenous technology system. In the Brazilian case, the social actors were unable to produce a LEOS system that might have had the potential at least to be better geared to the social

and economic needs of the country. Arroio suggests that too little attention was given to building up the actors' negotiating strengths and to creating regulatory practices that might have encouraged the use of LEOS services to extend communications services especially in rural areas in line with stated policy objectives.

In the concluding chapter (Chapter 12), Robin Mansell assesses the results of our research agenda, which has been aimed at exploring the social and technical mediation processes that are deeply embedded within the communication revolution. An important observation emerges from these results. Interactions between conventional and new forms of social and technical mediation are crucially important for the interplay between technical and social developments in the 'old' and the 'new' economy or society. The new patterns of mediation involving digital technologies are contributing to the ascendancy of a new dominant technological regime. However, this regime is the product of many interlaced combinations of virtual and physically present social processes. The regime is extraordinarily dynamic. The regime itself is the product of interdependent technical and non-technical features and processes, and its malleability is often not considered by those seeking either to explain or to predict the outcomes of the communication revolution.

Our investigations into mediated communication involving ICTs provide a point of departure. The insights revealed by our research confirm that there is no generic 'one-size-fits-all' model for the deployment of digital technologies. There is room for diversity within a digitally mediated global information society. However, this diversity must be constructed through continuous negotiation by well-resourced social actors. An emphasis on variety is important for ensuring that local articulations of values and preferences that are socially accepted do, in fact, become embedded in our social and technically mediated interactions. This is not to offer a postmodern account of a multiplicity of emergent paradigms encompassing the fragmentary experiences of individuals within their situated contexts.<sup>8</sup> Our results display emerging patterns of technical and social interactions between technology designers, citizens and consumers, and business people and policy-makers. They offer insights that provide a basis for enhanced learning and reflection by these stakeholders. They also provide a foundation for structuring social and technical interactions in ways that elicit the more desirable features of the ICT paradigm. They highlight a basis for alternative actions that may enable these features to become embedded in the technological regime that comes to be associated with the ICT revolution as it progresses. As Garnham (2000: 135) argues in the particular case of the consumption of media products,

It is this view that forms of consumption are in complex ways embodied in different forms and institutions, and that they in their turn reinforce certain personal and social character traits, that

<sup>8</sup> Such as the accounts offered by Baudrillard (1988). Garnham (2000: 114) argues for a distinction between mediated social communication involving, for instance, the media and dialogic interaction. He does so on the basis of the observation that, in the latter face-to-face contexts of dialogue, the interchange of meaning is constantly reciprocal and immediate. We apply the term 'mediated' to all forms of interaction, but, like Garnham, we emphasize that the two kinds of mediated experiences must be treated as instances of phenomena that have similarities as well as differences.

is the rational core of McLuhan's theories, which in their turn derive from studies of the ways in which the development of printing and reading and the shift from orality changed society and the individuals within it. If so much is granted then we also know that the production and distribution of cultural commodities, what is made available for consumption and to whom, is structured—and intentionally structured—in specific, determinate ways. If the connection to individual and group identity formation is granted, then how that power of structuring works and with what effects becomes a matter of legitimate interest.<sup>9</sup>

In order to understand these structuring processes in the broader context of emerging paradigms for ICTs, we argue for a multilevel analysis of structuring processes that embraces both the micro-level mediated experiences of individuals within their social contexts and the institutionally mediated experiences of people that are informed by specific aspects of the economic and political environment and their interactions with technologies.

<sup>9</sup> Garnham's reference is to Marshall McLuhan (1962: 31), who claimed, for example, that 'electronic interdependence recreates the world in the image of a global village'.