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New Media and New Economy Cluster Dynamics

PHILIP COOKE

This chapter focuses on the organizational characteristics of new media businesses. Like other new economy industries such as information and communication technologies (ICT), including varieties of software engineering, and biotechnology, such firms tend to cluster in geographical proximity. They do this for a number of reasons, but the main one seems to be to access 'spillovers'. These are external economies that come from co-location with other like-minded or complementary businesses. Opportunities for joint contracts, sharing of knowhow, and exchange of human or, more collectively, social capital are greater in such settings. New media differ from other new economy clusters in being less likely to agglomerate around universities or research laboratories and more likely to occupy downtown fringe locations where rents may be relatively cheap because industry has vacated space, but access to large customers in film, TV, advertising and publishing is good. Moreover, ambience is important too; thus fashion, funky entertainment and fusion food are likely ingredients in the general scene. But, as is reported next, important features of new media have been changing and there are good reasons for thinking that rapid transitions in forms of new media articulation have become endemic.

Thus in the 1990s the glamorous new technology was multimedia, subsequently known more widely as new media. Today, new media's public prominence has been eclipsed by interest in Internet or dot.com businesses, mobile telephony, iPod, and a revived biotechnology. It is by now well appreciated that a new economy stock may well hold the public eye for a brief period, before investor hypermobility moves to the next 'new new thing' (Lewis, 2000), but for an embryonic sector to, apparently, disappear from view is still slightly shocking. The question that drives this contribution is whether new media retain some intrinsic core identity or have already hypertransmuted into or been absorbed by the Internet and foreseeably into the convergent service delivery medium of the handheld *communicator*. This, of course, is the third-generation mobile or cell phone which in its late second-generation form, such as the Nokia Communicator, already provided telephony, Internet access, musical composition, graphic imaging and e-mail. A Palm device accessed news, music, e-mail, barcode scanning, flight schedules, language translation, expense reports and digicam functions among others. These are clearly varieties of multimedia device. The third generation, in 2005 available on the High Street, provides TV and video services in addition to

Bluetooth capabilities regarding wireless inter-equipment communication, for example the refrigerator tells the mobile phone that it is running short of milk but that the fridge contents can supply ingredients for particular recipes.

Clearly, these functions are new and they are performed by media: so to repeat the question, are they new media? Unquestionably there has been 'morphing' of what, even in conference in 1997 (see for example Braczyk et al., 1999), was painfully being defined as multimedia or new media, into handheld communicator equipment by 2000 and wireless telephony by 2005. But that may not be the whole story. As industries mature, even in a few years, divergences become evident. Thus, whereas specialist banking, financial and stock market information, accessible only by PC on CD-ROM or online in 1997, was accessible on a mobile phone in 2000, advanced computer graphics of the kind now routinely deployed in films like *Star Wars* were probably not. However games deploying comparable pixel densities were, by 2005, commonplace on mobile devices. Internet games firms were part of the dot.com revolution, as were varieties of Internet applications businesses; they had, in many cases, a high market value measured by share price and, having made an initial public offering (IPO), still are often courted and acquired by the likes of Sony, Sega or Nintendo, Nokia, and Microsoft games divisions. By 2000, Web page design, which was considered as the 'bottom-feeder' end of new media, could be performed by anyone with Microsoft Frontpage. By 2005 A4 Desk Flash Website Builders were similarly available.

The texture is complex, not least because much of the nexus of businesses around new media is entrepreneurial, small or very small scale in terms of human capital, but creative and knowledge-driven with even 'virtual firms' being a pronounced feature. Classically, these businesses tend to congregate in geographical clusters, often, as we have noted, where the coffee is good and the street life is vibrant. Crossover interactions between members of social, political or economic networks focused on cultural products with design-intensive content are the lifeblood of such communities. In this sense they are rather like biotechnology firms, clustered near university campuses, that have intellectual power but crave the venture capitalists and large pharmaceutical firms to fund their next contract or milestone. But these do not cohabit spatially, unless the corporate client puts a lookout branch in the cluster. Such small-firm clusters are dynamic, productive and innovative and show remarkable new firm formation and death rates. The two go together: risky businesses operate in clusters because of strength in numbers, or the aforementioned spillover effects. They are an increasingly prominent organizational form as the new economy transcends the old, but as we have seen, their identity can be fleeting.

In what follows, the first section will, reasonably briefly, review the relevant literature on what multimedia and/or new media comprise. Other chapters in this book perform this function at greater length. Nevertheless, it is important to be clear about the focus of *this* contribution, since, as has been argued thus far, the sector is changing and coalescing with some technologies while diverging from others, and it is crucial to understand why and with what effects. Following that, the second section will deal with the interesting question of why industries like new media organize themselves as clusters. These are becoming widespread in new economy sectors, but they were also the spatial form that early capitalism took almost wherever it started, and as Porter (1998) showed for the US, many of those also survive and prosper.

The pivotal part of this section will relate the small-firm clustering phenomenon, where creativity and innovation are pronounced, to overall industry structure, where corporate behemoths like Time-Warner in new media clumsily seek to 'get on board' by acquisition, yet lack the agility and 'absorptive capacity' (Cohen and Levinthal, 1990) to succeed, terminating with their own acquisition by a dot.com firm like America Online (AOL). By 2003, such was the ignominy and so vast the losses incurred ($100 billion) by the merged entity due to AOL's overstating of its advertising revenue that AOL was downgraded to a unit of a division of Time-Warner. On 16 October 'AOL' was removed from the corporate name and within a year all AOL executives had been ousted from senior

positions in the now 'repudiated' merged entity (Klein, 2003). Clearly, such new-economy/old-economy dynamics were interestingly poised at the start of the millennium. Nevertheless, now as then, the predominant industry force remains technological *convergence*.

NEW MEDIA IN TRANSITION

Old media were fairly easy to grasp conceptually: they were products and services that broadcast knowledge, information and entertainment in forms intermediary between the originator and the ultimate consumer of product or service. The 'Gutenberg galaxy', as Marshall McLuhan (1962) called the effect of the invention of the printing press, captures the idea perfectly. The 'word', hitherto accessible only to the priesthood and its interpretations of the source message, became mechanically reproducible as the book, an intermediary object capable of independent, democratic interpretation and use by its consumers. Other communication media such as newspapers, pamphlets and songsheets followed suit. Later, their electronic forms of film, radio, TV and video performed equivalent functions in wider secular fields. So what is new about new media? In one important sense nothing, since CD-ROMs, the Internet, digital databases, computer games content and advanced computer graphics that can simulate anything from tornados to *T. Rex* carry content that informs or entertains as an intermediary between creative talent and consumer. The old, new new thing, to paraphrase Lewis (2000) in respect of new media, was its *convergent* nature. New media involved the capability to have on disk or online a broadcast message that combined still and moving images, text, voice and music as discrete elements of a single product or service. These were made possible because of hardware advances in cabling and routing using upgraded copper or optical fibre, enabling simultaneous transmission of the multiplicity of media – hence multimedia. Clearly, all these media had been previously combinable. Once *The Jazz*

Singer had appeared, moving and still images, voice and music were combined on a single medium. The line of trajectory in old media was locked into elaborations and enhancements of these basic tools. But the key to their integration was their property of supporting the *narrative* flow of the product. Coinciding with the more recent hardware enhancements in cabling and routing came the cultural turn against narrative and the rise of the *spatial* consciousness to challenge the *temporal* (Cooke, 1990). The possible and the desirable interacted in the creation of the multimedia product, a classic example of which would be Microsoft's Encarta encyclopaedia.

One of the earlier intellectual contributions to understanding the nature of new media, presented in 1995 and published as Scott (1998), argued that in California new media took the following form. Making their appearance from the mid 1980s in San Francisco, especially Silicon Valley, and Hollywood, Los Angeles, they intersected high technology and cultural industries. For Scott, the industry was organized into four hierarchical levels. At the base was machinery and hardware, notably computing, communication and associated peripherals and components. Resting on this base was programme interfacing software and systems design. Utilizing the software platform were the visual, audio and print media industries at whose intersection were found *multimedia*. Thus Scott's core definition of multimedia or new media exactly replicates ours in that they exist at the point of convergence of traditional or 'old media' and take the form of discrete combinations of voice, text and visual communication. These discrete combinations are then realized as multimedia products and services such as games and entertainment, educational products, business applications and so on. At the product and service end of this chain are two kinds of actor: developers who actually design and make titles, and publishers that market them. The latter sometimes finance the former who tend to be small-medium enterprises (SMEs). Title publishers are both large (e.g. Disney) and SME in scale. Scott concludes that new media emerged in Hollywood as an

adjunct to the entertainment, film and music industries with studios such as Fox, Disney, Universal and Time Warner active as publishers and commissioners of multimedia titles. Northern California has a little of this, as with Sony Electronic Publishing, and Dreamworks, but it is strongest in production of the platforms enabling multimedia titles to be produced. In addition, more business multimedia products such as financial and business-related database products (e.g. Dataquest) were developed there.

In their definitive collection on the subject, Braczyk et al. (1999) concur with the definitions discussed so far by saying that 'multimedia' has a narrow and a broader meaning. In the former case it is conceived of as a convergence of several digital media that, interestingly, contain time-sensitive (sound, motion pictures) and time-insensitive (text, graphics) elements used interactively to produce an integrated effect. This is an aspect of the novelty of new media. More broadly, rather as the opening remarks of this contribution emphasized, 'multimedia' can be said to describe the present form taken by information and communications technology (ICT). That is, convergence has almost been achieved, unifying the contributions of content developers, programme and service providers, network operators, server and router suppliers, software and computer, telephony and consumer electronics industries. This elaborates the four-level multimedia value chain identified by Scott (1998). The extent of the then relatively recent technological innovations that made multimedia possible was outlined by Egan and Saxenian (1999). They included: operating systems software at 32 and 64 MB for PCs, audio and video processing on PC, storage growth from CD to DVD, high-resolution and flat-panel displays, colour laser printing, software applications for desktop publishing, image processing and editing for audio and video, interface devices like touch screens, graphic scanners, digital cameras and multimedia projectors, and networking through Internet and WWW accessed through TV, PC and, recently, handheld devices. By 2005,

many of these technologies were embodied in 3G mobile telephony.

So we are clear on the technological convergences that have made new media possible. Now it is time to look at some divergences, even though it is essential to remember that, according to Mansell (2000), the digital economy is fundamentally chaotic, 'devoid of shape, form, edges and geography', in the words of a visionary from British Telecom. Hence, among the divergences there are always coalescences caused by institutional actors such as firms and regulators. One such sphere of coalescence is Hollywood where Scott (1999) observed a 'multimedia and digital visual-effects' industry growing apace. As field leader this obviously had implications for new media and motion picture activities of all kinds. The digital visual-effects element of the couplet arose from digital enhancement through computer graphics applied to conventional media. This encompassed and unified hitherto separate fields of multimedia, animation and special effects into a toolbox routinely used in TV and film and video programming. Scott identified, by 1997, 188 firms doing this kind of multimedia work in Los Angeles, mostly in or near Hollywood.

Another diversion was Internet games, a vast market with abiding growth opportunities. Modern games service providers rely on the fact that up to 80 per cent of games can be played in a multiplayer format on the Internet on a hand-held device or a 'box'. The spectrum of providers runs from the lower end, based on a central server enabling up to 30 to be involved in a system which keeps track of the virtual game world in question, to companies supplying massive multiplayer games based in a 'server farm' capable of serving hundreds of thousands of players, British Telecom's Wireplay and smaller firms like Gameplay were then cases in point. Small startups concentrate on the former segment but are also key in designing and writing code for big games firms in the latter. Advertising to build a customer base is done online and much of the burn rate of startups is explained by the need to advertise. The more widely used games technology,

the Sony Playstation 2 or Nintendo Game Boy type with sales of 80 million units has converged with the PC-based multiplayer kind. As Safer (2000) reported, Digital Bridges in early 2000 introduced Wirelessgames.com as a portal delivering multiplayer games to third-generation, wireless application protocol (WAP)-enabled mobile phones. This is a step beyond the large numbers of providers who have developed games playable on the Palm handheld device.

Finally, a further divergence, which, as we have already noted, also comes back to Palms and WAP mobiles, is business information. Despite the leading-edge software to build the global financial nets that were once only the province of currency dealers, but in the dot.com boom, became routinely exploited by day-trading taxi drivers and academics *inter alia*, such systems are characterized by a combination of picosecond speed in monitoring and updating, but a rather dull passivity in service provision. The news cuttings services, while of use, are scarcely interactive and, in consequence, are incapable of supplying the kind of problem-solving advice, tailored to specific need, that is so characteristic of required enterprise support. The dot.com-induced stock market slide after March 2000 cost dearly many such investors and stock option holders who were locked in to swiftly declining paper assets that the popularity of stock markets for non-experts may take a generation to recover.

Curiously, interactivity had been vaunted for decades, since Fowles' *French Lieutenant's Woman*, and in other narrative-oriented entertainment where there is scarcely any market for it. Current cases in point are interactive TV and the cinematically questionable but available interactive ('choose your own plot line and ending') cine-camera developed from the personalized version so successfully deployed in *Blair Witch Project*. But on business information it has yet to surface, leaving global financial markets with relatively unimaginative services in abundance.

Underlining this, Heydebrand (1999) presented a portrait of New York's 'Silicon Alley'. First, New York is home to seven globally significant multimedia firms, among which Dow Jones and Co. (owners of *Wall Street Journal* and other financial titles) is the leading business information specialist. In London, Pearson Group (owners of *Financial Times* and ft.com) and, particularly, Reuters have comparable functions. Of course, New York's dominant old/new media firms dwarf Dow Jones, particularly Time Warner, Viacom, NBC, CBS and the Hearst Corporation, and these also have new media roles in business and financial information as well as entertainment. Pavlik (1999) noted that in 1997 southern Manhattan had 1106 multimedia firms employing 23,390 while midtown and uptown together had 668 firms employing 25,378. The former, 'Silicon Alley', was, as the numbers signify, the home of the small, creative firm cluster. Most of the multimedia energy of such firms was drawn into the dot.com surge and much of what was temporarily a sector with fleeting identity as multimedia was thus better understood as having morphed into that sphere.

It would be remiss not to pay some attention to the larger entertainment segment of the New York new media industry, where more skills remain in niches around computer graphics, special applications programming and content provision and small firms feed to and from corporate giants such as Time-Warner (TW), for a short time AOL–Time Warner as we have seen. An insider's view of some cultural discontinuities involved in such relationships was supplied by Wolff (1998), whose Wolff New Media (WNM) content business created *NetGuide*. In search of a possible acquisition or at least investment, WNM courted Time-Warner and AOL in the 1990s. The TW New Media Group had recently appointed a new general manager of New Media to join the editor of New Media, an old media journalist who, nevertheless, occupied third position on the headed notepaper. The new appointee replaced an executive whose enthusiasm for new media was such that he announced publicly 'the death of the book', something not guaranteed to please TW shareholders. TW had an Online Steering Committee and a president of Multimedia who outranked the head of the

New Media Group, but knew far less about the subject.

The TW New Media Group was responsible for the company's relationship with AOL who published *Time* on the Internet, for which AOL received free advertising in *Time*. The earnings ratio was at least 1 to 30 in AOL's favour by 1994. The Online Steering Committee was formed to solve the AOL conundrum. TW appointed WNM as a consultant to the Online Steering Group. For the editor of New Media, 'content is king' was the mission statement, to which 'technology is destiny' had recently been added. Hence, 'put *Time* on the Web' became the strategy, despite the obvious evidence that AOL customers had rejected that option substantively. Pathfinder, the vehicle for this, cost TW up to $20 million per year to run on revenues of $2–4 million. Meanwhile WNM started courting AOL, only to find them a firm where the supplicant had to organize the whole corporate interaction process, the exact opposite of the rococo administrative structure of Time-Warner. No result came from the interaction with AOL, whose executives gave every indication of seeking an acquirer as much as WNM, except that in early 2000 the acquired turned out to be Time-Warner and the acquirer AOL. The medium had truly taken over the message.

AOL–Time Warner was the first and maybe last new media conglomerate, merging all the multimedia elements of visual, print and audio media into the ISP-dominated infobahn. Sony, Bertelsmann, Viacom and the rest of the pack also came to terms with this content and communication convergence. As we saw, for AOL–Time Warner it unravelled because of incompatibilities, not least of management style. Klein (2003) reported the detestation of Time-Warner executives for the aggressive, accounts-driven management style that had brought swift growth to AOL's stock market valuation. One Time-Warner executive referred to his AOL counterparts as 'gross creeps', hardly grounds for a happy merger of corporate minds (Klein, 2003: 228). So it is important to recognize the overarching role of large and powerful units of multimedia capital such as Time-Warner, who are, generally speaking, not technologically creative except in making first moves and then aggrandizement. They may not be as intriguing to analyse as the lean and agile startups (which of course included AOL at that time) on whom large corporate actors almost completely depend for new media content. But the creativity to achieve scale without imagination is a subject worthy of study in its own right, yet regrettably perhaps, not one that is able to be pursued here. We have, rather, set the scene by exploring the transmutations of new media and defined the field in the process. The next step is to set that field in a wider context of industry organization and spatial dynamics because, despite the power of the corporate sector, there would be few, even transient, new economy industries without the exploitation, innovation and commercialization capabilities of small, dynamic new business entrants. The next section explores the settings in which such firms prosper.

THE CLUSTER IMPERATIVE IN THE NEW ECONOMY

Clustering is neither an unusual nor a new form of business organization. It was present in the beginning of the industrial age where cotton textiles firms in Britain, France and the USA concentrated in industrial districts, and handgun manufacturers famously clustered in places like Springfield, Massachusetts. They did so to access skilled labour and to pick up as free goods the knowhow that was said to be 'in the air' in such places. For much of the twentieth century the ownership of firms in such districts concentrated so that, for example, the classic auto cluster of Detroit was dominated by the big two producers, Ford and GM, with Chrysler some way behind, and now part of Daimler-Benz's global grouping. But these were once clusters of numerous independent assembly and components supplier firms, and when Japanese competition began to bite in the 1980s the giants began to downsize and externalize production back into supply chains

that were by now as much global as local. Simultaneously, new industries such as semiconductor and computer production grew as new small firms entered production in places like Silicon Valley and Boston (Rogers and Larsen, 1984; Saxenian, 1994), and while the evolutionary trajectories of even these two places have diverged, more such clusters have emerged elsewhere in the world, including the developing world (see, for example, Schmitz and Nadvi, 1999). Fired by the early success of high-technology clusters, many administrations tried to emulate Silicon Valley. Most failed dismally, but one case that stands out as successful and policy-driven is Austin, Texas (see, for instance, Henton et al., 1997) where strong private leadership involving business, government and education in association attracted blue chip firms such as Motorola and IBM as well as high-technology consortia such as Sematech and MCC. It was in the 1970s and 1980s that a soft infrastructure of investors and other knowledge-intensive service providers grew in tandem with a harder incubation infrastructure at the University of Texas, to form an establishment known as IC². From this, what had the look of a branch plant economy became more entrepreneurial as firms like Dell and its suppliers came to prominence through endogenous growth.

Clusters have now become a key mode of economic coordination and focus of government policies across the world and for a wide variety of industries. The UK IT industry's cluster prospective group Information Age Partnership definition of a cluster as a 'geographical concentration of interdependent companies and institutions connected by a system of market and non-market links' is a useful starting point, as it captures key elements of competitive *and* collaborative interaction that characterize firm relationships. It also recognizes the importance of *proximity* to those relationships and that important relationships are not limited to those between firms only. It is thus close to Michael Porter's (1998) definition, which is that: 'A cluster is a geographically proximate group of interconnected companies and associated institutions *in a particular field*, linked

by commonalities and complementarities' (emphasis added). This, in turn, underpinned the definition used by the UK Minister of Science for the work of his task force on *biotechnology* clusters, as: 'geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries and associated institutions (for example universities, standards agencies and trade associations) in particular fields that compete but also cooperate'.

There is nothing wrong with these definitions except that they are all *static*, whereas the key feature of clusters is that they are *dynamic*. Hence we prefer the following also to be taken into account. A cluster displays a shared identity and future vision. It is characterized by 'turbulence' as firms spin off, spin out and start up from other firms or institutions. A cluster is an arena of dense and changing vertical input–output linkages, supply chains and horizontal interfirm networks. It is likely to have developed localized, third-party representative governance associations that provide common services but also lobby government for change. A cluster may have caused governments to develop policies to assist cluster development, especially where market failures are present. Over time, clusters can reveal features of emergence, dominance and decline. So we come to a preferred definition of a cluster as: 'geographically proximate firms in vertical and horizontal relationships, involving a localized enterprise support infrastructure with a shared developmental vision for business growth, based on competition and cooperation in a specific market field'.

Why are clusters more prominent now than hitherto? Why does the hierarchical firm, so pronounced a feature of the mid-twentieth-century corporate landscape, no longer necessarily act as the model for economic coordination? There are at least three key reasons for this. First, global competition, initially from Japan and South East Asia, then from the US response to it, caused large corporations to reduce in-house production and administrative overhead while increasing outsourcing and learning, for example, lean production, in order to survive. Second, innovation became a leading

competitive weapon and small, knowledge-based firms, often close to universities, were further up the technological learning curve. Ultimately large firms have, in many areas, outsourced even their R&D functions to such entities in a process called 'open innovation' (Chesbrough, 2003). Third, as we have seen in the case of Time-Warner and new media, the intrinsic rigidities of the hierarchical corporate organization meant rapid learning and accommodation to change could not be easily implemented.

In brief, Porter (1998) holds that a number of advantages are derived from clusters, among which are the following. First, *productivity* gains arise from access to early use of better-quality and lower-cost specialized inputs from components or services suppliers in the cluster. Local sourcing can be cheaper because of minimal inventory requirements and transaction costs generally can be lower because of the existence of high-trust relations and the importance of reputation-based trading. Common purchasing can lower costs where external sourcing is necessary. Serendipitous information trading is more likely in contexts where formal or informal face-to-face contact is possible. Complementarities between firms can help joint bidding and scale benefits on contract tenders, or joint marketing of products and services. Access to public goods from research or standards bodies located in proximity can be advantageous.

Second, *innovation* gains come from *proximity* between customers and suppliers where the interaction between the two may lead to innovative specifications and responses. User-led innovation impulses are recognized as crucial to the innovation process and their discovery has led to a better understanding of the interactive rather than linear processes of innovation. Proximity to knowledge centres makes the interaction processes concerning design, testing and prototype development physically easier, especially where much of the necessary knowledge is partly or wholly tacit rather than codified. Localized benchmarking among firms on organizational as well as product and process innovation is facilitated in clusters. Qualified personnel are more

easily recruited and are of key importance to knowledge transfer. Informal knowhow trading is easier in clusters than through more distant relationships.

Finally, *new businesses* are more readily formed where better information about innovative potential and market opportunities is locally available. Barriers to entry for new firms can be lower because of a clearer perception of unfulfilled needs, product or service gaps, or anticipated demand. Locally available inputs and skills further reduce barriers to entry. A cluster in itself can be an important initial market. Familiarity with local public, venture capital or business angel funding sources may speed up the investment process and minimize risk premiums for new startups and growing businesses. Clusters attract outside firms and foreign direct investors who perceive benefits from being in a specialized, leading-edge business location. These may also be a further source of corporate spinoff businesses.

Clusters work through networks between a variety of business and other appropriate actors who are familiar with each other's expertise, trustworthiness, reliability and willingness both to share relevant assets (e.g. information or lending a machine or employee if needed) and engage in normal business relationships based on market exchange. Networks can be formal or informal, soft or hard (i.e. contractual, with an agreed project and business plan). In high-technology industry, such linkages are likely to involve research organizations such as universities for knowledge, but also indirectly through spinout firms (Cooke et al., 2000). Aspects of this appear in Figure 13.1, which anatomizes key parts of the Cambridge (UK) IT cluster, showing regular cooperative as well as competitive relationships within the cluster.

A key question for policy is: can clusters be built? This refers to the role of policy on the part of different levels of government. While many correctly cast doubt on the difficulty, if not impossibility, of building clusters from zero, this has not stopped governments trying to do this in the past. Technopoles and the cognate notion of 'technopolis' are cases in point.
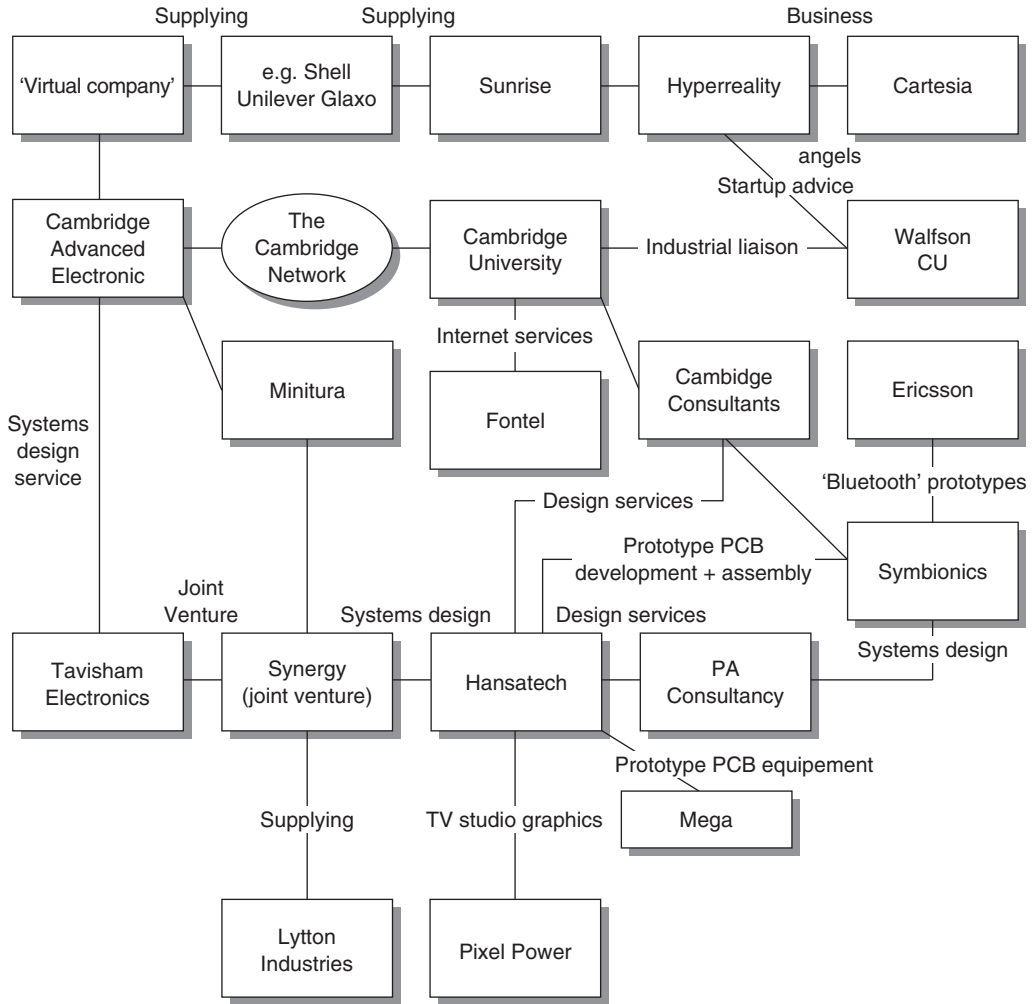
Figure 13.1   *Aspects of the Cambridge IT Cluster*

These are large spaces, sometimes even whole towns or cities, designated by governments as locations for which incentives are available to encourage corporations or public organizations to relocate research and development (R&D) facilities. The aspiration was that these would interact with synergetic growth and innovation effects. France and Japan built 'technopoles' by attracting research branches to co-locate in special zones such as Sophia Antipolis and Tsukuba City. However, most commentators agree these are not clusters. Indeed Japan has abandoned its technopolis programme in favour of a 'clusters' programme since 2001 (Cooke et al., 2004). This is because synergetic interactions scarcely occured despite proximity; most interactions persisted over distance back to corporate headquarters or other corporate divisions elsewhere. There was little evidence of spinoff or other kinds of new firm formation despite this also being a key aspiration. This lack of local linkage denied technopoles the status of clusters. Synergy effects are now understood to be extremely hard to create. But it is now better understood that a 'soft infrastructure' of knowledge-intensive

business services ranging from investment, management, legal, patenting and technology transfer to specialist consultancies is a key presence in most successful clusters. These were typically not present in technopoles. Synergies, meaning a surplus or Gestalt effect created by fruitful interaction, can be assisted enormously by the market transactions of such private intermediaries and the supportive actions of grant-giving public ones.

However, where there is something with which to work, especially in creative and knowledge-intensive activity, then policy may enhance cluster formation. Some examples of this include Finnish regional science and technology policy encouraging universities to set up technology parks on university campuses, with Nokia or other research labs acting as customers to multimedia software and computing services supplied by startups. The Technical University at Tampere has generated a small multimedia cluster on its Hermia Technology Park. As Nokia recognized content to be the key to its future profitability with hardware being outsourced to China, it built a number of new R&D laboratories in proximity to behavioural psychology and cognitive neuroscience research centres of universities such as Helsinki, Tampere and Jyväskäla to access new knowledge applicable to games technologies, notably its N-Gage box and 3G mobile telephony solution. In the US, clusters are often promoted at state level through setting up infrastructure, industry associations, grants, tax credits and R&D credits. But there still has to be a knowledge-generating source in research labs or other key firms.

Stimulated by the evident success of Silicon Valley, California in the 1970s and 1980s, many national and regional governments sought to encourage the formation of high-technology industry complexes by earmarking budgets and special high-tech development zones, modelled to some extent on the pattern established by the science park at Stanford University, founded in 1951 (Castells and Hall, 1994). It is well known that Frederick Terman, later Provost and Vice-President at Stanford, was the driving force behind Stanford Industrial Park, as it was officially known, and that among his student entrepreneurs were the founder of Litton Industries, and later Hewlett and Packard, preceded as tenants on the park by Varian and succeeded by Fairchild Semiconductors. Fairchild was the matrix for Intel, National Semiconductors, American Micro Devices and some 40 other US chip manufacturers from 1957, when the 'Shockley eight' began to find their feet.

The science-push emphasis of the story fitted in well with the dominant *linear* model of innovation then at the forefront of understanding of the relationship between scientific progress and the commercialization of products and processes. Clearly also, for what, with hindsight, were the truly radical innovations of semiconductors, namely integrated circuits and microprocessors, technology push was a significant impulse, at least in relation to civilian applications. Even so, the role of the Department of Defense and the National Aeronautics and Space Administration as *users* of miniaturized computers and guidance systems has perhaps been highlighted less than their role as suppliers of large-scale *funding* for the development of microcircuitry. We still know relatively little about the nature and extent of interaction between users and technologists at the early stage of the development of these new technologies, though it has been argued that 67 per cent of the functional source of innovation development for semiconductors was *users* and only 21 per cent *manufacturers* (von Hippel, 1988: 4).

To return to the efforts by policy-makers to model high-tech innovation on developments at Stanford and Silicon Valley, it is clear that most approaches have involved the idea of co-locating research centres and innovation-intensive firms in science and technology parks. In some cases this has involved designating whole cities as science cities or technopoles. Although benefits have been accrued from such plans, there is also in the literature that reviews such developments a frequent sense of disappointment that more has not been achieved. In cases drawn from France and Japan, countries that have arguably proceeded furthest with the *technopolis* policy, a certain absence of *synergies* has been observed

among co-located laboratories and firms. Science parks, in themselves, have not always met the expectations of their founders and efforts have been made to learn from early mistakes. Nowadays, in response to the improvement in understanding of innovation as an interactive, possibly systemic process, more attention is paid to the factors that lead to embeddedness among firms and innovation support organizations (Granovetter, 1985). This anthropological idea refers to the institutional and organizational features of community and solidarity, the exercise of 'social capital' (Cooke and Wills, 1999; Putnam, 1993) and the foundations of high-trust, networked types of relationship among firms and organizations. To some extent also, there is emerging recognition that science parks are a valuable element but not the only or main objective of a localized or regionalized innovation strategy. A good deal of research has been conducted which helps understanding of the nature and range of interaction among firms and organizations engaged in innovation (see, for example, Acs, 2000; Braczyk et al., 1998; Cooke and Morgan, 1998; Cooke et al., 2004; de la Mothe and Paquet, 1998; Edquist, 1997) and policy is moving towards a notion of the *regional innovation system* as an important level at which strategic innovation support is appropriate (Cooke, 1992; Cooke et al., 2000; Tödtling and Sedlacek, 1997).

The French and Japanese examples of technopole implantation help us learn how difficult it is to plan clusters. The French were the first to experiment with the idea of technopoles at Grenoble with Meylan-ZIRST (Industrial Zone for Research in Science and Technology). This has concentrated many public and private research laboratories but produced few synergies among smaller or even larger firms locally. Our example is that of Sophia Antipolis, which has eventually succeeded, like Meylan-ZIRST, in attracting government research laboratories and larger private investment but is perceived still to suffer from the relative absence of interactive innovation. Even in Grenoble, Rallet and Torre (1998) noted that despite strong specialization in

health technologies, research and training infrastructures were 'poorly connected' with local industry and industrial cooperation has been for a long time 'considered insufficient'. De Bernardy (1999) also suggested that, to the extent collective learning was present in Rhône-Alpes it was informal, fragile and vulnerable to market pressures.

Sophia Antipolis

Established in 1972 as a personal mission of Pierre Laffitte, co-director of the prestigious Paris École des Mines, Sophia Antipolis started slowly with little interest in the idea from business or the public sector. After 1975 a second launch was aimed at attracting R&D from US firms. Some, such as Digital, came and were joined by French firms Thomson and L'Oréal, and government pharmacological and information technology laboratories followed. By the early 1990s Sophia Antipolis had 14,000 employees with 9000 of them directly engaged in technological activities (Longhi and Quéré, 1993). Among the US firms locating development units to introduce products to the European market were Cardis, Dow and Rockwell (in addition to Digital).

In Longhi and Quéré's (1993) evaluation the following key points were made. First, innovation networks were still marginal in Sophia Antipolis, especially regarding local activities and employment. While Digital and Thomson had organized a local network, as had two pharmacological firms, interacting with production and research skills locally, few dynamic innovations had ensued and learning from local partnerships was minimal. Second, where a few linkages existed they were almost exclusively vertical, never horizontal. Firms were isolated from their parent organizations and feared 'poaching' from other co-located laboratories. Further, active *mistrust* existed between innovative large firms and local research institutions, although not between the latter and local small, innovative firms. The fear of losing proprietary knowhow was behind this mistrust. Third, there was no local labour market. There was almost no

mobility between firms or organizations. In each case an internal labour market operated. The risk of information exchange was the main reason for this absence of labour market mobility. This was the single most obvious instance of the lack of an innovative network or milieu culture at Sophia Antipolis.

In terms of learning from this experience, the following points are of considerable significance. There were, by 2000, weak signs of innovative interaction between larger firms seeking, for example, locally available software services. Some French firms were being attracted to Sophia Antipolis by aspects of its critical mass and network potential. More new firms were still needed to create sufficient critical mass for synergies and creative innovation. Where external networking existed it largely remained a vertical, supply-chain relationship. The public-sector policy networks were the most significant factor in potentially building up local innovative networks. Early on, their main focus had been on 'selling square metres'. Thus, Longhi and Quéré (1993) concluded Sophia Antipolis was only a qualified and rather one-dimensional economic success. A more recent paper by Longhi (1999) underlined the missing preconditions for collective learning in the absence of a science base, spinoff firms and weak local interactions. However, some moderation of the position occurred when the University of Nice moved its IT departments to Sophia Antipolis in 1986, helping create a local labour market supply resource. Global firms were thereafter making stronger local linkages with startups and research institutes. Elements of a localized form of systemic innovation began to emerge after 25 years.

Technopoles in Japan

In Japan, a major effort to build a scientific pole or cluster occurred at roughly the same time as in France. Tsukuba originated in 1958 as a satellite science city for Tokyo. Tsukuba met the criteria regarding infrastructure, location and transportation later used to judge which cities would join the technopolis programme. It was mainly government funded: the Japan Housing Corporation built housing for nearly 125,000 people and the Ministry of Construction paid for infrastructure. Laboratories and a science and technology university were relocated to the science city. Only in the 1980s did private industry show interest in the site, following construction of a motorway to service the International Science and Technology Expo of 1985. Public investment by 1990 was $1.1 billion. But many national research institutes (e.g. Inorganic Materials; Disaster Prevention; High Energy Physics; Health and Hygiene; and Environment) continued to experience difficulties in developing linkages other than the *vertical* ones typical of government agencies. Hence they did not share facilities or link to universities or private industry. There was also a lack of new spinoff firms. Tsukuba was seen as an isolated island, although in the 1990s more local conferences and information exchanges began to occur. But, in general, there was relatively little synergy among organizations.

An evaluation of the Japanese technopolis programme was reported in Castells and Hall (1994). They concluded that there had been failure to achieve the original vision. Some were dormitory or conventional new towns, not technopoles. There was a branch-plant syndrome as decentralized firms mainly conducted routine assembly work for the parent company. There had been failure to develop university–industry links; the main links were with local technical laboratories rather than universities. Notable was a lack of 'soft infrastructure' consisting of venture capital, R&D consortia and university research networks. There had been a failure to relocate R&D laboratories. Before decamping to China, these had been relocating closer to headquarters than to factories. Problematic was a lack of interindustry linkages because of the weak R&D and strong branch-plant characteristics. There was a lack of spinoff for the same reasons as the absence of interindustry linkages and universities. In general, the conclusion made by Castells and Hall (1994) was that the Japanese technopolis programme had not yet proved itself successful in terms of interactive innovation. As we saw, by 2001 the programme had been closed down.

Neither France nor Japan became leading players in new economy sectors, new media in particular, except for handheld electronic games by Sega and the like (though recall most of the creative work is done by startups in the UK and US). Nonaka and Reinmöller (1998) had an interesting take on this, at least for Japan. They referred to Japan's problem as 'the legacy of learning'. That is, Japan spent so much time and energy on catching up with the West by learning from its practices and seeking to improve upon them in mature sectors, that its economy became locked into old economy activities and its universities and technopoles failed to anticipate any new economy areas. Now there is a frantic effort to relearn and leapfrog as once before, but economic conditions are far less propitious for achieving this than they once were. France also suffers from an overdependence on institutional structures that are state-led and subsidized, a predeliction for mature old economy sectors and a weak base in the new economy. This could be said of the other European big-hitting economies: only the UK has a good presence in new economy business, including new media, while Germany and Italy are adrift in major ways despite strong German media corporations like Kirch and Bertelsmann.

NEW MEDIA CLUSTERS AND THE INDUSTRY TRAJECTORY

We thus do not find much 'new economy' industry, particularly that relating to new media, to be satisfactorily built by public policy from scratch, with the small but interesting exception of the Finnish policy of inducing multimedia firms from technology faculties linked to a proximate and exacting user such as Nokia. More typical are the following five cases in cities varying in size from the global metropolitan to the regional business or administrative capital, where the unifying feature is the overwhelming importance for production of the kind of small firm-dominated clusters described in the preceding

section, connected to large, often global customers, located not in geographic but in functional proximity. Functional proximity means 'virtual space' whereby a customer and supplier may be extremely close in their specific shared interest (in an aspect of new media, for example) but geographically poles apart. Of the two, geographic proximity is the more important from a creativity or innovation capabilities point of view, but of course without finance – especially in new media where there are few public research grants available – there is no demand. So they are conceptually as important as one another, constituting a global capabilities relationship that is fundamental to a given new economy sector. In the largest cities, geographic and functional proximity may coincide (see, for further analysis, Rallet and Torre, 1998).

A good example of the latter case occurs in London, where small, creative new media firms are found in a cluster in Soho and numerous large corporate consumers are found in rather less funky locations in the West End. Soho is interesting in terms of industrial history, having once been London's garment district. Accordingly, comparatively large working spaces were available when these workshops and small factories were no longer viable once scale economies entered the business. The UK film industry has for long been managed and had its distribution arranged from Soho, as to some extent has the recorded music industry. But most famously Soho became one of Europe's leading adult entertainment centres with outstanding jazz and blues clubs, strip joints, and gourmet as well as more affordable restaurants and pubs with artistic clienteles. Much of this economy operated in basements, but in the 1960s into the former clothing workshops upstairs entered the UK software industry, represented by firms like Logica and Hoskyns. The large, relatively open-plan working spaces with attractive iron-frame building construction and cheap rents were ideal for such firms. So unlike SoHo, New York, where such industrial spaces were adaptively reused by artists, helping leapfrog the area into a loft-living cultural

space of which one part was new media, Soho, London possessed the fine tilth of multiple cultural forms, including old media, the arts, entertainment and advertising from which multimedia could naturally grow.

As Nachum and Keeble (2000) showed, London has at least 70 per cent of UK employment in media and 90 per cent in music. Of this, Soho captures about 70 per cent and, as they said, 'The entire chain of production – film production and post production, film distribution and sales agents, design, photography, music, advertising – is available in an area of about one square mile' (2000: 11). Soho is also home to foreign media firms as well as those from the UK. Hence multimedia in London has a bias towards traditional media and advertising, growing from the audio, video and print media in the neighbourhood. The main kinds of new media market served involve corporate presentation, entertainment and leisure, particularly Internet games, and advertising and marketing, notably development of Internet websites. In a study by Russ (1998) he shows that London also has subclusters in Covent Garden, Clerkenwell and Shoreditch. The first named is well known as one of Europe's leading urban cultural zones, the ambience of which was reinvigorated when the capital's fruit and vegetable market was adaptively reused for shopping and leisure activities to complement its traditional function as one of the world's leading places for opera. The other two are in London's East End, former industrial and working-class zones; Clerkenwell was once London's clock-making quarter. These locations are selected because they are in cheap rent areas, yet the EC1 postcode is seen as valuable owing to its proximity to central London's huge financial district. Much of the market for these firms is governed by the variety of clients locally available, especially in business services. Although far smaller than the Soho clusters, firms in these mini-clusters congregate for the same reasons, notably that it is useful to be co-located as an insurance against breakdowns of equipment or for subcontracting. Trust in each other is highly valued and accessed as a normal business 'spillover'.

In Heydebrand's (1999) and Pavlik's (1999) studies of multimedia in New York, as we have seen, the entertainment and financial sectors are powerful drivers of the industry with both functional and geographic proximity being key features, albeit, as in London, the precise streetblocks occupied by the corporate giants are somewhat upscale of those of the new media firms themselves. In south Manhattan, especially around SoHo and the iconic 55 Broad Street, where was established the New York Information Technology Center, business, as elsewhere, involved entertainment software, Internet services, CD-ROM title development and website design. Surrounding them functionally and spatially are the advertising, marketing, entertainment, education, publishing and TV, film and video producers and publishers. Heydebrand (1999) saw a three-level structure to the industry with the corporate giants resting on the mass of new media businesses who themselves relate importantly to Silicon Alley's creative and innovative capability as represented particularly strongly by 55 Broad Street. Because the last named is unique to New York, it is more interesting to explore its existence as a public–private intervention than to repeat the locational lineages and rationales of the 1000 plus startups in and around SoHo. That it functions as a cluster with horizontal and vertical networks based on trust, exchange, co-bidding and competition on contracts, subcontracting and knowhow and equipment sharing as in London, is made clear by Heydebrand (1999) and Pavlik (1999) in their accounts.

The development at 55 Broad Street is different in that it is the product of the new economy governance practice of 'associationism' (Cooke and Morgan, 1998). With its first meeting in mid 1997 the New York multimedia innovation network set a mission of developing the city as the global capital of multimedia. It united mayoral and gubernatorial representation, Columbia University's NSF-backed Engineering Research Centre in multimedia, the finance and services community, venture

capital, leading multimedia startups, major multimedia companies, arts and culture groups and industry associations. They met in the New York Information Technology Center, 55 Broad Street, brainchild of developer William Rudin, who invested $40 million in superwiring the building as an incubator for multimedia startups. Technologically the building offered, in 1997, turnkey multimedia transmission with satellite access, desktop fibre optics, C5 copper, video conferencing and 100 MB per second Internet bandwidth. There were 72 tenants in 1997, including International Business Machines and many startups in design, reportage, security and research among others. The association, like other cluster governance networks has policies to lobby for tax, equity and rent incentives, business support programmes and expanding incubator opportunities. By 2005 as well as startups it housed the likes of Cap Gemini (software), Nokia (content), Level 3 (communications) and Sun Microsystems (Java mobile devices).

We have already given some attention to Scott's (1998, 1999) studies of Californian multimedia. As we have seen, they are closely linked to the software and peripherals sectors of Silicon Valley, and business and education products, often for San Francisco clients in the north, with the Hollywood entertainment cluster in southern California being the driver of multimedia in Los Angeles. There are many smaller and startup businesses in the clusters, with many of the standard characteristics found generically elsewhere. Geographically, San Francisco's multimedia firms are strung out along Route 101 from south of San Jose to San Mateo and the main concentration in downtown San Francisco, across the Golden Gate bridge to northern Marin County. In Los Angeles, the axis is much less attenuated, concentrated on a line from Burbank through Hollywood to Santa Monica. In California, there are more developers and hardware/software technicians in the San Francisco area and more entertainment and communication companies in Los Angeles. They also overlap somewhat with pre-existing software and

computing clusters, gaining externalities or 'spillovers' from such co-location. Median firm size is small, converging upon nine employees, though it is supplemented with freelancers as required by specific projects; large firms tend to have a more stable labour force profile. Creative workers are rather intensively employed in the industry, at a level approximately equivalent to those employed in technical and business functions together. Firms market products globally but interact in production highly locally. Over half the value of sales is accounted for by inwardly or outwardly subcontracted activities, more than two-thirds of which is local. The San Francisco cluster is more 'associative' (Cooke and Morgan, 1998) in the sense of having developed representative organizations, but real service support is largely private rather than public in origin, except for close association with universities in the Los Angeles cluster.

A second case, of special interest because of its cluster identification and warehouse district location, is that offered by Brail and Gertler (1999) which anatomized the multimedia industry of Toronto, Canada. Underlining the functional division of the industry between developers and publishers by reference to the Canadian Interactive Multimedia Arts and Technologies (IMAT) distinction between *producers* and *publishers*, Brail and Gertler segment the market into four: corporate, education, entertainment, and information/reference. They speculate that *health* may be developing as a new segment. Interestingly, evidence is advanced of the Ontario Film Development Corporation's view that multimedia, like the film/TV industries, shows increasing *vertical* integration as producers attempt to control distribution channels. However, Brail and Gertler's research evidence suggests this is a misreading of the situation and that most Canadian multimedia firms are independent, small, creative and dualistic (full-timers and freelancers) just as in California.

The Toronto study identified some 300 firms in Ontario (from a Canadian total of some 560), of which 201 (67 per cent) are in

metropolitan Toronto. The largest proportion were located near the city centre in former inner-city industrial areas. These displayed flexible workspaces, heritage buildings, proximity to other cultural industries, central business services and clients. Toronto combines two capital functions, corporate/financial and cultural (publishing, film, broadcasting) which acted as magnets for multimedia firms. Research with firms in face-to-face interviews revealed that locational preference was determined by the relational questions noted earlier, flexible and affordable space, and the 'downtown' ambience. Clients were mainly Toronto based but links were developing with the California clusters. Interviewees reported little interfirm information sharing, a competitive ethic, and low-trust relationships at the horizontal level, i.e. between firms of similar size and with similar or complementary assets. Informal knowhow sharing occurs between individuals rather than firms. Confidentiality clauses and secrecy on competitive bid prices are normal even though there are few competitors for contracts. Collaboration among firms occurs but on a strict 'need to know' basis; joint ventures are a favoured mode of collaboration. Finance is precarious, based on venture capital and involving trading of product rights in exchange for funding. High marketing and distribution costs mean firms specialize in customized products, unless they are large, generic producers. Public support for the industry is strong at national, regional and local levels, with funding of projects available from the province of Ontario.

Finally, to show the importance of the link to old media and their re-regulation in the UK, first in stimulating the rise of independent TV programme producers who, second, stimulated directly through spinoff, and indirectly as a market, the formation of multimedia activity, we may look at the case of Cardiff, capital of Wales, one of the UK's four constituent countries. Here we will show both the cluster structure of the industry and the organogram of the wide variety of private and public actors that act as the enterprise support infrastructure for the cluster system,

arranging scholarships and bursaries for different kinds of human capital; representing the industry at Cannes, Venice, Los Angeles and other major festivals; and pump-priming or assisting in small-firm bootstrapping to try to ensure that this small and fledgling industry, dependent mainly on a regional market but pushing to sell more widely, evolves. Cooke and Hughes (1999) provide an account of the industry derived from a survey of 300 firms in multimedia and media, animation, graphics, creative arts and services; 48 (16 per cent) were core multimedia producers (online or offline producers). Of the 145 firms responding to the questionnaire (48 per cent response rate), 28 (19 per cent) were core producers. Of these firms, 17 were specifically set up to produce online and offline products such as CDs composed of film and TV clips for entertainment; CD-interactive musical instrument tutoring; geographical information systems; financial trading CD databases and media business CD databases along with vocational training CDs. A further 11 were providers of Internet services or web page designers. Three of the first group and six of the second are currently located in Cardiff Bay.

In Figure 13.2 the degree of co-location and the known market and non-market interactions between firms are visible. Thus, for obvious reasons, editing firms and the manufacturer of editing equipment interact, but they also cross-connect to the CD-ROM and web design, computer graphics, Internet services and animation firms according to need. Not all firms are located in the main multimedia cluster district in the waterfront area, once the home to the commercial activities of the largest coal-export port in the world; many are dotted around the city of Cardiff. Nor are all firms shown, which would be graphically impossible, so this is a cut across the industry in Cardiff, rather as that of Cambridge was in the previous section. In Figure 13.3 can be seen the rather elaborate associational infrastructure and its functions that underpins the new media and old media industries in Wales.
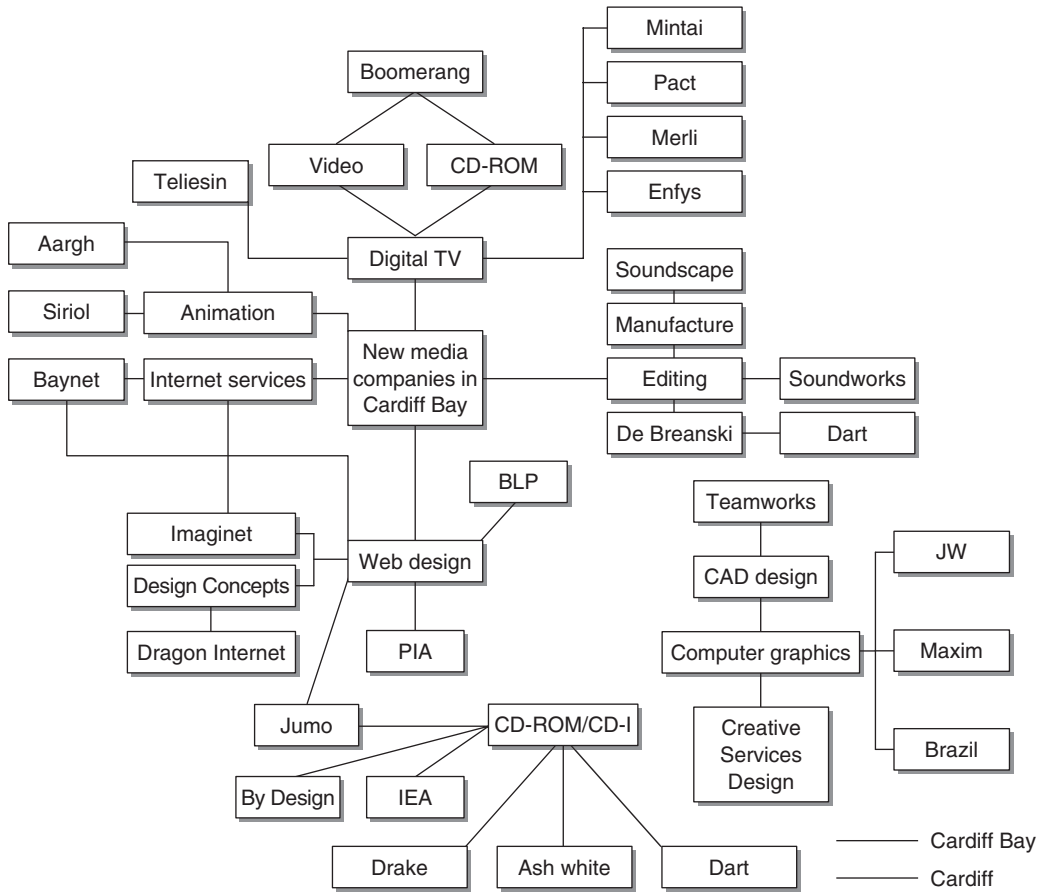
Figure 13.2   *New media companies in Cardiff and Cardiff Bay (selected)*

The relative prominence of this small-scale industry is testified for by the fact that two of its film outputs, *Hedd Wyn* and *Solomon a Gaenor* (both Welsh language titles), and two cartoons received Oscar nominations in the foreign film and animation categories in the 1990s and 2000. Historically, Wales' contribution to Hollywood had been supplying movie stars like Ray Milland (né Reginald Truscott-Jones), Richard Burton (né Richie Jenkins), Anthony Hopkins, Catherine Zeta Jones and Ioan Gruffydd. The promotional activities of an organization like Screen Wales are of some assistance in getting actual feature films before the appropriate assessment panels. However, more prosaically and of more daily importance are the contracts small media firms get from the three main publishers, BBC, HTV and S4C. Screen Wales also helps them access EU, UK Lottery Film Fund or regional (e.g. the $20 million Wales Film Fund, a public venture capital source) grants and financing through the EU Information Society and Media programmes, or special help from Cardiff's Media City Initiative. So, as in Hollywood, particularly, London, New York and Toronto, but at a smaller scale, new media in Wales are quite closely connected to old media, but developing an identity of their own to some degree before being transmuted, as elsewhere, into Internet
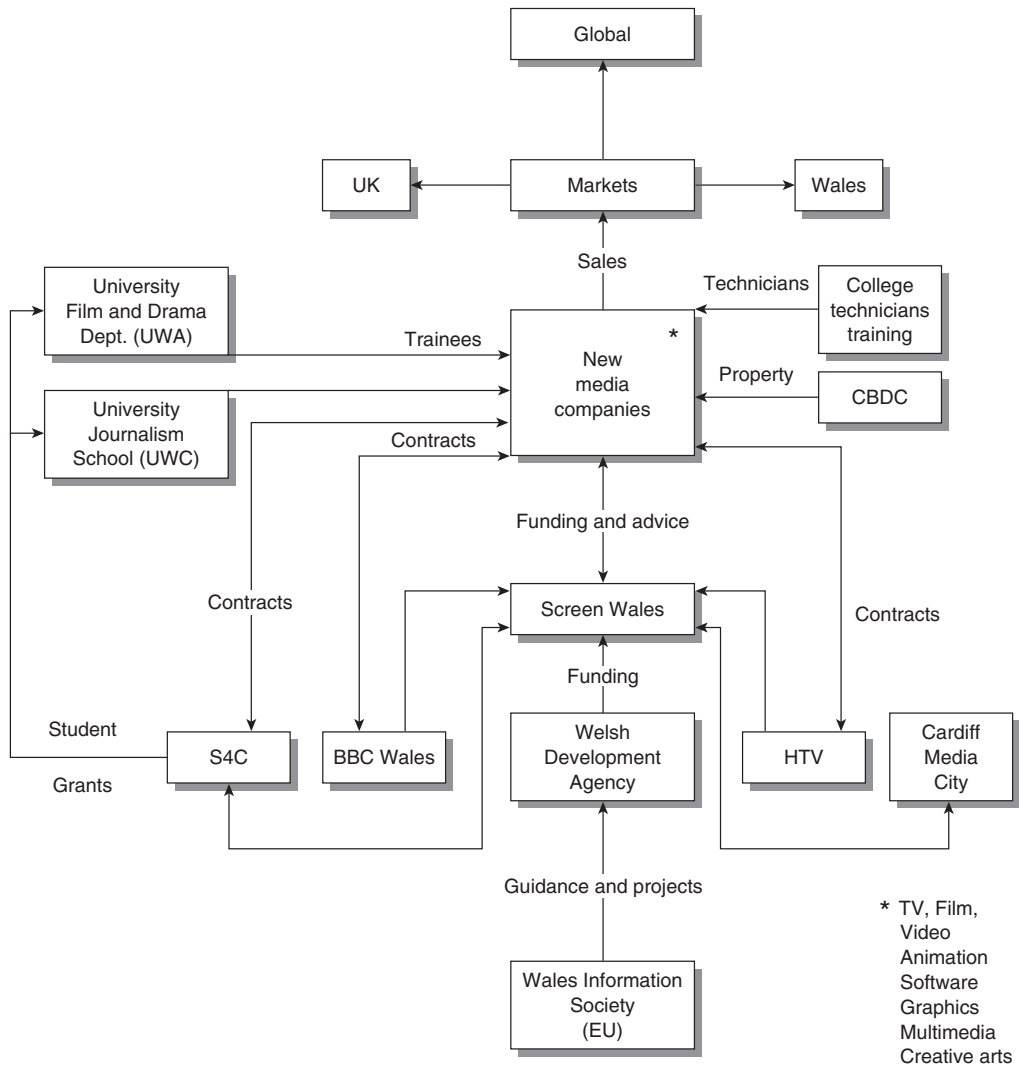
Figure 13.3 *The Cardiff new media cluster*

and other means of communicating online, entertainment, business database, educational, corporate presentation and large- and smaller-scale website design and maintenance.

CONCLUDING REMARKS

Space does not allow for fuller reflection on the movements and transitions that have been registered in this account of the business and spatial dynamics of this burgeoning new industry. In drawing the discussion to a close, three key things stand out. The first of these is that there is a considerable amount of movement, coalescence and divergence but all within an overarching and strong tendency towards technological and even content convergence in new media. Nowadays, all the older media that converged to form new media are available on a 3G mobile phone. They may evolve distinctive

forms inherited from the past, like TV, radio and music channels. More likely, they will develop integrated website-like presentational forms with footer text scrolling, video streaming and multiscreening for news and action presentation and music overdubs. This could be seen on some specialist TV channels by 2000, and grew, mainly for monitoring rather than 'absorptive watching' media programming. New media will join traditional media rather than replace it, just as Internet shopping will join 'going to the shops' rather than replacing that activity. There will be more rather than less choice of media experiences.

Second, when we look at the industry dynamics and their economic geography, we find new media to be generically similar to other new economy sectors like IT and biotechnology. These are characterized by small startup firms spinning out from a creative or technologically innovative base, clustering together for reasons of mutual support, knowhow trading, trustful exchange and industry monitoring but, essentially, remaining co-located in the now classical form of the geographic cluster. Firms in such clusters reduce risk by moving into *applications* domains where they use their expertise in new activity markets like client-driven multimedia public relations, event management and conference organization. This is the functionally diversifying but technologically convergent character of the production, or supply of value-added knowledge, side of the equation. Clusters form near knowledge centres like universities, or in new media, where street life is vibrant. Thus far, the new media businesses that have broken free of the hegemony of large old media corporate control are America Online, that ballooned then burst as we saw, and the more specialist businesses like Amazon.com or Yahoo! that have prospered, albeit the latter now integrated into the UK company BT's corporate set-up. These firms grew massively in scale and market capitalization at tremendous speed, without in some cases troubling the accountants to count profits, since there were none. Traditional IT is much more conservative in its business development planning than some of these new

media/Internet types of firm, and perceived as less risky for obvious reasons. They too have displaced behemoths like IBM from pole position in IT, Microsoft and Intel being the key cases in point. Nevertheless, despite the present power of clusters, firms in them still require large corporations as clients and milestone project funders.

Finally, while new economy markets are dynamic, keeping first-mover advantage often reveals market failures. Supporting fledgling new media businesses and whole strands of the industry requires concerted efforts by a range of private and public actors operating associationally. This is well exemplified by the support given to the essentially private 55 Broad Street multimedia scheme, which is looking to the future of New York's position on a global basis. In Cardiff, a smaller-scale activity with roots in a relatively immature independent old media sector gains some valuable infrastructural support, human capital and global promotion from the public and private collaboration system put in place in Wales. In the final analysis, these are necessary but not sufficient to sustain businesses in swiftly changing fields like new media. Markets will dictate survival or annihilation, and markets are increasingly global, but paradoxically, as this contribution has shown, the creative spirits, innovative ideas and social interactions that make new media possible as commercial products are normally clustered in remarkably localized spaces of the new economy.

REFERENCES

Acs, Z. (ed.) (2000) *Regional Innovation, Knowledge and Global Change*. London: Pinter.

Braczyk, H., Cooke, P. and Heidenreich, M. (eds) (1998) *Regional Innovation Systems*. London: UCL Press.

Braczyk, H., Fuchs, G. and Wolf, H. (eds) (1999) *Multimedia and Regional Economic Restructuring*. London: Routledge.

Brail, S. and Gertler, M. (1999) 'The digital regional economy: emergence and evolution of Toronto's multimedia cluster', in H. Braczyk, G. Fuchs and

H. Wolf (eds), *Multimedia and Regional Economic Restructuring*. London: Routledge.

Castells, M. and Hall, P. (1994) *Technopoles of the World*. London: Routledge.

Chesbrough, H. (2003) *Open Innovation*, Boston: Harvard Business School Press.

Cohen, W. and Levinthal, D. (1990) 'Absorptive capacity: a new perspective on learning and innovation', *Administrative Sciences Quarterly*, 35: 128–52.

Cooke, P. (1990) *Back to the Future: Modernity, Postmodernity and Locality*. London: Unwin Hyman.

Cooke, P. (1992) 'Regional innovation systems: competitive regulation in the new Europe', *Geoforum*, 23: 365–82.

Cooke, P. and Hughes, G. (1999) 'Creating a multimedia cluster in Cardiff Bay', in H. Braczyk, G. Fuchs and H. Wolf (eds), *Multimedia and Regional Economic Restructuring*. London: Routledge.

Cooke, P. and Morgan, K. (1998) *The Associational Economy: Firms, Regions and Innovation*. Oxford: Oxford University Press.

Cooke, P. and Wills, D. (1999) 'Small firms, social capital and the enhancement of business performance through innovation programmes', *Small Business Economics*, 13: 219–34.

Cooke, P. Boekholt, P. and Tödtling, F. (2000) *The Governance of Innovation in Europe*. London: Pinter.

Cooke, P., Heidenreich, M. and Braczyk, H. (eds) (2004) *Regional Innovation Systems*. 2nd edn. London: Routledge.

De Bernardy, M. (1999) 'Reactive and proactive local territory: co-operation and community in Grenoble', *Regional Studies*, 33: 343–52.

De la Mothe, J. and Paquet, G. (1998) *Local and Regional Systems of Innovation*. Dordrecht: Kluwer.

Edquist, C. (ed.) (1997) *Systems of Innovation*. London: Pinter.

Egan, E. and Saxenian, A. (1999) 'Becoming digital: sources of localization in the Bay Area multimedia cluster', in H. Braczyk, G. Fuchs and H. Wolf (eds), *Multimedia and Regional Economic Restructuring*. London: Routledge.

Granovetter, M. (1985) 'Economic action and social structure: the problem of embeddedness', *American Journal of Sociology*, 91: 481–510.

Henton, D., Melville, J. and Walesh, K. (1997) *Grassroots Leaders for a New Economy*. San Francisco: Jossey-Bass.

Heydebrand, W. (1999) 'Multimedia networks, globalization and strategies of innovation: the case of Silicon Alley', in H. Braczyk, G. Fuchs and

H. Wolf (eds), *Multimedia and Regional Economic Restructuring*. London: Routledge.

Klein, A. (2003) *Stealing Time: The Collapse of AOL Time-Warner*. London: Simon & Schuster.

Lewis, A. (2000) *The New New Thing*. New York: Norton.

Longhi, C. (1999) 'Networks, collective learning and technology development in innovative high technology regions: the case of Sophia-Antipolis', *Regional Studies*, 33: 333–42.

Longhi, C. and Quéré, M. (1993) 'Innovative networks and the technopolis phenomenon: the case of Sophia-Antipolis', *Environment & Planning C: Government & Policy*, 11: 317–30.

Mansell, R. (2000) 'Knowledge and the Internet: the end of control?'. Sussex University Professorial Inaugural, Falmer, Science Policy Research Unit.

McLuhan, M. (1962) *The Gutenberg Galaxy: The Making of Typographic Man*. Toronto: Toronto University Press.

Nachum, L. and Keeble, D. (2000) 'Foreign and indigenous firms in the media cluster of Central London'. Working Paper no. 154, Cambridge University, Centre for Business Research.

Nonaka, I. and Reinmöller, P. (1998) 'Toward endogenous knowledge creation for Asian economic development', *in Wissenschaftszentrum Berlin Jahrbuch*. Berlin: WZB.

Pavlik, J. (1999) 'Content and economics in the multimedia industry: the case of New York's Silicon Alley', in H. Braczyk, G. Fuchs and H. Wolf (eds), *Multimedia and Regional Economic Restructuring*. London: Routledge.

Porter, M. (1998) *On Competition*. Cambridge, MA: Harvard Business School Press.

Putnam, R. (1993) *Making Democracy Work*. Princeton, NJ: Princeton University Press.

Rallet, A. and Torre, A. (1998) 'On geography and technology: proximity relations in localized innovation networks', in M. Steiner (ed.), *Clusters and Regional Specialization*. London: Pion.

Rogers, E. and Larsen, J. (1984) *Silicon Valley Fever*. New York: Basic.

Russ, A. (1998) 'Multimedia: a new industry in a global city'. Unpublished MSc thesis, Department of Geography, King's College, London.

Safer, S. (2000) 'Get 'em while they're young: America's teens may be leading the handheld revolution', *Red Herring*, 78: 290.

Saxenian, A. (1994) *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Cambridge and London: Harvard University Press.

Schmitz, H. and Nadvi, K. (1999) 'Clustering and industrialization: introduction to the special issue', *World Development*, 27: 1503–14.

Scott, A. (1998) 'From Silicon Valley to Hollywood: growth and development of the multimedia industry in California', in H. Braczyk, P. Cooke and M. Heidenreich (eds), *Regional Innovation Systems*. London: UCL Press.

Scott, A. (1999) 'Patterns of employment in southern California's multimedia and digital visual effects industry: the form and logic of an emerging labour market', in H. Braczyk, G. Fuchs and H. Wolf (eds), *Multimedia and Regional Economic Restructuring*. London: Routledge.

Tödtling, F. and Sedlacek, S. (1997) 'Regional economic transformation and the innovation system of Styria', *European Planning Studies*, 5: 43–64.

Von Hippel, E. (1988) *The Sources of Innovation*. Oxford: Oxford University Press.

Wolff, A. (1998) *Burn Rate*. London: Orion.

14

Globalization and the Structure of New Media Industries

TERRY FLEW AND STEPHEN McELHINNEY

GLOBALIZATION AND THE MEDIA

Globalization is a term used to describe, and make sense of, a series of interrelated processes including:

- internationalization of production, trade and finance, with the rise of multinational corporations, reductions in cross-border tariffs upon flows of goods and services, the deregulation of financial markets, and the rise of Internet-based electronic commerce;
- international movements of people (as immigrants, guest workers, refugees, tourists, students and expert advisers), the development of diasporic and emigrant communities, and the increasingly multicultural nature of national societies;
- international communications flows, delivered through telecommunications, information and media technologies such as broadband cable, satellite and the Internet, which facilitate transnational circulation of cultural commodities, texts, images and artifacts;
- global circulation of ideas, ideologies and 'keywords', such as the so-called export of 'Western values', 'fundamentalism', 'the war on terror', democracy, feminism, environmentalism;

- establishment of international regimes in intellectual property which entrench the enforceability of ownership of knowledge and information;
- emergence of local resistance to globalization for domestic political and cultural objectives, by nationalist movements of the political right, progressive and anti-colonialist movements of the left, and extremist religious movements;
- development of international governmental organizations, including regional trading blocs such as the European Union (EU), the North American Free Trade Agreement (NAFTA), the Association of South East Asian Nations (ASEAN) and the Asia–Pacific Economic Cooperation grouping (APEC);
- formation of cultural, professional and standards bodies such as UNESCO, the World Trade Organization, the World Intellectual Property Organization, the European Broadcasting Union, the Asian Broadcasting Union and the International Telecommunication Union;
- the increasing activity of global non-government organizations (NGOs), such as Amnesty International, Greenpeace, Médecins sans Frontières and the Red Cross in domestic and international politics;

- the contested influence of international laws on national policy formation and efforts to sideline multilateral fora (United Nations, World Trade Organization, Kyoto Convention on climate change) where they inhibit national interests;
- the use of overt programs of public relations or 'spin' by governments, multinationals and NGOs aimed at shaping opinion at global, international and local levels.

Developments in communications media have an important role in all of these processes of globalization. The technological forms that are used to communicate messages influence the communicative practice of individuals and institutions, and this in turn influences societies and cultures. Developments in communications media are important in all processes of globalization. There are three dimensions to this centrality of media to globalization. First, media constitute the technologies and service delivery platforms through which international flows are transacted. Second, the media industries are leaders in the push towards global expansion and integration. Finally, the media provide informational content and images of the world through which people seek to make sense of events in distant places. The intersections of these factors can be seen in the universal recognition and astounding levels of public commentary associated with September 11, 'the war on terror', the war in Iraq, the Beslan school massacre in Russia, the Indian Ocean tsunami of December 2004 and other events which affected particular places and communities before becoming 'global' media events.

Manuel Castells (1996, 2000) has provided an important contribution by placing communications media at the centre of the changes that are driving globalization. Castells argues that the period since the late 1970s has seen discontinuous historical and structural change in the economy, society and culture, driven by advances in information and communications technologies (ICTs). Central elements of this information technology paradigm, or *informational society*, include: the pervasive effects of ICTs through all forms of social interaction; the networking logic of systems and social

relationships and the flexibility of these networks; and the convergence of specific technologies into a highly integrated system. As a result, economies have become globally interdependent, with effects felt through entire societies as information and communications establish new forms of relationships 'between economy, state and society in a system of variable geometry' (1996: 1). While there has been an integrated capitalist world economy since the sixteenth century, the current configuration is, for the first time, a global economy 'with the capacity to work as a unit in real time on a planetary scale' (1996: 92).

The role played by communications media in overcoming barriers of space and time should not be seen as being without historical precedent, although the scale, pace and pervasiveness of change are historically unique. From the outset, the growth of media and communications in shaping social and economic life beyond the boundaries of village or immediate community largely corresponds with the rise of literacy. Harold D. Lasswell (1965) saw the roots of media growth in the synchronous programs of mass literacy through universal public schooling and the emergence of markets that stretched beyond local communities. Literacy and international trade links underpinned growth of the commercial press which provided local communities with information on politics, industry, commodities and events in distant locations. The telegraph extended and sped up the movement of this information. James Carey (1992a) has drawn attention to the profound significance of the development of the telegraph in the 1840s, which enabled the rise of the modern, multidivisional corporate enterprise, monopolistic markets and futures exchanges. The telegraph was at the centre of the development of the electrical goods industries, and it restructured everyday language through the impact of 'wire services' upon popular journalism, as it required a new economy of writing style, since payment was by the letter at this time. Most importantly, it meant that the movement of messages was separated from the movement of physical objects, and hence communication separated from transportation,

and this 'freed communication from the constraints of geography' (1992a: 204). Associated with this, it changed the way in which communication was thought about, and provided a new model – the transmission model – for conceiving of communication as a social practice. Carey points out that, in this sense, 'the telegraph was not only a new tool of commerce but also a thing to think with, an agency for the alteration of ideas' (1992a: 204).

Media have been given a particularly significant role in globalization debates, because of the particular part that global media are seen as playing in the cultural weakening of the bonds which tie people to nation-states. Ernest Gellner's (1983) analysis of nationalism proposed that culture provides the 'political roof' that links a nation to its people, while Benedict Anderson (1991) drew attention to the historical role of popular print media in enabling the development of the modern nation as an 'imagined community'. From such insights, some have argued that the rise of global broadcast media is leading to an uncoupling between polity and culture within the nation, which is analogous to the uncoupling of polity and economy associated with the rise of multinational corporations and global financial markets. Utilizing the work of Canadian communications historian Harold Innis (1951), Joshua Meyrowitz (1985) and James Carey (1992b) have observed that while print culture was associated with the rise of nationalism, as it promoted continuity over time, decentralization and regional differentiation, broadcast media were space binding, promoting centralization of production, decentralization of dissemination, and international distribution. Drawing upon Anthony Giddens' (1997) interpretation of globalization as a 'consequence of modernity' that involves a 'disembedding' of social relations from local contexts, Chris Barker has described television as simultaneously 'globalized because it is an institution of capitalist modernity' and as 'contributing to the globalization of modernity through the worldwide circulation of images and discourses' (1997: 13). In other words, global media, and global broadcast media in particular, are globalizing in their form as well as their content, and are controlled by corporate interests keen to expand their global market reach. Arjun Appadurai has referred to global mediascapes as one of the five 'landscapes' of global cultural flow – the others being ethnoscapes, technoscapes, financescapes and ideoscapes – which have generated 'fundamental disjunctures between economy, culture and politics' (1990: 296) in all societies over the last 20–30 years.

These views represent conventional starting points for conceptualizing globalization of the media. However, they also reflect perceptions that are rooted in the study of North American or European media discourses. There is equal merit in recognizing that media industries are regulated by national governments, and the markets for information and entertainment are national as well as international. Most nations continue to impose restrictions on ownership and control over electronic media industries and often use quotas or censorship to inhibit the importation of content, although the effectiveness of such rules is challenged by new media (OECD, 1999: 133–4). Economic concerns are not the only motivating factor for regulation. Many governments have extended existing approaches to media regulation to the operation of Internet and other digital forms in ways that minimize political consequences. Singapore, and China have established national firewalls and monitor users (Sussman, 2003; Zittrain and Edelman, 2002), while routine monitoring, surveillance and site blocking is conducted in Saudi Arabia, Burma and the United Arab Emirates, along with Vietnam and Cuba (Kalathil and Boas, 2003).

THE POLITICAL ECONOMY OF GLOBALIZATION: 'STRONG GLOBALIZATION' THEORIES AND THEIR CRITICS

Any listing of the trends and developments associated with globalization raises the issue of whether, as Castells proposes, such developments point to a *qualitative* shift in the pattern of economic, social, political and cultural relations within and between states and societies, or

whether they are extensions and intensifications of more long-standing trends, i.e. part of a *quantitative* change. There are also important questions of the relationship between local forms of agency and external structural imperatives. Should globalization be seen as an external force imposing changes upon local and national laws, institutions and policies, or as a set of developments induced primarily by these institutions? Or might globalization be conceived as a joint project between local people seeking access to foreign goods, services and ideas and using them in unique ways that might be likened to 'glocalization' (Robertson, 1994)? While communications technologies such as broadband cable, satellite and the Internet are often presented as forcing nation-states to become more open to globalizing influences, others, such as Linda Weiss in her analysis of the role of the state in East Asian industrialization, have argued that 'globalization must be seen as a politically rather than a technologically induced phenomenon' (1997: 23).

Globalization theories have been developed in the fields of economics, sociology and politics, as well as in media, communications and cultural studies. So-called *strong globalization* theories argue that these developments mark out such a qualitative shift in societies that the analytical and normative categories that guided social analysis in the nineteenth and twentieth centuries, such as the nation-state, society, national economies and national cultures, will be less and less applicable. In economic terms, globalization has been defined by the International Monetary Fund as 'the rapid integration of economies worldwide through trade, financial flows, technology spillovers, information networks, and cross-cultural currents' (1997: 1). The first Director-General of the World Trade Organization, Renato Ruggieri, interpreted this in particularly strong terms when he argued that 'globalization was a reality which overwhelms all others', as did the Australian Foreign Minister, Alexander Downer, when he proposed that 'whether people fear globalization or not, they cannot escape it' (quoted in Flew, 2004a: 179). The pessimistic account of economic globalization presents the spectre of an international 'race to

the bottom' scenario, where the increasingly 'footloose' nature of capital is seen as generating a situation whereby 'capital will be increasingly able to play workers, communities, and nations off against one another as they demand tax, regulation, and wage concessions while threatening to move … increased mobility of MNCs (multinational corporations) benefits capital while workers and communities lose' (Crotty et al., 1998: 118).

Economists have always recognized the international nature of economic transactions and, at least in the mainstream traditions, have seen international trade and investment as largely positive activities. Yet globalization is perceived as a challenge to mainstream economic theory, since its working premise has been that of an *inter*-national economy, where transactions take place between sovereign nations and economic agents with an identifiable national base. Some economists have cast serious doubts on the empirical and intellectual foundations of 'strong globalization' arguments. Paul Krugman (1997) accuses writers such as Robert Reich of peddling a form of 'pop internationalism' that distorts international trade theory by treating nations as competing entities, analogous to capital and labour. Political economists such as David Gordon (1988) have argued that the statistical evidence presented as proof of economic globalization is misleading, while Andrew Glyn and Bob Sutcliffe (1998) have argued that a focus upon trends in the manufacturing sector is misleading, since the fastest-growing services industry sectors display less international mobility and are less internationally traded than manufactured goods.

In the most extensive critique of economic globalization theories, Paul Hirst and Grahame Thompson (1996) have argued that, while there has been an increase in international economic integration since the 1970s, this is not unique in international economic history since the overall level of international trade and investment in the period from 1890 to 1914 is equal to that of the late 1990s. Like Gordon, and Glyn and Sutcliffe, Hirst and Thompson critique globalization theory on the basis of their belief that it presents an overly pessimistic view of the

capacity of nation-states to control the activities of corporations.

Analogous debates about globalization have taken place in sociology and cultural studies. The sociologist John Urry proposed that 'there has been a "Globalization" of economic, social and political relationships that has undermined the coherence, wholeness and unity of individual societies' (1989: 97). In a similar vein, media theorists David Morley and Kevin Robins have argued that, with media globalization, 'audiovisual cultures are … becoming detached from the symbolic spaces of national culture' (1995: 11). Robertson (1991), Waters (1995) and Shaw (1997) have posed the question of whether a global society has replaced or is superseding discrete national societies as the dominant structuring principle of social relations, with major implications for the methods of sociological analysis. Anthony Smith has expressed concern that such arguments are premised upon an overly rationalistic conception of culture as being in some sense determined by techno-economic structures, and ignoring the 'obstinate fact' that 'national cultures, like all cultures before the modern epoch, are particular, time-bound and expressive … [and] specific, historical cultures possessing strong emotional connotations for those who share in them' (1991: 178). Stuart Hall (1993) has expressed a similar concern that 'global cosmopolitanism', and a certain blindness to continuities of national cultural experience, are indicative of a certain 'wish-list' element of theories such as liberalism and Marxism, that see nationalism as essentially a transitory and political phenomenon, likely to decline over time as societies become more secular, rational and cosmopolitan.

MEDIA GLOBALIZATION: 'GLOBAL VILLAGE' OR 'CULTURAL IMPERIALISM'?

Media globalization debates can be placed into two camps. Mainstream economists and liberal communications theorists have emphasized the relationship between new technologies and markets, and argued that media globalization promotes opportunities for shared information, borderless communication and global commerce. Further, they believe that global media encourage the spread of liberal democratic ideas and empower citizens worldwide against unjust forms of local authority, by allowing the 'whole world to watch' and witness such injustices. In *The Death of Distance*, Frances Cairncross concluded that: 'Free to explore different points of view, on the Internet or on the thousands of television and radio channels that will eventually become available, people will become less susceptible to propaganda from politicians who seek to stir up conflicts. Bonded together by the invisible strands of global communications, humanity may find that peace and prosperity are fostered by the death of distance' (1998: 279). Not surprisingly, such arguments find favour with the heads of the giant media corporations. Rupert Murdoch (1993) once famously argued that cable and satellite broadcasting had not only 'been a key factor in the spread of freedom' worldwide, but would also 'liberate people from the once-powerful media barons'. This echoes the comments by Ted Turner when launching the 24-hour cable global news service CNN: 'We're gonna take the news and put it on the satellite,' said Turner, 'and then we're gonna beam it down into Russia, and we're gonna bring world peace, and we're gonna get rich in the process! Thank you very much! Good luck!' (quoted in Wark, 1994: 36).

Ironically, while Ted Turner subsequently lost control of CNN, Rupert Murdoch has displayed a chameleon-like ability to operate in diverse political environments, including the United States, Europe, China and India, to expand the reach of the News Corporation into new national markets and audiences. He practices a 'footloose' approach to business that included renouncing his Australian citizenship and moving the incorporation of the News Corporation to the benign business environment of the US state of Delaware in 2004. News Corporation represents the ultimate example of industrial flexibility in the global economy with business

units ranging across different media – books, newspapers, magazines, broadcast TV, cable and satellite TV, films, music and the Internet – and across six continents, making it 'the first vertically integrated entertainment-and-communications company of truly global reach' (Shawcross, 1997: 399). Its size, audience reach and influence of its commentators on key political constituencies also encourage affinity with political elites. Since 2001, News Corporation's Fox Network and its leading commentator Bill O'Reilly have been vociferous supporters of US President George W. Bush's 'war on terrorism', invasion and democratization of Iraq and re-election campaign in 2004. The affinity between the Bush administration and the News Corporation was evident in the regulatory support from the Federal Communications Commission for the takeover the largest cable TV network DirecTV. A different hue to the News Corporation has been evident across the Pacific, demonstrated by the dropping of BBC World News from Star-TV's north Asian platforms following expressions of dissatisfaction over critical coverage by the Chinese Government (Atkins, 1995). The approach seems hereditary. After the launch of the News Corporation joint-venture Phoenix TV in China, James Murdoch concurred with official opinion 'that Falun Gong was indeed a dangerous and apocalyptical cult' (Anonymous, 2001). The Murdoch success in forming political alliances with conservative political movements and subsequent media patronage has attracted considerable enmity from a wide range of critics: the former editor of *The Times* in the UK, Harold Evans, who was fired for failing to 'toe the company line' (Evans, 1983), the late British TV scriptwriter Dennis Potter, who named his cancer 'Rupert', and, in 2004, in the documentary *Outfoxed: Rupert Murdoch's War on Journalism* (Greenwald (director), 2004).

For critics of global media, such as political economists and critical communications theorists, the News Corporation's geographic spread and emphasis on distributing sport, entertainment and news globally and creating local versions can be described as an element of *cultural imperialism* or *media imperialism*. The political economy tradition has long drawn attention to

the adverse political and cultural implications of the unequal distribution of international communications power and resources, and how they intersect with broader structures of dominance and Western hegemony in the international political economy. The cultural domination approach, associated in particular with North American political economists such as Herbert Schiller (e.g. 1969, 1976, 1989; Nordenstreng and Schiller, 1993) and Edward Herman and Noam Chomsky (1988), as well as theorists of the new world information and communication order such as Kaarle Nordenstreng and Cees Hamelink, has stressed the importance of the internationalization and commercialization of global communications to the status of the United States as the world's dominant capitalist economy. In *Mass Communications and American Empire*, the founding text of this tradition, Herbert Schiller argued that 'Nothing less than the viability of the American industrial economy itself is involved in the movement towards international commercialization of broadcasting' (1969: 95). Linking the study of communications dominance to theories of economic imperialism such as world systems and dependency theories, Schiller defined cultural imperialism in *Communications and Cultural Domination* as 'the sum of processes by which a society is brought into the modern world system and how its dominating stratum is attracted, pressured, forced, and sometimes bribed into shaping social institutions to correspond to, or even promote, the values and structures of the dominating centre of the system' (1976: 9).

Anxieties about the influence of global media on culture and values, as well as their direct political and economic power, were expressed at an international level through the new world information and communication order (NWICO) debate. This debate, which occurred through the United Nations Educational, Scientific and Cultural Organization (UNESCO) from the early 1970s and was led by 'Third World' or so-called 'non-aligned' nations, sought to use UNESCO and other international forums to call for a redistribution of global communications resources to redress international inequalities and enable the development of

stronger national and regional communications systems in the developing world. The NWICO debate peaked with the submission of the MacBride Report, *Many Voices, One World*, to the 1980 UNESCO general conference in Belgrade, but declined in the face of hostility from the United States and Britain in particular, who withdrew their funding from UNESCO in 1985 (Gerbner et al., 1994).

In a major contribution to this literature, Edward Herman and Robert McChesney (1997) have outlined in great detail the rise of global media corporations such as News Corporation, Disney and Time-Warner, and shown how their global expansion strategies have been facilitated by national policies of trade liberalization, deregulation of media markets, telecommunications privatization, and the winding-back of funding to national public broadcasters and other non-commercial media and cultural forms. They argue that this expansion has not been primarily the result of technological change or market competition, but is indicative of the extent of transnational corporate influence over national policy-makers and the hegemonic role that has been played by global media in the international dissemination of ideas. For Herman and McChesney, the global media are the 'new missionaries of global capitalism', and their adverse consequences include the spread of individualistic values, displacement of the public sphere, the strengthening of conservative political forces worldwide, and the erosion of local cultures.

Oliver Boyd-Barrett (1998) has distinguished the cultural domination models, based upon neo-Marxist world systems theory, from approaches more directly rooted in Marxist political economy and the Gramscian model of cultural hegemony (see Brewer, 1980 for a discussion of these distinctions). The latter approaches have been critical of the reductive nature of the 'cultural dominance' model and its inadequate treatment of 'local' conditions, lived experience, and the diversity of forms taken by what Annabelle Sreberny-Mohammadi terms 'the many ordinary, everyday ways that life in the South has been affected by the social structures of imperialism' (1997: 51). In particular,

the focus upon conflicts and inequalities between nations in a global state system, and the 'diplomatic' solutions proposed by the NWICO framework, were seen as having the danger of downplaying structures of domination and resistance within nation-states, where the rhetoric of cultural nationalism could be used to promote a conservative and highly regressive national cultural politics (Mattelart et al., 1984).

Two other changes in the dynamics of media globalization were seen as challenging the assumptions of the cultural domination model. First, the process of globalization, and the centrality of communications technologies to this process, meant that models of dependency which assumed direct conflicts with a politically and geographically defined power, and the capacity of the nation-building state to represent mass popular aspirations for 'independence', were becoming less adequate as a way of mapping the relations between economic, political and cultural flows in the world system and their local and national impacts (Canclini, 1986; Martin-Barbero, 1993). Second, the pattern of global media flows has become more complex, as new patterns of audiovisual flow emerged around geolinguistic regions, particularly among Spanish-speaking and Portuguese-speaking communities, and Indian, Chinese and Arabic communities worldwide (Sinclair et al., 1996).

In their analysis of these trends, Sinclair et al. (1996) argue that a 'mid-range' analysis alert to linguistic and cultural differences, as well as regional submarkets, is a necessary corrective to overly global analyses such as theories of cultural or media imperialism. The development of international broadcasting channels to serve particular communities provides an alternative to long-standing concerns about the 'Western' nature of global media and content. The Arabic language news channel *Al-Jazeera* provides one of the more compelling of these non-Western alternatives. Naomi Sakr comments that the emergence of Arabic-language satellite television services has brought a sense of cultural and political identity to the Middle East and acted to raise the international profile of the State of Qatar in the Persian Gulf (Sakr, 2005).

An issue of particular relevance to all critical theories of global media is the relationship between United States hegemony in the global system and the 'soft power' deriving from US media and cultural exports and their impacts upon the culture and values of importing societies. Joseph S. Nye, Jr, Assistant Secretary of Defense for international affairs in the Clinton administration, succinctly defined 'soft power' as the 'ability to achieve desired outcomes in international affairs through attraction rather than coercion. It works by convincing others to follow, or getting them to agree to, norms and institutions that produce the desired behaviour. Soft power can rest upon the appeal of one's ideas or the ability to set the agenda in ways that shape the preferences of others' (quoted in Thussu, 1998: 66–7). Jesus Martin-Barbero has observed that, in assessing the relationship between global media and cultural hegemony in Latin America, 'Much more than the many percent of programmes imported from the United States (including programme formats), what will really affect us will be importing the US model of television' (Martin-Barbero, 1988: 457). Sinclair et al. make a similar observation in critiquing the cultural imperialism theory which, they argue, 'failed to see that, more fundamental than its supposed ideological influence, the legacy of the USA in world television development was in the implantation of its systemic model for television as a medium – the exploitation of entertainment content so as to attract audiences which could then be sold to advertisers' (Sinclair et al., 1996: 9).

STRUCTURES AND SPACES OF THE GLOBAL MEDIA

Alongside debates about flows, audiences and technologies, the global distribution of production and creative activities by media companies invites investigation. Gillian Doyle (2003) points out that media companies have developed structures that allow them great flexibility in the sourcing of content through the formation of joint ventures, production deals and diagonal mergers that provide synergies between audiovisual commodities held by different corporate entities. These arrangements are best considered through methodology associated with the 'commodity chain' derived from economics to consider industrial activities (Gereffi and Korzeniewicz, 1994). Media activities might be critiqued using a methodology involving the following steps: creative input, development, production, distribution and exhibition. Classic examples of the global spread of these arrangements include Time-Warner's establishment of audiovisual facilities in Australia as a base for production of the *Matrix* trilogy or its subsidiary New Line Cinema's use of locations and personnel in New Zealand to create the *Lord of the Rings* while assembling an ensemble cast of actors from around the world. Doyle (2003) notes that these practices help to reduce the costs and risks associated with production of complex media commodities produced for a global market. The capacity to coordinate this complex industrial activity across time zones and borders has become possible through the utilization of advanced communications and recognition that media content can be exploited across different commodities – a feature film offers spin-offs to games, television programmes and so on. This is particularly evident in new media content produced for children.

MEDIA GLOBALIZATION AND THE ROLE OF TELECOMMUNICATIONS

The transformation of telecommunications through a combination of technological change, regulation, and industrial reconfiguration has spurred a new phase of change in media and communications around the world. These factors have underpinned media globalization and the rise of new media industries and services such as the Internet and increasingly interactive broadcasting platforms. From the outset, the liberalization and privatization programmes begun in the UK during the late 1980s and steadily undertaken throughout

Europe, Latin America, Southern Africa and the Asia–Pacific during the 1990s transformed telecommunications systems from relatively static national utilities charged with the supply of telephone and often postal services to become a dynamic engine of the global economy and communications infrastructure (OECD, 1999).

Liberalization and privatization drew a vast amount of investment capital to the sector for a variety of reasons. First, there was recognition that telecommunications infrastructures would underpin the new economy as distribution and transmission platforms. Second, telecommunications had become an almost ubiquitous utility (primarily in developed economies) via long-standing universal service programmes that had required national telephone utilities to build infrastructures reaching almost every household and business. Third, these infrastructures had been increasingly upgraded to provide digital or high-speed data capability to support wireless, Internet or cable connections. Finally, a new generation of personal communications technologies, including mobile telecommunications (e.g. Bluetooth, Symbian and WAP), was increasingly capable of carrying information and entertainment services that were central to the emerging information economy and associated practices that can be described under the emerging descriptive lexicon of 'e-commerce', 'e-health', 'e-government', 'e-business' and so on (ITU, 2000; OECD, 1999).

An indicator of the importance of telecommunications as a driver of the new economy can be derived from uptake of mobile telephony, including that geared toward the sophisticated interactive information and entertainment services. The International Telecommunication Union (ITU, 2001) has illustrated the growth in the sector with subscribers rising from 11 million in 1990 to an estimated 1.329 billion in 2003, and with more than 250,000 people connecting to new services each day. Likewise, the growth of telecommunications spawned innovative suppliers of new communications technologies that provide the human interface with new media. Increasingly, globalized suppliers including Nokia, Motorola and Ericsson

have created the technologies which have placed new media in our pockets instead of desktops, lounge rooms and offices (see ITU, 2000).

Access to computers, reliable telecommunications infrastructure, and capacities to afford services are market factors inhibiting globalization, although there is considerable evidence that new media and communication technologies are contributing to development in emerging economies and offer means to tackle wider social, health and educational challenges (Melkote and Steeves, 2004). The expanding reach of Internet and mobile telephony into parts of Asia, Africa and Latin America is acting to reconfigure the global experience and use of new media. Figures for Internet access vary greatly. The ITU (2001) estimated that 665 million people would use the Internet in 2003, while the Computer Industry Almanac estimated that more than 1 billion people would have used the Internet by the mid-2000s (Anonymous, 2004). The fastest growth rates for Internet use between 1997 and 2002 were in Asia, the Middle East and Eastern Europe, with China, Brazil, Russia and India emerging as being among the world's largest aggregate Internet-using population (Flew, 2004a: 71–3). Yet, the significant disparities in access and use within and between countries, also known as the *digital divide*, remain. International comparisons of telephone subscribers (mobile and fixed) presented by the ITU demonstrate the stark reality of access: there are 8.65 telephone subscribers per 100 inhabitants across the continent of Africa; 66.62 per 100 in the Americas; 28.52 per 100 across Asia; 96.28 per 100 in Europe and 94.85 in Oceania (ITU, 2004a). Yet these aggregated figures obviously hide disparities between countries: 161.26 lines per 100 people in Hong Kong against 0.85 in Myanmar (ITU, 2004a). Internet hosting presents similar circumstances: 4.22 hosts per 10,000 people in Africa; 2002.47 in the Americas; 50.29 across Asia; 280.95 in Europe and 1053.02 in Oceania. Disparities include 0.01 hosts per 10,000 in Angola compared to 62.25 in South Africa (ITU, 2004b). With the growing importance of Internet and mobile communications

as means to access media services, these geographic disparities obviously illustrate the limits to possible participation in emerging media forms like Web logs, forums and file-sharing.

GLOBAL MEDIA AND NATIONAL POLICIES: INFLUENCES AND INTERSECTIONS

There are two important factors which regulate the impact of global media in particular local and national cultures. The first is that of *audiences*. Interpretive approaches, drawing on cultural studies methodologies, have challenged assumptions that global media flows can be identified through measurement of the economic interests of participants. Proponents of these interpretive approaches have pointed to the need to come to terms with the *cultural* meanings that are derived from flows of content and the adoption of media practices, particularly by assessing the relationships with local societies and contexts. Ien Ang has drawn attention to the extent to which 'global media do affect, but cannot control local meanings'; as a result, 'the construction of a "global culture"… should not be conceived as a process of straightforward homogenization', but rather 'local cultures everywhere tend to reproduce themselves … through the appropriation of global flows of mass-mediated forms and technologies' (1996: 153). At a more empirical level, Michael Tracey (1988) argued that globalization rhetoric disguises the extent to which US TV product has tended to be less popular than local product in almost every country where both are readily available. Tracey also argued that the presence of US imports acts as a trigger to the development of local programming to meet the cultural needs and expectations of local audiences. These findings are supported by Straubhaar (1997), whose empirical analysis of the balance between local and imported programming in various Asian, Latin American, Middle East and Caribbean nations finds that levels of national television programming have been increasing in the majority of these countries in the period from the 1960s to the 1990s. Lent (1993)

also identified a trend for substitution of imports from the US with local content in Thailand.

The issue of 'reterritorialization' has become increasingly possible with new media such as the Internet and the creative use of household information technology and entertainment equipment. One of the fundamental characteristics of the twentieth century was the mass migration of people across the globe. Many of these diasporic communities have sought to remain connected with originating cultures by maintaining links through use of media and communications systems. Miller and Slater's (2000) study of Internet use in Trinidad found that, rather than the Internet being an 'imposed' global technology which 'disrupted' local cultural traditions, the various possibilities of the technology had been taken up in different ways to globally project a 'Trini' identity. In particular, it generated critical linkages between people in Trinidad, the 'Trini diaspora' (e.g. Trinidadian students at North American universities), and wider global communities of interest. Cunningham and Sinclair (2000) illustrate the point with research on the ways that Thai, Vietnamese and Filipino migrants have built communities and remain engaged with home societies with a mixture of old and new media. A variety of mechanisms is used ranging from shopkeepers maintaining videotape libraries, programmes on community radio and television services, websites, and commercial pay-TV services (Cunningham and Sinclair, 2000). Even with ostensibly global media forms, such as Massively Multiplayer Online Games (MMOGs), which also clearly deal in 'fantasy worlds' rather than local cultures, players in Korea prefer local games such as *Lineage* to more North American-based games such as *EverQuest*, for reasons related to language, cultural affinity, and even the time zones in which most of the activity is occurring (Flew and Humphreys, 2004). Such global media flows are illustrative of media globalization, but not of cultural imperialism.

The second major element regulating media globalization, which is *public policy*, and the role it plays in regulating the relationships between global flows and their local impacts

within the nation-state. Philip Schlesinger has proposed that national media and cultural policies can be seen as exercises in 'communicative boundary maintenance', out of which emerge distinctive national media cultures, and particular configurations of local and imported media content and styles (1991: 162). This is particularly apparent in broadcasting, where national public broadcasters, national regulatory systems and audience preferences for locally produced material have intersected with economic and technological forces that promote imported programming, and political, cultural and linguistic factors which make particular countries more or less open to imported English-language content from the United States. Countries such as Australia, Brazil, Canada and Mexico, which have always been highly exposed to globalizing cultural influences, have developed 'hybrid' programme forms that negotiate local, national and international cultural markets. Sustained exposure to overseas television programming has been in these instances the trigger for strengthening national production systems, through protectionist cultural policies of *lé défi américain* (Schlesinger, 1991), cosmopolitan programme formats which 'play at being American' (Caughie, 1990), or the fashioning of 'national champions' which can compete in definable global audiovisual markets, such as 'soaps' and *telenovellas* (Moran, 1998; Sinclair et al., 1996).

While national media and communications policies can set limits to the impact of media globalization on national media cultures, such policies can also act as catalysts for globalization. Media policies such as liberalization of media and communications markets are fundamentally shaped by the interaction of domestic politics with global structures and flows, out of which frequently emerge opportunities that become available to local industries. Although corporations based in Europe and North America are most often cited as driving globalization, it is the partnerships and opportunities they offer domestic businesses which often hold the key to market entry. The partnership between the US computer software giant Microsoft and powerful Australian media

conglomerate Publishing & Broadcasting Ltd in building a Web portal called NineMSN, that draws viewers from a range of existing television, print and software businesses to the new media, illustrates this trend (Barr, 2000). The Indian satellite broadcasting system provides another key to conceptualizing media globalization. As a vast and multicultural country, India has attracted foreign investors seeking to establish media and telecommunications businesses. Yet successful entry to the market was not possible until privatization allowed local media and telecommunications interests to develop joint ventures (Mehta, 1998; Thussu, 1999). These commercialized and privatized services could also improve the capacity to reach the various language markets within the country and address political and cultural considerations (Thomas, 1996).

Understanding new media globalization also requires the unpacking of content from the infrastructure that supports production, distribution and exhibition. Establishment of satellite broadcasting systems and telecommunications networks that support the seamless distribution of content is actively supporting the globalization of new media. These mechanisms are being used by local, regional and global businesses to build markets. Several Sino-Thai entrepreneurs have grasped the opportunity to provide the Thai market and regional countries with an alternative to imported programming from either Western countries or Japan. The Thaicom satellite, controlled by the company owned by Thai Prime Minister, Thaksin Shinawatra carries telecommunications services, Internet services and television broadcasts from the five free-to-air Thai-language stations as well as the pay-TV services featuring CNN, BBC World and Nickelodeon to more than 70 million people in Thailand, Laos, Burma, Cambodia and Vietnam (Anon, 1997: 179–93; Thaicom, 2000).

Transnational corporations have long been associated with globalization. Communications and new media systems have supported the expansion of business beyond national markets to a system whereby components are developed, manufactured, assembled and sold far from where corporations exercise control over these

activities. Communications technologies and new media are both enabling mechanisms for these practices and businesses in their own right that support the deterritorialization of industrial practices. Some transnational corporations provide communications infrastructures and software that support the activities of other businesses which may also be transnational in nature. More recently, the Internet has provided the platform for businesses to reach consumers or to provide services to other businesses. It has been argued that such arrangements lead to the *disintermediation* of traditional approaches to production, distribution and supply of goods and services. The Internet has allowed consumers to communicate directly with producers of certain types of goods (e.g. books, music and software) and services (e.g. banking, finance, government transactions and information) without the need to use existing channels including retailers. While these trends became increasingly prevalent in the late 1990s, business models remained in flux as these 'convergent service industries' models are tested by traditional and new media, communications and other service industries.

Intellectual property and copyright have become increasingly important factors in the globalization of media and related communications industries. Bettig (1996) notes how copyright provides the means for controlling information and entertainment products and ensuring that they can be exclusively exploited in a particular national market. He also argues that the bulk of the information and entertainment products traded globally are controlled by a handful of corporations based in North America, Europe and Japan. Copyright allows content to be packaged and exploited in different ways across old and new media. For instance, a television programme can be packaged for free-to-air, pay-TV and cable systems. It can be modified and placed on other services and with digital technology re-versioned through inclusion of different sound tracks for multiple markets. At all stages, the copyright owner is able to determine how the content is used and can generate a different pricing schedule for each use. With the establishment of global media markets, copyright is a central issue in

trade negotiations and international relations. US and European software and media industries, in particular, have lobbied for stronger international regimes that require governments to enact laws to protect intellectual property ownership rights that permit the commercial exploitation of content (Drahos with Braithwaite, 2002). As trade in intellectual property becomes an increasingly important sector in the US and European economies, with the growth of new media and related software industries, industry groups including the Business Software Alliance, the Motion Picture Distributors Association of America and the Recording Industry Association of America have sought to launch retaliatory trade actions against countries that do not adequately protect copyright, through organizations such as the World Trade Organization (WTO) and the World Intellectual Property Organization (WIPO) (US Trade Representative, 2000).

The capacity of new media to support the collection, use and storage of vast amounts of personal information by business and governments has underpinned debates on the need to build mechanisms which protect the privacy of individuals using the Internet and other technologies (Garfinkel, 2000; Whitaker, 1999). Use of technologies including cookies and Web bugs to track behaviour across the Web, and the increasing capacity to profile consumers using data gathered from purchases and page accesses, have encouraged the development of international agreements, including the Safe Harbor arrangement between the European Union and United States (see Federal Trade Commission, 2000), to manage the use of and trade in personal information (see Garfinkel, 2000). Both Simon Garfinkel (2000) and Reg Whitaker (1999) also argue that traditional notions of privacy have been curtailed by the development and application of new technologies to the collection and monitoring of personal information by both commercial interests and governments. The Internet and interactive media permit business and government to track and monitor individual behaviour, in ways that would have been previously impossible for even the most authoritarian regime, through the establishment of databases,

data-mining techniques, and the application of e-mail monitoring and interception technologies including the 'Carnivore' system utilized by US security agencies. Equally, governments and businesses have sought to adopt technological and procedural measures including Web seals and encryption to protect information they have collected from unauthorized access and use. This sensitivity has been argued to be a factor retarding uptake of e-commerce and other online services promoted by government and business including electronic health, banking and other records (OECD, 2000).

GLOBALIZATION AND POLICY DISCOURSE: FROM DEVELOPMENT COMMUNICATIONS TO THE GLOBAL INFORMATION SOCIETY AND THE CREATIVE INDUSTRIES

One of the ways in which media globalization has influenced national media policies is at the level of dominant policy discourse. Theories of cultural and media imperialism had an analogy with the approach of development communication that emerged from countries in Latin America, Asia and Africa in the 1970s. The approach of *development communication* (Melkote and Steeves, 2004: Chapter 6) was popularized as a means for governments in emerging economies and post-colonial societies to determine which media technologies and approaches they would take to improve the lot of their citizens. The approach encouraged governments to introduce policies that limited foreign control over local industries, emphasized the primacy of the domestic development task, encouraged cultural and information autonomy, valued democratic institutions and offered support for other countries following similar trajectories. Governments of developing countries often placed provision for basic needs above expenditure on advanced communications and media systems, in the belief that raising capital to pay for these infrastructures would drain national budgets, increase levels of foreign debt and require adoption of technologies that were not proven

in local conditions. Moreover, there was recognition that skills to build and operate these systems would not be locally available or could be used for tasks that were more important. Other concerns related to the likelihood that foreign investors would only be interested in providing technologies to profitable customers concentrated in cities, earnings would be repatriated, and governments would lose the capacity to intervene directly in the provision of services.

From the late 1970s, development communication approaches were progressively abandoned as the technological transformation in media and communications industries increased the sophistication and interconnection of media and communications industries. Further, neoliberal economic theories became increasingly influential over national policy formation in both developed and developing countries. In the media and communications sectors, the neoliberal policy agenda could most readily be identified with the trend for countries to privatize national telecommunications monopolies, and to allow the private sector to introduce new television services such as pay-TV, cable and satellite broadcasting. The demise of the new world information and communication order (NWICO) agenda in multilateral forums such as UNESCO in the 1980s marked the symbolic end of development communications as a core element of international media and communications policies. By the 1990s, incorporation of telecommunications and audiovisual policies into the disciplines of the General Agreement on Trade in Services (GATS), with its expectations of progressive trade liberalization and the elimination of differential treatment of domestic and foreign investors, constituted the dominant discursive and policy landscape informing communications policies worldwide.

The concept of 'citizenship', with its political connotations of egalitarianism and nation building being central to most national media policies, was increasingly displaced by the idea that individual interests could be more readily encapsulated in a privately operated, liberalized and market-driven media and communications environment by applying the discourse of

'consumer sovereignty' (Golding and Murdock, 1989; Mosco, 1998). Such arguments appear, at first glance, to readily fit the new media environment of global communications networks, transborder delivery infrastructures, and technologies such as the Internet and digital broadcasting. By contrast, William Melody has argued that much of the literature on the information society 'is either unsupported "blue sky" speculation about future technological and service possibilities, or promotional "hype" by the industries trying to sell the new technologies and potential future services' (1996: 243). Melody sees a critical role for public policy in shaping the development of national information societies, in the context of an emerging global information infrastructure, arguing that 'there will be as many "information societies" as there are societies [and] all countries should not try to charge down a single path emulating the perceived leaders in technological development at any moment in time' (1996: 244). Melody makes the critical point that much discussion about information society policies is focused upon developing the technical infrastructure through which to supply new media and communications services, with considerably less attention paid to developing a society of users of new ICTs, and the sorts of infrastructures that support universal low-cost access to basic information services.

The history of this development trajectory is worth consideration. Armand Mattelart (2003) argues that what came to be popularized as the 'information society' via Daniel Bell's (1973) work and the later configuration of the 'information economy' (Machlup, 1962; Porat, 1977), were deeply ideological projects, sponsored by successive US governments, business and academia, that followed the contours of Cold War rhetoric about emancipating the individual, encouraging political freedom and unlocking private enterprise in ways that supported the formation of a world market. To this end, an array of new communications and computing technologies and methodologies developed in US government and military research facilities from the late 1960s were turned over to commercial interests rather than more socially directed projects while the

OECD began to promote the virtues of an information economy from 1975 (Mattelart, 2003). A consequence of globalization of the media and ICT industries and the opening up of national markets to foreign competition was the establishment of national information policies, in recognition that it would underpin other industrial activities as well as be an important sector in its own right (Northfield, 1999). From the mid 1990s, many countries undertook large-scale programmes to support the transition to the 'information society', often setting up agencies to coordinate activities between governments, the private sector and other relevant stakeholders. While general goals of building advanced telecommunications networks capable of broadband or high-speed Internet were raised and the concept of universal service for all consumers was promoted, national responses naturally varied depending on domestic circumstances. These policies varied from the market-led approaches stressed in Australia, Canada and the European Union, to more state-led and *dirigiste* models, such as the Singaporean 'intelligent island' strategy, Malaysia's multimedia super corridor (MSC) development, and South Korea's 'informatization' policy. Strategies were also developed by local and state governments to attract investment in new media and communications sectors, with iconic North American cities such as New York finding themselves in global 'bidding wars' to retain the head offices of the giant media, entertainment and information technology corporations (Miller et al., 2001; Mosco, 1999).

Information society strategies hit a number of limitations in the late 1990s and early 2000s. The Asian economic downturn of 1997–8 exposed significant problems with 'state capitalist' developmental strategies, and the problems arising from 'picking winners' in the ICT sectors became even more apparent with the downturn of the global information technology sector after the crash of the US NASDAQ stock exchange in April 2001. Moreover, the skill sets associated with IT industries, such as software development, have proved to be able to be acquired from many places, and the capital associated with them to be highly geographically

mobile and 'footloose'. As a result, there has been a worldwide outsourcing of such activities to the resurgent economies of China and India, which possess nodes of advanced ICT, large labour forces and comparatively low wages (Rai and Lal, 2000: 226–7).

There has thus been a shift of thinking away from national information society or information economy strategies towards strategies to develop the creative industries, defined more broadly to incorporate the arts, media and intellectual property industries as well as the ICT sector (Cunningham, 2004; Hartley, 2005). This partly reflects a desire for more inclusive and holistic development strategies which harness the creative potential of people more effectively. As British creative industries thinker John Howkins has put it, 'If I was a bit of data, I would be proud of living in an information society. But as a thinking, emotional, creative being – on a good day, anyway – I want something better' (Howkins, 2005: 117). The emergence of creative industries policies, first developed in Britain under the Blair Labour Government in 1998, and since emerging in countries as diverse as Australia, New Zealand, Taiwan, Singapore and Hong Kong SAR, is also reflective of the growing prominence of the digital content or 'copyright' industries as drivers of global economic growth (Flew, 2004a; OECD, 1998; Chapter 6). Creative industries strategies recognize that, in an age of globally mobile capital, commodities and information, it is the 'cultural' or 'software' side of ICTs that can generate distinctive forms of intellectual property, more so than the technologies themselves. It also marks the growing significance attached to cities as distinctive sites of creativity, and the ways in which diverse and original thinkers are attracted to *creative milieux*, or places that generate new experiences and, hence, new ideas (Landry, 2000). In Richard Florida's *The Rise of the Creative Class* (2002) – the best-known application of this thinking – it is culturally vibrant and bohemian cities that are the natural incubators of new ideas, rather than the centres of ICT production and software development. Shalini Venturelli (2005) has interpreted these trends as indicating that culture has now moved from the

margins to the centre of the global information economy:

> Culture can be seen as the key to success in the Information Economy, because for the very first time in the modern age, the ability to create new ideas and new forms of expression forms a valuable resource base of society … Cultural wealth can no longer be regarded in the legacy and industrial terms of our common understanding, as something fixed, inherited, and massdistributed, but as a measure of the vitality, knowledge, energy, and dynamism in the production of ideas that pervades a given community. As nations enter the Global Information Society, the greater cultural concern should be for forging the right environment (policy, legal, institutional, educational, infrastructure, access etc.) that contributes to this dynamism … The challenge for every nation is not how to prescribe an environment of protection for a received body of art and tradition, but how to construct one of creative explosion and innovation in all areas of the arts and sciences. (2005: 395–6)

The appeal of creative industries strategies, with their emphasis on the value of a broadly defined notion of culture and their commitment to productively harnessing human creativity for wealth-creating purposes, is considerable. In contrast to the information policy strategies of the 1990s, they do not artificially silo-ize information technology development from the arts or media, nor do they draw strict boundaries between commercial and non-commercial developments in the digital media realm. Nonetheless, considered on a global scale, one would wish to make a few cautionary observations. First, the definitional looseness of the term 'creative industries' does require an awareness that it aggregates domains that run from the traditionally subsidized arts to frankly commercial sectors such as advertising and online games; whether the participants in these sectors share the confidence of policy makers in bringing them under the common umbrella of the creative industries, and claiming to devise policies which serve all of their interests, remains to be seen. Moreover, because 'creativity' tends to be seen as a 'good thing', there can be conceptual slipperiness between creative industries and other industries, most notably service industries, where the boundary becomes as much moral as grounded in anything more substantial (Flew, 2004b). Second, for all of the diversity contained

in the notion of creativity, there is the danger of creative industries policies adopting a 'cookie-cutter' approach grounded in excessive sameness. Oakley (2004) has expressed concern in the UK context that creative industries strategies too often 'seem hellbent on trying to replicate a single creative industries model', characterized by 'a university, some incubators, and a "creative hub", with or without a café, galleries and fancy shops' (2004: 73). As Oakley notes, such strategies cannot simultaneously work in all places, and it would be better to try and understand and work with local and regional differences rather than apply this model to all places, in the vain hope that, for instance, the British advertising industry may move *en masse* from London to Sheffield or Huddersfield. On an international scale, it would be one thing to observe that Beijing has aspirations to be a creative city, but another to then assume that Richard Florida's emphasis on San Francisco's large gay population as a factor in its creative dynamism will find enthusiastic acceptance with Beijing's local political authorities. Finally, if the creative industries are narrowed down to their more market-specific form of intellectual property – copyrighted culture – we find more familiar patterns of global inequality, with the United States dominating global exports, while developing countries are struggling to direct resources to such sectors when basic human needs are not being met, and where foreign direct investment is often in the lowest-value-adding and most competitive parts of global production networks (United Nations Conference on Trade and Development, 2004).

CONCLUSION

Globalization is a central trend of the late twentieth and early twenty-first centuries. Media and communications technologies, corporations and services have been central features of globalization, both by being part of its structural formation and by transmitting its social, cultural and political consequences across geographic, linguistic and national boundaries. Rather than leading to the demise of nation-states or the homogenization of national cultures, it has involved the dual processes of synchronization of economic and technological infrastructures and the re-emphasis of valued cultural and social differences for domestic political purposes. In practical terms, national governments have responded to global policy discourses promoted by the GATS and the GII by opening national markets to investment and trade across a range of media and communications properties while retaining ownership and control mechanisms that prevent foreign takeover of key industries. In recent years national governments, sensitive to domestic political and economic pressures, have sought to establish new media industries that enable local business to compete with transnational enterprises in local and global markets. Although governments have traditionally intervened in media and communications industries through direct investment, the market liberalization associated with economic globalization has forced sophisticated national regulatory responses. The new media industries have played a central role in these trends, but their capacity to exercise influence independently of supportive arrangements through the negotiating strategies of major economic powers such as the United States, the rules and norms established by multilateral agencies such as the World Trade Organization, and the support of particular national governments, is limited. The 'global information economy' is an unequal one, and one where transnational corporate power is certainly significant and perhaps hegemonic, but its basic contours have similarities with the distribution of power and resources in earlier economic regimes.

REFERENCES

Anderson, Benedict (1991) *Imagined Communities: Reflections on the Origin and Spread of Nationalism.* London: Verso.

Ang Ien (1996) 'Global media/local meaning', in *Living Room Wars: Rethinking Media Audiences*

for a Postmodern World. London: Routledge. pp. 50–61.

Anonymous (1997) 'Thailand', in Alan Baskerville (ed.), *Asian Terrestrial Television*. Thousand Oaks, CA: Baskerville Communications Corporation.

Anonymous (2001) 'Broadcasting in China: unscrambling the signals', *The Economist*, 25 October.

Anonymous (2004) 'Worldwide Internet users will top 1 billion in 2005', *Computer Industry Almanac*. Available online: http://www.c-i-a.com

Appadurai, Arjun (1990) 'Disjuncture and difference in the global cultural economy', in Mike Featherstone (ed.), *Global Culture: Nationalism, Globalization and Modernity*. London: Sage. pp. 295–310.

Atkins, Will (1995) '"Friendly and useful": Rupert Murdoch and the politics of television in South-East Asia, 1993–95', *Media International Australia*, 75: 54–64.

Barker, Chris (1997) *Global Television: An Introduction*. Oxford: Basil Blackwell.

Barr, Trevor (2000) *newmedia.com.au: The Changing Face of Australia's Media and Communications*. Australia: Allen & Unwin. pp. 20–39.

Bettig, Ronald, V. (1996) *Copyrighting Culture*. Boulder, CO: Westview.

Bell, Daniel (1973) *The Coming of Post-industrial Society: A Venture in Social Forecasting,* New York: Basic Books.

Boyd-Barrett, Oliver (1998) 'Media imperialism reformulated', in *Electronic Empires: Global Media and Local Resistance*. London: Arnold. pp. 157–76.

Brewer, Anthony (1980) *Marxist Theories of Imperialism*. London: Routledge & Kegan Paul.

Cairncross, Frances (1998) *The Death of Distance: How the Communications Revolution Will Change Our Lives*. London: Orion Business.

Canclini, Nestor Garcia (1986) 'Culture and power: the state of research', *Media, Culture & Society*, 10 (4): 467–98.

Carey, James (1992a) 'Space, time and communication', in *Communications as Culture*. New York: Routledge. pp. 142–72.

Carey, James (1992b) 'Technology and ideology: the case of the telegraph', in *Communications as Culture*. New York: Routledge. pp. 201–30.

Castells, Manuel (1996) *The Rise of the Network Society*. Oxford: Blackwell.

Castells, Manuel (2000) 'Information technology and global capitalism', in Will Hutton and Anthony Giddens (eds), *On the Edge: Living with Global Capitalism*. London: Cape.

Caughie, John (1990) 'Playing at being American: games and tactics', in Patricia Mellencamp (ed.),

Logics of Television. Bloomington, IN: Indiana University Press. pp. 44–58.

Crotty, James, Epstein, Gerald and Kelly, Patricia (1998) 'Multinational corporations in the neo-liberal regime', in Dean Baker, Gerald Epstein and Robert Pollin (eds), *Globalization and Progressive Economic Policy*. Cambridge: Cambridge University Press. pp. 117–43.

Cunningham, Stuart (2004) 'The creative industries after cultural policy: a genealogy and some possible preferred futures', *International Journal of Cultural Policy*, 7 (1): 105–16.

Cunningham, Stuart and Sinclair, John (eds) (2000) *Floating Lives: The Media and Asian Diasporas*. Brisbane: University of Queensland Press.

Doyle, Gillian (2003) *Understanding Media Economics*. London: Sage.

Drahos, Peter, with Braithwaite, John (2002) *Information Feudalism: Who Owns the Knowledge Economy*. London: Earthscan Publications.

Evans, Harold (1983) *Good Times, Bad Times*. London: Weidenfeld & Nicolson.

Federal Trade Commission (2000) 'Safe Harbor arrangements'. Available online: http:/:www.FTC.gov/privacy/safeharbor/slip.html

Flew, Terry (2004a) *New Media: An Introduction*. 2nd edn. Melbourne: Oxford University Press.

Flew, Terry (2004b) 'Creativity, cultural studies, and services industries', *Communication and Critical/ Cultural Studies*, 1 (2): 176–93.

Flew, Terry and Humphreys, Sal (2004) 'Games: technology, industry, culture', in T. Flew (ed.), *New Media: An Introduction*. 2nd edn. Melbourne: Oxford University Press.

Florida, Richard (2002) *The Rise of the Creative Class*. New York: Basic Books.

Garfinkel, Simon (2000) *Database Nation: The Death of Privacy in the 21st Century*. Cambridge, MA: O'Reilly and Associates.

Gellner, Ernest (1983) *Nations and Nationalism*. Oxford: Basil Blackwell.

Gereffi, Gary and Korzeniewicz, Miguel (1994) *Commodity Chains and Global Capitalism*. Westport, CT: Greenwood Press.

Gerbner, George, Mowlana, Hamid and Nordenstreng, Kaarle (eds) (1994) *The Global Media Debate: Its Rise, Fall, and Renewal*. Norwood, NJ: Ablex.

Giddens, Anthony (1997) 'The globalizing of modernity', in Annabelle Sreberny-Mohammadi, Dwayne Winseck, Jim McKenna and Oliver Boyd-Barrett (eds), *Media in Global Context: A Reader*. London: Arnold. pp. 19–26.

Glyn, Andrew and Sutcliffe, Bob (1998) 'Still underwhelmed: indicators of globalization and their

misinterpretation', *Review of Radical Political Economics*, 31 (1): 111–32.

Golding, Peter and Murdock, Graham (1989) 'Information poverty and political inequality: citizenship in the age of privatized communications', *Journal of Communications*, 39 (3): 180–95.

Gordon, David (1988) 'The global economy: new edifice or crumbling foundations?', *New Left Review*, 168: 24–65.

Greenwald, Robert, director (2004) *Outfoxed: Rupert Murdoch's War on Journalism.* Film

Hall, Stuart (1993) 'Culture, community, nation', *Cultural Studies*, 7 (3): 349–63.

Hartley, John (ed.) (2005) *Creative Industries.* Oxford: Blackwell.

Herman, Edward S. and Chomsky, Noam (1988) *Manufacturing Consent: The Political Economy of Mass Media.* New York: Pantheon.

Herman, Edward S. and McChesney, Robert W. (1997) *The Global Media: The New Missionaries of Global Capitalism.* London: Cassell.

Hirst, Paul and Thompson, Grahame (1996) *Globalization in Question.* Cambridge: Polity.

Howkins, John (2005) 'The mayor's commission on creative industries', in J. Hartley (ed.), *Creative Industries.* Oxford: Blackwell. pp. 117–25.

Innis, Harold A. (1951) *The Bias of Communication.* Toronto: University of Toronto Press.

International Monetary Fund (1997) *World Economic Outlook.* Paris: IMF.

ITU (1999) *World Telecommunication Development Report 1999: Mobile Cellular/World Telecommunications Indicators.* International Telecommunication Union, October.

ITU (2000) *Mergers and Alliances 1995–1999: Merger Mania as Telecoms go Multimedia.* International Telecommunication Union. Available online: www.itu.org

ITU (2001) *Key global telecom indicators for the world telecommunication service sector*, Available online: http://www.itu.int/ITU-D/ict/statistics/at_glance/KeyTelecom99.html

ITU (2004a) *World cellular subscribers*, Available online: http://www.itu.int/ITU-D/ict/statistics/at_glance/cellular01.pdf

ITU (2004b) *Information Technology*, Available online: http://www.itu.int/ITU-D/ict/statistics/at_glance/Internet03.pdf

Kalathil, Shanthi and Boas, Taylor C. (2003) *Open Networks, Closed Regimes: The Impact of the Internet on Authoritarian Rule.* Washington, DC: Carnegie Endowment for International Peace.

Krugman, Paul (1997) *Pop Internationalism.* Cambridge, MA: MIT Press.

Landry, Charles (2000) *The Creative City.* London: Earthscan.

Lasswell, Harold, D. (1965) *World Politics and Personal Insecurity.* New York: Free Press.

Lent, John (1993) 'Four conundrums of Third World communication', in K. Nordenstreng and H.I. Schiller (eds), *Beyond National Sovereignty: International Communications in the 1990s.* Norwood, NJ: Ablex.

MacBride, Sean (1980) *Many Voices, One World.* Paris: UNESCO.

Machlup, Fritz (1962) *The Production and Distribution of Knowledge in the United States*, Princeton, NJ: Princeton University Press.

Martin-Barbero, Jesus (1988) 'Communications from culture: the crisis of the national and the emergence of the popular', *Media, Culture & Society*, 10 (4): 447–66.

Martin-Barbero, Jesus (1993) *Communications, Culture and Hegemony: From the Media to Mediations*, trans. E. Fox and R.A. White. London: Sage.

Mattelart, Armand (2003) *The Information Society: An Introduction.* London: Sage.

Mattelart, Armand, Delcourt, Xavier and Mattelart, Michèle (1984) *International Image Markets.* London: Comedia.

Mehta, A. (1998) 'Media regulation in India', *Media Asia*, 25 (2).

Melkote, Srinivas R. and Steeves, Leslie, H. (2004) 'Information and communication technologies for rural development', in Festus Eribo and Charles C. Okigbo (eds), *Development and Communication in Africa.* Oxford: Rowman & Littlefield. pp. 165–73.

Melody, William (1996) 'Towards a framework for designing information society policies', *Telecommunications Policy*, 20 (4): 243–59.

Miller, Daniel and Slater, Don (2000) *The Internet: An Ethnographic Approach.* Oxford: Berg.

Miller, Toby, Govil, Nitin, McMurria, John, and Maxwell, Richard (2001) *Global Hollywood.* London: British Film Institute.

Meyrowitz, Joshua (1985) *No Sense of Place: The Impact of Electronic Media on Social Behaviour.* New York: Oxford University Press.

Moran, Albert (1998) *Copycat TV: Globalization, Programme Formats and Cultural Identity.* Luton: University of Luton Press.

Morley, David and Robins, Kevin (1995) *Spaces of Identity: Global Media, Electronic Landscapes and Cultural Boundaries.* London: Routledge.

Mosco, Vincent (1998) 'Political economy, communication, and labor', in G. Sussman and J.A. Lent (eds), *Global Productions: Labor in the*

Making of the 'Information Society'. Cresskill, NJ: Hampton.

Mosco, Vincent (1999) 'New York.com: a political economy of the "informational" city"', *Journal of Media Economics*, 12 (2): 103–16.

Murdoch, Rupert (1993) Address given at the launch of New World Communications, London, September.

Nordenstreng, Kaarle and Schiller, Herbert I. (eds) (1993) *Beyond National Sovereignty: International Communications in the 1990s*. Norwood, NJ: Ablex.

Northfield, Dianne (1999) *The Information Policy Maze: Global Challenges – National Responses*. Melbourne: Centre for International Research into Communications and Information Technologies (CIRCIT).

Oakley, Kate (2004) 'Not so cool Britannia: the role of the creative industries in economic development', *International Journal of Cultural Studies*, 7 (1): 67–77.

OECD (1997) *Towards a Global Information Society: Global Information Infrastructure/Global Information Society: Policy Requirements*. Paris: Organization for Economic Cooperation and Development.

OECD (1998) *Content as a New Growth Industry*. Paris: Organization for Economic Cooperation and Development.

OECD (1999) *Communications Outlook 1999*. Paris: Organization for Economic Cooperation and Development.

OECD (2000) *OECD Privacy Guidelines*. Available online: http://www.cs3-hq.oecd.org/scripts/pwv3/pwhome/htm

Porat, Marc U. (1977) *The Information Economy: Sources and Methods for Measuring the Primary Information Sector*. Washington, DC: Department of Commerce; Office of Telecommunications.

Rai, L.P. and Lal, K. (2000) 'Indicators of the information revolution', *Technology in Society*, 22: 221–35.

Reich, Robert (1992) *The Work of Nations*. New York: Vintage.

Robertson, Roland (1991) 'Mapping the global condition: globalization as the central concept', in Mike Featherstone (ed.), *Global Culture: Nationalism, Globalization and Modernity*. London: Sage. pp. 15–30.

Robertson, Roland (1994) 'Globalization or Glocalization', *The Journal of International Communication*, (1) 1, June.

Sakr, Naomi (2005) 'Maverick or model? Al-Jazeera's impact on Arab satellite television', in Jean Chalaby (ed.), *Transnational Television Worldwide*. London: I.B. Tauris. pp. 66–95.

Schiller, Herbert I. (1969) *Mass Communications and American Empire*. New York: Kelley.

Schiller, Herbert I. (1976) *Communications and Cultural Domination*. New York: International Arts and Science Press.

Schiller, Herbert I. (1989) 'Not yet the post-imperialist era', *Critical Studies in Mass Communication*, 8: 13–28.

Schlesinger, Philip (1991) 'On national identity. I: Cultural politics and the mediologists', in *Media, State and Nation: Political Violence and Collective Identities*. London: Sage. pp. 139–51.

Shaw, Martin (1997) 'The theoretical challenge of global society', in Annabelle Sreberny-Mohammadi, Dwayne Winseck, Jim McKenna and Oliver Boyd-Barrett (eds), *Media in Global Context: A Reader*. London: Arnold. pp. 27–36.

Shawcross, William (1997) *Murdoch: The Making of a Media Empire*. New York: Touchstone.

Sinclair, John (1997) 'The business of international broadcasting: cultural bridges and barriers', *Asian Journal of Communication*, 7 (1): 137–55.

Sinclair, John, Jacka, Elizabeth and Cunningham, Stuart (1996) 'Peripheral vision', in John Sinclair, Elizabeth Jacka and Stuart Cunningham (eds), *New Patterns in Global Television: Peripheral Vision*. Oxford: Oxford University Press.

Smith, Anthony D. (1991) 'Towards a global culture?', in Mike Featherstone (ed.), *Global Culture: Nationalism, Globalization and Modernity*. London: Sage. pp. 171–92.

Sreberny-Mohammadi, Annabelle (1997) 'The many cultural faces of imperialism', in *Beyond Cultural Imperialism: Globalization, Communication and the New International Order*. London: Sage. pp. 49–68.

Straubhaar, Joseph D. (1997) 'Distinguishing the global, regional and national levels of world television', in Annabelle Sreberny-Mohammadi, Dwayne Winseck, Jim McKenna and Oliver Boyd-Barrett (eds), *Media in Global Context: A Reader*. London: Arnold. pp. 284–98.

Sussman, Gerald (1997) *Communication, Technology, and Politics in the Information Age*. Thousand Oaks, CA: Sage.

Sussman, Gerald (2003) 'The Tao of Singapore's Internet politics', *Journal of International Communication*, 9 (1): 35–51.

Thaicom (2000) 'Satellite services'. Available online: www.thaicom.net

Thomas, Amos Owen (1996) 'Global-diasporic and subnational-ethnic: audiences for satellite television in South Asia', *Journal of International Communication*, 3 (2): 61–75.

Thussu, Daya Kishan (1998) 'Infotainment international: a view from the South', in *Electronic Empires: Global Media and Local Resistance*. London: Arnold. pp. 63–82.

Thussu, Daya Kishan (1999) 'Privatizing the airwaves: the impact of globalization on broadcasting in India', *Media, Culture & Society*, 21: 125–31.

Tomlinson, John (1997) *Globalization and Culture*. Cambridge: Polity.

Tracey, Michael (1988) 'Popular culture and the economics of global television', *Intermedia*, 16 (2): 9–24.

United Nations Conference on Trade and Development (2004) 'Creative industries and development', UNCTAD *Eleventh Session*, São Paulo, Brazil, 13–18 June. Available online: www.unctad.org/en/docs/tdxibpd13_en.pdf

Urry, John (1989) 'The end of organised capitalism', in Stuart Hall and Martin Jacques (eds), *New Times: The Changing Face of Politics in the 1990s*. London: Lawrence & Wishart. pp. 94–102.

US Trade Representative (2000) 'Special 301 Report'. Available online: www.ustr.gov

Venturelli, Shalini (2005) 'Culture and the creative economy in the information age', in J. Hartley (ed.), *Creative Industries*. Oxford: Blackwell. pp. 391–8.

Wark, McKenzie (1994) *Virtual Geography: Living with Global Media Events*. Bloomington, IN: Indiana University Press.

Waters, Malcolm (1995) *Globalization*. London: Routledge.

Weber, Ian G. (1995) 'The moral market: social vision and corporate strategy in Murdoch's rhetoric', *Media International Australia*, 77: 45–53.

Weiss, Linda (1997) 'Globalization and the myth of the powerless state', *New Left Review*, 225: 3–27.

Whitaker, Reg (1999) *The End of Privacy*. New York: New Press.

Zittrain, Jonathan and Edelman, Benjamin (2002) 'Empirical analysis of Internet filtering in China', Berkman Center for Internet & Society, Harvard Law School. Available online: http://cyber.law.harvard.edu/filtering/china

15

Universal Access to the New Information Infrastructure

HEATHER E. HUDSON

Technological innovation and the transition to a global digital economy have focused new attention on the importance of access for all to telecommunications facilities and services. 'Universal service', meaning access to basic telephone service for all, remains the primary objective. However, the emergence of the Internet is forcing policy-makers to rethink this concept, in terms of both what services should be universally available, and whether 'access' is a more appropriate goal for so-called 'advanced services'. This chapter examines the availability of telecommunications and information services access in industrialized and developing countries, the changing goals and definitions of universal service, and the strategies being implemented to extend access to various levels of service, particularly in rural and disadvantaged areas.

OVERVIEW

Background

The term 'universal service' originated not as a public policy goal, but as an industrial strategy. Theodore Vail, the early visionary head of AT&T, coined the term to mean the delivery of all telephone services through one network, the Bell system (Mueller, 1997). Vail was later willing to submit to government regulation to achieve his goal: a single, unified carrier providing both local and long-distance service throughout the country. However, by 1920, only 35 per cent of American households had a telephone (Crandall and Waverman, 2000). The Communications Act of 1934, which established the Federal Communications Commission, made no specific reference to universal service, although it did invoke 'the public interest' and stated that its purpose was 'to make available, so far as possible to all people of the United States, a rapid, efficient, nationwide … communications service with adequate facilities at reasonable charges'. Over the next 40 years, various methods were adopted to apportion the costs of providing telephone service among various elements in the network, which generally resulted in keeping local service prices low through cross-subsidies from long-distance and other services.

The term 'universal service' was reintroduced in 1975 in testimony by AT&T consultant (and former adviser to President Lyndon Johnson), Eugene Rostow, who sought to ward off competition from MCI and other new long-distance competitors, and to resist the

efforts of the Department of Justice to break up AT&T: 'In this struggle, the concept of universal service was redefined in a way that linked it to the practices of regulated monopoly' (Mueller, 1997). While AT&T eventually lost the argument that the way to keep local rates low and affordable was to prevent competition, a system of access charges was implemented so that all carriers would contribute to the costs of providing universal service.

Changing Concepts of Universal Service

The concept of universal service today is 'virtually synonymous with government policies designed to promote the affordability of telephone service and access to the network' (Mueller, 1997). In the US, targeted subsidies to ensure affordable access to a basic telephone service are available for low-income households, regardless of where they are located, as well as for telephone companies providing service in high-cost rural and remote areas, with the result that the price of service is lowered for all households, regardless of income. The Telecommunications Act of 1996 adds two new categories: identifying (but not defining) 'advanced services' that should be universally available; and specifying institutions (namely schools, libraries and rural health centres) rather than households as the means through which these services should be made accessible.

Many other countries have some form of universal service policy, which aims to ensure access to at least basic telephone services throughout the society, including low-income, isolated and disadvantaged residents.[1] In developing countries, such policies are generally formulated as goals to extend access to unserved populations or regions.

THE CURRENT CONTEXT

The concept of universal access must be viewed in a context of changing economic, technological and policy environments. Three major trends driving these changes are the rapid introduction of new technologies and services; the restructuring of the telecommunications sector; and globalization of economies and of communications. Together these developments are changing not only the world of telecommunications, but the ways people work, learn and interact. As noted elsewhere in this volume (see Chapter 18), economic activity is becoming increasingly information intensive, as the costs of information processing and transmission decline. Producers and consumers are becoming part of a globalized economy where national boundaries and time zones are becoming irrelevant. This transition to a so-called 'new economy' is being driven largely by the exploitation of the Internet, which in turn is made possible by changes in technology and communications policies.

Key technological trends that are driving the proliferation of new information and telecommunications services include the following:

- *Digitization* Telecommunications networks are becoming totally digital, so that any type of information, including voice and video, may be sent as a stream of bits. Digital compression allows more efficient use of bandwidth so that customers may have more choices (such as compressed satellite television channels) and/or lower costs, such as use of compressed video for distance education and compressed voice for Internet telephony.
- *Capacity* New technologies such as optical fibre have enormous capacity to carry information, and can be used for services ranging from entertainment and distance education to transmission of highly detailed images for remote medical diagnosis. Satellites and some terrestrial wireless technologies also offer a tremendous increase in availability of bandwidth.
- *Convergence* The convergence of telecommunications, data processing and imaging technologies is ushering in the era of multimedia, in which voice, data and images may be combined according to the needs of users, and distinctions between the traditional sectors of telecommunications, information

processing and broadcasting are increasingly arbitrary and perhaps irrelevant.

- *Ubiquity*   Advances in wireless technology such as cellular networks, personal communications systems (PCS) and rural radio subscriber systems offer affordable means of reaching rural customers and urban areas without infrastructure in developing countries. Low-cost wireless services may also replace wireline in industrialized countries as the primary means of personal access.

The policy environment is also changing dramatically, with increasing emphasis on private-sector ownership and market-driven competition. Major models of ownership and structure in the telecommunications sector include the following.

Ownership

- *Government-owned and operated utilities* In most countries (with the notable exceptions of the United States and much of Canada), telephone service was initially established as an offshoot of the postal service, through a government-owned entity often known as the PTT (post, telephone and telegraph). Typically, revenues from telecommunications services may be used to subsidize the postal service, or to contribute to the national treasury. Many countries also have separately managed military telecommunications networks; in China, the army as well as other government departments operate public telecommunications networks.

- *Autonomous public-sector corporations*   For countries with government-owned telecommunications operators, the first step for creating incentives to improve efficiency and innovation in the telecommunications sector is to create an autonomous organization operated on business principles. This is often seen as an intermediate step between a PTT structure and some form of privatization.

- *Privatized corporations*   Privatization models range from minor investments by private companies, to joint ventures between private carriers and governments, to full

privatization without any government stake or with a small government 'golden share'. Telecommunications carriers in industrialized countries are generally now partially or fully privatized.

Structure

- *Monopoly*   Most countries began with a national monopoly model, which has gradually been opened to competition. Many maintain some level of monopoly, for example in the local loop, but alternative providers using wireless and fibre are also beginning to challenge the assumption of natural monopoly in the local loop.

- *Open entry for unserved areas*   An intermediate step between national monopoly and competition is a policy of open entry for unserved areas. For example, in the US, Finland, Hungary and Poland, small companies or cooperatives were formed to provide services in areas ignored by the national monopoly carrier.

- *Competition*   Competition can range from terminal equipment (now commonly competitive almost everywhere) to new services such as cellular telephony, to value-added services such as Internet access, to full competition in all network services. Hong Kong has perhaps the most competitive environment, with full local competition; many other countries such as the United Kingdom, the United States, Canada, Australia and Japan have authorized local competition, but have little actual competition at the local level.

- *Consolidation*   Industrialized countries are now witnessing consolidation among competitors that seek economies of scale or scope, by buying either similar companies (such as the acquisitions by SBC of Pacific Bell and Ameritech, and by Bell Atlantic of NYNEX) or companies that provide new means of accessing customers, such as wireless networks and cable television systems. US examples include AT&T's acquisition of McCaw Wireless and TCI cable television, and Verizon (formed by the merger of Bell Atlantic with GTE).

The ownership and structure of telecommunications networks may influence goals and strategies for universal service. For example, government-owned monopolies may heavily cross-subsidize local and domestic services to extend access; in a competitive environment, dominant carriers (which are likely to be at least partially government owned) may have a special obligation to provide service in areas deemed to be unprofitable. In a fully competitive environment, efforts to ensure universal service must be based on competitively neutral policies such as incentives available to all carriers or explicitly targeted subsidies (see below).

THE IMPORTANCE OF ACCESS TO INFORMATION

The theoretical underpinning of research on the impact of information and communications technologies in general is that information is critical to the social and economic activities that comprise the development process. Much of the research to date on the socioeconomic effects of new communication technologies has examined the role of information networking through telecommunications. Access to information is critical to development; thus information and communication technologies (ICTs) as a means of sharing information are not simply a connection between people, but a link in the chain of the development process itself. Information is obviously central to activities that have come to be known as the 'information sector' including education and research, media and publishing, information equipment and software, and information-intensive services such as financial services, consulting and trade. But information is also critical to other economic activities ranging from manufacturing to agriculture and resource extraction, for management, logistics, marketing and other functions. Information is also important to the delivery of health care and public services (Hudson, 1984, 1995; Saunders et al., 1994).

For individuals, access to information can have personal, social and economic functions, often accomplished using the same devices. An individual can summon help in an emergency via telephone; she may stay in touch with friends and family members and arrange appointments by telephone or e-mail; and she may find the Internet a more efficient means of tracking down consumer information on products and services than the mass media. Entrepreneurial sole proprietors, ranging from programmers and consultants to small farmers and craftspeople, can set up global storefronts on the Internet.

In general, the ability to access and share information can contribute to the development process by improving:

- *efficiency*, or the ratio of output to cost (for example, through use of just-in-time manufacturing and inventory systems, through use of information on weather and soil content to improve agricultural yields);
- *effectiveness*, or the quality of products and services (such as improving health care through telemedicine);
- *reach*, or the ability to contact new customers or clients (for example, craftspeople reaching global markets on the Internet; educators reaching students at work or at home);
- *equity*, or the distribution of development benefits throughout the society (such as to rural and remote areas, to minorities and disabled populations) (Hudson, 1997a).

It is the importance of communication to socioeconomic development and equity that has been the foundation of the 'public interest' concerns in telecommunications, and the concept of universal service as a means of providing accessible and affordable communications throughout the society.

INFORMATION GAPS

In industrialized countries and other high-income countries, telephone service is almost

universally available through fixed lines and increasingly through wireless networks. Ownership of computers is widespread, and use of the Internet is increasing dramatically. In the US, about 95.5 per cent of households have telephones, while 56.5 per cent have personal computers and 50.5 per cent have Internet access (Federal Communications Commission, 2004). However, despite growth in access overall, there is a widening gap between high- and low-income households. Urban households with incomes of $75,000 and higher are more than 20 times as likely to have access to the Internet than rural households at the lowest income levels, and more than nine times as likely to have a computer at home (McConnaughey et al., 1999). Blacks, Hispanics and native American populations now lag further behind whites and Asian Americans in computer ownership and online access (see Winseck, and Gandy, in this volume).

In the rural US, there has been significant progress in access to basic telecommunications. Distance no longer accounts for difference in household access to a telephone; income levels are now a better predictor. Yet the gap in access to the Internet persists. Regardless of income level, Americans living in rural areas are lagging behind in Internet access; at the lowest income levels, those in urban areas are more than twice as likely to have Internet access as rural Americans with similar incomes.[2] Those who are connected typically pay more than their urban counterparts for Internet access. Disparities in Internet access are found in the Canadian north and the Australian outback, and in rural and disadvantaged parts of Europe.

However, this so-called 'digital divide' is much more pronounced in developing countries, where access to information and communications technologies (ICTs) remains much more limited. In its *Statement on Universal Access to Basic Communication and Information Services* of April 1997, the United Nations Administrative Committee on Coordination noted the following:

The information and technology gap and related inequities between industrialized and developing nations are widening: a new type of poverty – information poverty – looms. Most developing countries, especially the Least Developed Countries (LDCs), are not sharing in the communications revolution, since they lack:

- affordable access to core information resources, cutting-edge technology and to sophisticated telecommunications systems and infrastructure;
- the capacity to build, operate, manage and service the technologies involved;
- policies that promote equitable public participation in the information society as both producers and consumers of information and knowledge; and
- a work force trained to develop, maintain and provide the value-added products and services required by the information economy. (ITU, 1998: 10)

More than 85 per cent of the world's Internet users are in developed countries, which account for only about 22 per cent of the world's population.[3] Of course, Internet access requires both communications links and information technologies, particularly personal computers or networked computer terminals. While there is still much less access to telecommunications in developing countries than in industrialized countries, at present, the gap in access to computers is much greater than the gap in access to telephone lines or telephones. High-income countries had more than 14 times as many telephone lines per 100 population as African countries, but 35 times as many computers and more than 300 times as many Internet users per 100 population (Table 15.1).

Typically, a high percentage of developing country residents live in rural areas (as much as 80 per cent of the population in the least-developed countries), where access to communication networks is much more limited than in urban areas (Table 15.2). It should be noted that Table 15.2 overestimates rural access because the 'rest of country' includes everything except the largest city. Also, facilities are not likely to be evenly distributed throughout the country, so that in poorer nations there may be many rural settlements without any communications infrastructure.

Internet Access Indicators

Table 15.1 *Internet access by region*

Region	Main tel. lines 100 pop.	PCs/100	Internet users 100
Africa	2.7	1.3	0.03
Americas	34.8	29.0	14.5
Asia	11.7	4.6	0.4
Europe	36.6	21.4	2.3
Oceania	39.1	42.4	9.7
World	17.1	10.2	9.9

Source: Derived from ITU (2004).

ACCESS PARAMETERS

Access versus Service

The terms 'universal access' and 'universal service' are sometimes used interchangeably, although access is becoming the more common term. The distinction is between services that are delivered to all users, and access to a variety of services that may be provided to individual users, households, community facilities, institutions and workplaces, etc. However, it is also necessary to consider access to the technologies connected to these networks that make possible information access and processing, particularly when considering access to the Internet. Typically, end-user equipment would include personal computers with sufficient speed and capacity to process data from the World Wide Web (or networked terminals with central access to sufficient capacity), and access to value-added services such as Internet service providers (ISPs).

Access is thus a broader concept than service, and involves the following components.

- *Infrastructure* Reach of networks and services, for example to rural areas, low-income populations in inner cities; available bandwidth (such as broadband capacity for high-speed Internet access).
- *Range of services* For example, basic voice service (plain old telephone service or 'POTS'), value-added services such as ISPs.
- *Affordability* Pricing of installation, monthly service, usage by time or volume, etc.
- *Reliability* Quality of service, as shown by extent of outages, breakdowns, circuit blockage, circuits degraded by noise or echoes, etc.

Another important component of access is specification of the entitities to whom telecommunications services should be accessible. Users may be considered in several categories.

- *Public* Geographic, i.e. urban/rural, regional; demographic, i.e. disadvantaged people such as low-income groups, the disabled, ethnic or other minorities.
- *Commercial enterprises* Large and small businesses, entrepreneurs; critical sectors, i.e. agriculture, transportation, manufacturing, tourism, etc.
- *Public services* Health care, education, other government/public services, etc.; nonprofit and non-governmental organizations (NGOs).

Universal Access: A Moving Target

Universal access should be considered a dynamic concept with a set of moving targets.

Table 15.2 *Access to telecommunications*

Country	Teledensity (telephone lines per 100)		
Income classification	National	Urban	Rest of country
High	46.0	52.9	43.8
Upper middle	13.7	25.7	11.5
Lower middle	9.7	22.1	7.2
Low	2.5	6.5	2.3

Source: Derived from ITU (1998).

Rapid technological change dictates that the definitions of basic and 'advanced' or 'enhanced' services will change over time, while the unit of analysis for accessibility may be the household, the municipality, or even institutions such as schools and health centres. Thus, for example, a multi-tiered definition of access could be proposed, identifying requirements within households, within communities and for education and social service providers. For example:

- *level one* community access, for example through kiosks, libraries, post offices, community centres, telecentres;
- *level two* institutional access through schools, hospitals, clinics;
- *level three* household access.

Economic and demographic diversity in inner cities, impoverished rural areas, and developing countries will require a variety of goals for information infrastructure. In North America and Europe, the goal has been to provide basic telephone service to every household, with the assumption that businesses and organizations could all afford access to at least this grade of service. However, for Internet access, the US is applying community and institutional access models. As noted earlier, the US Telecommunications Act of 1996 specifies that 'advanced services' should be provided at a discount to schools, libraries and rural health centres. 'Advanced services' are currently interpreted as Internet access. In the future, it is likely that advanced services will be redefined, perhaps to include access to new generations of services available through the Internet or its successors. It should also be noted that industrialized countries such as the US and Canada have extended the concept of basic service beyond quality adequate for voice to include single-party service, and circuits capable of supporting the capacity of current modems, with the assumption that people will want to communicate electronically from their homes.[4] These criteria are also likely to be revised over time to keep pace with the demands of the information economy.

Developing countries generally use community access criteria: China, India, Mexico, Nepal and Thailand, for example, aim for at least one telephone per village or settlement. Other developing countries set targets of public telephones within a radius of a few kilometres in rural areas (ITU, 1998: 69). The ITU's Maitland Commission called for a telephone within an hour's walk throughout the developing world.

The Danger of Electronic Islands and Ghettos

National goals of interoperability and open standards are needed to ensure that users are not left on 'electronic islands' because their service provider is not interconnected with other networks. An analogy would be the early stages of commercial e-mail, when each e-mail service was autonomous, so that communication between subscribers to different services was impossible or at least very cumbersome.

There is still a danger of creating electronic ghettos – low-profit regions such as inner cities and rural areas – that carriers and service providers may have little incentive to serve or upgrade. For example, large US telephone companies have been reluctant to upgrade their networks in rural areas by adding technologies such as signalling system 7 (SS7), integrated services digital network (ISDN) and digital subscriber line (DSL). Ironically, customers of some rural telephone companies that have invested in new facilities may gain little benefit if the connecting long-distance carriers do not offer similar services.

TECHNOLOGICAL TRENDS

Demand for Internet access has created a market for higher-speed communication than is typically available over a dialup telephone line. The least-cost solution in areas with communications infrastructure is to upgrade

these facilities, for example to offer DSL over existing telephone lines or cable modems for access over cable television networks. Where population density is high and funds are available, optical fibre is being provided to the end user (for example, in Singapore and in new subdivisions in industrialized countries). However, high-capacity wireless networks may offer a lower-cost solution than optical fibre to provide high-speed networking.

In the past, there have been few incentives for carriers to provide access to low-income customers such as disadvantaged minorities and inner-city residents who are presumed to have limited demand for new services, and rural and remote regions where the cost of extending or upgrading facilities and services is assumed to be higher than expected revenues. However, technological innovations, many of which were initially designed for other applications, are now creating opportunities to reduce costs and/or increase revenues among these populations. As noted earlier, high-capacity wireless may be a less expensive means of providing or upgrading access in urban areas. Wireless also has enormous potential in rural areas where the cost of installing cable or fibre is much higher. Satellite systems may also be used in rural areas for basic telephony (generally through a local network connected to a community satellite terminal) or for Internet access (which could also be through an individual VSAT – a very small aperture terminal). More information on these technologies and their implications for improving access is provided in the Appendix at the end of this chapter.

There are several significant implications of these technological trends, particularly for rural and developing regions.

- *Distance is no longer a barrier to accessing information* Technologies are available that can provide interactive voice, data and multimedia services virtually anywhere.
- *Costs of providing services are declining* Satellite transmission costs are independent of distance; transmission costs using other technologies have also declined dramatically. Thus communications services can be priced not according to distance, which penalizes rural and remote users, but per unit of information (message, bit) or unit of time.

- *The potential for competition is increasing* Lower costs make rural/remote areas more attractive. New competitors can offer multiple technological solutions, including wireless, satellite, copper, cable and others described above.

In addition, it is no longer technically or economically necessary to set rural benchmarks lower than urban benchmarks for access – both to basic telecommunications and to the Internet. The US Telecommunications Act of 1996 requires that rural services and prices are to be *reasonably comparable* to those in urban areas. This standard rejects the assumption that 'something is better than nothing' in rural areas because minimal service was all that was either technically feasible or economically justifiable. However, as noted earlier, advances in technologies such as terrestrial wireless and satellite systems can now provide higher quality at lower cost in rural areas. The implications of these changes in policy and technology are particularly critical in enabling rural residents to participate in the digital economy.

While the US and other industrialized countries must upgrade outdated wireline networks and analogue exchanges in rural areas, developing countries can leapfrog old technologies and install fully digital wireless networks. Thus developing country regulators can also adopt rural comparability standards to avoid penalizing rural services and businesses in access to information services. For example, in the Philippines, after extensive discussion, both government and industry representatives agreed on rural benchmarks including digital switching, single-party service, and line quality sufficient for facsimile and data communications.[5]

UNDERSTANDING DEMAND FOR COMMUNICATION SERVICES

Lack of understanding of demand for telecommunications services (i.e. the need for the service and ability to pay) creates problems in designing universal service policy. For example,

Table 15.3   *Access to telephones v TV sets per household*

Country income classification	Telephone lines per household	TV sets per household	Ratio TV sets/telephone lines
High	96.1	97.1	1.01
Upper middle	59.0	92.6	1.60
Lower middle	49.4	89.4	1.80
Low	8.2	35.2	4.30

Source: Derived from ITU (2004).

'low-income' households in industrialized countries may be able to pay for the cost of monthly telephone service subscriptions, which are likely to cost less than other utilities and than entertainment, including cable television (Crandall and Waverman, 2000). Thus, it may not be necessary to provide a subsidy for service to most low-income households. However, utilization of the network (for long-distance or measured rate calls) which subscribers need to maintain contact for family or work may be much more expensive. Some consumer representatives have advocated a policy of providing a live telephone connection in all dwellings which could be used for emergencies. Other possibilities include blocks on the line to prevent unauthorized use for other than local calls, and prepaid service in the form of a rechargeable account or smart card that allows calling only up to the limit of funds on the card or in the account.

Communications service providers may also be reluctant to extend services to poorer populations who are assumed to have insufficient demand to cover the cost of providing the services and necessary infrastructure. Certainly, household income may be the best indicator of both willingness and ability to pay for communication services. Typically higher-income populations are better educated, and are thus likely to have not only the money but also the skills to use new technologies and services.

However, indicators other than population and household income may be better predictors of demand for communication services. One study estimates that rural users in developing countries are able collectively to pay 1 to 1.5 per cent of their gross *community* income for telecommunications services (Kayani and Dymond, 1997: xviii). The ITU uses an estimate of 5 per cent of *household* income as an

affordability threshold. To generate revenues to cover capital and operating costs of the network, the average household income required would be $2060; for a more efficiently run network, it would be $1340 (ITU, 1998: 35). Using the higher estimate, 20 per cent of households in low-income countries could afford a telephone; in lower-middle-income countries the range could be from 40 to 80 per cent; while in upper-middle-income countries such as Eastern Europe, more than 80 per cent of households could afford telephone services (1998: 37).[6]

Just as income may not fully explain demand for information technologies and services, lack of access to telephone services cannot necessarily be attributed to lack of demand or purchasing power. For example, in many developing countries, television sets are much more prevalent than telephones. In industrialized countries, both TV sets and telephone lines are almost universally available. However, in lower-middle-income countries there are almost twice as many TV sets as telephone lines, while in low-income countries there are more than four times as many TV sets as telephone lines (see Table 15.3). It appears that where television is available, a significant percentage of families will find the money to buy TV sets. Thus, even in the poorest countries, there may be much more disposable income available than per capita GDP data would indicate, and there may be significant demand for other information services.

Other approaches may also be used to gauge demand for information services. For example, the presence of video shops indicates significant disposable income available for television sets, video cassette players and cassette rentals. Telephone service resellers (such as in Indonesia, Senegal and Bangladesh), local cable television

operators (common in India) and small satellite dishes on rural homesteads and urban flats (common in Eastern Europe and many Asian countries) also signal demand and ability to pay for information services.

A conclusion that can be drawn from the above analysis is that changing the policy environment to create incentives to serve previously ignored populations may significantly increase access among these groups. Incentives are some of the innovative strategies that have been adopted to provide community access to telecommunications, and more recently to the Internet, which are summarized in the next section.

POLICIES AND STRATEGIES TO INCREASE ACCESS

Community Access Requirements

Some countries such as Chile and Mexico have mandated requirements for operators to install payphones in rural communities; South Africa has also required its wireless operators to install fixed rural payphones. Franchised payphones have been introduced in Indonesia, India, Bangladesh and other countries in order to involve entrepreneurs where the operator is still government owned. Indonesia's franchised call offices, known as wartels (*warung telekomunikasi*), operated by small entrepreneurs, generate more than $9000 per line, about ten times more than Telkom's average revenue per line (ITU, 1998: 77). Franchised telephone booths operate in several francophone African countries; in Senegal, phone shops known locally as telecentres average four times the revenue of those operated by the national carrier (1998: 77–8). In Bangladesh, Grameen Phone has rented cell phones to rural women who provide portable payphone service to their communities. Such examples of simple resale can create incentives to meet pent-up demand even if network competition has not yet been introduced.

Telecentres and other public facilities can provide access to e-mail, which is much faster than the postal service and cheaper than

facsimile transmission. For example, a message of 2000 words takes 10 minutes to read over a telephone; 2 minutes to send by fax; and about 4 seconds to transmit via a 28.8 kbps modem (M. Hegener, quoted in ITU, 1998: 80). Such services can be valuable even for illiterates. For example, a Member of Parliament from Uganda stated that his father sent many telegrams during his lifetime, but could neither read nor write. Local scribes wrote down his messages. Similarly, 'information brokers' ranging from librarians to cybercafé staff can help people with limited education to send and access electronic information.

Virtually every major city in the developing world now has cybercafés or privately operated telecentres equipped with personal computers linked to the Internet. The African Communications Group plans wireless kiosks for Internet access, with web pages enabling artisans, farmers and other small entrepreneurs to set up shop in the global marketplace (Petzinger, 1998: B1). Initiatives to provide public Internet access through community telecentres are being supported by several development agencies including the International Telecommunication Union (ITU), UNESCO, United Nations Development Programme (UNDP), Canada's International Development Research Centre (IDRC), and the US Agency for International Development (USAID). South Africa is also supporting the installation of telecentres equipped with phone lines, facsimile and computers with Internet access through a universal service fund; South Africa now plans to provide Internet access to government information and electronic commerce services through post offices. Many other countries are extending public access to the Internet through telecentres, libraries, post offices and kiosks.

Access to telephones through booths, kiosks and telecentres can be coupled with electronic messaging to provide a 'virtual telephone service'. TeleBahia in north-eastern Brazil offers a virtual service for small businesses without individual telephones. These customers rent a voice mailbox for a monthly fee and check their messages from a payphone, providing a means for clients to contact them. African Communications Group[7] is setting up wireless

public payphones and providing voice mail accounts and pagers that announce incoming messages. The recipient calls back or leaves a voice mail message using a phone card; the service is priced for people making $200 per month (Petzinger, 1998: B1). Similar systems are used for migrant farm workers in California to enable them to stay in touch with their families, and in homeless shelters to enable job seekers to be contacted by employers.

Service Obligations

Many countries include a universal service obligation (USO) as a condition of the licence. The cost of USOs may vary depending on geography and population density. British Telecom's universal service obligation costs just 1 per cent of its total revenue base (Oftel, 1994; quoted in Kayani and Dymond, 1997: 53). Latin American countries with USOs include Argentina, Chile, Mexico, Peru and Venezuela. In Mexico, the privatized monopoly operator TelMex was to provide service to all communities with at least 500 population by the year 2000. In the Philippines, local exchange obligations are bundled with cellular and international gateway licences; licensees were required to install up to 300,000 access lines in previously unserved areas within three years (Hudson, 1997b).

Some countries use a 'carrier of last resort' model which has the obligation to provide service if no other carrier has done so. Typically, the dominant carrier bears this obligation and is entitled to a subsidy to provide the service. However, this approach can be flawed if it provides no incentive for the carrier with the USO to use the most appropriate and inexpensive technology and to operate efficiently. It can also serve as a justification for the dominant carrier to be protected from competition because it has additional costs and obligations not required of new competitors.

However, rather than designating a single carrier of last resort, some countries are introducing bidding schemes for rural subsidies. In Chile, a development fund was established in 1994 to increase access for the approximately 10 per cent of the population in communities

without telephone access. The regulator estimated the required subsidies, distinguishing between commercially viable and commercially unviable, and put them out to competitive tender. There were 62 bids for 42 of the 46 projects. Surprisingly, 16 projects were awarded to bids of zero subsidy; as a result of preparing for the bidding process, operators were able to document demand and willingness to pay in many communities. Once completed, these projects will provide service to about 460,000 people, about one-third of the Chilean population without access (ITU, 1998: 79). Peru is introducing a similar programme.

Subsidies

A variety of schemes can be used to subsidize carriers that serve regions where revenues would apparently not cover costs. Subsidies may be paired with USOs to compensate the carrier with the obligation to serve. The traditional means of ensuring provision of service to unprofitable areas or customers has been through cross-subsidies, such as from international or interexchange to local services. However, technological changes and the liberalization of the telecommunications sector now make it impracticable to rely on internal cross-subsidies. For example, customers may bypass high-priced services using so-called 'callback'[8] services or Internet telephony.

In a competitive environment, cross-subsidies cannot be maintained. Carriers that have relied on revenues from one service to subsidize another now face competitors who can underprice them on individual services. Also, new entrants cannot survive if their competitors are subsidized. Therefore, if subsidies are required, they must be made explicit and targeted at specific classes of customers or locations such as the following.

- *High-cost areas* Carriers may be subsidized to serve locations that are isolated and/or have very low population density so that they are significantly more expensive to serve than other locations. This approach is used in the US and has recently been mandated in Canada.

- *Disadvantaged areas or customers* Subsidies may target economically disadvantaged areas or groups that could not afford typical prices for installation and usage, or where demand for service is significantly lower than average. Some carriers may offer interest-free loans or extended payment periods to assist new subscribers to connect to the network. In the US, the Lifeline programme subsidizes basic monthly service charges for low-income subscribers. The subsidy funds come from a combination of carrier contributions and surcharges on subscriber bills. Some 4.4 million households receive Lifeline assistance. Also in the US, the Linkup programme subsidizes connection to the network for low-income households.
- *Route averaging* Some countries including Australia, Canada, the United Kingdom and the United States require that rates be averaged so that all customers pay uniform distance charges, regardless of location. Thus, for example, the rate per minute between Sydney and Melbourne would be the same as the rate over an equal distance in the Australian outback, where costs are much higher. Such policies can bridge the digital divide by reducing rural access costs.

Funding Universal Service

Funds for subsidies may be generated from several sources such as contributions required from all carriers: for example, a percentage of revenues, a tax on revenues or a surcharge on customer bills. Subsidies may also come from general tax revenues or other government sources.

- *Transfers among carriers* Some countries with many carriers rely on settlement and repayment pooling schemes among operators to transfer payments to carriers with high operating costs. For example, the US Universal Service Fund is mandated by the Federal Communications Commission (FCC) but administered by the carriers through the National Exchange Carriers Association (NECA), and transfers funds to subsidize access lines to carriers whose costs are above 115 per cent of the national average.[9]

- *Government-financed funds* In Poland, over 7885 localities were connected between 1992 and 1996 with funding of US$20 million from the state budget (ITU, 1998: 78). In 1994, Peru established a rural telecommunications investment fund, FITEL (Fondo de Inversion de Telecomunicaciones), which is financed by a 1 per cent tax on revenues of all telecommunications providers, ranging from the country's newly privatized monopoly operator Telefonica/ENTEL to cable TV operators. Since established, it has generated an average of US$450,000 per month, growing by US$12 million annually (1998: 79). Private-sector operators may apply to FITEL for financing (Kayani and Dymond, 1999: 63–4).

Licensing Rural Operators

Some countries grant monopoly franchises to rural operators. For example, Bangladesh has licensed two rural monopoly operators; they are allowed to prioritize the most financially attractive customers and charge a substantial up-front subscriber connection fee. The Bangladesh Rural Telecommunications Authority (BRTA) is profitable, even though it has to provide at least one public call office (PCO) in each village that requests one (Kayani and Dymond, 1997: 18).

However, other countries are opening up rural areas to competition as part of national liberalization policies. Argentina allows rural operators to compete with the two privatized monopolies, Telecom and Telefonica. Some 135 rural cooperatives have been formed to provide telecommunications services in communities with fewer than 300 people (1997: 18). Finland's association of telephone companies has created several jointly owned entities that provide a range of rural, local and long-distance services in their concession areas, in competition with the national operator (1997: 19). In Alaska, a second carrier, GCI, competes with AT&T Alascom to provide long-distance services in rural and remote areas. This competition has benefited Alaskan schools in gaining access to the Internet. GCI has assisted

school districts in applying for E-rate subsidies for Internet access, apparently viewing this initiative as a win–win opportunity for both schools and the telephone company.

Although in most countries a single carrier provides both local and long-distance services, it is also possible to delineate territories that can be served by local entities. In the US, the model of rural cooperatives fostered through the Rural Utilities Service (formerly Rural Electrification Administration) has been used to bring telephone service to areas ignored by the large carriers. As noted earlier, wireless technologies could change the economics of providing rural services, making rural franchises much more attractive to investors. As a result of availability of funds from the RUS for upgrading networks, rural cooperatives in the US typically provide more modern facilities and better Internet access than provided by large telephone companies serving rural areas.

Third parties may also be permitted to lease capacity in bulk and resell it in units of bandwidth and/or time appropriate for business customers and other major users. This approach may be suitable where some excess network capacity exists (e.g. between major cities or on domestic or regional satellites). Resale is one of the simplest ways to introduce some competition and lower rates for users, but is not legal in many developing countries, even where some excess capacity exists in backbone networks.

CURRENT AND FUTURE TRENDS

Understanding Trends in Access

Research is needed to determine which underlying factors are the best explanations of variations in access. For example, in the US, attention is frequently focused on ethnicity and rurality, e.g. access by blacks, Hispanics and native Americans, and on disparities between urban and rural residents. However, other factors such as income and education (often highly correlated) may influence access. Similar analysis in other countries may reveal underlying factors that form barriers to access. As definitions of access change to include

computers and Internet connectivity as well as a telephone service, we could expect that education would be an increasingly important predictor of access, since better-educated people would tend to have better technical skills and greater perceived need for use of computers and online services.

Other industrialized countries show trends broadly similar to those in the US, with access greater among those with higher incomes and more education, and somewhat greater in urban than in rural areas. However, the percentage of the population with Internet access at home or at work is more than twice as high in the US, Canada, the Nordic countries and Australia as in the United Kingdom, and more than three times higher than in Germany, Japan and France (ITU, 1999a: 22). It would be useful to learn what enabling or inhibiting factors are contributing to these disparities.

Studies of outliers and anomalies could also improve our understanding of trends in access to new services and their implications. For example, why are the Scandinavian countries (Finland, Sweden, Norway, Denmark) in the top ten countries in Internet hosts per 1000 population, and what impact is this high level of Internet access likely to have on their economies? Does the fact that Israel, Ireland and Taiwan have more Internet hosts per 1000 population than France and Japan indicate future trends in economic growth, or is it a short-term artifact of national policies? Are middle-income countries such as Egypt and Jordan, which have better Internet access than other economically similar countries, likely to reap greater economic benefits than countries with below-average access such as Tunisia and Algeria? Among the 'Asian tigers', does the greater Internet access of Singapore, Hong Kong and Taiwan give them an advantage over South Korea, Malaysia and Thailand (1999a: 22, 38)?

From Access to Use

Beyond access, it will be important to understand what factors influence use of information services once they are accessible, either through individual ownership and connectivity

or via public sites such as schools and libraries. Are there other factors such as computer use at school that are likely to encourage access? Are there strategies such as community access or training that could increase utilization? Among youth, are there specific factors such as exposure at an early age that appear preconditions for later use? Among adults, are there information-seeking behaviours or social norms that may influence use of ICTs? For example, in some cultures, women may be discouraged from using technology; also, older or less educated people may feel more comfortable using an 'information broker' such as a librarian, social worker or extension agent to find information they need or to contact others electronically.[10] Anecdotal evidence from projects such as SeniorNet in the US and telecentres in developing countries indicates that such resource people can be very important as facilitators, especially at early stages in using the Internet among some populations such as senior citizens and women. For example, at telecentres with local facilitators in Mali, Uganda and Mozambique, from 30 to 45 per cent of the users are women, despite the fact that women typically have less education and exposure totechnology than men in these societies.[11]

CONCLUSION

The concept of universal service continues to evolve, both in terms of services that should be universally included and in our understanding of access – meaning that the services are available, affordable and reliable. This chapter has shown how innovative technologies, strategies and policies can help to increase access to communication services. However, it is important to note that more than access will likely be necessary to achieve significant benefits. A workforce with sufficient general education and specialized training as well as an institutional environment that fosters innovation and productivity are likely to be critical factors. Effective applications of these facilities may require training, mentoring and, in some cases, facilitation through intermediaries. Sustainability will

continue to be a concern, particularly in maintaining non-commercial forms of access such as through schools and libraries, and non-profit community access centres.

APPENDIX: TECHNOLOGIES AND SERVICES FOR EXTENDING ACCESS

The following are key technologies that offer new or lower-cost access to information and telecommunication services:

Wireline

Digital Subscriber Line (DSL)

This technology offers increased capacity, suitable for Internet access, over existing copper wire, making it an attractive option for upgrading Internet access in urban areas where telephone lines are already installed (its range is too limited for rural areas). However, it should be noted that copper wire is prone to theft in some countries: Telkom South Africa reported more than 4000 incidents of cable theft in 1996, at an estimated cost of R230 million (about US$50 million) (ITU, 1998: 60).

Interactive Cable Systems

Coaxial cable installed to deliver cable television can also be upgraded to provide telephony and Internet access. Cable modems provide faster transmission than DSL; however, older cable systems are not optimally configured for interactivity, and quality of service may be inferior to that provided by telephone companies.

Hybrid Fibre/Coax (HFC)

A combination of optical fibre and coaxial cable can provide broadband services such as TV and high-speed Internet access as well as telephony; this combination is cheaper than installing fibre all the way to the customer premises. Unlike most cable systems, HFC allows two-way communication. The fibre runs from a central switch to a neighbourhood

node; coax links the node to the end user such as the subscriber's home or business. HFC is found in many industrialized countries; developing countries with HFC projects include Chile, China, India, South Korea and Malaysia (1998: 57).

Optical Fibre

Optical fibre is commonly found in links between switches, terrestrial backbone networks and submarine cables. Fibre is being installed in new towns and subdivisions in industrialized countries, but the cost of upgrading existing local loops to fibre is very high. However, Singapore has provided fibre to end users, and Japan is committed to upgrading local loops to optical fibre throughout the country.

Terrestrial Wireless

Cellular

Cellular technology, originally designed for mobile services (such as communication from vehicles), is now being introduced for personal communications using small portable handsets. Wireless personal communications are almost ubiquitous in Scandinavia, Japan and Hong Kong, and are proliferating very rapidly in other industrialized and emerging economies. In developing countries without sufficient wireline infrastructure, wireless personal networks can provide a primary service. In China, there are more than 70 million wireless customers; other developing countries where wireless is used as a primary service include Colombia, Lebanon, Malaysia, the Philippines, Sri Lanka, South Africa, Uganda, Venezuela and Thailand (ITU, 1998: 49).

Wireless Local Loop (WLL)

Wireless local loop systems can be used to extend local telephone services to rural customers without laying cable or stringing copper wire. WLL costs have declined, making it competitive with copper; wireless allows faster roll-out to customers than extending wire or cable, so that revenue can be generated more quickly; it also has a lower ratio of fixed to incremental

costs than copper, making it easy to add more customers and serve transient populations. Wireless is also less vulnerable than copper wire or cable to accidental damage or vandalism. Examples of countries with WLL projects include Bolivia, Czech Republic, Hungary, Indonesia and Sri Lanka (ITU, 1998: 53).

Cordless

Short-range cordless extensions can provide the link from wireless outstations to subscriber premises; the DECT (digital European cordless telephone) technology standard will also allow the base station to act as a wireless PBX (Kayani and Dymond, 1997: 48). For example, DECT has been used in South Africa for the link to rural subscribers.[12]

Wireless Payphones

Cellular installations can be used to provide fixed public payphones. For example, new cellular operators in South Africa were required to install 30,000 wireless payphones within five years as a condition of the licence. By March 1997, almost 15,000 wireless payphones had been installed (ITU, 1998: 50). Alternatively, a cellular subscriber may resell access. Entrepreneurs in Bangladesh offer payphone service using cell phones leased from Grameen Phone, which they carry by bicycle to various neighbourhoods.

Multi-access Radio

Time division multiple access (TDMA) radio systems are a means of providing wireless rural telephony. They typically have 30–60 trunks and can accommodate 500–1000 subscribers. Their range can be extended using multiple repeaters (Kayani and Dymond, 1999: 27).

WiFi

Wireless fidelity (WiFi) refers to a set of standards known as IEEE 802.11 which are used for wireless communications over short distances. WiFi can be used for networks in the home or business, but also to cover a campus or a village. WiFi is now built into most laptop computers.

Satellite Technologies

Very Small Aperture Terminals (VSATs)

Small satellite earth stations operating with geosynchronous earth orbiting (GEO) satellites can be used for interactive voice and data, as well as for broadcasting of data, audio and video. Remote villages in Alaska and the Canadian Arctic use satellites for telephone service, Internet access and broadcast reception. VSATs may also offer affordable access for business networks: banks in remote areas of Brazil are linked via VSATs; the National Stock Exchange of India links brokers with rooftop VSATs.

Demand Assignment Multiple Access (DAMA)

In GEO satellite systems, instead of assigning dedicated circuits to each location, DAMA allows the terminal to access the satellite only on demand and eliminates double hops between rural locations served by the same system. The system is very cost-effective because satellite transponder expense is reduced to a fraction of that associated with a fixed-assigned system for the same amount of traffic. Also, digital DAMA systems provide higher bandwidth capabilities at much lower cost than analogue. DAMA is used to reduce costs of village telephone service in Alaska, and is now used in other satellite dialup networks.

Global Mobile Personal Communications Systems (GMPCS)

Using low earth orbiting (LEO) satellites, these systems – such as Globalstar, Iridium and ICO – can provide voice and low-speed (typically 2400 to 9600 kbps) data virtually anywhere, using portable satellite phones. However, the price per minute for these services may be much higher than national terrestrial services, and the first generation of LEOs has very limited bandwidth.

Internet via Satellite

Internet gateways can be accessed via geostationary satellites. For example, MagicNet (an ISP in Mongolia) and some African ISPs access the Internet in the US via PanAmSat, and residents of the Canadian Arctic use the Anik satellite system, while Alaskan villagers use US domestic satellites. However, these systems are not optimized for Internet use, and may therefore be quite expensive. Several improvements in using GEOs are becoming available.

- *Optimized interactive access via VSAT*: Several companies are developing protocols for fully interactive Internet access via satellite, that should be much more efficient than current systems.[13]
- *Hybrid systems*: This approach uses a VSAT as a downlink from the ISP, but provides upstream connectivity over existing telephone lines. Some rural schools in the US are using hybrids for Internet access.
- *High-bandwidth LEOs*: Future LEO systems are being planned to provide bandwidth on demand. Future constellations of LEO satellites may provide another means of Internet access via satellite (Hudson, 1998a).
- *Data broadcasting*: Satellites designed for digital audio broadcasting (such as Worldspace) can also be used to broadcast web pages to small receivers. Users would not have a fully interactive service, but could receive regular downloads of specified pages addressed to their receivers.

Digital Services

Compressed Voice

Compression algorithms can be used to 'compress' digital voice signals, so that eight or more conversations can be carried on a single 64 kbps voice channel, thus significantly reducing transmission costs.

Internet Telephony (Voice over IP)

Some carriers are beginning to offer dialup access to Internet telephony. The advantage of using Internet protocols for voice as well as data is that transmission costs are much lower than over circuit-switched telephony networks. IP telephony generally requires broadband access.

Compressed Video

Compressed digital video can be used to transmit motion video over as few as two telephone lines (128 kbps), offering the possibility of low-cost video conferencing for distance education and training. Interactive low-resolution video can also now be delivered over the Internet.

Smart Cards

Prepaid phone cards, widely available in Europe and Japan, have been introduced in developing countries to eliminate the need for coin phones (which require coin collection and may be subject to pilferage and vandalism). Cellular operators have now extended this concept to offer prepaid cellular service using rechargeable smart cards, so that telephone service is now available to customers without credit histories or even bank accounts. In South Africa, Vodacom sold more than 300,000 prepaid starter packs and one million recharge vouchers for cellular use in 1997 (ITU, 1998: 44). In Uganda, within one year of licensing a second cellular operator, aggressive marketing of a prepaid service and attractive pricing have resulted in there being more cellular customers than fixed lines in the country. For most of the new subscribers, their cell phone is their first and only telephone.[14]

NOTES

1 For a comparison of universal service in the United States, Canada and the United Kingdom, see Crandall and Waverman (2000).

2 Fact sheet: 'Rural areas magnify "digital divide"'. Available online: www.ntia.doc.gov/ntiahome/digitaldivide/factsheets/rural.htm

3 It should be noted that Japan and Australia are included in the Asia and Oceania categories in Table 15.1; the estimate in the text includes them with industrialized countries of Europe and North America.

4 See www.crtc.gc.ca

5 Meeting at Department of Transport and Communicatons attended by the author, Manila, January 1998.

6 It should be noted that this calculation appears to assume even distribution of income throughout the society at higher income levels, which is not necessarily true.

7 Africa Communications Group is to be known as Adesemi Communications International.

8 The simplest form of callback involves a caller in an area where tariffs are high asking the other party to call back using cheaper rates from their location. Simple examples include a traveller using a hotel's payphone to call home and asking family members to call back to her room, rather than paying the hotel's high charges. Now callers in high-cost areas (typically developing countries) can set up an account with a callback company and then call a special number, hang up and wait for the return call from the cheaper jurisdiction. The company can identify the caller without even answering the call, and can set up the call between the two parties using its own software.

9 See www.neca.org, and information on the Universal Service Fund on the FCC's website: www.fcc.gov

10 For example, peasant farmers in Ecuador found out how to eliminate a pest that was destroying their potato crop through the assistance of a fieldworker who posted their question on several Internet newsgroups (personal communication, October 1999).

11 Heather E. Hudson, field research and unpublished reports, 1999. (See also Hudson, 2003, 2004a, 2004b)

12 It should be noted that a disadvantage of all these wireless technologies is limited bandwidth. While they can be used for e-mail, they do not provide sufficient capacity for accessing the World Wide Web at present. However, a new protocol known as WAP (wireless application protocol), developed to enable cellphone users to access the Web, may also make it possible to access text on the Web using very limited bandwidth.

13 See www.alohanet.com; also *The Red Herring*, 29 September 1998. Available online: www.redherring.com/mag/issue59/limit/html

14 Personal interview, Uganda Communications Commission, Kampala, November 1999.

REFERENCES

Anderson, Robert H. et al. (1995) *Universal Access to E-Mail: Feasibility and Social Implications.* Washington, DC: RAND.

Aufderheide, Patricia (1987) 'A universal service: telephone policy in the public interest', *Journal of Communication*, 37 (1): 81–96.

Aufderheide, Patricia (1999) *Communications Policy and the Public Interest: The Telecommunications Act of 1996.* New York: Guilford.

Crandall, Robert W. and Waverman, Leonard (2000) *Who Pays for Universal Service?* Washington, DC: Brookings Institution.

Cronin, Francis J., Colleran, Elisabeth K., Herbert, Paul L. and Lewitzky, Steven (1993) 'Telecommunications and growth: the contribution of telecommunications infrastructure investment

to aggregate and sectoral productivity', *Telecommunications Policy*, 17 (9): 677–90.

Cronin, Francis J., Parker, Edwin B., Colleran, Elisabeth K. and Gold, Mark A. (1993) 'Telecommunications infrastructure and economic development', *Telecommunications Policy*, 17 (6): 415–30.

Duestenberg, Thomas J. and Gordon, Kenneth (1997) *Competition and Deregulation in Telecommunications: The Case for a New Paradigm.* Indianapolis: Hudson Institute.

European Union (1993) *Communication on Developing the Universal Service for Telecommunications in a Competitive Environment.* COM 93/543. Brussels, 15 November.

European Union (1996) *Communication on Universal Service for Telecommunications in the Perspective of a Fully Liberalised Environment.* COM 96/73 final. Brussels, 13 March.

Federal Communications Commission (2004) *Trends in Telephone Service.* Washington, DC: Federal Communications Commission.

Hardy, Andrew P. (1980) 'The role of the telephone in economic development', *Telecommunications Policy*, 4 (4): 278–86.

Henry, David et al. (1999) *The Emerging Digital Economy II.* Washington, DC: US Department of Commerce.

Hobbs, Vicki M. and Blodgett, John (1999) 'The rural differential: an analysis of population demographics in areas served by rural telephone companies'. Paper presented at the Telecommunications Policy Research Conference, September. See also www.rupri.org

Hudson, Heather E. (1990) *Communication Satellites: Their Development and Impact.* New York: Free Press.

Hudson, Heather E. (1995) *Economic and Social Benefits of Rural Telecommunications: A Report to the World Bank.* Washington, DC: World Bank.

Hudson, Heather E. (1997a) *Global Connections: International Telecommunications Infrastructure and Policy.* New York: Wiley.

Hudson, Heather E. (1997b) 'Converging technologies and changing realities: toward universal access to telecommunications in the developing world', in *Telecom Reform: Principles, Policies, and Regulatory Practices.* Lyngby: Technical University of Denmark.

Hudson, Heather E. (1998a) 'The significance of telecommunications for Canadian rural development'. Testimony on behalf of the Public Interest Advocacy Centre and others, Canadian Radio, Television and Telecommunications Commission Hearing on Telecom Public Notice CRTC 97–42, Service to High-Cost Serving Areas.

Hudson, Heather E. (2003) 'Bridging the broadband divide: strategies for rural and developing regions'. Proceedings of the ITU Telecom Forum, ITU Telecom World 2003, Geneva: International Telecommunication Union.

Hudson, Heather E. (2004a) 'Investing in infrastructure: increasing Internet access in the developing world'. Proceedings of the Telecommunications Policy Research Conference.

Hudson, Heather E. (2004b) 'Universal service: what have we learned from the E-rate?', *Telecommunications Policy*, 28 (3–4): 309–21.

Hundt, Reed E. (2000) *You Say You Want a Revolution: A Story of Information Age Politics.* New Haven, CT: Yale University Press.

ITU (1998) *World Telecommunication Development Report 1998.* Geneva: International Telecommunication Union.

ITU (1999a) *Challenges to the Network: Internet for Development.* Geneva: International Telecommunication Union, October.

ITU (1999b) *World Telecommunication Development Report 1999.* Geneva: International Telecommunication Union.

ITU (2004) *World Telecommunication Indicators Database*, 8th edn. Geneva: International Telecommunication Union.

Kayani, Rogati and Dymond, Andrew (1997) *Options for Rural Telecommunications Development.* Washington, DC: World Bank.

Maitland Commission (1984) *The Missing Link.* International Commission for Worldwide Telecommunications Development. Geneva: International Telecommunication Union, December.

Margherio, Lynn et al. (1998) *The Emerging Digital Economy.* Washington, DC: US Department of Commerce.

Mueller, Milton (1997) *Universal Service: Competition, Interconnection, and Monopoly in the Making of the American Telephone System.* Cambridge, MA: MIT Press.

Mueller, Milton and Schement, Jorge Reina (1996) 'A universal service from the ground up: a study of telephone penetration in Camden, New Jersey', *The Information Society*, 12: 273–92.

National Telecommunications and Information Administration (1994) *20/20 Visions.* Washington, DC: US Department of Commerce.

National Telecommunications and Information Administration (2004) *A Nation Online: Entering the Broadband Age.* Washington, DC: US Department of Commerce.

National Telecommunications and Information Administration (1997) *Falling through the Net: Defining the Digital Divide.* Washington, DC: US Department of Commerce.

O'Siochru, Sean (1996) *Telecommunications and Universal Service: International Experience in the Context of South African Telecommunications Reform.* Ottawa: International Development Research Centre.

OFTEL (1994) *A Framework for Effective Competition.* London: Office of Telecommunications.

Parker, Edwin B. and Hudson, Heather E. (1995) *Electronic Byways: State Policies for Rural Development through Telecommunications*, 2nd edn. Washington, DC: Aspen Institute.

Parker, Edwin B., Hudson, Heather E., Dillman, Don A. and Roscoe, Andrew D. (1989) *Rural America in the Information Age: Telecommunications Policy for Rural Development.* Lanham, MD: University Press of America.

Petzinger, Thomas, Jr (1998) 'Monique Maddy uses wireless payphones to battle poverty', *Wall Street Journal*, 25 September: B1.

Saunders, Robert, Warford, Jeremy and Wellenius, Bjorn (1994) *Telecommunications and Economic Development*, 2nd edn. Baltimore, MD: Johns Hopkins University Press.

Schement, Jorge Reina (1995) 'Beyond universal service: characteristics of Americans without telephones', *Telecommunications Policy*, 19: 477–85.

Telecommunications Act of 1996 (1996) United States Congress. Public Law 104-104, 8 February.

World Information Technology and Services Alliance (1998) *Digital Planet: The Global Information Economy.* Washington, DC: WITSA.

WEBSITES

Alaska Public Utilities Commission: www.state.ak.us/local/akpages/COMMERCE/apuc.htm

Aloha Networks: www.alohanet.com

Canadian Radio Television and Telecommunications Commission (CRTC): www.crtc.gc.ca

Department of Commerce: www.ecommerce.gov/ece

Federal Communications Commission: www.fcc.gov

General Communications Inc. (GCI): www.gci.com

National Computer Board of Singapore: www.ncb.gov.sg

National Exchange Carriers Association: www.neca.org

National Telecommunications and Information Administration: www.ntia.doc.gov

Rural Utilities Service: *The Red Herring*: www.redherring.com

Vitacom, Inc.: www.vitacom.com