Part One

Information and communication technologies and social processes

Chapter 1
Human development

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This chapter analyses the economic significance of modern information and communication technologies (ICTs) and assesses the economic of ICTs from the human development point of view.

The concept of development is mentioned in Article 55 of the Charter of the United Nations and constitutes one of the raisons d'être of the entire UN system. Over the course of time, and through the formulation of various development strategies, the understanding and practice of development were deepened to include not only specific objectives but also broader goals.

One of UNESCO's major contributions to the concept and practice of development has consisted of raising awareness about the cultural dimension of development. After the World Conference on Cultural Policies (Mexico, 1982), the UN and UNESCO jointly launched the World Decade for Cultural Development (1988–97), which laid the foundations for important contributions in this respect, more particularly the Report of the World Commission on Culture and Development, Our Creative Diversity (1995) and the first World Culture Report (1998).

The Director General has advocated for UNESCO's wider concept of development on numerous occasions, and more particularly at international conferences such as the World Summit for Social Development (Copenhagen, 1995) and the Intergovernmental Conference on Cultural Policies for Development (Stockholm, 1998). As Mr Mayor stated in Copenhagen: 'That development is a comprehensive process, as UNESCO has been advocating for decades, is now agreed upon by the international community. Beyond economic growth, which is an engine and not an end in itself, development is first and foremost social; it is also intimately linked to peace, human rights, democratic governance, environment, and last but not least, the culture and life styles of the people' (World Summit for Social Development, Position paper presented by the Director-general of UNESCO, p. 5).

The United Nations Development Programme (UNDP), on its side, launched in 1990, together with its Human Development Report, the concept of human development, which has become the 'leading alternative to the view of development equated exclusively with economic growth. Human development focuses on people' (UNDP, 1998, p. 16).

One result of this change in focus is that the eradicationofpovertyhasbecome a multi-dimensional activity. Poverty is considered to be more than a lack of material well-being. 'It also reflects poor health and education, deprivation in knowledge and communication, inability to exercise human and political rights andthe absence of dignity, confidence andself-respect' (UNDP, 1997, p. iii). ICTs play a prominent role in this broader conception of poverty. They provide important tools for the improvement of health and education, offer new channels for the diffusion of knowledge and create physical and virtual spaces for social communication. This human approach does not ignore the importance of economic growth and productivity, but addresses the question of how economic performance relates to human empowerment and thus asks whether such growth is equitable and sustainable.

Human development implies that people's capabilities are enhanced and their lives enriched. In the annual reports of the UNDP, human development is defined as the 'process of enlarging people's choices' (UNDP, 1997, p. 15). This is achieved 'by expanding human capabilities and functionings. At all levels of development the three essential capabilities for human development are for people to lead long and healthy lives, to be knowledgeable and to have access to the resources needed for a decent standard of living' (UNDP, 1998, p. 14).

The essential features of human development are:

→ equity in access to vital resources and capabilities
→ sustainability of resources and institutions
→ acquisition and distribution of knowledge for human empowerment
→ people's participation

It would seem logical to conclude that better access to a resource as basic as information would greatly improve standards of living. It is, however, very difficult to provide solid empirical evidence to support this conclusion.

As Mansell and Wehn write, 'Attempts to measure the impact of ICTs on the economies of industrialized and developing countries encounter severe problems of statistical classification and data availability' (Mansell and Wehn, 1998, p. 14). Data are not always reliable. They may be unclear or use different definitions, classification schemes are contested and some data are protected as company property. An important reason for the difficulty in measuring productivity is that 'ICTs are used to produce an intermediate good or product, information. The value of information in use varies dramatically depending upon the context' (ibid., p. 15). A further complication for a full global assessment is that most of the developing countries still have to begin the process of harnessing ICTs to their development goals. Another problem is that ICT deployment and economic growth have a dialectical relationship so that there are no unilateral causal links. Economic growth may be partly the result of the growth in the use of ICTs, but then the proliferation of ICTs is itself dependent upon the availability of economic resources. If the definition of development is extended beyond mere economic growth, the assessment is complicated even further.

THE ECONOMICS OF ICT

Although the debate about the contribution of ICT-related industries and the deployment of ICTs in market sectors to overall economic growth continues, there is a good deal of evidence that ICTs play an important role in national and international economies. Across all industries, there has been a strong growth of investments in ICT applications. Spending on ICT equipment as part of overall spending on business equipment has grown dramatically in most industrial countries. In the United States, for example,

such spending rose from less than 5% in 1960 to over 45% by 1996 and if the current trend continues the figure could be over 50% in 2000. According to an estimate of the United States Department of Commerce (the United States Bureau of the Census and Bureau of Economic Analysis for 1990–1995) in 1998, the American ICT-industry generated $683,000 million. In some industrial countries ICT-related activities produce a growing share of the Gross Domestic Product (GDP). In the United States, the ICT-industry accounted for almost 8% of the GDP in 1997 and was responsible for over 12% of GDP growth. In the Organisation for Economic Development and Co-operation (OECD) countries, the ICT market sector generally accounts for 15% to 25% of current real economic growth.

Investments in the telecommunications sector are an important indicator of the economic significance of ICTs. Worldwide investments in telecommunication rose from $115,000 million in 1990 to $152,000 million in 1995 (ITU, 1997, p. 19). These investments have often been linked to the privatization of public telecommunication operators (PTOs). The privatization schemes introduced in a number of countries have raised considerable funds. Examples are Germany with the privatization of Deutsche Telekom in 1996 which raised over $13 billion, Japan with Nippon Telegraph and Telephone (NTT) raising $70,000 million over the 1986, 1987 and 1988 period and the United Kingdom with British Telecom bringing in almost $23,000 million spread over 1984, 1991 and 1993.

The ICT industry

The ICT industry encompasses the manufacturing of telecommunications equipment, computers, semiconductors and other electronic equipment, the provision of telecommunications services, computer services and software. It is the world's most important and fastest-growing industry. Of the fifty largest companies in the world (as listed by Fortune, August 3, 1998), ten are ICT companies. They account for 17.5% of the total revenue of the fifty largest companies, for 23% of the total profits and for 26% of the total number of employees. In 1997, four ICT companies, General Electric, Microsoft, NTT and Intel, were among the ten largest companies in the world in terms of market value. In the same year three ICT companies, General Electric, Intel, and International Business Machines (IBM), were among the ten most profitable companies in the world (Business Week, 13 July 1998). The leading companies in the ICT industry are presented in Table 1.1.

In Figure 1.1, the world's ten best-performing ICT companies are presented on the basis of shareholder return.

Telecommunications, semiconductors and computers are among the high growth industries in the emerging-market economies. Among the 200 top companies in these economies, twenty-two are telecommunications market operators and ten are electronics products manufacturers.

Concentration in the ICT-industry

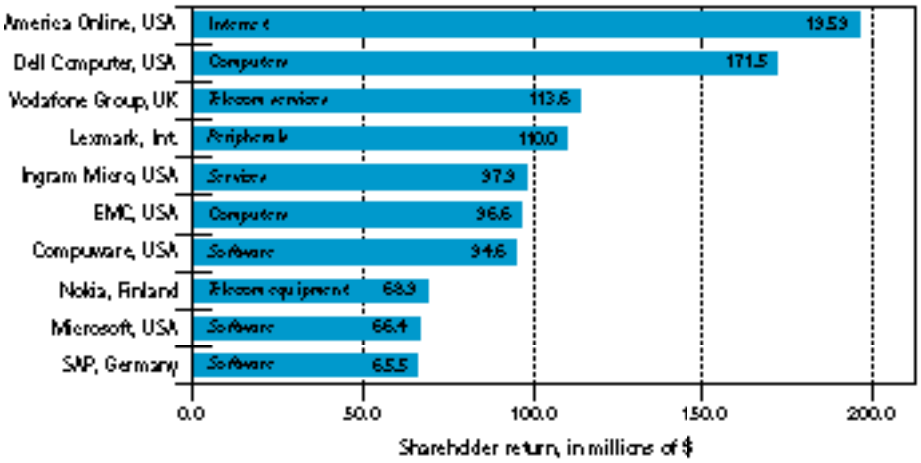
Just like other industrial sectors, ICTs are affected by a great deal of merger activity. The largest transactions of 1998 include the SBC Communications merger with Ameritech for $272,400 million, AT&T with Telecommunications Inc. (TCI) for $48,000 million, Worldcom with MCI Comm for $37,000 million, Northern Telecom with Bay Networks for $9,000 million, and Alcatel with Digital Service Corporation (DSC) for $4,400 million.

There is high degree of concentration in this industry. In the telecommunications equipment market, for example, 50% of all sales are controlled by only five companies. In the market for public telephone switching equipment, five firms (Alcatel, Siemens, Lucent, Ericsson and Nortel) control 76% of all activity. The major companies that carry the bulk of international telephone traffic have formed global alliances. These are:

Table 1.1 → Leading companies in the ICT industry, 1997

Company	Country	Revenues (in millions of $)	Profits (in millions of $)	Profits (% of sales)
Telecommunications 1997 (Source: Fortune, August 3, 1998.)				
NTT	Japan	76,984	2,361	3
American Telephone and Telegraph Company (AT&T)	USA	53,261	4,638	9
Deutsche Telekom	Germany	38,969	1,905	5
Alcatel Alsthom	France	31,847	799	3
Bell Atlantic	USA	30,194	2,455	8
France Telecom	France	26,854	2,547	9
British Telecom	UK	26,294	2,801	11
Telecom Italia	Italy	25,130	1,531	6
Satellite Business System (SBS) Communications	USA	24,856	1,474	6
General Telephone and Electronic Corporation (GTE)	USA	23,260	2,794	12
Bellsouth	USA	20,561	3,261	16
Microwave Communications (MCI)	USA	19,653	2	0
Telefonica de España	Spain	16,139	1,298	8
Ameritech	USA	15,998	2,296	14
Royal KPN	The Netherlands	15,514	1,376	9
Computers and electronic office equipment 1997 (Source: Fortune, August 3, 1998.)				
IBM	USA	78,508	6,093	8
Hewlett-Packard	USA	42,895	3,119	7
Fujitsu	Japan	40,613	46	0
Compaq Computer	USA	24,584	1,855	8
Canon	Japan	22,813	982	4
Xerox	USA	18,166	1,452	8
Digital Equipment	USA	13,047	141	1
Dell Computer	USA	12,327	944	8
Ricoh	Japan	11,432	245	2
Electronics semiconductors 1997 (Source: Fortune, August 3, 1998.)				
IBM	USA	78,508	6,093	8
Intel	USA	25,070	6,945	28
Texas Instruments	USA	10,562	1,805	17
Electronics equipment 1997 (Source: Fortune, August 3, 1998.)				
General Electric	USA	90,840	8,203	9
Hitachi	Japan	68,567	28	0
Matsushita	Japan	64,281	763	1
Siemens	Germany	63,755	1,427	2
Sony	Japan	55,033	1,809	3
Toshiba	Japan	44,467	60	0
Nippon Electric Company (NEC)	Japan	39,927	336	1
Philips	The Netherlands	39,188	2,939	7
ABB ASEA Brown Boveri	Switzerland	31,265	572	2
Mitsubishi	Japan	30,967	863	3
Motorola	USA	29,794	1,180	4
Lucent Technologies	USA	26,360	541	2
Bell Canada Entreprises (BCE)	Canada	23,974	1,109	5
Samsung	South Korea	23,810	640	3
L. M. Ericsson	Sweden	21,956	1,563	7
Computer services and software 1997 (Source: Fortune, August 3, 1998; Business Week, November 2, 1998.)				
Electronic Data Systems	USA	15,236	731	5
Microsoft Corp.	USA	14,484	4,490	31
Oracle Corp.	USA	7,524	1,000	13
Systems Applications and Products in data processing (SAP AG)	Germany	4,131	516	12
Compuware	USA	1,254	224,5	18
BMCSoftware	USA	798	235,1	30

Figure 1.1 → The world's ten best-performing ICT companies, 1998, listed on the basis of shareholder return



Source: Business Week, November 2, 1998.

- → Concert Communications Company (of which 75% is owned by British Telecom and 25% by WorldCom-MCI) with revenues in 1995 of $37,300 million;
- → Global One (Deutsche Telekom, 10% + France Telecom, 10% + Sprint USA) with 1995 revenues of $88,500 million;
- → Unisource (Telia of Sweden, Royal KPN of the Netherlands, the Swiss PTT and Telefonica in Spain) with 1995 revenues of $37,400 million;
- → Cable & Wireless (a United Kingdom based company with interests in over 25 public telephone operators (PTOs) throughout the world) with revenues in 1995 of $8,500 million.

These four alliances are responsible for some 30% of worldwide telecommunication services revenues. Another example of concentration is provided by Internet traffic. The world's largest Internet Service provider (ISP) is UUNET, which is the subsidiary of the company WorldCom (that merged with MCI), responsible for over 50% of the Internet backbone traffic. One company, Netscape, controls 74% of the market for World Wide Web navigators (in 1995–96), with 8% for America Online and 4% for Microsoft (Forrester Research).

ICT world market and world trade

The ICT market is growing rapidly and expanding globally. The top ten companies in the manufacturing of telecommunication equipment derive an average 61% of their revenues from sales abroad. These are Motorola (United States), Alcatel (France), Lucent (United States), Siemens (Germany), Ericsson (Sweden), NEC (Japan), Nortel (Canada), Nokia (Finland), Fujitsu (Japan), and Bosch (Germany) (ITU, 1997, p. 24). Most analysts expect a further growth of global sales since the domestic markets in many countries are either too small or already saturated. From various trade figures, it can be estimated that the share of the ICT industry in the world economy ranges from between 10% to 15% of total world trade. In several ICT sectors the world market shows rapid growth rates. The market for computer hardware and software, for example, grew at about 15% annually in the 1990-1995 period. In the same period, the average growth rate for total world trade was 8%. In 1997, worldwide revenues in the telecommunications industry were nearly $600,000 million. Some analysts expect this figure to grow to $1,400,000 million by the year 2000.

The value of total imports in the world trade of computer equipment grew by 67% from $87,500 million in 1992 to $145,500 million in 1996. The value of total exports grew by 75% from $73,000 million in 1992 to $127,000 million in 1996 (Comtrade, United Nations Statistics Division). The market for personal computers (PCs) is still growing and may reach a sales figure of over $250,000 million in 2000. There is also rapid growth in the world market

for computer software, which in 1996 generated $109,300 million in revenues (source: US Industry and Trade Outlook 1998, US Department of Commerce).

In the world trade of telecommunication equipment the value of total exports grew by 68% from $65,000 million in 1992 to $108,000 million in 1996. The value of total imports grew by 58% from $66,000 million in 1992 to $104,000 million in 1996. Growth rates in this sector are linked to the worldwide increase in the number of telephone lines. The growth from 519 million lines in 1990 to 693 million lines in 1995 represents an average growth rate of 6.8% per year (ITU, 1997). In 1995, 45 million new fixed telephone lines were added and 33 million people became new subscribers to mobile communications. In fact, the strongest growth rates are in the mobile communication market, particularly in the United States and Japan. In the OECD countries in 1996–67, the contribution of mobile communications to overall telecommunication services revenues amounted to some 12% and the number of subscribers doubled (The OECD Observer, No. 205, April/May 1997). In 1990, the worldwide trading of telecommunications services generated some $377,000 million. This figure increased in 1996 to over $600,000 million. Largely as a result of the further internationalization of transnational corporations and increases in the volume of travel, this sector of the market continues to show very high growth rates. There is an ever-growing demand for telecommunication services around the world and thus for the building and renovation of networks.

The total value of exports in the world trade of audio and video recording equipment grew by 23% from $18,000 million in 1992 to $21,000 million in 1996. The total value of imports grew by 6% from $17,000 million in 1992 to $18,000 million in 1996 (International Trade Centre, World Trade Organization, 1998).

Trade balance

According to data from the International Telecomunications Union (ITU), the developed countries represent some 70% of overall telecommunication equipment exports, showing a $9 billion trade surplus. Particularly striking is the shift from a trade deficit for the USA in 1990 to a trade surplus of $3.2 billion in 1995. Over 100 developing countries produce no exports at all. They are obliged to import and thus show trade deficits that in 1995 exceeded $10,000 million. For most developing countries, the obvious problem is lack of capital for imports, since low overall income means that local telecommunications generate minimal revenues. The profits in national telecommunications operation are, without exception, found in international traffic, but the financial gains from overseas services do not benefit the national telecommunications carrier. For political and other reasons, many countries decide not to re-invest a sufficient share of this income in the expansion and upgrading of telecommunication facilities. Moreover, there is growing competition in the provision of international telecommunications services and strong pressures to lower rates on busy routes. Foreign investments in telecommunications have been stimulated by the privatization of former national public telecommunication operators as part of the worldwide trend toward deregulation that emerged during the 1980s. In the 1984—96 period the 44 PTOs that were privatized raised in total a sum of $159,000 million. Almost one third of the financing came from foreign investments.

Electronic commerce

The increasing economic importance of ICTs is also linked to the growth of electronic commerce. Although for the moment electronic commerce is still a factor of limited economic significance, with revenues of approximately $26,000 million in 1998, this figure is expected to exceed the trillion dollar mark in the early 21st century. A note of caution should be sounded,

since it is difficult to measure precisely the economic significance of electronic commerce. Several of its important features, such as easy access to data, cannot be quantified, and reliable and comprehensive statistics are not yet available; this uncertainty leads to widely varying estimates. The OECD definition of electronic commerce refers to commercial transactions that take place through open networks, like the Internet. These transactions are both business to business and business to consumers. The growing number of people around the world connected to the Internet (estimates vary from 50 to 80 million for 1998 and between 100 and 200 million for 2002) have begun to develop a digital economy. In cyberspace, consumers can purchase flowers, shirts, jeans, books, compact disks (CDs), tickets, hotel reservations, skin care products, pornography, kitchen equipment and household consumer goods. World Wide Web sales grew approximately from $8,000 million in 1994 to over $45,000 million in 1998. According to various analysts in Business Week (11 May 1998), digital trade could grow from $1,200 million in 1998 to $65,000 million over the next three years. Other forecasters propose even higher figures, for instance in the travel industry, book and music sales and financial services. Electronic sales of software also hold enormous growth potential.

Whatever the precise significance and validity of the forecasts, the general expectation predicts formidable growth in this sector of the global economy. Most analysts observe that this will be mainly business-to-business trading. Expectations of growth in the business-to-consumer trade are based on the assumption that on-line trading will lower production, and thus distribution, costs by up to 10% of total sales. Some 50% of this reduction of costs may be used to lower consumer prices thus stimulating further purchases by consumers. Electronic trading via the Internet is in fact the successor to the Electronic Data Interchange (EDI) that is already used by many companies. EDI is the exchange of electronic documents in goods trading and financial services and usually operates within closed Value Added Networks (VANs). EDI is expensive because complicated software applications have to be installed for each new trading partner and flexibility is limited because invoices and orders must be exchanged in fixed standard formats. The Internet facilitates the exchange of electronic data by accepting many different formats. However, many of the big EDI users see EDI as more reliable than current Internet traffic. In the United States at present, the volume of EDI-traffic is some fourteen times greater than that of Internet traffic (Business Week, 22 June, p. 83). Many analysts expect that in the years ahead this ratio will change, first to a more equal distribution between EDI and Internet transactions and later to a definite advance for the Internet. This situation will be reinforced by the rate at which companies begin to share their 'intranets' (internal networks for authorized users) with more trading partners and thus create 'extranets'.

Controlling access to cyberspace

An increasingly important part of all commercial activity on the digital market is geared toward the control over access to cyberspace. The gates that provide access to the World Wide Web – the so-called web-portals – have become crucial targets in the struggle for dominance in this market. In 1998 a veritable 'portal-fever' emerged as more and more companies sought to secure a piece of the expected profits. In June 1998 the media giant Walt Disney announced it would spend $70 million for the purchase of 43% of the stock in the search engine Infoseek. In 1998, the American National Broadcasting Company (NBC) invested $165 million for the purchase of the online service Snap! from van Cnet Inc. Time-Warner and News Corp. began to develop their own web portals. Manufacturers of personal computers, vendors of operating systems, producers of browsers, telecommunications operators, Internet Service Providers, search engines, the big producers

of information and entertainment are among the many contenders in this field (see Table 1.2).

Recent acquisitions or investments among the various companies involved in cyberspace illustrate the high level of competition in this area. In 1997, Microsoft bought a 5% participation in Apple Computer for $150 million. As part of the deal, Microsoft insisted that Apple Macintosh computers be delivered with the Microsoft 'browser', Explorer. In 1998 Compaq Computer acquired Digital Equipment in a deal valued at $9,600 million. The combined revenues are estimated at around $38,000 million. WorldCom controls 60% of worldwide Internet traffic and can be seen as a major gatekeeper of access to lines and networks. In September 1997, America Online (AOL) acquired Compuserve through a complicated deal that made WorldCom the owner of Compuserve's infrastructure (the access to Internet). WorldCom paid $1,200 million to H&R Block (Columbus, Ohio) for the purchase of Compuserve. The subscribers to Compuserve were sold to AOL. Through this deal AOL became the largest ISP on the European market with 1.5 million subscribers. On the world market, AOL has some 12 million subscribers.

The ISPs provide access to the services on the Internet and exercise considerable control over access to cyberspace. Some of them conclude agreements with the search engines. Provider MCI, for example, concluded a deal with Yahoo! in order to guide clients to the Web page of this particular search engine. The world market of ISPs is concentrated. If interest in the Web continues to grow, ISPs are likely to allow certain websites to purchase a right of 'priority'. This would mean that if too many clients browse the Web at one time, customers of the privileged sites will have priority and have to wait less time than others.

There is also market concentration in this area and many linkages among the players. For example, Bertelsmann is very active on the Internet. Since 1997 it has held a 50/50 partnership with AOL for Internet services in Europe. On 7 October 1998 it invested

Table 1.2 → Access to cyberspace: leading contenders, 1997

Company	Country	Revenues in 1997 (in millions of $)
PC manufacturers		
IBM	USA	78,505
Hewlett Packard	USA	42,895
Fujitsu	Japan	40,613
Compaq	USA	24,584
Digital Equipment	USA	13,047
Dell Computer	USA	12,327
Vendors of operating systems		
Microsoft	USA	11,358
Sun Microsystems	USA	8,598
Apple Computer	USA	7,081
Browser makers		
Netscape	USA	80,700 in 1995
Microsoft	USA	11,358
America Online	USA	1,685
Telecommunication companies		
AT&T	USA	51,319
Deutsche Telekom	Germany	37,891
Bell Atlantic	USA	30,194
France Telecom	France	26,197
British Telecom	Britain	25,504
SBC Communications	USA	24,856
L.M. Ericsson	Sweden	21,420
BellSouth	USA	20,561
MCI Communications	USA	19,643
Ameritech	USA	15,998
Sprint	USA	14,874
Telecommunications Inc. (TCI)	USA	7,570
Internet service providers		
WorldCom	USA	7,351
America Online	USA	1,685
Search engines		
Excite	USA	89
Yahoo!	USA	67
Infoseek	USA	52
Producers of information and entertainment		
Disney	USA	22,473
Sony Music Entertainment	Japan	16,900
Bertelsmann	Germany	14,006
Viacom	USA	13,505
Time Warner	USA	13,294
News Corp.	Australia	11,216
Seagram	Canada	11,000

$300 million in a 50/50 joint venture with Barnes & Noble Inc. for on-line book sales. Such lateral or vertical concentration is very likely to continue over the next few years, if use of the World Wide Web maintains the same rate of expansion as in the recent past.

ICTs and employment

In 1996 in the United States, over 7 million people were employed in ICT firms and in ICT-related jobs. This means that ICT-related employment represented over 6% of overall employment (US Department of Commerce, 1998). The indications are that this growth will continue. The picture is, however, very different when different economies and market sectors are considered. In several state economies, there has been an increase of employment in such ICT-related professions as technicians, programmers, operators, assemblers and analysts. Growth of employment opportunities is particularly strong in the software sector. In California's Silicon valley, over 50,000 new jobs were created during 1996 with higher incomes than the national industry averages. However, in the sector that manufactures the technologies themselves, jobs decreased. The creation of new employment is often related to various uses of ICT, for example in new service applications in banking, shopping, education, health and business services. The development of networks combined with the lowering of communication costs has stimulated the growth of 'teleworking'. This means that people work from home and use telecommunication services. The fastest growth is generally expected in 'telecommuting' where people work alternately at home and at the office. The Internet could play a major role in creating employment for the design, maintenance and management of sites on the World Wide Web. The growth of electronic commerce initially raised concerns about implications for the labour market, but there is also the expectation that few jobs will really be lost since companies will continue to use traditional forms of commerce along with digital trading. When digital trading finally predominates, some jobs will be lost, but new ones requiring new skills will also have been created.

As Mansell and Wehn observe, the overall picture is characterized by contradictions. 'On the one hand, information-related service jobs are associated with the dislocation of family and community life and threats to the health of workers, especially of women. On the other, new types of employment and modes of work organization can be highly beneficial leading to improved quality of life and greater economic resources' (Mansell and Wehn, 1998, p. 253). There is some empirical evidence that automation eliminates jobs, but there is also evidence that automation creates new jobs. What remains uncertain is the eventual balance. The notion of a single standard impact is very inadequate and it is preferable to look at plural impacts. The skills implications of ICTs are varied and are related to differences in socio-economic, cultural and political environments. Different countries will choose different ICT-applications in order to reap different benefits from technological development. It is too early to foresee how all these factors will operate. The observation that in the affluent economies more and more employees use ICT applications in their daily work is generally uncontested. By and large, ICTs are used by some 50% of the workforce in the industrial nations.

ICTs and economic productivity

The processing capacity of ICTs doubles every two years, but this is not matched by growth in economic productivity. There are indications of a real ICT contribution to overall economic growth, although no definite assessment is possible. In his testimony to Congress (24 February 1998), US Federal Reserve Board Chairman Alan Greenspan pointed to increasing growth rates in productivity for the American economy and stated that: 'The dramatic improvements in computing power and communication and

information technology appear to have been a major force behind this beneficial trend'. Other analysts raise serious doubts about such a causal link between ICT power and productivity. Of the world's total investment in capital goods, 50% concerns computers and peripherals. Yet expected growth in productivity has not materialized. During the period 1970—90 white collar productivity remained stagnant at around 0.9% per year and improved in the early 1990s to 1.3% – a low figure despite the announcement by Fortune magazine that 'the productivity payoff arrives' (27 June 1994, pp. 35-90). It is not clear at present what factors cause this ICT-paradox. One possible explanation refers to the criteria that are used for the measurement of economic productivity. Another factor may also be the inadequate way in which organizations adapt to the use of ICTs. It could also be that what looks like an unexplainable delay is in fact the normal time lag needed before new technologies can lead to higher levels of productivity (Makridakis, 1995, p. 800; UNESCO, 1996a, p. 276; American Economic Review, May 1996).

ICTs are 'synergetic' technologies and their growth therefore leads to growth in other sectors of the economy. They create an infrastructure around their products and services, similar to that of car technology earlier in the century. As with the transition from manual power to mechanization techniques and later to electro-mechanical innovations, today's shift towards the pervasive application of ICTs has given rise to a range of new industries such as software production, processing services, time-sharing facilities, semiconductor manufacturing, database management or electronic publishing. This potential for new economic productivity requires an educational infrastructure that teaches the knowledge and skills required for ICT-related occupations. Although there has been a considerable increase in ICT teaching in many schools and universities around the world, new multimedia tools are still widely underused or used only to supplement conventional teaching methods. There is also a lack of solid and creative training materials that cater for the specific needs of the developing countries (see also Chapter 2).

Unequal distribution

The economic benefits that may accrue from the development and the deployment of ICTs are unequally distributed throughout the world. There seems to be general agreement in scientific literature and in public policy statements that the ICT gap between the developed and developing countries is widening and will be a major obstacle to the integration of all countries into the so-called Global Information Society. In this context, the reader may wish to refer to Part III and the Statistical Annex of the Report. The seriousness of the ICT gap is clearly demonstrated by figures on the world distribution of telephones. In 1996 there were 743.66 million main telephone lines in the world. Europe (274.23 million), the United States (170.57 million) and Japan (61.53 million) represent 68% of this total, compared with 1.8% in Africa. The density of telephone lines per 100 inhabitants is also very unequally distributed. Whereas the world average is 12.88 lines per 100 inhabitants, Europe provides 34.6, the United States 63.9, Japan 48.9 and Africa 1.85. In early 1997, some 62% of the world's main telephone lines were installed in 23 affluent countries, which account for only 15% of the world's population. Over 950 million households in the world (65% of the total) were equipped with a telephone (ITU, 1998). Another indicator of this gap is the revenue from telecommunication services, which reached a world total of $620,000 million in 1996. Europe, the United States and Japan benefited from 77% of these revenues, while Africa received a mere 1.5%. Investments in the telecommunication sector show a similar distribution. In 1996 the world total was worth $166,000 million. Europe, the United States and Japan are responsible for 67% of these investments and Africa for 1.7% (ITU, 1998).

Total ICT equipment installation reveals highly uneven geographical distribution. The estimated number of PCs in the world in 1996 stood at 234,200,000. The share for Europe (72,864,000), the United States (96,600,000) and Japan (16,100,000) was 79%, while for Africa it was only 1.3%, representing 0.64 computers per 100 inhabitants. The world average for that year was 4.6 computers per 100 inhabitants. Far above this average are the figures for Europe, 9.6, the United States, 36.2, and Japan, 12.8 (ITU, 1998). Of all the 47,972,000 fax machines operating in the world in 1996, Europe was using 10,942,500, the United States 17,000,000, and Japan 14,300,000. These figures combined represent 88%, in contrast with the 0.5% in use in Africa. Of the total number of television sets in the world in 1996, Europe, the United States and Japan possessed 47% while Africa possessed only 3% (ITU, 1998). Internet host computers are distributed throughout the world in such a way that the United States (51.5%), the EU countries (23%), Canada (6.1%) and Japan (5.2%) represented 85.8% of the world's total in 1997 (OECD, 1998b). Expenditures for electronic data processing per capita vary greatly as well. In 1995, the world average was $46 per person. In the United States these expenditures were $315, in Japan $400, in Singapore $1,500, in Brazil $39, in Thailand $29, and in India $0.87 (Mansell and Wehn, 1998, p. 35). Large disparities can also be seen in the world trading of ICTs. In 1996, the share in worldwide computer equipment imports for the United States, Japan, Germany and the United Kingdom alone was 60%; in worldwide computer equipment exports for the United States, Singapore, Japan and the United Kingdom was 57%. The share in telecommunication equipment imports for the United States, Hong Kong, the United Kingdom, Japan, Germany, China and Singapore was 58%; in telecommunication equipment exports for the United States, Japan, Germany, the United Kingdom, Sweden, and Singapore was 60%. The share in world imports of sound recorders and televison sets for the United States, Hong Kong, Germany, the United Kingdom and Japan was 67%. The shares on the world market for computer software in 1996 for the United States (46.2%), Japan(11.4%),Germany (8.6%) and the United Kingdom (5.7%) amounted to 72% of the world total.

Whatever the economic benefits of ICT deployment may be, at the present time the worldwide distribution of ICT resources is enormously unequal. In terms of availability, accessibility, and affordability of equipment and services as well as the mastery of technical and managerial skills, there are great disparities not only between affluent and developing countries, but also among different social groups within all countries. A very problematic factor is that these disparities, rather than diminishing, are growing throughout the world.

Gender inequity

A particularly skewed worldwide distribution of ICT resources and use concerns women. An immediate problem is the fact that ICT skills are linked almost completely to literacy and 'it seems likely that the vast majority of the illiterate population will be excluded from the emerging knowledge societies' (Mansell and Wehn, 1998, p. 35). This situation particularly affects women, since around the world illiteracy rates for women are higher than for men. In the developed world, a large majority of the population is literate, and most devices ensuring user-machine communication – hardware and software – therefore reflect reading or writing capabilities. ICTs could have developed devices based on sound, touch, images or symbols which do not require literacy, but markets are the driving force for technological developments, and the needs of illiterates in the developing world were, and still are, completely ignored.

In terms of sharing ICT knowledge, women are also disadvantaged, since their numbers in enrolment for science and technology education lag far behind the figures for male enrolment. In 1990, the percentages of women enrolled in science and technology at

the university level in Africa were 10%, in Latin America 40%, in Western Europe 32%, in Eastern Europe less than 30% and in the Asia/Pacific region 34% (UNESCO, 1996).

ICTs offer new forms of communication that may enable women to break through their often isolated social situation. They also create new opportunities of employment for women in jobs that require new skills. However, the technologies themselves will not achieve this. The full use of opportunities that are in principle created by the deployment of ICTs will depend upon social variables such as cultural factors, class and age. Robust policies are needed for the ICTs to have a beneficial impact on women's lives. In the emerging 'knowledge societies' access to communication is becoming the key tool for social inclusion' (ibid., p. 250). In most developing countries women are disadvantaged in terms of scientific and technological literacy, in terms of opportunities for education and training for the acquisition of technical skills, and in terms of real access to information and knowledge.

Summary

At the present time it is impossible to present a comprehensive and valid assessment of the economics of ICTs. There are, however, a series of indicators that point to the increasing economic significance of the ICT sector in national and international economies. Important variables include the contribution of the ICT industry to the GDP of national economies and the role that ICTs play in overall business investments. In the past few years leading companies in manufacturing and service sectors have considerably increased their investments in ICT products and services in order to boost economic productivity and efficiency. In many commercial companies the investment in ICT equals almost 75% of all investments in equipment. One factor that has reinforced the growth of ICT economics is the fact that whereas the capacity of ICT products (such as computers) has increased exponentially, prices have decreased. There is one very clear conclusion: whatever the economic benefits of ICT uses, their economics are very unevenly distributed across the world.

HUMAN DEVELOPMENT

The ICT rush

In the 1980s, the expectation that innovations in telecommunications and computer technologies would improve industrial performance and increase economic productivity in the industrialized nations became firmly established among the leader of the developing countries. The common position that emerged was that ICTs would allow them to leapfrog over the industrialization of their economies into a post-industrial society. Countries began to launch policies and programmes to acquire a share in international satellite communications and transborder data flow networks. In many countries, however, concern arose that ICTs might entail serious social risks, such as a potential for cultural colonialism, the replacement of jobs by machines, and the erosion of individual privacy and national sovereignty.

Towards the end of the 1980s these fears seemed to have abated. A new phase began in the 1990s, characterized by a very strong fear of being left behind and cut off from the emerging global digital highway system. The general belief seems to be that without adequate access to the system, countries cannot hope to be economically competitive in world trade. In many developing countries, the 'digital rush' is on to ensure connections with the electronic networks for trade, finance, transport and science. This phenomenon has been inspired by the obvious benefits that digital information and communication technologies – at least in principle – seem to offer. Educational facilities can be improved by providing distance learning and on-line library access.

Chapter 2 describes many promising projects in a wide range of countries. Electronic networking has also been used to improve the quality of health

services by providing remote access to the best diagnostic and healing practices and cutting costs in the process. Digital technologies for remote resource sensing can provide early warning to areas vulnerable to seismic disturbances or identify land suitable for crop cultivation. Computer technology can contribute to the development of flexible, decentralized and small-scale industrial production. Thus the competitive position of local manufacturing and service industries can be improved. In Singapore, Brazil and Hong Kong the introduction of computer-aided manufacturing (CAM) technologies has been very successful in small-scale industries.

The World Commission on Environment and Development, in its report Our Common Future suggests that 'new technologies in communication, information, and process control allow the establishment of small-scale, decentralized, widely dispersed industries, thus reducing the levels of pollution and other impacts on the local environment' (1987, p. 215).

The currently available computer-communication technologies make it fairly easy for PC users around the world to create a public sphere in 'cyberspace'. Personal computers, modems and telephone lines are being used to establish new global communities. Organizations in developing countries find it increasingly possible to join these forms of horizontal, non-hierarchical exchange that have already demonstrated their ability to counter censorship and misinformation (see Chapters 4 and 6). Groups of all types, from ecological movements, human rights activists, farmers, senior citizens, to the Zapatistas and the groups attending the Women's summit in Beijing, have made impressive use of the new, fast, reliable and effective networks of communication. The combination of telecommunication technologies with desktop publishing software has created new opportunities for even the smallest action group to disseminate its messages across the globe with relative ease and at minimal expense. In the late 1980s and early 1990s, various aid projects introduced electronic information systems into rural health services (India), agricultural extension projects (Peru), infrastructural development (Pakistan), or energy management (Malaysia). In some developing countries, special computer training courses have been developed in schools and colleges (Sri Lanka).

The growing ICT-demand in developing countries can be seen in the long waiting lists for telephone connections, the increase in cellular systems and the rapidly expanding numbers of Internet users. To meet this demand, more and more developing countries have placed the ICTs at the centre of national agendas for social and economic development. There are plans in many developing nations to enhance telecommunications infrastructures in order to facilitate participation in world markets. The planned increase in telephone lines over the next five years in developing countries represents a need for $200,000 million in investments, which it is expected will be provided largely through a massive inflow of foreign capital.

Human development challenges and equity

Human development is forcing policy makers to face the complex challenges of equity of access with respect to vital resources and capabilities, the sustainability of resources and institutions, the acquisition and distribution of knowledge for human empowerment and people's participation. The reality of the widening gap in digital capacity raises the serious concern that the poorer countries may not be able to overcome the financial and technical obstacles now limiting their access to the digital technologies. In early 1995 the concern about the ICT-gap inspired many public and private donor institutions to propose plans for the elimination of digital disparity. For example, the World Bank established the Information for Development Program to assist developing countries with their integration into the global

information economy. In the same year, the ITU established WorldTel, an ambitious project to generate private investments for bridging the telecommunications gap in the world by developing basic infrastructures. WorldTel aims to establish 40 million telephone connections in developing countries over the next ten years, which will require a minimal investment of $1,000 million. Chapter 13 describes some of the projects being launched by private firms to provide telecommunications connections in and among African countries.

The equitable sharing of communication infrastructures (the electronic highways systems created by carriers such as satellites, cables, fixed lines and mobile transmissions), computing capacity (computers, peripherals, networks), information resources (databases, libraries), and ICT-literacy (intellectual and social capabilities to deploy ICT in beneficial ways) will require an enormous effort from the international community. Massive investments are required for the renovation, upgrading and expansion of networks in developing countries, for programmes to transfer knowledge and for ICT skill training, in particular for women. In 1985, the Maitland Commission estimated that an annual investment of $12,000 million would be needed to achieve the goal of simple, universal access to a telephone early in the 21st century. In 1996, Gautam S. Kaji, managing director of the World Bank, said in a talk to the World Trade Organization (WTO) Ministerial Conference (8 December 1996), 'We estimate that telecommunications infrastructure investments in developing countries, which averaged roughly US$30 billion over the 1990–1994 period, will need to double over the next five years, in order to implement the necessary upgrades. The magnitude of these investments is clearly beyond what can be financed from tax revenues and internal public sector funding sources. The private sector will need to come in' (I-Ways, 1996, pp. 32-34). To attract private funding, countries will have to liberalize their ICT markets and adopt measures in favour of competition.

In this context the World Bank has recommended the creation of investor-friendly business environments, the protection of investments and security for repatriating revenues. When public companies are privatized there may be losses in revenues as a result of the change in service charges or severance payments. The World Bank is therefore proposing to finance the adjustment costs of the adoption of liberalization schemes in individual countries. The World Bank's policies are characterized by a strong emphasis on economic growth and a key role for the private sector. The expectation is that, in a sufficiently free market, economic growth will also benefit the poorer sector of society. In this context the contribution of the ICTs is to provide the essential infrastructure for economic development. This position bypasses the question raised earlier, as to whether the deployment of ICTs does indeed lead to growth in economicproductivity and, if so, whether such growth will be equitably distributed. The governance of ICTs is in fact left to freely operating private entrepreneurs. The basic assumption is that a country's telecommunication infrastructure can be managed by private companies and that, whenever parts of the network are unprofitable, the state will provide the public means to ensure that no citizen is disenfranchised.

There is some debate about the expectation that private funding will create worldwide equity in the access to and use of ICT resources. It appears in any case that the international community and national governments of affluent countries need to bear in mind that problems stem not only from a lack of financial resources but also from a lack of political will. Creating adequate access to ICT resources worldwide should not be a problem in a world economy with income amounting to roughly $22 trillion. The core issue is that expenditures for development assistance represent only $55,000 million and thus a mere 0.25% of this income. As the UNDP reported in 1998: 'Official development aid is now at its lowest since statistics started' (UNDP, 1998, p. 37). An

informed conjecture of the amount needed to provide universal access to basic ICT equipment and services needs to include basic infrastructural investment costs and recurrent service charges. The annual costs for all developing countries for adding one thousand million telephone lines, subsidizing over 600 million households that cannot afford basic telephone charges, providing PCs and access to the Internet for schools over a period of ten years could represent from $80,000 to $100,000 million. This is not a prohibitive level of funding. It represents about 11% of the world's annual military expenditure, about 22% of total annual spending on narcotic drugs, and is comparable with the annual expenditure on alcoholic drinks in Europe alone (UNDP, 1998). For a variety of political and economic reasons, many donor governments are presently reducing budgets for financing ICT-development. Between 1990 and 1995, multilateral lending for telecommunications decreased from $1,253 million to $967 million. Bilateral aid for telecommunications decreased from $1,259 million in 1990 to $800 million in 1995 (ITU, 1997).

Financial obstacles are, however, not the only concern. The transfer of ICTs also raises questions about their appropriateness and about the capacity of the recipient countries to make the best use of them. Over the past few decades the prevailing international policies on technology transfer have placed formidable obstacles in the process of reducing North-South technology gaps; the present discussion on the ICT-gap provides no convincing evidence that the technology owners will change their attitudes and policies towards the international transfer of technology. There is no indication that current restrictive business practices, constraints on the ownership of knowledge, and rules on intellectual property rights that are adverse to developing country interests are radically changing, and there are no realistic prospects that the relations between ICT-rich and ICT-poor countries will change in the near future.

The question must be raised as to whether there can be any serious reduction of the ICT disparity, given the realities of the present international economic order. It may well be an illusion to think that the ICT-poor countries could catch up or keep pace with progress among countries in the Northern hemisphere, where the rate of technological development is very high and is supported by considerable resources. This is not to say that poor countries should not try to upgrade their ICT-systems. They should, however, not act with the unrealistic expectation that those who are ahead are planning to wait for them. The situation may improve for the poorer countries, but the disparity will not go away.

In most countries, the problems concerning access to ICTs are handled through public policies based on an already defined technological environment. Developing countries thus find it difficult to assess what digital technologies would be appropriate for their specific development strategies. A problem compounding this situation is that in many cases 'peripheral states seem to have no disinterested non-governmental organizations to advise them on telecommunication technology and the social objectives of regulation that would safeguard those interests that private profit will not meet. Without adequate regulatory intervention to ensure accountability to the general public, market forces that respond to those groups with purchasing power are bound to generate unequal development' (Mody et al., 1993, p. 270).

Most developing countries lack the capacity to identify appropriate digital technologies, and, to make matters worse, there is also a critical absence of co-ordination of 'digital' policies among the developing countries themselves. It is essential to recognize that planning for the adoption and deployment of digital technologies can no longer be a local affair. Global negotiations, such as the recent General Agreement on Tariffs and Trade (GATT) Uruguay Round of Multilateral Trade Negotiations, heavily affect national technology plans, while the processes of globalization

(in trade, finance, culture, etc.) determine the playing field for local actors. As a result, local planning has to take into account the effects of global forces, possible only when planners in the periphery pool resources and mobilize a constituency that counteracts the Northern dominance in global planning. Since today's globalization process is largely determined by Northern forces, 'many developing countries do not obtain a fair share of the benefits of globalization, and some actually suffer net losses' (Khor, 1995, p. 16). The North is in control not only due to strength but also because of lack of co-ordination in the South. National technology policies are largely determined by the work of global institutions and their rules and standards. It is vital that developing countries participate more forcefully and effectively in these institutions. This requires policy co-ordination among developing countries: 'Without policy co-ordination, Southern countries will stand to lose out in the formulation of international policy frameworks that will have important impact on their national policies' (ibid.).

Box 1.1 → UNESCO's mission and activities

UNESCO's constitution requires the Organization to facilitate universal access to information through international co-operation, 'for the purpose of advancing . . . the objectives of international peace and of the common welfare of mankind'. UNESCO pursues this mission by defending freedom of expression and its corollary freedom of the press, encouraging the development of pluralistic and independent media, promoting the free flow of information, ensuring that the new electronic media are of benefit to the greatest possible number of people and taking measures to avert the risks of uniformization and exclusion.

A new communication strategy

At the end of the cold war, the General Conference of UNESCO adopted a new communication strategy which, inter alia, solemnly reaffirmed the principle of the 'free flow of information' and reiterated that freedom of expression must be exercised 'without any obstacle'. With this return to constitutional basics, UNESCO regained its moral authority in this area. UNESCO is playing a leading role within the United Nations system for the defence and promotion of freedom of expression and its corollary, press freedom, which, in the words of the General Conference, is an 'essential component of any democratic society'. Together with the United Nations, UNESCO organized five regional seminars on the promotion of independent and pluralistic media. Their conclusions and recommendations contained in the Declarations of Windhoek, Almaty, Santiago, Sana'a and Sofia were endorsed by the General Conference, as was the decision by the United Nations General Assembly taken at the initiative of UNESCO, to proclaim 3 May, the anniversary of the adoption of the Windhoek Declaration, 'World Press Freedom Day'. These activities and events have done much to promote freedom of expression worldwide. The launching in 1997 of the 'UNESCO-Guillermo Cano World Press Freedom Prize', the Director-General's systematic public condemnation of crimes committed against journalists (most of which go unpunished), and UNESCO's discreet diplomatic action on behalf of journalists and other intellectuals in prison or missing, are all examples of initiatives in keeping with this fundamental role of the Organization.

Action in conflict zones

In several conflict zones, UNESCO is playing a pioneering role by helping to promote a culture of peace with and by the media. For more than five years now, in the countries of former Yugoslavia, the Organization has been offering assistance to independent media in order to to preserve their freedom of expression. This action is essential if they are to provide the local population with non-partisan information and to counter the propaganda of violence and hatred disseminated by media under the direct or indirect control of

those who advocate force and confrontation. This type of action in former Yugoslavia, which has won UNESCO recognition within the United Nations system as the 'lead agency' for the provision of assistance to independent media in zones of conflict, has since been extended to other regions of the world. Moreover, the Organization has taken a number of initiatives to provide opportunities for exchange and co-operation among media professionals belonging to antagonistic national, ethnic or religious groups. This allows them to analyze together their attitudes towards each other and to create, through dialogue, a climate of mutual understanding to ease tension and foster reconciliation. The establishment of press houses in Rwanda and Burundi, open to both Tutsi and Hutu journalists, the setting up in Latin America of the REDIPAZ network and the launching in Jerusalem of the Israeli-Palestinian Media Forum, are examples of UNESCO's contribution to a culture of peace with and by the media.

Key issues in communication

UNESCO also makes a special effort to strengthen communication and information capacities in developing countries so that they can participate more actively in the communication process. This is done through the programmes and projects responding to the needs of these countries and of society in general.

There is no doubt about the growing impact of communication media in today's society, both the conventional media (press, radio and television) and the information technologies such as the Internet, and the rapidly developing digital media. In this context, UNESCO has become a principal world forum for the discussion on such issues as Public Service Broadcasting and Editorial Independence; strengthening democratic voices (Tampere, 1997); The Young and the Media – Tomorrow (Paris, 1997 and 1998); and Sexual Abuse of Children, Child Pornography and Paedophilia on the Internet (Paris 1999).

The Organization also issued a Global Study on Media Violence, based on a survey administered by leaders of the World Movement of Scout Organizations and computer-analyzed by Utrecht University. The UNESCO International Clearing House on Children and Violence on the Screen, established in February 1997 at the University of Gothenburg, regularly issues information on this subject, and published a yearbook entitled Children and Media Violence in 1998 and 1999.

Women and the media have also figured prominently in UNESCO's programme. Thousands of women media practitioners, people's movements, news and features services and information resources on women's issues participate in the WOMMED world network. A practical handbook, Women on the Net, has been issued in English and French and under a special project, Women Speaking to Women, community radio stations are run by women in six countries in Africa and Asia.

UNESCO's regional and national training programmes are an important part of communication development, particularly for independent local newspapers and community media. This work is further reinforced through the Global Network of Journalism Training Centres and Institutes organized in 1997 and launched with support from the International Programme for the Development of Communication (IPDC) in 1999. This complements the work done in universities by the UNESCO Chairs in Communication, including the most recent one created for communication technology for women at the Sook Myung University, Seoul (Republic of Korea).

The International Programme for the Development of Communication

Freedom of expression is meaningful only when there is a wide range of media in existence, such as newspapers, radio stations and television channels. That is the basic philosophy on which the IPDC was founded. Established by a resolution of UNESCO's General Conference, it is a specialized programme focusing exclusively on building up the means of mass communication in developing countries.

Since its establishment in 1980, IPDC has mobilized some $41 million in voluntary contributions for its special account and nearly $45 million for projects financed under

funds-in-trust. Fellowships sponsored by individual countries have provided retraining for 1,500 communication professionals.

The projects carried out with IPDC funding cover a wide range of activities which seek to promote the concept of media pluralism and independance. They include the launching of community radio networks, newspapers for women and rural communities, the training of journalists for all types of media and the computerization of the editorial offices of news agencies, television channels, radio stations and newspapers. In addition, IPDC finances and supports the setting up of networks to denounce violations of press freedom.

Information and informatics

In the area of information and informatics, UNESCO is promoting international development of both 'content' and 'infostructure'.

UNESCO is fostering access to diversified content in cyberspace by promoting the concept of the electronic 'public domain', accessible on-line and off-line. The 'Publica' CD-ROM series of electronic documentary heritage, produced in co-operation with institutions in developing and developed countries and made available free of charge, covers, for example, electronic anthologies of development literature, free software and classical literature. The Memory of the World programme helps to inventory, preserve and disseminate the worlds documentary heritage including manuscripts of unique cultural significance. UNESCO itself aims at providing a portal to the global 'cyber commons' of public domain information and applications through its own Web site, and regularly organizes activities to promote creativity and diversity on the Internet, such as through the annual UNESCO Web Prize awarded for outstanding achievements in creating Web sites in the areas of education, science, culture, and communication.

Another content-related focus concerns the use of electronic information to improve governance and facilitate democratization, which was the subject of a global UNESCO survey in 1998/99 to identify promising technologies, applications and approaches in this area of particular relevance for developing countries. Within its Infoyouth programme, UNESCO supports the establishment of Info-centres, info-skills and info-bulletins for young people.

In the 'infostructure' area, UNESCO provides assistance in the establishment of regional computer communication networks for public service applications and for new approaches to virtual communities for learning, for scientific exchange and for cultural development. Examples are a pilot project for the use of the Internet in priority development sectors in the Eastern Caribbean, extending the European Union's Trans-European Tele-Education Network (TEN) to four East European countries, the HeritageNet project linking libraries, archives, museums, art galleries and universities in Central Asia, and, in Africa, 'Learning Networks' enabling teachers to use the Internet for the improvement of education and multi-purpose community telecentres in rural or disadvantaged locations.

Since its beginnings, UNESCO has been promoting library and archive development through the preparation of guidelines and methodologies, advisory services, training of specialists and technical support to selected institutions. More recently, over 300 libraries have been linked through the UNESCO Network of Associated Libraries (UNAL) which was launched in 1990, and within the MEDLIB project major libraries in the Mediterranean region are focusing together on improving the management of and access to electronic information.

Given the critical importance of skills for the development of an information society, UNESCO pays particular attention to the training of information professionals (librarians, archivists, documentalists, computer specialists), as well as of users at all levels. For example, a complete modular framework for training in informatics, covering undergraduate, and postgraduate and continuing education programmes, has been developed in collaboration with the International Federation for Information Processing (IFIP) to serve as a framework for development, testing and international exchange of training materials in these areas.

In another key interdisciplinary area, UNESCO is assisting Member States in the formulation of appropriate

national information and informatics policies through guidelines, workshops and technical assistance. Special consideration is given to 'info-ethical' questions, to achieving a balance between the common good and economic imperatives, and to facilitating the use of information and communication technologies for development purposes by the public sector and the civil society.

UNESCO's general orientations concerning the cyberspace are described in Box 8.2. Activities in the field of ICTs funded from extra-budgetary sources are described in the Statistical Annex (Section 4).

This review illustrates the wide range of UNESCO's actions in the fields of communication, information and informatics, and its contribution to the emerging information society at the political, intellectual and operational levels. Other agencies also make important contributions, but for reasons of space, it is not possible to review them here. Given the magnitude of the problems, it is clear that a strong commitment by the international community is necessary to ensure that commercial interest do not dominate the development of ICTs in the world, more particularly in developing countries. Governments, public and private institutions have to assume their responsibilities if the gap between information–rich and information-poor is not to continue to widen (for more information see www.unesco.org/webworld).

Sustainability

An important concern has arisen in connection with the possible proliferation of digital technologies in the developing countries, namely, whether ICTs can be used in environmentally sustainable ways. The global use of ICTs would drastically increase the emission of carbon dioxide (from printers, copiers, computers, and so on) to environmentally untenable levels. More ICTs would also imply more production of computers. The production of a single PC requires approximately as much energy as the average electricity consumption of a European household per year. One PC needs twenty tons of natural resources and after three to four years when the equipment is obsolete, the PC will be dumped on the growing heap of electronic scrap (Malley, 1996), along with toxic waste such as cadmium (in the batteries) and lead (in the screens). The situation has to be seen in the light of a rapidly growing world population which could by the mid-21st century amount to some 12,000 million people. For policy makers this may be one of the most difficult questions: can a global digital grid, accessible to all, be combined with environmentally sustainable development?

The challenge of sustainability involves not only the environment but also financial, institutional and technical considerations. When foreign investments have facilitated the growth of national networks, can they be maintained, upgraded and renovated through the independent generation of funds? Can the development of local production capacity for ICTs and the effort to gain an export position over the long term – particularly in the smaller and weaker economies – be sustained given international competition and fluctuations on the world market? Will sufficient financial resources and training be invested in developing adequate management and technological skills to secure the longer-term local control over ICT-projects?

Knowledge

One essential dimension of human development is knowledge, crucial in enabling people to broaden their choices. ICTs are the basic tools of emerging knowledge-based societies. They represent an important shift from the utilization of natural and material resources to the deployment of data and information and related analytical and processing skills. This development is, however, accompanied by

a strong trend toward the privatization and commercialization of knowledge sources and the concurrent enforcement of legal measures to protect private intellectual property (see also Chapter 8). The emerging global regime for Intellectual Property Rights (IPR) tends to give more emphasis to the economic aspects of IPR protection than to public interest considerations. There is a dominant economic angle in this regime which gives priority to the interests of large producers over those of small creators and consumers. The central focus is on the misappropriation of corporate property rather than on artistic and literary creativity. The move to give IPR protection to material in the public domain when it has been entered in an electronic database could render access to knowledge more costly – and thus prohibitive – for large numbers of people. In addition, the initiative to extend copyright protection to all forms of digital copying could make the Internet a pay-per-view medium creating obstacles to the access to knowledge for those who cannot pay.

Developments in the international regime for intellectual property protection are an attempt to create and maintain a balance between a set of rival claims to the control over knowledge and its dissemination. The protection of intellectual property rights must provide the incentives, rewards and recognition for individual producers of knowledge in order to stimulate progress. Benefits for the creator, and public access to artistic, literary and scientific works must both be secured. Whereas IPR protection seeks to promote the progress of science, it also restricts access to knowledge, since it defines knowledge as private property and has a tendency to facilitate monopolistic tendencies. It may well be that the current trends in the trade-oriented IPR regime lead to more restricted access rather than better public distribution. Although an absence of legal protection could have adverse effects on intellectual production, the move toward overprotection is 'not conducive to access to the networks by research workers and academics of developing countries' (UNESCO, 1997, p. 88). As the UNESCO World Communication Report concludes: 'The correct balance therefore remains to be found between the right of creators to benefit from the use of their work and the needs of users to access those works and use them freely' (ibid.).

Participation and public interest

On the whole, ICT developments are more technology driven than user oriented. If the ICT potential for human development is to be successfully exploited, the needs and aspirations of users must be central to the whole process of design, construction and application. Present experience is concisely summed up by Mansell and Wehn: 'There is substantial evidence that if applications do not reflect user needs or involve them in the process of development, they simply will not bring the expected benefits. They are likely to create new problems that will be costly to address. If the specific social, cultural, and economic conditions, the expertise and commitment of users, and components of the infrastructure are not assembled together, ICT applications will fail to yield benefits' (1998, p. 97). The essential requirement of user orientation is hampered by the strong tendency to delegate social responsibility for the governance of the ICT-sector to a global trade regime. In fact, the politics of world communication represent a historical shift from a public service orientation to private competition with a predominantly commercial focus.

CONCLUSION

The social uses of ICTs today are to a large extent guided by the political-institutional arrangements within which they operate. Whether the ICT-potential will be successfully exploited in support of human development depends much more on the institutional organization of the technology than on its technical features per se. Given the growing demand for digital technologies, policy makers in developing countries will need to make policy choices about the deployment

of these technologies in the interests of human development. 'For all our ignorance of the overall impact of IT on jobs, general agreement exists that the impact is real, pervasive and occurs at an increasing pace. . . . Social choice, as well as technological potential, is clearly crucial to whatever pattern eventually emerges' (Lyon, 1988, p. 72). The critical implication of this situation is that policy makers will have to make social choices that adjust the technological potential to the needs of human development. The immediate question this raises is which analytical perspective will be able to guide the search for these choices. This is particularly important since the 'digital landscape' is kaleidoscopic. There are strong expectations that the social and economic implications of digital technologies create a very bright future. There are also very negative and pessimistic projections that point to serious social and economic problems. The difficulty with both these scenarios is that empirical reality does not appear to confirm either of them completely. The question is: how can defensible policy choices be made in this confusing panorama?

The current ICT-discourse focuses to a great extent on the implications of the adoption of these technologies for processes of social change. Since these processes are difficult, if not impossible, to foresee, it would seem more beneficial to concentrate on the social and institutional changes that are required, if the potential for human development of ICTs is to be guided in the preferred direction. A major problem for policy makers is the general tendency to adopt and deploy ICTs within the social and institutional (conceptual and organizational) frameworks and routines of yesterday. ICTs will not by themselves change existing institutional settings. This will need processes of political decision-making that are guided by the genuine aspiration to bring about sustainable and democratic human development. Once it has been accepted that digital technologies should be (re)-shaped to suit scenarios of preferred futures (for example increased productivity with reduced resource consumption, full employment, direct democracy, cultural diversity), then the social and institutional changes required for the technologies to achieve the preferred future have to be identified and ways to bring about these changes have to be found. This is an urgent matter, because as the UNESCO World Science Report warns, the use of ICTs within conventional social and institutional frameworks may not only hamper the realization of potential benefits, but may also reinforce the possible social risks (Ferné, 1996, p. 273).

World communication politics have traditionally been made in such intergovernmental forums as UNESCO (see Box 1.1), the World Intellectual Property Organization, and the International Telecommunication Union. These organizations have always been relatively open to the socio-cultural dimension of developments in the field of information and communication technologies. Moreover, they have offered a platform in the past where the interests of developing nations could be voiced. In recent years the position of these intergovernmental organizations has been considerably weakened, as the major players have begun to prefer the forum of the WTO which is generally more favourable than other intergovernmental bodies to the trading interests of the major industrial countries. Among its main policy principles are the worldwide liberalization of markets and the non-discrimination principle that provides for national treatment of foreign competitors in national markets. In fact, given the increasing economic value of communication networks and information services, it should surprise no one that communication politics has shifted to this trade forum. In 1997, the global information and communication market generated revenues of more than $2.2 trillion. The major communication and information corporations provide essential support structures for commodity and financial markets, and the governance of communication areas is therefore largely destined to become

part of a global trade regime. Global governance of communication and information is thus largely committed to minimizing public intervention and maximizing the freedom of market forces. Much analysis and debate is still needed to assess what governance structures can ensure that ICT deployment meets the challenges of human development. These challenges need adequate institutional responses, because the problems are not tecnological, but rather political. The design of ICT-strategies must make use of the lesson learned from experience in the domain of industrial policies. One striking observation here is that in many developing countries, industrialization has failed to bring about economic modernization because the social structures were not ready for such a process. If changes in social institutions, values and practices lag too far behind the process of economic growth, there is a great risk that deep societal crises will be triggered.

It is essential to note that possible benefits from ICT-applications (in public administration, education, health or business) depend on how the technology is used in the production and distribution of products and services and whether the necessary skills and institutional settings have been developed for effective use.

It is also realistic to expect that the materialization of potential benefits will take a long time. The acquisition of the necessary skills and the design of adequate institutional structures are time-consuming processes. Moreover, these processes require considerable investments in both material (finance, technology) and human resources. A sober assessment of ICT efforts in different areas of application reveals that, at the present time, there is no unequivocal, empirical evidence of success stories. The so-called 'ICT revolution' holds enormous potential for social change, but engineering this change to meet the goals of human development is an equally enormous challenge.

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Chapter 2
New directions in education

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CHALLENGES IN EDUCATION

Information and communications technologies (ICTs) are a diverse set of technological tools and resources used to communicate and to create, disseminate, store, and manage information. These processes lie at the very heart of education. In recent years, educational access to digital ICT tools, applications, networks, and media worldwide has grown dramatically. As noted in the World Education Report (UNESCO, 1998), education is facing a significant challenge in preparing students and teachers for 'our future "knowledge-based" society' at a time when most teachers are not trained to use ICTs and 'the majority of existing school buildings, even in the most developed countries, are not equipped to integrate the new information and communication technologies.'

Digital ICTs are quickly becoming more accessible, but it is important to note that earlier technologies continue to play a critical role in education worldwide. Access to films, videotapes, telephones, television or radio is still far more commonplace than access to a computer or to the Internet and the World Wide Web. For example, the Telesecundaria Project in Mexico, which began in 1965 as a closed-circuit television pilot project, today delivers classes designed for lower secondary school level to over 12,000 rural communities, enrolling more than 800,000 students.

In this chapter, the focus is on the 'newer' digital ICTs with special emphasis on educational uses of the Internet and the World Wide Web. The new digital ICTs are not single technologies, but combinations of hardware, software, media, and delivery systems. As will be seen, ICTs in education today encompass a wide range of rapidly evolving technologies, including hardware, software and applications.

New ICTs differ in several important dimensions from older technologies: they can integrate multiple media into single educational applications; they are interactive and include the capacity to control, manipulate, and contribute to the information environment; they are flexible, offering freedom from

rigid scheduling and from barriers of time and location; through connectivity, they provide access to every other person on the planet who has an Internet account, to hundreds of thousands of information archives, and to millions of Web pages. These four dimensions – integration of multiple media, interactivity, flexibility of use, and connectivity – distinguish digital ICTs from previous technologies. Because of these differences, educators are finding powerful new ways to integrate digital ICTs into the curricula.

The introduction of new ICTs has always raised difficult debates among specialists in education, but the purpose of this chapter is not to reopen them in relation to modern informations and communication technologies. Their impact on education is so recent and the situation is evolving so fast, that it would be hazardous at this point in time to attempt any assessment of the 'state of the art' on the matter, let alone an evaluation. In the present context, the main purpose is to show that a wide range of initiatives are taking place all over the world, at all levels of education, showing a potential for further developments which looks almost unlimited. However, it is important to discuss the various issues in a realistic way. For this reason the chapter is presented in four parts. Firstly, typical examples from across the five continents will be given, thus confirming that the impact of ICTs is real everywhere in the world. Secondly, the effectiveness of ICTs will be examined, showing how they can improve normal teaching assignments or introduce new methods. Thirdly, some general problems raised by the use of ICTs will be discussed more particularly in relation to the creations of content and teacher training. Lastly, the main aspects of national planning will be presented briefly.

WORLDWIDE EXAMPLES

Although there is apparently no comprehensive data on ICTs in schools worldwide, it is clear from many national examples that schools are increasingly being equipped with them. It is also apparent that ICT equipment and Internet connectivity is still much more widespread in North American schools than elsewhere. For example, in the United States, the ratio of students per computer dropped from 63:1 in 1985 to 6:1 in 1997 while the number of schools with Internet access has grown from 35% in 1994 to 72% in 1997.

In Europe, more than 80% of schools in Slovenia have access to the Internet – 93% of secondary schools and 80% of primary schools – which is similar to the percentages of developed countries. The Government of the United Kingdom plans to connect all schools, colleges, universities, libraries, and as many community centres as possible to the Internet by 2002. The German Government will connect 10,000 schools to the Internet by mid–1999. In Italy, plans were announced in 1998 for the installation of computer and multimedia facilities in 15,000 Italian schools to be completed by the year 2000.

In Asia, similar developments are taking place. In Japan, as of 1997, over 94% of public schools were computer-equipped and 10% were connected to the Internet. The Government plans to achieve a pupil-to-computer ratio of 2:1 in middle schools and 1:1 in high schools by 1999. All of the public schools in Japan will be connected to the Internet by 2003. In the People's Republic of China, the central government will increase funding for basic, vocational and higher education projects over the next two years. These plans include strategies to make increasing use of Internet-based educational programmes. In New Zealand, 83% of primary schools and 94% of secondary schools have Internet access.

In Latin America, the Chilean government established the Enlaces (Links) project to connect schools and related institutions to Chile's national computer network. By 1996, over 180 primary schools and 62 secondary schools had been connected and, by the year 2000, the Chilean government plans to connect 50% of the 8,250 primary schools and 100% of the 1,700 secondary schools.

In Africa, the Creating Learning Networks for African Teachers Initiative aims to contribute to educational change by encouraging educational institutions to become information and learning resource centres for their communities. It also hopes to contribute to attitudinal change among teachers with a view to stimulating ongoing professional development by creating electronic learning networks among teacher training institutions and their partners in education at local, national and international levels. These networks will allow for exchange of information, experiences and expertise, for collaborative action and for new patterns of communication. Pilot projects were initiated in Zimbabwe by connecting five teacher training centres (TTC) and their partner institutions to the Internet. Currently the project is carried out in close collaboration with the World Bank's WorldLinks for Development programme. A project in Senegal is structured in a similar way, while in Kenya and Uganda the Initiative is being introduced as part of a collaborative learning project in the area of science/mathematics teaching, linking teachers, students and researchers in Zimbabwe, Kenya and Uganda.

In the Middle East, as part of a programme sponsored by the World Bank to improve basic education, the Turkish Government will be installing computer laboratories in over 15,000 schools and training over 200,000 teachers in computer literacy and computer-aided instruction techniques.

Informal and non-formal education institutions are also increasingly being equipped with ICTs and connected to the Internet. At present, about 20% of libraries in the United Kingdom are connected to the Internet. The government's National Grid for Learning initiative will connect all libraries and museums in the United Kingdom to the Internet. In the United States, a 1998 survey found that 73% of the nation's public libraries offered basic Internet access to the public. Many public and privately-funded museums are offering ICT-based learning opportunities. For example, in a joint project with the Fraunhofer Institute for Software and Systems Engineering, the German Historical Museum in Berlin and the Haus der Geschichte of the Federal Republic of Germany in Bonn are developing a virtual exhibition of German history for the Internet.

Community schools are also making more use of ICTs. The Lighthouse Project in Thailand is offering non-formal educational programmes at five locations in Thailand (lcs.www.media.mit.edu/groups/el/thai/LightHouse/Lampang/lp_index.html).

In part, efforts to connect educational organizations to the Internet are being driven by societal pressure. This does not eliminate, however, the need to check whether there will be positive consequences for such a move. One aspect of this question is how effective the ICTs are in education.

EFFECTIVENESS

To answer this question three aspects must be considered. The first deals with the comparison between traditional teaching techniques and those which make use of ICTs; here the term ICT-mediated instruction will be used. The second covers teaching activities which would not be possible without modern ICTs, hence the expression ICT-enabled instruction. The third concerns all the techniques, whether ICT-mediated or enabled, and raises the question as to whether they are worth their costs.

ICT-mediated instruction

The first question to be considered about the effectiveness of ICT in education is what impact, if any, ICT-mediated instruction has on student performance. ICT-mediated instruction refers to instruction delivered through a technological channel such as television, radio, or a computer network.

Evidence has consistently shown that ICT-mediated instruction using conventional teaching methods is as effective as traditional face-to-face instruction (see, for example, www2.ncsu.edu/oit/

nsdsplit.htm) and, in the case of computer-based instruction, may in certain instances improve student learning and attitudes to learning (Kulik 1994, as cited in Glennan and Melmed, chap. 2, 1995). However, the picture is less clear – but promising – for more sophisticated uses of ICTs in the classroom, especially for the host of applications and methods that support 'constructivist' learning, in which students are encouraged to work in rich environments of information and experience to build their own understanding of them (Apple Computer, Inc., 1995; Bertelsmann Foundation, 1998). Research into the effectiveness of ICT-mediated instruction is continuing worldwide, and should provide a clearer picture of the effectiveness of ICTs in supporting constructivist teaching. For example, as part of the Helsinki 2000 project, Finnish researchers are conducting a five-year, multi-disciplinary study focused on analyzing innovative teaching practices through intensive case studies on computer-supported collaborative learning.

ICT-enabled education

A second way to assess the merit of ITC-use in education is to consider what, if anything, they enable students and teachers to do that they would not otherwise be able to do. To explore this question, five aspects of the educational use of ICTs will be considered: supporting new teaching methods, accessing remote resources, enabling collaboration, extending educational programmes and information literacy.

Supporting new teaching methods

Modern constructivist educational theory emphasizes critical thinking, problem solving, 'authentic' learning experiences, social negotiation of knowledge, and collaboration. The teaching methods concerned change the role of the teacher from a disseminator of information to a learning facilitator, helping students as they actively engage with information and materials to construct their own understanding. ICTs have the potential to be used in support of these new educational methods, enabling students to learn by doing. ICTs can make it possible for teachers to provide students with self-paced, self-directed problem-based or constructivist learning experiences, as well as to test student learning in new, interactive, and attractive ways that may better assess the depth of their understanding of content and processes.

One example may help illustrate how ICTs can support constructivist teaching methods. Computer Supported Intentional Learning Environments (CSILE, csile.oise.utoronto.ca/intro.html), developed at the Ontario Institute for Studies in Education, is a network system that provides support for collaborative learning and inquiry within a school. CSILE promotes student interaction through referencing, connecting ideas, sharing authorship, and 'building on' the work of others to advance knowledge. The central feature of CSILE is a 'communal' database into which students can enter text and graphics, and can read, add to, and comment on the work of others.

Accessing remote resources

As previously mentioned, connectivity is one of the main differences between older and newer ICTs. The first aspect of connectivity concerns access to material resources.

Digital library initiatives that will provide collections that are electronically accessible on the Internet, including printed works (e.g. textbooks, journals,illustrations,maps,chartsand graphs),photo-graphs, films and videotapes, paintings, 3D models, graphics, animations, software, reference materials, audio files, and so forth are being undertaken in countries around the world.

Thousands of websites that contain collections of high quality curriculum guides, lesson plans, and instructional activities now exist. For example, the United Nations CyberSchoolBus website (www.un.org/Pubs/CyberSchoolBus) contains teaching units on urbanization, health, the environment, and women

and politics, as well as interactive games, maps, databases, and quizzes.

In addition to efforts to digitize existing physical resources, many new information resources (e.g. websites, digital images, electronic journals and newsletters) are being created which can only be accessed electronically. As digital representations of physical resources are created, and as more information resources are distributed in digital format only, it will be critical that students and teachers have ICT access.

Enabling collaboration

Since not all resources are inanimate, a second important aspect of connectivity deals with human resources. ICT enables educational collaboration between individuals and groups of people. E-mail, computer-mediated conferencing, and desktop videoconferencing are all being used to support collaboration among individuals and groups. Collaboration is also taking place by means of real-time chat systems (www.idiom.co.uk/intchat.htm); whiteboards (www.sisweb.com/math/whiteboard/); newsgroups (www.peg.apc.org/~iearn/works.htm); computer-mediated conferencing (CMC) (www.ascusc.org/jcmc/); and specialized software like CaMILE: Collaborative and Multimedia Interactive Learning Environment (www.cc.gatech.edu/gvu/edtech/CaMILE.html) and The Knowledge Integration Environment (www.kie.berkeley.edu/KIE. html). Other applications include MUDs (Multi-User Domains) MOOs (Multi-user Object Oriented domains), and MUSHs (Multi-User Shared Hallucinations). Such applications are Internet-accessible, text-mediated virtual environments in which participants can both interact with others and help construct the common virtual space.

ICTs make it possible for people in widely dispersed locations to participate in 'virtual learning communities.' Virtual learning communities are learning groups based on shared purpose, rather than on distinctions of location or age. Through the ICTs, learners can be drawn together from almost anywhere in the world, and can construct their own formal or informal learning groups. Such communities may cross barriers of time, geography, age, ability, culture and social status. Virtual education allows students to study at their own time, place and pace. In essence, a virtual education means having educational transactions accessible from the home, the workplace or anywhere that the student chooses to be.

Virtual Design Studios, begun in 1993, are a form of collaboration among teams of architecture students in universities worldwide (arch.hku.hk/projects/vds/). Teachers and students, on different continents and in different time zones, work on common design projects using computer-aided design systems, e-mail, a central database, and video-conferencing. Participants use the World Wide Web to display their designs and a virtual international jury of architects and teachers judges the relative merit of the work. Virtual Design Studio techniques are also being utilized by other disciplines, such as engineering.

The SIMULAB Project, supported by the European Union, involves web-based communication among language students across national boundaries. Using specialized software, teachers can create Internet-based simulations for role-playing activities in language learning. The simulations, incorporating e-mail, chat, and online creation and editing of documents, are thought to motivate oral and written communication among the participating groups, while students are guided through scenarios relevant to the country of their chosen language (www2.echo.lu/telematics/education/en/projects/files/simulab.html).

Extending educational programmes

ICTs make it possible to extend the reach of educational programmes in two important ways. First, educational programmes can be delivered anywhere in the world. Second, ICTs can help individuals learn throughout their lifetime.

Distance education programmes, also known as 'distributed' education programmes, are those in which the teacher and students are physically separated, and teaching and learning takes place by means of single technologies or combinations of ICTs. In the past, such programmes made use of print, radio, and television (see box 2.1.). Today, new ICTs are leading to changes in these traditional 'open' or distance education programmes. For example, the International Francophone Consortium of Distance and Open Learning Institutions (CIFFAD), a consortium of open and distance learning institutions spread over 49 countries, of which 80% are in developing nations, has recently entered into a phase of re-engineering to make use of new ICTs. The group aims to provide at least one hundred access points to the Internet per year in member establishments with the major part of the consortium having access to the network by the end of 1998. In the Pacific region, the University of the South Pacific has been using Intelsat for several years.

The Western Governors University (www.wgu.edu) is an example of a 'virtual university', or university with no physical campus. WGU, initiated in 1996 by 18 governors in the western United States, offers more than 300 college-level distance learning courses from 30 affiliated universities and education providers. WGU has forged international alliances with the China Internet Education Center, Tokai University in Japan (www.u-tokai.ac.jp), the University of British Columbia in Canada (www.ubc.ca), the Open University in the United Kingdom (www.open.ac.uk) and the Virtual University of the Monterrey Institute of Technology in Mexico (www.sistema.itesm.mx/english/uv.htm). The principal aim is to collaborate on the development and delivery of distance learning programmes.

In Germany, the four Baden universities, namely, Freiburg, Karlsruhe, Mannheim and Heidelberg, recently announced the establishment of that country's first virtual university. The objective is to establish individual distance learning via e-mail Integrated Services Digital Networks (ISDN) or digital television. In Africa, the World Bank is funding the development of the African Virtual University (AVU). AVU (www.avu.org) completed a pilot phase in 1996–98 and is now moving into an operational phase when it will begin delivering full-fledged undergraduate degree programmes in science and engineering in January 1999. The AVU's programmes will be delivered by a combination of ICTs including interactive television and the Internet. The programme is developing a digital library of scientific engineering as a resource for students and teachers.

The Hanoi Summit (November 1997) entrusted the creation of a francophone virtual university to the Agence Universitaire de la Francophonie for a budget of 4 million French francs. As a beginning, six digitized campuses have been opened in Bulgaria, Cameroon, Haiti, Madagascar, Senegal and Viet Nam (www.aupelf-uref.org/UVF/).

Virtual educational programmes are not limited to postsecondary education. The United States Department of Education has funded the Virtual High School (VHS) project (vhs.concord.org). During the 1997/98 school year, VHS offered 29 Internet-based, credit-bearing courses to about 500 students in 27 schools located in 10 states. This approach is thought to be particularly useful as many of the participating schools either have no qualified teacher or insufficient enrollment to justify individually offering some of the courses which are available through this collaborative scheme.

In addition to educational institutions using ICTs to enhance or create distance learning programmes, commercial companies are offering ICT-based distance education programmes. Although alternate and distance education providers currently make up less than 2% of the postsecondary education market, almost $2 billion dollars has been raised on Wall Street since 1996 to finance such new ventures.

Establishing lifelong learning habits among citizens and providing lifelong learning opportunities

Box 2.1 → The use of electronic media in open learning and distance education

This is a worldwide study based on data from 147 institutions involved in distance education.

39 countries are represented; 72% of the institutions are located in developed and 28% in developing countries.

Educational level of the programmes included Training levels	Programmes (%)
Pre-primary	2
Primary	6
Secondary	14
Tertiary	60
Vocational	26
Continuing education	46
Life enrichment, civic education, etc.	13

Use of learning materials	Programmes in:	
	Developed countries (%)	Developing countries (%)
Documents	99	100
Audio	67	86
Video	82	77
Computer assisted learning	50	43
Multimedia	30	7

Distance education is by no means a new phenomenon, but the means of distribution are changing and increasing rapidly with recent technological developments. The study provides some insight into the use of electronic media in terms of the types and means of interaction that takes place in the course of the educational programmes. The most noticeable result is that electronic media are used mainly to support traditional learning methods. Only a few cases could be identified where media were used to change the characteristics of learning to better serve the needs of the learners.

Use of communication tools	Programmes in:	
	Developed countries (%)	Developing countries (%)
Telephone/fax	84	84
Audio-conferences	34	27
Video-conferences	24	18
Computer conferences	28	5
E-mail	64	30
Database access	15	11

Some selected results concerning:

- → types of learning materials
- → types of communication tools
- → types of communication channels

Audio-based materials have a significantly higher usage in developing countries than in developed countries. Production of audio materials is relatively inexpensive and requires less technical sophistication than other electronic learning materials. The requirements at the user-end are also lower than for other electronic learning materials.

Use of communication channels	Programmes in:	
	Developed countries (%)	Developing countries (%)
Mail/physical delivery	87	86
Public service telephone network	83	57
Radio	6	29
Direct Broadcast TV	9	16
Terrestr. Broadcast TV	13	11
Integrated Services Digital Network	20	7
Specialized links (unspecified)	17	2
Digital spec. links	11	5
Public data network	12	2
Cable	11	2

Concerning the tools used to facilitate the interaction during the learning process, all forms except the use of telephone/fax are more highly represented in the developed countries. Consequently the channel most used for communication (apart from mail) is the public service telephone network; radio is used on a larger scale in the developing countries than in the developed countries.

Compiled from The Use of Electronic Media in Open and Distance Education, prepared by My von Euler and David Berg, Paris, UNESCO, 1998.

has become a major goal of governments and non-governmental organizations worldwide. For example, UNESCO's Learning Without Frontiers (LWF) initiative (www.unesco.org/education/lwf/), 'is geared towards stimulating innovation and exploring alternative pathways/partners/technologies for the provision of lifelong and lifewide learning opportunities, particularly, to those who are currently unreached by or excluded from conventional modes of educational delivery' (UNESCO, 1996). In addition to this initiative, UNESCO has recently set up an Institute for Information Technologies in Education (IITE) (www.info/iite.ru), located in Moscow and designed to act as an international clearing-house for the collection and dissemination of best practices and models in the field of application of information and communication technologies in education. It will also offer assistance in the pre- and in-service training of the teachers in the use of information technology, particularly in the developing countries, countries in transition and countries of the Commonwealth of Independent States.

The European Lifelong Learning Initiative (www.ellinet.org/elli/home.html) makes use of ICTs, 'to initiate the dissemination of information, the co-ordination of projects and studies, the mobilization of actions, people and organizations to bring Europe into the Lifelong Learning Age. It covers all sectors and all countries' (European Lifelong Learning Initiative, 1997). The Asia Pacific Economic Cooperation (APEC) Forum has established three mechanisms to assist countries in the region to establish lifelong learning projects: the creation of a database of scholars, researchers and practitioners in the region involved with lifelong learning issues and programming for the region; the development and publication of a book of papers on lifelong learning policies, practices and programmes in the Asia Pacific region; and a lifelong learning conference for APEC members to discuss issues identified in the book (www.apec-hurdit.org/lifelong-learning-project.html).

Information literacy

In the light of changing perceptions about what constitutes appropriate skills for the modern era, some organizations are promulgating educational standards that attempt to define what all students should know about ICTs. For example, the National Educational Technology Standards (NETS) project (cnets.iste.org) in the United States has released an initial set of national educational technology standards for pre-college students.

However, although it may be assumed that students will have to acquire new skills in order to compete and contribute in an increasingly ICT-dominated global economy, it is not clear what skills will be necessary: 'Unlike the more stable content and goals we have for other areas of school study, technology continues to change and evolve; with these changes come ever-new goals for how technology should serve learning, and what students should know about technology' (Fulton, 1998).

There does seem to be a growing consensus that all students must achieve 'information literacy': 'It is the task of general education to provide every girl and boy with the versatile basic skills in acquiring, managing and communicating information which are necessary in the information society and essential for successful further study' (Ministry of Education, Finland, 1995). Focusing on concepts such as 'information literacy', rather than on specific technologies or applications, may be essential in planning and developing new curricula.

Cost-effectiveness

The third issue when assessing the effectiveness of ICT in education is the question of cost-effectiveness. Information is of critical importance, especially to developing countries with fewer resources to invest. However, assessing the cost-effectiveness of ICTs in education is difficult, if not impossible, for at least four reasons: lack of meaningful data, variability in

the use of ICTs, difficulty of generalizing from specific programmes, and difficulty of assessing the value of qualitative educational differences. In addition, traditional cost-analyses cannot take into account the societal and economic consequences of not investing in ICTs for education.

Cost comparisons

Nonetheless, even in the face of such obstacles, attempts to establish the relative costs of ICTs in education have been reported. In general, these studies find that the use of new ICTs is more expensive than instruction delivered by older technologies like print and radio, but less expensive than instruction delivered by television (see Potashnik and Capper, 1998).

In a World Bank report (1998a) on education and ICTs in Latin America and the Caribbean, the costs of using a computer with an Internet connection in a school was much less expensive per pupil than broadcast television, but substantially more expensive than radio.

M. Potashnik and D. Adkins (1996), in spite of severe lack of data, were able to compare the per pupil costs of setting up a computer laboratory in a school for computer-assisted instruction in Belize ($78), Jamaica ($89), and Chile ($104) (pp. 13–15). A similar analysis of the costs of equipping a classroom, not a laboratory, with computers in the United States for computer-assisted instruction yielded a figure of $453.

L. Osin (1998), in a paper on ICTs in developing countries, assessed the annual per-student cost of providing computers for instruction in developing countries at $84. This finding is in close agreement with the study by Potashnik and Adkins mentioned above. On the same basis, if 30 computers were used 300 days per year, 10 hours per day, as a resource to raise the skills and education levels of all members of the community, not just students, Osin estimates the cost would decrease to $0.34 per hour of interaction. He concludes, 'There is no alternative system known that may provide the benefits possible by integrating computers in the education system, while at the same time serving the whole community' (1998, p. 9).

Costs of alternatives

Another factor that must be considered when calculating the cost-effectiveness of ICT use is the question of alternatives. The costs of building sufficient campuses to handle the rising demand for education may be prohibitive. Virtual educational institutions do not require the same campus infrastructure and related costs incurred by campus-based institutions.

In Taipei (Taiwan, China), the distance education-based National Open University, with its budget of NT$800 million, accommodates approximately 30,000 adult students each year. By comparison, the National Taiwan University, one of the larger universities in Taipei, has an annual budget of $NT3,500 million for its 21,000 students (Ministry of Education, 1996). Though gross numbers of this sort beg some level of refinement, the differential costs remain substantial and manifest (Huang, 1997).

Costs to society

Lastly, when discussing cost-effectiveness, the societal costs to developing countries of not preparing their citizens to participate in an information-based global society must be considered. The World Development Report 1998/99 (World Bank, 1998b) warns that the global explosion of knowledge may either lift hundreds of millions of the world's poor out of poverty or it may create a widening knowledge gap, in which poor countries lag further and further behind. As Potashnik and Adkins (1996) have pointed out, 'even in countries which do not believe in the cost-effectiveness of information technology as a tool for mass education, it is important that they begin acquiring experience using this technology for educational purposes. Otherwise, educators in

developing countries will be marginalized in the international dialogue on education' (p. 3).

CREATING AN ICT-ENABLED LEARNING ENVIRONMENT

In this section, the focus will be on the development of ICT-enabled learning environments, specifically on infrastructure, content, teacher education and training, and technical support.

Infrastructure

In order to make use of digital ICTs, schools must be equipped with computers. In order to access the Internet from a computer, schools, homes, libraries, and other educational venues must be equipped with an Internet connection, either by means of the telephone or cable network and a modem or a direct connection. Many creative means of providing computers and building the necessary Internet infrastructure are being explored in countries throughout the world.

Education/business collaboration

Collaboration, including cost sharing, between education and industry to build ICT infrastructure is becoming commonplace. For example, the Bristol Education Online Network (BEON) project (www.education.bt.com/ednews/43beon.htm) and the follow-on Merseyside Education Online Network (MEON) (meon.eonic.net) are co-operative efforts of the commercial companies British Telecom (BT) and International Computers Limited (ICL), local schools and the University of Exeter School of Education. ICL is supplying multimedia computers and BT is providing access to remote services and to the Internet to a number of schools in the area. Another promising approach to equipping schools with computers inexpensively is to transfer the technology from government organizations and businesses to schools. For example, the Computers for Schools programme in Canada (www.schoolnet.ca/cfs-ope/welcome_e.html), is soliciting donations of 'obsolete' or redundant computers from business, industry, and individuals, and refurbishing them before donating them to schools.

Netdays

Netday (see www.netday.org) initiatives, which began in 1995, are characterized as 'high-tech barn-raising,' in other words, efforts by community volunteers to wire classrooms, libraries, and computer laboratories so that they may connect to the Internet. Organizers of such efforts typically help schools to develop a technical plan that includes instructional goals, network and wiring architecture, network management and technical support, training, and an operating budget. On a specific day, volunteers from the local community do the physical work necessary to set up the network, greatly reducing the costs of providing Internet access within the schools. Netdays now take place in many countries including Australia (www.netdayoz.edu.au), New Zealand (www.netday.net.nz), European countries, (www.netdays.org/en/projects/country.html), Israel (www.netdays.org.il), Japan (www.netday.or.jp/index-e.html), and South Africa (www.netday.org.za). In Latin American and the Caribbean, UNESCO is sponsoring a netday initiative (www.unesco.org/events/latin/euro_america.html).

Community networking

Many community networking initiatives have educational components and are worthy of mention. In an interesting example of how community networking can benefit educational institutions, the International Telecomputing Consortium (www.itc.org) is working with schools and universities in China to create school-based community networks. In these projects, schools establish computer centres with Internet access for use by students and teachers in class (www.itc.org/chinaprojects.html). After hours, the centre remains open and training by teachers and students is made available to parents and other members of

the community who may not have Internet access. The school thus provides Internet access for the community with some revenue returning to the school.

Content

Beyond equipment and software, appropriate content is necessary to make use of ICTs for educational purposes. In this section, a few of the many initiatives related to the creation and standards of educational content will be considered.

Content creation

Although some online content is specifically designed for educational purposes, most is not. One approach to facilitating access to appropriate educational content is the creation of a 'Schoolnet'. Schoolnets, also known as 'national education grids', are local, national or regional projects that may include efforts to wire schools physically to information services, but the fundamental aim is to provide access to appropriate educational content.

For example, the United Kingdom's National Grid for Learning (NGfL) 'is both an architecture (or structure) of educationally valuable content on the Internet, and a programme for developing the means to access that content in schools, libraries, colleges, universities, workplaces, homes and elsewhere' (ICT in Education News, 1998). Schoolnets now exist in France (www.educnet.education.fr/), Ireland (www.scoilnet.ie), Japan (www.schoolnet.or.jp/schoolnet/index-e.html), South Africa (www.gp.school.za/gsnsite.htm), Thailand (www.school.net.th), and other countries (cf. European Schoolnet (www.eun.org/index.html).

One of the advantages of new ICTs is that they empower users not only to consume information, but also to produce it. With a computer, printer, and desktop publishing software, any local educational group can produce high quality printed materials. With an Internet connection and a website, any educational organization can 'publish' content derived from local knowledge and experience. For example, the Summer Institute of Linguistics (SIL) has helped set-up Literacy and Awareness Publication (LAMP) centres in each of the twenty provinces of Papua New Guinea to promote literacy in approximately 850 local languages. At these centres, literacy texts are produced that can be shared between the centres; they cover a wide variety of subjects including healthcare, hygiene and preservation of the environment.

Content standards

Although many tools exist to help teachers and students locate information (see Alexia.lis.uiuc.edu/lrl/links/search.html), at present finding specific educational materials on the World Wide Web can be likened to a scavenger hunt, often resulting in wasted time and unexpected results. A teacher or student may find it difficult to locate specific information or materials that might be useful within the curriculum at a particular grade level. The results of indiscriminate searches also raise the issue of the validity and reliability of the information let alone legality and harmfulness (see box 8.3). Because of varying technical standards, materials created with one ICT-based learning system may not be usable in a different technical environment once they have been found.

Several efforts to bring order to the chaos of the Internet and World Wide Web are underway. To this end, the European Commission has initiated a Memorandum of Understanding: Multimedia Access to Education and Training in Europe. By December 1998, over 160 educational organizations, government agencies, and commercial companies had signed the MoU (www2.echo.lu/telematics/education/en/news/mou1198/nov1998mou.html).

Projects like the Dublin Core Metadata Initiative (purl.oclc.org/dc) and the Instructional Management Systems (IMS) project (www.imsproject.org) which create technical standards, may 'help transform the end-user experience of the Web from the unstructured tangle it is today into something more like a digital

library or virtual learning centre' (Sithers, 1998). If international agreement can be reached on an acceptable set of technical standards, teachers and students may be able to search for educational materials with common descriptors and be assured that the materials, once found, will be compatible with local ICT applications.

Teacher training

As noted in a Finnish government report, 'how computers are used in education depends on the pedagogical competence and technical skills of the teaching staff who must know how to exploit these modern technologies in pedagogically meaningful ways' (Finnish National Fund for Research and Development, 1998). In some countries, for example the United Kingdom, training in ICT use is a requirement for a teaching certificate. As educational applications of ICT continue to evolve, apart from preparatory training, refresher courses for experienced teachers will also be necessary. Furthermore, it may not be sufficient simply to provide training for teachers. For instance, Murphy and Gunter (1997) advocate that ICT training be extended to educational administrators.

ICT training for teachers must deal with at least two aspects. First, teachers need technical training to learn how to use and maintain ICT equipment and software. Such technical training is being offered to teachers in a wide variety of ways. Pre-service university-based courses, in-service workshops, commercial training programmes, and other opportunities abound, many of which make use of ICTs to deliver the training. Second, since 'integration of technologies into curricula requires changes of huge magnitude' (Foa et al., 1998, p. 1), training in how to integrate ICT use into the curriculum is necessary. Such training should include effective ICT teaching methods and the use of discipline-specific applications.

In one possible framework for organizing ICT training for teachers, McDougall and Squires (1997) identify five areas: skills with particular applications; integration into existing curricula; ICT-related changes in curricula; changes in teachers' roles; and underpinning theories of education. The authors note that most ICT teacher training mistakenly focuses entirely on the first issue.

Many innovative approaches are being developed to provide support for university staff. For example, several universities have established 'expert partners' programmes. As reported by Guernsey, 'people who fill the jobs have one thing in common: a hybrid expertise that blends academic computing with college teaching' (1998, p. A35). Staff who are both qualified academics within a discipline and who have expertise using ICTs for instruction are hired 'to provide faculty on-site, intradepartmental consulting and support in information and instructional technology for academic purposes to foster their awareness and use of technological resources, both within and without the University' (rits.stanford.edu/atss/atp/index.html). In another innovative but more costly approach, students are being enlisted to provide ICT support and training for teachers. At Wake Forest University (North Carolina) in the United States, first-year students are hired and trained to work as Student Technology AdvisoRS (STARS). STARS are assigned to faculty members to help implement ICT-based projects (www.wfu.edu/Computer-information/STARS/index1.html).

Training methodologies vary, but 'training of trainers' models are common and in most instances may be more cost-effective than on-site, small group or individual ICT training. In such programmes, 'teacher-leaders' are selected using a variety of criteria such as prior experience with ICTs in education, staff development expertise, and the commitment to the programme by school and district administration. These individuals receive intensive training courses to master technical details and approaches to integrating ICTs into the curricula. Once

trained, they return to their educational institutions and provide ICT training and support for their peers. Such programmes may also include ongoing, long-term support for the trainers, including site visits, computer-based conferences, and e-mail advice. In large geographical areas, the responsibility for such training and continuing support may be delegated to regional ICT consortia co-ordinated by a central administrative body (cf. www.rtec.org).

Technical support

The provision of on-site, technical support as needed is critical to the success of an ICT-based educational programme. Although standard service agreements, purchased separately or included in the purchase of ICT equipment and software, typically cover regular maintenance and repair costs, and may even include e-mail or telephone support, such arrangements may fall short of what is necessary in educational settings. Without adequate technical support, schools have experienced 'large workloads for existing staff, maintenance backlogs, and reduced computer use because computers were out of service' (U.S. Government Accounting Office, 1998).

In universities, such support may take the form of technical staff assigned to a 'computer centre', 'media centre', or 'distance learning centre'. In schools, knowledgeable peers, students, volunteers and specialized computer teachers are generally providing such support; less frequently, trained technical staff, located either within the school or district office, are employed.

NATIONAL PLANNING

The use of ICTs in education is a difficult, expensive and complex undertaking and a host of issues, including infrastructure, curricula changes, teacher training, technical support, and so on must be considered. Such an undertaking, especially on a national level, requires careful planning.

As noted in a World Bank report, 'Many governments stand at the threshold of the twenty-first century without clearly-defined plans and strategies about the use of educational technology – but they are making major new investments anyway' (1998a, p. 31). The report identifies generic issues for planners to consider when developing national ICT education strategies. These are broadly grouped into three categories: educational policy and goals setting, teaching and learning, and institutional development and capacity building. The report also itemizes several successful strategies, implemented in varying degrees, including developing a national or regional plan for country-wide deployment of technologies; implementing experimental projects to gain experience for country-wide deployment; undertaking small-scale demonstration projects; using technology to address educational equity issues; using broadcast technologies, including computer networks, to reach learners in remote areas; investing in preparing students and teachers for technology-based jobs; and creating schools using ICT as their core educational delivery system (ibid., p. 5).

Claeys, Lowych, and Van der Perre (1997), in an article based on interviews with a sample of 65 experts from across Europe about introducing ICTs into education, summarize the respondents' view of the role of government as that of developing a clear vision on reforming the educational system through ICTs, enacting adequate funding measures, and establishing partnerships with education and industry for the development of educational software. In addition:

> . . . interviewees expect: (1) the development of a special cell in the department of education to support the introduction of ICT in education, (2) the development of incentives/projects, (3) the development of an advisory council to help the government promoting the introduction of ICT in education and, (2) the re-creation of the curriculum, in which information technology is embedded and an equivalent adaptation of the rules for examination (Claeys et al., p. 151).

Osin (1998), summarizing the experiences of projects in developed countries, warns against beginning a project by purchasing computers. He advocates an eight-step planning process beginning with gathering together the necessary expertise in an Advisory Committee that will define and implement a plan which starts by the careful implementation of pilot projects. Osin also recommends training a cadre of instructors for teacher training, introducing computers into teacher-training colleges, and conducting both formative and summary evaluations of the pilot projects before attempting large-scale ICT implementation.

Apart from planning, national governments have a role to play in helping to remove political and economic roadblocks that prevent the sharing of educational resources among countries. McIsacc and Blocher (1998), in a discussion of distance education, advocate: 'Courses offered globally should encourage broad international participation and have sliding scale tuition policies. Sharing in developing educational materials and courses saves the duplication of time and effort and conserves valuable national resources' (p. 46). Potashnik and Capper, in their article, note:

> Employers and universities are now drawing both staff members and students from all corners of the globe. Consequently, they face new challenges in evaluating course work done at, and degrees earned from, unknown institutions in other countries. While accreditation has typically been controlled by individual countries, the globalization of distance education has created a whole new challenge in accreditation and certification of learning (op. cit., p. 45).

These authors continue, citing the Global Alliance for Transnational Education (GATE) (www.edugate.org), an international alliance of higher education, government and business, as one effort 'to carry out the formidable task of creating a global certification and review process for education delivered across borders' (id.).

Government intervention may also help assure affordable ICT access for education. For example, telecommunications rates may be regulated to assure economical ICT access to educational institutions. In late 1996, the United States Congress enacted the Telecommunications Act of 1996 (www.technologylaw.com/techlaw/act_index.html). The universal service section of the law, Section 254, will help schools and libraries obtain access to telecommunications services and technologies at discounted rates. Tax incentives, such as the 21st Century Classrooms Act for Private Technology Investment (P.L. 105–34, Title II B, Sec. 224) (hillsource.house.gov/IssueFocus/SpecialProjects/ALearner/ ALMain/tech.pdf), enacted by the United States Congress in 1997, are one way of encouraging corporate ICT-equipment donations to educational institutions. The Act allows companies to deduct the full price of a computer which is donated to a school within two years of purchase from their taxes.

ICTs are evolving rapidly and, once established, national educational policies on ICT 'have to be regularly updated if they are to respond adequately to the challenge of effectively exploiting these constant changes to the technologies and their applications' (Byron and Gagliardi, 1996).

CONCLUSION

Because of their ability to integrate multiple media, interactivity, flexibility of use and connectivity, the newer digital ICTs are bringing about remarkable changes in education around the world. Those changes affect both the pedagogical and the institutional aspects of education. As far as teaching is concerned, in our view, the two changes which are worth recalling, are first, the interactivity of ICTs, which creates an environment where the learners have a much more active role; and second, the immense information resource base which can be used to support teaching activities at all levels. From the institutional point of view, ICTs are introducing a completely new setting for teaching that might be

characterized by two keywords: flexibility, in the sense that constraints of time and place are less stringent, and opening, meaning that contacts and co-operation can be established anywhere in the world with a wide range of individuals both within and outside the educational community. The focus here has been on existing, widespread uses of ICTs in education, but advances in wireless telecommunications, virtual reality, pervasive computing, artificial intelligence, speech recognition, and 'next-generation' networking technologies promise to transform today's ICT educational applications as comprehensively as the computer revolutionized those of yesterday. The pressure for institutional changes which may result should not be underestimated. However, if ICTs are to cross the threshold from promise to practice in education worldwide, certain minimal conditions must be met. These include funding mechanisms to address inequities of access; agreements on technical standards and academic certification; sound implementation strategies; comprehensive regional, national, and local plans; appropriate educational pedagogy and content; networking infrastructure; and sufficient equipment, training and technical support. The costs of fulfilling these conditions will be high, but the alternatives may present even higher costs in terms of the loss of educational opportunities and in increasing the gap between rich and poor.

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Chapter 3
Cultural production and cultural pluralism

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Information and communication technologies (ICTs) are playing a decisive role in cultural production by transforming both the content and form of both works and products. As the century draws to a close, there are certain questions and even considerable anxieties about the rapid growth of electronic commerce, which has facilitated access to sound and audiovisual products that cross frontiers and zones of cultural influence and has even revolutionized the very patterns of cultural dissemination.

FROM TECHNOLOGY TO CONTENT

Although these technologies are advancing with unprecedented speed, particularly in the most economically developed countries, it would be a mistake to regard them as solely responsible for the current changes. This long-heralded momentum, which seemed slow at the beginning but is now well under way, seems likely to continue at a rapid pace and, if some authors are to be believed, will usher in a new information society or information age. It is, however, one thing to note the dynamic development of telecommunications, information technology and the audiovisual media, and quite another to credit them with changes in culture and in other areas of social life. As a rule, technical innovation is a by-product – only rarely a driving force – of transformations whose origin lies elsewhere. Technology provides such changes with new areas of opportunity, encouraging activities which would otherwise have been blocked by the dominant organizations in the sector and weakening the barriers set up to defend vested interests or to safeguard specific practices. It is important to look beyond the usual thought patterns, which see the issue as one of adaptation to technological changes, and turn our attention instead to changing trends in cultural production. ICTs may strengthen cultural production and help it to gain widespread recognition, or

conversely, they may cause it to be confined to a restricted area or even to decline.

Throughout the world, cultural production tends to be community based. Anthropologists, historians and cultural sociologists rightly emphasize this recurring feature which explains the persistence of locally-rooted and even non-commercial forms of culture, as well as the different ways in which viewers interpret television series, according to their own culture. In other words, despite more than two centuries of industrialized cultural production and despite the aggressive strategies of the increasingly-powerful communications groups, independent forms of entertainment still thrive all over the world. Folk productions are not declining – far from it: books and newspapers are published (at least when socio-political conditions are favourable), films and television series are produced (and are sometimes distributed beyond national borders) and music is recorded independently of the major companies. The pessimistic forecasts of the imminent globalization of cultural production heard over the last two decades have been proved wrong – or at least exaggerated. Culture remains an area of social activity in which industrialization meets with resistance and constraints, even though increasingly governed by markets (often small markets), and despite a growing trend towards the internationalization of production and the transnationalization of subjects, styles and standards.

The fact that predictions have not so far been fulfilled is, however, no guarantee for the future. The most likely hypothesis is that ICTs and the momentum they undoubtedly generate will eventually provide the means to move decisively ahead towards the industrialization and internationalization of cultural production. What in the past was only partly successful (driven by mechanical reproduction systems and the rationalization of design methods, with back-up from advertising funding increasingly geared to globalization) is now allegedly resulting directly from ICTs. In other words, what the mass audiovisual media merely launched in the past has now become firmly established and universal through ICTs, which have proven to be more successful at sidestepping the cultural structures of countries and peoples, and certainly more favourable to the worldwide circulation of transnational flows. Individual tools of communication and/or access to data and ready-made programmes (recorded music, written texts, sound and images and multimedia products) are ushering in sweeping transformations in cultural production. Some recent and future developments in cultural production are described below.

THE SPREAD OF COMMERCIAL AND INDUSTRIALIZED CULTURAL PRODUCTION

The history of the cultural industries is by no means linear. Until recently, it has progressed unevenly, whenever production techniques were adopted and made widely available, so that works of literature became accessible as books, musical works as records (the hardware changed regularly), and films and audiovisual works as screenings in cinemas or as video cassettes. The industrialization of culture has, however, encountered difficulties and setbacks. For producers and publishers, the values attached to culture usually act as 'restrictions', or at any rate as contingencies, for which marketing techniques have yet to be found. It has been more convenient to market the equipment used to deliver cultural works (record players, television sets, cameras, etc.) than to introduce successfully on to the market works available either in a physical medium (reproducing a single creation or a basic model) or accessible through projection or broadcasting by the audiovisual media. So the picture of the relationship between culture and industry today presents sharp contrasts. There are striking divergences between:

→ developed and developing countries (national, linguistic and cultural frontiers still play an important and, in some cases symbolic, role);

- → countries which give more or less free rein to market forces, and those in which the public authorities provide impetus and co-ordination;
- → countries where the market and industry are the major controlling factors in the cultural sphere, and those where small-scale productions, live entertainment with a popular appeal and non-commercial productions predominate;
- → the various art forms: it is very difficult to create added value in dance, poetry and narrative performances, as opposed to filmed entertainment, which should be considered an activity straddling art and industry;
- → individual access to works and live entertainment (whereas audiences for live entertainment are dwindling, new forms of entertainment regularly emerge which upset the plans of the major companies – public performances of 'techno' music are one example of this trend);
- → cultural productions broadcast through the mass audiovisual media (financed by advertising and/or public funds) and those which, once published, are bought by consumers.

This sharply contrasted picture provides convincing evidence that a unified system is not likely to emerge at the present time. Nevertheless, ICTs are capable of strongly reinforcing trends begun at least two decades ago, thereby giving a decisive boost to the expansion of cultural industries. The areas in which ICTs can make an impact need to be carefully evaluated, however. Contrary to what professionals often claim, it would be wrong to expect multimedia production to create innovative products – apart from games – and important markets in the short term. Innovative products of a truly multimedia type are still too rare and production costs remain too high for rapid progress to be expected. If there is not a rapid (and radical) change in product design and production methods during the next decade, ICTs will probably not be instrumental in extending the scope of commercial and even industrialized culture, since with the products which are currently available they are increasingly marginalizing certain cultures, standardizing universally accessible products and excluding those who lack the purchasing power to be ICT consumers. The solution to this problem would appear relatively easy and involves speeding up product flow, which is the second major feature of the development of the cultural industries.

SPEEDING UP OF PRODUCT FLOW, PARTICULARLY AT INTERNATIONAL LEVEL

Distance-shopping for products hitherto almost exclusively supplied by specialized end-product distributors or by mass distribution outlets, and downloading products accessible from a distance (e.g. books, magazines, recorded music, images, etc.) are two activities that have been made possible by the efficiency of communications networks and the growing sophistication of access terminals. The scope of this new electronic commerce is still difficult to gauge, but there is no doubt that in 1997–98 its growth was such that the major distribution groups all rushed headlong in that direction, preceded by small pioneering firms. This strategic choice was made despite the fact that monetary transactions on the Internet are still not totally safe and that arrangements for remunerating artists and publishers are still under negotiation (see chapter 8). Most specialists consider that cultural products are particularly well-suited to this new form of distribution. There are substantial advantages for consumers: real-time (i.e. immediate) access; the opportunity to browse through all available catalogues and products (a major advantage in the cultural field, where markets are very compartmentalized and few published works remain on the shelves for a long time); access (although not yet universal) to catalogues of foreign firms which used to be accessible only, if at all, with long delays involved (e.g. highly specialized book and record

publishing sectors such as the fields of scientific publishing and classical music). In other words, these new ways of accessing cultural products are of special interest both to the consumers least concerned by mass products, and to specialist publishers and producers. Paradoxically, the people who are apparently the most critical of this rapid change in the distribution of cultural products ('cultivated' members of society, let us say, who prefer the existing methods of accessing art forms, and also scientists) are those who, for the moment, find it most advantageous to purchase directly via the networks.

There is an additional paradoxical aspect to these immediate advantages for the most selective and demanding users. Producers and artists who offer the most distinctive products and who frequently encounter great difficulty in distributing the works they create and publish will obviously be tempted to bypass the large broadcasters and distributors (who demand a high percentage of the selling price) in order to contact consumers directly. This is all the more likely to happen because, throughout the history of the cultural industries, artists and their publishers have tried to eliminate intermediaries with little success. They themselves then joined that enviable group, thus only reinforcing the existing oligopolies.

The current trend consists mainly of users purchasing products after browsing through catalogues on publishers' sites and on the sites of artists acting as producers of their own works. Soon it will be possible to download actual works, meaning that publishers of books and recorded music will no longer need to reproduce and record the work in a physical medium. This is not a utopian prospect; it is already possible to access literary and musical works in this way, or even extracts from them (e.g. a chapter of a novel or a single track from a musical recording by a pop group). This phenomenon raises two essential questions about cultural products. Is a work on offer a finished product just because it has been stabilized in a medium (e.g. a novel on the printed page)? Next, have the forms of monetary payment by consumers, here encouraged to buy works piecemeal, and 'paying-as-they-go', been fully considered? These are not merely technical innovations which, by encouraging a commercial shift, coincide with changes in systems of accessing works. Here technical innovations are changing the very substance of cultural products in various ways, especially by calling into question their finished appearance, an aspect considered fundamental up until now.

A TREND TOWARDS THE OVERLAPING OF LEISURE ACTIVITY, INFORMATION AND CULTURE

In modern societies, the values and images associated with the concepts of leisure, information and culture are still sharply differentiated. Although these concepts are evolving and now sometimes overlap (in the economically dominant societies, leisure is often equivalent to cultural activity), it would nonetheless hardly be possible to confuse them taken in a strict sense. They have relatively stable definitions: information is more ephemeral than culture, and this idea orients the functioning of those who produce news and information; leisure time is primarily for entertainment, but leisure pursuits encouraging the development of cultural activities are judged as positive.

Although the trend began earlier, ICTs are causing these distinctions to grow more and more blurred, and in some cases it is becoming difficult to distinguish between information products and cultural products. Methods of creation (by journalists or artists, with an increasing use of streamlined methods), production structures (more and more often controlled by the same multimedia groups), distribution procedures (via networks or in the form of products accessible on- or off-line), consumption time and conditions of consumer use (use is often individual and involves interactivity with the hardware acting

as intermediary in programme communication) are now closely related, not to say identical. These similarities cannot be considered as either secondary or insignificant. Behind all the confusions and convergences, the question that arises is more than ever that of mass culture, although in forms different from those observed in the 1960s when the phenomenon became evident. As the transmission of standardized and increasingly transnational mass culture boosted by ICTs develops, cultural distinctiveness tends to be maintained within an elitist, or at any rate a niche, context. Although distinctive cultural production is not declining, and examples of it which successfully express popular and national identities continue to receive considerable attention, they enter into competition with mass products that are easily distributed on communication networks. The struggle is to some extent unequal, not because of inadequacy of supply (on the contrary, supply is increasing and diversifying) but because the major communications groups are strengthening their hold on the circulation of products. Insofar as future developments can be inferred from the situation today, culture seems to be going the same way as leisure and information.

WEAKENING OF PUBLIC SERVICES, UNCERTAIN PUBLIC POLICIES

For most people, ICTs have not yet become part of a familiar landscape. They have already led, however, to some fairly radical changes in the functioning and regulation of public services, resulting in considerable hesitation on the part of those responsible for cultural policy (cf. Chapter 5 on deregulation). The discussion here is limited to a few frequently overlooked aspects.

An increase in the supply of commercial products almost inevitably leads to the reduction, if not the disappearance, of non-commercial products (heavily subsidized by public funds) and of semi-commercial products (e.g. small-scale productions and those enjoying tax and customs protection). A movement of this type has recently become apparent in television production. In response to competition from powerful new commercial channels and in order to increase their output of programmes to compete with the commercial channels, with approximately the same resources, the managers of public channels have been obliged to subcontract production, placing it in the hands of new private producers for whom the origin of the orders they handle is of no importance. As a result, production variety in public television programmes has declined sharply, and some types of programme are less available or have actually disappeared since they are not commercially viable in a situation where audience ratings are all-important. Poetry and other literary programmes have disappeared or been banished from prime-time slots. Even once-popular variety shows have been downsized or incorporated into shows with a wider appeal, since the popularity of a group or singer is no longer sufficient in itself to attract a mass audience.

Over the past ten or fifteen years, some national cultural industries have continued to function and have even grown as a result of certain trends in public policy. In the European Union, community-wide or domestic measures have undoubtedly been beneficial to certain industries in Member States, such as book publishing (the French system of retail price maintenance for books has allowed a network of specialized bookshops to survive), recorded music publishing (radio stations are obliged to play a quota of nationally-produced songs and music), cinema and audiovisual production (a system incorporating various forms of aid to production) and television production (channels required to broadcast a quota of works produced nationally or elsewhere in Europe). There is, however, no guarantee that these hitherto undeniably advantageous effects will continue in the future. Not only do quota systems run into operational difficulties (is a cinematic co-production funded by capital from different sources considered ‘national’?),

attracting regular criticism because of their singularity in world commercial transactions (see below the section on the primacy of American English), but the fact that programmes can now circulate on the networks and largely escape control from public authorities will tend to reduce the effectiveness of support measures for small- and medium-sized industries operating mainly within a specific cultural or linguistic framework. This does not mean that such measures are unnecessary, but that their effectiveness may become more uncertain, simply because consumers will tend to diversify demand, including demand for products from the sphere of high culture (art films, rarely-heard music, scientific works, etc.).

IMPORTANCE OF INDIVIDUAL FORMS OF ACCESS TO CULTURE

A number of authors representing different schools of thought have long been predicting a trend towards the individualization of social behaviour, and the emergence of this trend does seem to be reinforced by ICTs, particularly in the developed countries. ICTs, unlike the media that developed earlier, usually require user-consumers to take active steps not only to access a specific programme but also to interact with it in order to obtain responses tailored to their personal requirements. To this extent, ICTs, more than any other earlier technology, promote a one-to-one correspondence between the content on offer and the user's demands, which are apparently unlike those of anyone else.

Too much should not, however, be made of this. Where ICTs are involved, cultural consumption is not simply a question of narcissistic contact with works. Likewise, collective forms of consumption are not doomed to disappear, because individualization does not necessarily spell a decline in public performances and other forms of collective entertainment. Despite predictions to the contrary, the proliferation of individual delivery systems for recorded music has not led to a decline in concerts of all types of music. Complex interactions and processes of mutual influence are observably taking place between different types of music, but it is not to be expected that this will have any practical outcome, although new linkages can be foreseen. ICTs encourage a fragmented, episodic pace of consumption which has little in common with the heyday of collective cultural consumption and this tendency may lead to a number of fundamental cultural changes. One consequence may be for increased cultural consumption to go hand in hand with a decline in discussion and debate focused on cultural productions. It is also possible that performances may become almost exclusively opportunities for the 'promotion' of cultural merchandise, something that would be inevitable if public aid earmarked for live performances were reduced or even abolished, with those responsible taking as their pretext the variety and quantity of commercial products available. This would mark the culmination of the process by which culture becomes a commercial product and, as noted above, is absorbed into the leisure and information sectors.

THE PRIMACY OF AMERICAN ENGLISH

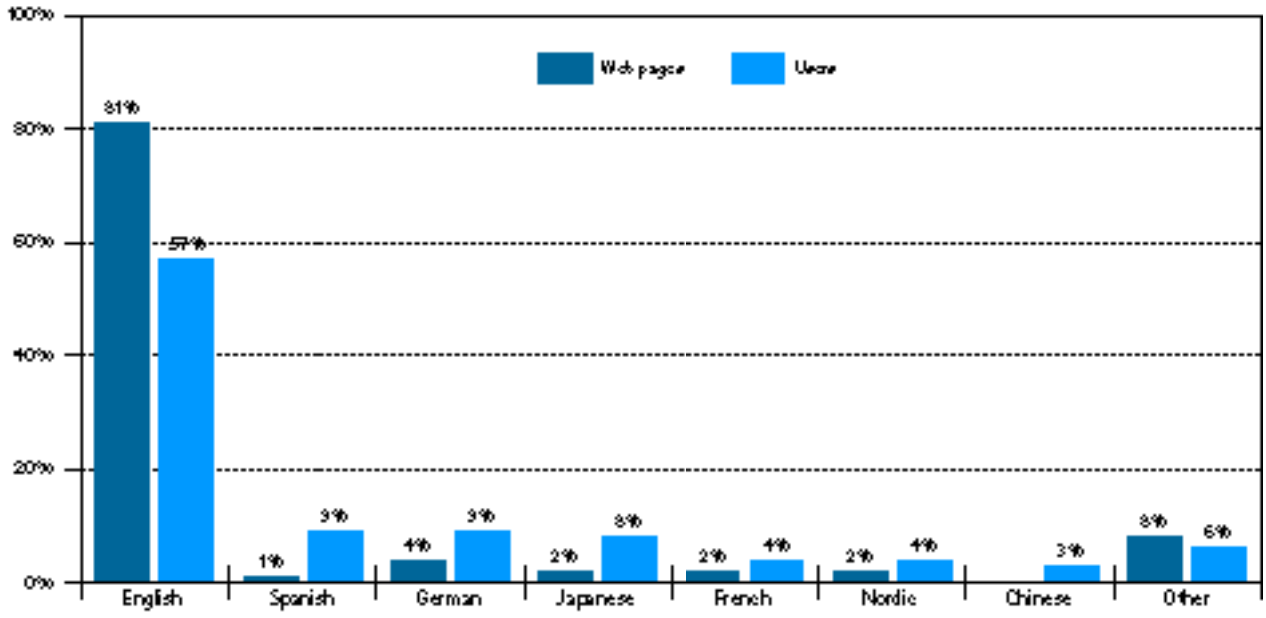
Thanks to ICTs, American English has suddenly been promoted to the status of an international language. According to a 1998 Euromarketing study, more than one of every two Internet surfers (58%) uses English. Other languages — Spanish (8.7%), German (8.6%), Japanese (7.9%) and French (3.7%) — are much less commonly used (see Figure 3.1). These data, which are obviously difficult to establish, have nevertheless been confirmed by other studies (see other related data in the Statistical Annex). However, they are difficult to assess because change is so rapid in both hardware and habits. Furthermore, it is not possible, on the basis of data on the preferred language of communication (used for electronic mail and forums), to draw similar conclusions regarding trade in cultural products. For example, after an initial phase when English

predominated, the satellite channels are now beginning to diversify into other languages.

Will automatic translation systems contain applications that will help to reduce misunderstandings between languages and promote genuine multilingualism? In the past, research has proved disappointing, and researchers are at present cautious, pinning their hopes on the development of computer-assisted translation systems. This indicates recognition of the fact that, in this field, approximations and simplifications are not sufficient, because they undermine languages as vehicles of specific cultural features. Only strong support for translation from producers and from authorities responsible for public policy can help to bring about a more balanced flow of cultural works. If this is not forthcoming, English and probably a few more of the most widely spoken languages will eventually dominate the cultural marketplace (see also box 3.1, Non-roman alphabets and the computer).

Support for translation and for the development of translation aid systems (including multilingual systems which should receive backing from international organizations) will not, however, be enough in the absence of systematic efforts to support productions suitable for distribution outside their country or region of origin, and support in distributing them. Recent experience has shown that the successful exportation of films, works for television and sound broadcasting or even literary works, depends as much on international standards being met (format, requirements concerning drama production and staging, etc.) as on the availability of an appropriate distribution system. It is also important for production costs on national broadcasting networks to have been absorbed in advance, which explains the recent

Figure 3.1 → Web pages (July 1997) and Internet users (October 1998) by language, by percentage



Source: Web pages, Alis Technologies/Internet Society (http://www.isoc.org.8080/palmares.en.htlm)
Users, EMA (http:www.euromktg.com/globstats).

Box 3.1 → Non-roman alphabets and the computer

In a period of rapid and accelerating developments in information and communication technologies, the letters and texts, the images and graphics that are the very raison d'être of these same technologies do not always receive sufficient attention.

This is a serious matter. The non-computerization of scripts which are not based on the Latin alphabet could lead to whole societies regressing to an almost pre-Gutenberg age, when only an élite of privileged scholars were commissioned to write, copy and read precious books, of which there was often only a unique original.

This problem is of great concern to over two hundred ethnic societies and language groups, mainly in Asia, but also to the autochthonous peoples of the circumpolar region and the indigenous peoples of Latin America. For a large number of languages, it is a matter of using graphic tools to represent the letters, words and phrases of these languages as symbols within computerized lines, in the same way that those who speak the languages would have written them. Because the computerized writing tool should follow as closely as possible the grammar and style of writing, it is not simply a question of correctly transposing one alphabet based on imitating sounds to another, also based on sound imitation.

In most cases, for example, the consonant is written first and the appropriate vowel becomes an accent or diacritic, near the consonant symbol. There could, however, be an essential difference if a vowel comes first or if it comes last as a stand-alone vowel, and the writing tool should be able to take this factor into account.

An entirely different writing tool needs to be developed in order to transpose ideo-based alphabets with characters that do not represent sounds, but rather objects or ideas, such as Chinese, Japanese and Korean. The challenge is even greater to develop writing tools for scripts based solely on ideogrammes, such as the Indian languages of North America or the Inuit scripts, which recount whole sagas and histories with what the uninitiated would call a scarcity of symbols.

Creating the appropriate fonts is only the first step. A computerized writing tool that enables the style of writing to be articulated and expressed has to be developed. In any given language, there are different ways of using bold characters, italics, underlining, and other typographical elements. There are different types of punctuation and different ways of separating words, sentences and paragraphs. In Thai, for example, all words are run together. There are no commas to mark independent thoughts, no full stops to end a sentence and no indentations to show a paragraph. Most traditional scripts are written in upper case; lower case has no meaning. Moreover, the size of the symbol is very important and is usually determined by the traditional use to which the script will be put.

Beyond these considerations, and making good use of new information technology, it will then be necessary to consider the following: the creation of electronic dictionaries, electronic thesauri, electronic spellcheckers integrated into the writing software, multiscript writing environments, voice activation and translation and format standardization to allow electronic transmission and conversion. Even for Afralpha, the script system developed on Apple computers to integrate several dozen African languages into an extended roman alphabet, there is a need to advance further to the stage of dictionaries, thesauri and other such reference tools.

Finally, given the fairly large number of initiatives to develop computerized writing tools for non-roman scripts, it will eventually be necessary to codify scripts to ensure uniformity within the script language and compatibility with related scripts, as for example between Dzongkha, the language of Bhutan, and Tibetan, the origin of most of the religious writings used in Bhutan.

The importance of computerizing scripts as one integrated and holistic programme cannot be overestimated. Peoples and societies who are unable to write their own language script on computer for global transmission and exchange will also be unable to participate fully in the emerging information society or to benefit wholly from the opportunities offered by information and communication technologies. Another consequence may be that their creative spirit and their cultural identities could be adversely affected.

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success of Brazilian and Mexican series outside the areas where they were produced. The same factors are likely to be important in the future. Although in theory the new communications networks guarantee wider distribution, and even distribution that crosses borders and cuts out intermediaries (direct from artist to consumer), which may be helpful for niche products that may even be boycotted in their place of origin, it would be illusory to think that world markets will develop on this basis. Direct transactions will leave room for a few new actors, but free flow will probably lead to a rapid jump in production costs (met either through co-productions or by raising new capital) and a concentration of distributors. The major communication groups are preparing for this eventuality. Their uncertainties about the future focus on the plans of their direct competitors rather than on the emergence of newcomers or the development of direct commerce that would be beyond their control.

ICTs undeniably complicate a number of issues facing the production of culture in all its diversity. However, the more or less rapid spread of hardware and networks is not the only factor involved in sustaining artistic pluralism within countries and regions and keeping a variety of production methods in place (whether market-oriented or non-commercial, small independent producers or production on an industrial scale). Blithe and often exaggerated statements to the effect that we are now living in an information society which will impose its ground rules on culture should be viewed sceptically. It should also be remembered that, for complex reasons that research into technical innovation has already begun to elucidate, technical developments seldom fulfil expert predictions. In other words, ICTs do not contain a blueprint for the future. They will not be the sole factors shaping the future. If, however, those responsible for cultural production worldwide adopt a wait-and-see attitude and fail to grasp the importance of what is at stake, then culture will be increasingly subservient to the norms of mediatized communication and information flows. In conclusion, it must be emphasized that public cultural policies are important and should be reinstated in areas where the field has been left free for the commercial audiovisual media and transborder flows of information. Public action will have little effect, however, if it is confined to protective and defensive measures which are in any case liable to be inefficient, if not impossible, to implement.

This issue is likely to give rise to considerable debate and to social movements and even 'resistance' instigated by artists, producers, users and political leaders. During the 1993 General Agreement on Tariffs and Trade (GATT) negotiations, France strongly supported the idea of 'making an exception of culture' and provisionally won its case, arguing that with the opening of world markets, cultural products (in particular cinema films) should not be treated like other commercial commodities. Since then, the question has been asked worldwide, some counting on a de facto abolition of the 'cultural exception' by technological development, while others are waiting for international organizations and regional bodies to come out in support of cultural pluralism. Another crucial issue being debated is the future of copyright and authors' continuing control over their works in an environment complicated by the emergence of multimedia products (see chapter 8). Many developing countries have not yet stated that they are directly concerned by these discussions, which nevertheless do affect them. In order to maintain cultural pluralism, it is pointless to avoid or side-step negotiations on these basic issues. An attempt was made to do this in the case of the Multilateral Agreement on Investment (MAI) by seeking to negotiate behind closed doors within the OECD. What are needed are balanced agreements that acknowledge the distinctive nature of cultural products and do not treat them simply as industrial goods. The expansion of world trade in cultural products, associated with the rapid development of communication hardware and networks,

makes it clear that, if cultural pluralism is to be maintained and if the distinctive cultures of peoples and communities are to be respected, the search for new solutions should not be postponed.

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Chapter 4
Freedom of the media

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This chapter was written by the author in his personal capacity. The views expressed do not necessarily reflect the official views of Human Rights Watch.

PARADOX

The emergence of any new form of technology inevitably gives rise to euphoric hopes or dark fears. The development of information and communication technologies (ICTs) is no exception to the rule. On the one hand are those who promise us an increasingly democratic global village, and on the other, those who announce a new era of domination and dogmatism. The paradoxes are numerous. ICTs, for instance, have produced an unprecedented profusion and diversity of media, but they have also opened up territory where the most powerful media are in cut-throat competition, and risk either crushing the weakest actors under their weight or leaving them jobless by the wayside. The reason is that the control and use of these new technologies require capital and capabilities of such enormous scale that, on the wealthiest of the consumer media markets, they inexorably lead to further concentration. The economic stakes are obvious: the 1997 sales figure for the largest communication group in the world, Time Warner, was $24,600 million. Sales for the second largest corporation, Disney, stood at $22,500 million, $6,500 million of which were generated by television and magazines.

Another paradox, however, is that this concentration is occurring just when thousands of new and independent media are bursting into disorderly life, in contrast with the previous era of one-party systems and the state-controlled monopoly of information. In Africa in particular and in the countries of the former Soviet Union, the stranglehold of the state on the media has been broken, at least in the written press. There is a paradox within that paradox. In countries where until recently only one party predominated, the transition to democracy has been propitious for the media, whereas the return to democracy in the countries of the Southern Cone, and the end of apartheid in South Africa, have seen the disappearance of many titles that used to support the fight for freedom. It may be that periods of transition

are more auspicious to pluralism and media diversity than the advent or return of democracy.

'Communication without borders' is an equally contradictory notion. The transnationalization of media groups complicates the task of certain regimes that seek to hide the 'opposite point of view' from their people and merges together a number of cultural, political and journalistic models. Despite the fact that the new media in many countries have played the role of contradicting the party line, their globalization has not necessarily introduced the worldwide adoption of the values (human rights, freedom, tolerance) that their most ardent supporters believed they represented. Indeed, in certain countries, 'media interference' has, on the contrary, provoked even harsher reactions from authorities or countries with an identity crisis.

While the objections of authoritarian regimes are fairly easy to overcome in the name of the principles of freedom, those put forward by democratic countries on the fundamental conception of freedom of expression – and above all on its limits – are worthy of particular attention. The debate between the champions of free speech, based on the model of the First Amendment to the Constitution of the United States of America, and those who wish to impose stricter limits on the freedom of expression in the name of the struggle against racism, discrimination or war, lies at the heart of the information revolution. In this respect, technology has contingencies of its own, for the freedom of speech specific to one country is not necessarily that of other nations, who may define this notion by other norms. 'We need to think carefully about these differences', notes the American jurist Rodney A. Smolla, 'because the new technologies that increasingly knit the globe into one giant electronic village will tend to create an international marketplace for free speech, which will in turn create enormous pressures towards uniformity in free speech policies [author's italics]. There will be pressure from one direction on the rest of the world to adopt notions of free speech more like America's. There will be corresponding pressure from the opposite direction for America to water down its free speech principles to conform more closely to the rest of the world's' (Smolla, 1992, p. 352).

Freedom of expression is precisely one of the issues concerning labelling and filtering systems for Internet sites which are supposed to protect the public, and especially children, against inappropriate messages. 'The categories established by labelling convey value judgements which are essentially subjective and which vary from one culture, and even from one individual, to another', notes Jean Chalaby, a researcher at the London School of Economics. 'Consequently, systems such as these may be harmful to the cultural diversity of cyberspace. Since the most influential labelling agencies are established in the United States, the filtering procedures will obey North American moral values and beliefs' (Chalaby, 1998, p. 39).

THE INTERNET: A NEW MEDIUM

Against this background the Internet has a decisive role to play, because it escapes the technical and legal barriers set up by governments far more easily than the satellite television programmes picked up by dish antennas. The Internet is both a medium with its own audience, and a source of information for the other media. It is also a 'creator' of information flows, since it enables individuals and groups hitherto marginalized to become involved. Oppressed or isolated ethnic communities, underprivileged social groups, local social movements, banned political parties: all find in the Internet a means of entering onto the world stage, of presenting their situations in their own words, of expressing their claims independently of governments and the channels laid down by the large media groups. This role of the Internet is reinforced by e-mail, which also forms a new broadcasting medium. 'Virtual communities' have therefore

become – a reality. The Internet also enables contact to be made with a new, younger audience, already prepared by experience with video game interactivity to plug into the cyberworld.

These features have led some observers to the rather hasty conclusion that the Internet is the antidote to the dominant power of the media giants, the absolute weapon against state control and censorship, and the instrument of a new, more participatory form of citizenship. New technology, however, does not eliminate conflictual relations or financial considerations. The large and most frequently visited Internet sites are already the prerogative of the established media groups. The communication giants present in the other media have purchased access providers or data banks. In most of the countries in transition, the costs of computer equipment and access subscriptions continue to be major obstacles which de facto exclude a large majority of the population from using the Internet.

THE CHANGING FACE OF THE CENSOR STATE

Corresponding to this explosion in the scope of knowledge and scale of communication, are the new forms of state censorship. With limited success, governments have multiplied measures to prevent the media from crossing borders by banning dish antennas or foreign radio broadcasts. They even hope to dampen the liberating or contentious repercussions of the Internet by erasing 'hostile' sites using labelling and blocking systems, sanctioning access providers which tolerate them, and multiplying administrative or financial obstacles (registration with post offices, application of prohibitive tariffs, and so on) in order to limit the number of users (Human Rights Watch, 1996). Democratic states are not necessarily the least repressive. 'How else do you explain,' wonders Jeffrey A. Perlman, 'the fact that in Beijing you can go to an Internet café and read many U.S. newspapers on-line, but at a public library in London, Virginia, some of them are blocked because they contain articles on AIDS or gay rights?' (Net Censors, 1998). (See also Chapter 8.)

The new media also offer new methods of information manipulation, which is the other face of censorship. Counselled by international public relations agencies, masters in the art of abusing information and communication techniques, authoritarian governments or large corporations with controversial business activities turn these new media around and use them against those who saw in them no more than an instrument of freedom. China has created its own site specializing in human rights. Another country has even set up a site which 'pirates' that of an organization designed to defend human rights.

THE PRIVATIZATION OF CENSORSHIP

Censorship is also going through a period of 'privatization'. In many countries, it is not the state which poses the greatest threat to the freedom of expression, but the 'new powers', non-governmental organizations which are taking over the work of state violence, either against it or with its connivance. In recent years, an increasing number of journalists have been the victims of mafia groups, paramilitary gangs and extremist religious factions. Increasing areas of the globe under the control of such groups have once again slipped out of range, thereby limiting the capacity for data collection at the source. The new technologies are a poor weapon when armed gangs seal off an area and terrorize its people. More and more private individuals and public corporations are bringing court actions for slander or damages against even the most respectable programmes and publications, thereby attempting to intimidate them. Some of these lawsuits are legitimate, because freedom of speech must be balanced against other rights such as non-discrimination, respect for privacy, or for a person's reputation and honour, but they are increasingly seen as a means of harassing the media

and limiting public debate. In the United States, they have been given the eloquent name of 'slapp', for strategic lawsuits against public participation.

The privatization of censorship is also occurring at the distribution level. Closely supervised by self-appointed guardians of morality, or ethnic or religious groups, certain chain stores refuse to display and even sell certain books, videos or CDs. Internet access providers exclude sites deemed to be dangerous or harmful, and some public libraries, at the risk of blocking legitimate sites, have installed filtering software in order to prevent their younger customers from having access to obscene products. But the use of keywords enabling 'obscene' sites to be detected can just as easily block access to sites fighting pornography, defending the rights of women and children, or describing violations of human rights.

Technology in these instances is simply a new battlefield for groups which have always defended censorship in the name of morality, nationalism or religion. Now that the media have become commercialized, they worry about damage to their public image and try to avoid publicity which might keep them from being seen by general audiences. Censorship – self-censorship – may therefore be the result of the supposed reactions of consumer groups or lobbies which are the noisiest and best organized. This situation also leads producers to steer clear of topics which are too sensitive or too controversial, thereby limiting the public space necessary for genuine debate and diversity. Hence a truly new paradox: just when technology is capable of pushing back the frontiers of censorship virtually to infinity, society is redefining the 'acceptable' limits of freedom of expression, through legislation or by adopting speech codes which are sometimes extremely strict, thus outlawing points of view which are deemed politically incorrect.

HORIZONTAL AND VERTICAL CONCENTRATION

In recent years, powerful media groups have grown still more powerful, not only in the countries of the North, but also in many countries of the South. The number of these media groups with their different levels of influence, ranging from global to regional, to national, to local, is in itself decreasing from year to year as a result of various mergers, takeovers and alliances. Concentration is horizontal, combining different media (the written press, television, etc.) and/or vertical (ranging from film studios to television channels and cinemas). It also sanctions a convergence of content (information and entertainment) and technology (the same content simultaneously supplies the written press, the audio-visual sector and the Internet). In certain countries, sometimes more than half the national circulation of daily newspapers is controlled by just one press group (Ostergaard, 1997). In most countries, local monopolies are the rule, and in these cases the newspapers are often part of powerful national or international groups, such as Gannett or Knight-Ridder in the United States or the Hersant group in France. Backed by their press power, these local enterprises usually extend business activities to the audio-visual sectors, as well as to publishing and advertising, and in so doing engulf neighbouring countries: instances include the German press in Austria, the French press in Belgium, and the Swedish press in the Baltic countries. Rupert Murdoch's News Corp. is an edifying example of the trend towards vertical and horizontal concentration, because the company is present in practically every media form (the written press, television, the Internet, book publishing, etc.), and covers the entire information chain: News Corp. has bought not only the exclusive rights for broadcasting sporting events, but also the subject of the information itself, i.e. the sports clubs, to ensure a more prestigious content and therefore a captive audience for its sports channels.

Alliances aimed at controlling both the production of content and every type of medium for transmission have become virtually the rule for the information and entertainment industry. Partnerships between cable-operators, programme producers, software manufacturers and similar actors have increased, resulting in the setting up of multimedia mega-groups such as Time Warner/Turner, Disney/American Broadcasting Company (ABC), News Corp., Bertelsmann/CLT, and others. Not only is the number of large-scale players decreasing, but competition between the majors is lessened by cross-holdings. Seagram, which controls Universal, is a shareholder in Time Warner; Latin America Pay TV is held by News Corp., Universal, Viacom and Metro Goldwyn Mayer (MGM); Home Box Office (HBO) Asia, the frontline competitor of Star TV (News Corp.), combines the forces of Time Warner, Sony, Universal and Viacom (Rose, 1998, pp. 42–54). Disney is linked to Time Warner and Sony via HBO Olé and HBO Brazil, to General Electric (GE) in the Arts and Entertainment (A&E) Network, to Telecommunication Inc. (TCI) in Entertainment, and to News Corp. in Entertainment and Sports Progamming Network (ESPN) Star Sports. The groups want to share the risks on markets which are promising but have yet to be proven profitable, and at the same time prevent any one of their competitors from gaining a decisive lead in one of these markets, by involving them in their own strategies. The history of Cable News Network (CNN), faced with lukewarm competitors like Fox News or MSNBC, demonstrates that the pioneer in a new medium is difficult to overtake once its information product has imposed itself as a reference brand.

As may be seen in Chapter 1, concentration of this kind exists not only in the field of the media, but also in the sectors on which they depend: telecommunications and distribution. 'The emergence in the audio-visual sector of new distribution technologies in competition with one another', writes Nicholas Garnham,

> far from serving as a basis for widening the field of the competition by diversifying products, has encouraged a concentration of competing distribution circuits that make use of the technology, not only through cross-ownership when it is not forbidden by legislation, but also by carefully staggered cascade marketing of the same range of products through every distribution circuit: in this way a film will move from the cinema to cable TV and so to video recorders, then to satellite TV and finally to syndicated television (Garnham, 1944, p. 39).

When a product is a hit, profits snowball. However, there are two sides to the coin: when the product is not a success, the whole network suffers a setback, with television stations or cinemas losing part of their audience and hence a share of their profits. The cumulative effect is not always a pleasant one.

The consequences of concentration are tangible. Book publishers find themselves faced with a handful of mega-distributors who have the ability either to neglect or to refuse outright the distribution of books deemed to be irrelevant, difficult or controversial. The integration of all the business activities involved, from production to distribution, poses an acute problem in terms not only of the saturation of the available media space, but also in terms of the cost of the 'entry fee' to the world of the information or communication giants, thereby limiting the possibilities for pluralism or disagreement.

Concentration of this kind is also a global phenomenon: in Latin America, groups such as Televisa (Mexico), Cisneros (Venezuela) or Globo (Brazil) each have a dominant position in their own country based on horizontal and vertical integration. But the phenomenon is particularly noteworthy in the United States of America, and is of even greater interest because the US information and entertainment industry exports its products and its concepts worldwide, adapting if need be to the language and specific features of the local culture or religion. One example is CNN's launching of a Spanish-language television channel in conjunction with the Hispanic press group

Prisa. Another is Music Television (MTV), which provides a different broadcasting programme for each of its markets. Partnership of this kind between concentrationanddiversityisknownas'glocalization'. The adaptation of messages and programmes to the language, culture and tastes of different audiences, or to the wishes of their governments, may technically mitigate the 'globalization' of worldwide mass communication, but it can also provide new weapons for censorship. Some international networks regionalize their programmes so that all references to politically upsetting topics are removed for certain authoritarian countries; these same topics are then broadcast in countrieswheregreaterfreedom ofspeech ispermitted.

The trend towards vertical and horizontal concentration is undeniable, but the emergence of a 'media-industrial complex' as well as its impact on journalism are tempered because they are both counterbalanced by a large number of factors:

- → the persistence of competition between the large-scale media, such as the rivalry between CNN in Spanish and Eco (Televisa), or between CNN International and the BBC World Service;
- → the creation of international networks on a linguistic or cultural basis, such as the French-language channel TV5;
- → the existence of alternative media, a community press and public service media, which still represent a significant dissenting voice despite a relatively weak presence;
- → access for the media of the South to the international scene, thanks to the same new technologies, such as the Middle East Broadcasting Centre (MBC);
- → the backing of many governmental, inter-governmental, non-governmental or private organizations for the independent and pluralist press in countries in transition;
- → the proliferation of 'opposition' groups (defence of the environment, of human rights, of small shareholders, etc);
- → the implementation of restrictive national or regional legislation;
- → society's independence of the dominant views expressed by the media, as is regularly illustrated by election results or the emergence of powerful social protest movements. In many countries, too, the most prestigious media with the greatest influence on political decision-makers often belong to press groups which are independent of the 'mega-groups'.

INDEPENDENCE AND THE THREAT OF CONGLOMERATES

Increasing numbers of media groups are being taken over and merged with powerful industrial conglomerates. Subsequently they usually find themselves not only at the mercy of a rationale which is essentially financial, but also torn by conflicts of interest which, in certain instances, can compromise the independence and quality of the journalism they produce. Westinghouse has bought out Columbia Broadcasting System (CBS), and now controls National Broadcasting Company (NBC). In Colombia, where the daily newspaper El Espectador, for many years the symbol of independent journalism, has fallen into the hands of the Grupo Empresarial Bavaria, the most powerful business group in the country; in France, a majority share of the equity in Télévision française 1 (TF1) is held by the Bouygues civil engineering group, and Hachette has connections with the Matra arms manufacturing group. 'Media concentration', exclaims Ted Turner, the founder of CNN, 'is a frightening thing. You have two of the four major networks owned by people that have huge investments in nuclear power and nuclear weapons. Both GE and Westinghouse. What sort of balanced story are they going to give you on the news about the nuclear issues?' (Hazen and Winokur, 1997, p. 8).

Such a mixture of interests, when combined with concentration in the advertising market – a major

source of funding for the media – has resulted in a reduction in editorial choices, since the quest for the greatest number of consumers tends to attenuate the coverage of disturbing or 'unsellable' topics. Pressure from advertisers is difficult to identify because it is either very discreet, or else made unnecessary due to the precautions taken by editorial staff. In 1997, however, the Wall Street Journal revealed that a few major advertisers were inquiring about the exact content of forthcoming issues before deciding whether or not to place their advertisements (McCheysney, 1998, p. 103). Another example is that of a major European car manufacturer which refused to place advertisements in magazines dealing with controversial subjects or containing texts criticizing its country. More generally, the borderline between the editorial policies and the commercial and advertising policies of the media is becoming increasingly blurred, precisely at a time when the predominent international role of transnational corporations would seem to require better definition and more distance between the media and these new actors. The increasing use of sponsorship to produce programmes or media events is creating areas of ambiguity which risk subordinating the requirements of independent information to the interests of a handful of large corporations or institutions.

The diversity of the 'non-media' interests of these groups also places them in an ambiguous position in relation to the political authorities which hold the power to grant them favours and contracts. How, for example, can a television channel equitably cover events in an authoritarian country which is negotiating with one of the group's industrial subsidiaries? When forced to choose between two loyalties – freedom of the press or corporate profits – the leaders of conglomerates may be tempted to sacrifice the former. One example is News Corp., which chose to eliminate BBC World Television from its Asian satellite programming stream and to terminate the publishing contract between the former governor of Hong Kong, Chris Patten, and the HarperCollins publishing firm, in order not to upset the Chinese authorities.

Some of these media groups have strong political viewpoints and even agendas. News Corp., supported Margaret Thatcher's Conservative party for many years before opting for Tony Blair's New Labour party during the 1997 elections. The group of the late Robert Maxwell defined itself as Labour-oriented. O Globo, in Brazil, has systematically campaigned against the left-wing candidate, while Televisa in Mexico has carefully played along with the party in government for many years. But the control of enormous amounts of broadcasting power gives the media groups the means to exert political pressure, which they then use to obtain their main objective, which is always the maximization of profits. Many of these groups even find themselves in tricky situations of conflict of interest when they finance electoral campaigns so as to win the good graces of future governments and thus protect themselves in advance against potential regulation policies.

The motivation of large media groups, being essentially financial, has equally important consequences for the type of information which is disseminated. The aim to achieve the highest ratings or readership or to reach prime target audiences, like the concern not to irritate certain financial interests, often results in silence and self-censorship, when it does not result in the promotion of certain causes or governments, although this is admittedly a less frequent occurrence.

The pressure to maximize profits and reduce costs is therefore as important as technology explosion in the definition of editorial priorities. Pleasing core targets or the largest possible audience affects the audacity and independence of editorial staff as well as the choice of topics and how they are covered. The current crisis in investigative journalism is an indicator of the will not to upset received wisdom and to reduce costs to a minimum. However, this type of

journalism lies at the heart of any public service mission, and often constitutes the role of the opposition in a democratic system (see Chapter 5). This phenomenon, linked to that of 'neighbourhood journalism', results in a reduction in the scale and scope of coverage of certain events, topics or groups deemed to be disturbing or unprofitable – a less innocuous form of self-censorship than it may appear at first sight. More than ever, censorship is affected by such 'silent zones'. As one professor of communication at the University of California, Ben Bagdikian puts it: 'Don't ask what's in the news, ask what isn't'. The quasi-invisibility of certain social groups and the unduly low coverage of certain topics stand in stark contrast both to the attention focused by the 'mod and mob press' on celebrities from the world of politics, sport, television, the cinema or business, and to the uncritical unanimity with which they are usually treated.

REDEFINING THE ROLE OF THE STATE AND NEW CITIZENSHIP

Every technological change has encouraged renewed creativity from those who attempt to break through censorship. Audio cassettes have carried the voice of the opposition into places where the scrambling of international programmes by authoritarian regimes had become too effective. At the beginning of the 1980s, the widespread use of video cassette recorders, in Latin America in particular, enabled people to get around the official television programmes controlled by military regimes, or those commercial stations insensitive to the coverage of social issues or cautious in relation to political questions. Satellite television – symbolized by dish antennas – makes party-line information or dominant viewpoints appear ridiculous. Satellite television thus stands for a more general notion of 'the right to interfere' necessary for the development of a transnational civil society, and which cannot exist without an extraordinary capacity for collecting and disseminating information. It encourages the emergence of non-governmental actors and their power to exert pressure on the state.

Some writers believe that the way to electronic democracy lies through the keyboard or the modem of interactivity. A 'wired' population might at last dialogue with the authorities, react to them, or even vote (see box 8.1, Teledemocracy). If certain authors see in the Internet the coming of a 'digital democracy', and a means towards increased involvement in the life of the community, others on the contrary are concerned about the impact of these new technologies on society and politics. For these techno-pessimists, the multiplication of the media (the explosion in numbers of television channels, websites, etc.), made possible by digital technology, cable television, satellite broadcasting and data compression, has fragmented the supply of information and led to the emergence of niche and made-to-measure media replying to specific needs, which will not be without consequences for the social contract. Michael Kahan, professor of political science at Brooklyn College, New York, observes that the points of convergence are vanishing. Fragmentation puts a serious strain on the state: being scattered over a considerable number of new locations, the public is increasingly difficult to apprehend; having no point of convergence, it becomes impossible to govern (Kahan, 1998).

Who will referee this planetary game? High-technological developments and large-scale financial manoeuvres are occurring at a time when the state, the traditional force for regulation or coercion, has lost much of its legitimacy and a number of its prerogatives (see also Chapter 8). ICTs have exploded the legal frameworks through which the media formerly operated, changing the tools of political decision-making, modifying the relations between governing and governed and strengthening 'democracies of opinion'. Although in many cases in the past the state was synonymous with political regimes of censorship and the 'party line', there is nothing now

to prove that the withdrawal of the state will open up new horizons of greater diversity and freedom, especially in democratic countries where the 'State' was identified with a public audio-visual service and often upheld the written press in the name of the protection of pluralism. 'Only a strong, creative and competitive public service – one that people watch,' warned Hervé Bourges, Chairman of the Conseil Supérieur de l'Audiovisuel in France, 'is capable of giving viewers an assurance that television will prove to be constantly attentive to their diversity; the public sector is both a landmark and an area of calm at the heart of an audio-visual system which is diversifying to the point of disintegration' (Bourges, 1997, p. 13).

THE PRACTICE OF JOURNALISM

In societies where the concept of a public service once prevailed, pluralism of information was formerly guaranteed by the unique status of radio and television and by policies of indirect or direct support for the written press. Today, media independence is usually thought to mean the freedom of publishers or broadcasters to print or transmit. The concentration of the media and their absorption by diversified industrial groups now means that the definition of this concept of independence must be revised. Accordingly, editorial offices have adopted charters of publishing independence that theoretically protect them from undue pressure from the authorities or their own management boards. The reinforcement of the independence of editorial staff within large media groups, based on the highest professional principles in terms of independence and pluralism, is one such protective measure promoted by journalists' associations. The Milan Declaration on Editorial Democracy in European Media, adopted by the International Federation of Journalists (IFJ) in March 1995, states that 'apart from measures aimed at safeguarding pluralism in the media in general, there is need for securing pluralism inside the publishing houses and broadcasting stations. There is need to secure editorial independence.'

The convention signed by the Australian Journalists Association and the publishers of the Melbourne daily newspaper The Age indicates that 'the Board of Directors acknowledges the responsibility of journalists . . . to report and comment on the affairs of the city, state, nation and the world fairly and accurately and regardless of any commercial, personal or political interests, including those of any shareholder, director, manager, editor or staff member'.

THE BALANCE OF THE INFORMATION FLOW

The control by the North of the new information technologies is likely to increase still further the quantitative and qualitative imbalance in the production and circulation of information between industrialized and developing countries. At the level of infrastructure – there are more telephone lines today on the island of Manhattan alone than on the entire African continent; only half the homes in Southern Africa have electricity, etc. – the disparities are increasingly flagrant. The fracture lines, however, are not only North-South. The technologies for television production and satellite broadcasting are controlled by groups originating in countries such as Mexico, Brazil, India or Saudi Arabia, all of which export their productions. Furthermore, the development of freedom of expression in many countries formerly under one-party rule has changed the nature of the information circulating between North and South. No longer are authoritarian states in control of national information, and no longer are the special correspondents from the Northern press the only people offering an independent viewpoint on these countries, because they now have to compete with a new generation of home-grown journalists.

Improving the equilibrium between the sources of information remains an important objective, but proactive measures in this area will be no substitute

for more balanced economic development. Changes in the press coverage of the South have occurred over the last few decades as a specific result of the emergence of the newly industrialized countries. These have become standard subjects for the media majors of the North because of their economic and political weight. They have siphoned off some international correspondents, and in most cases have considerably developed their own media industry.

LEGISLATION, REGULATION AND CODES OF CONDUCT

The history of the last few years has been marked by both liberalization and concentration, and the multiplication of channels counteracted by the standardization of the programmes shown. This has led some to suggest that it is urgent to create a media system by means other than the 'invisible hand of the market' alone. Such a system should be capable of providing more effective guarantees of pluralism, and access to and involvement in information, and of affording greater space to opinions and events outsides those dictated by market forces. Faced with these phenomena, attempts at democratic regulation, which should be distinguished here from censorship, are omnipresent. Some believe that, with so much power in the balance, freedom will begin to oppress and the law to set free, and that democratic states indeed express legitimate concerns when they worry about how cartels control both media and mentalities, when they emphasize their 'cultural differences' or when they express concern about the role played by media in racial discrimination, sexual trafficking and crime.

National legislation comes up against a number of obstacles, however, such as the difficulty of applying domestic legislation to the circulation of 'intangible' information on networks which are transnational in nature, or to the new rules of international economic relations fixed by the World Trade Organization.

Regulations may yet turn out to be less significant than the reactions of society or other power bases. In recent years, organizations defending the freedom of speech, such as the International Freedom of Expression and Exchange Network (IFEX), which centralizes information on infringements of that freedom, have been considerably strengthened. Although their mandate usually restricts them to denouncing state censorship or the violence of mafia groups, leaving unexplored the much less well-charted territory of the 'privatization of censorship', they have a real role to play as opposition. Some individuals in the business world and international financial institutions are also concerned about the phenomenon of concentration and conglomeration and the danger of giving a dominant position to the holders of media power. Others are irritated by a form of media ownership or the practice of journalism which leads those involved either to accept the censorship of authoritarian regimes or to leave unchallenged the validity of their statements or statistics. The impact of the recent Mexican and Asian financial crises has been such that top financiers are blaming the occurrence and the seriousness of the two slumps to some extent on censorship, government secrecy and manipulation, not to mention the conformist euphoria of a certain brand of journalism. The reaction can be seen even more clearly in the impressive explosion in the number of 'media critics', who cut through the 'newspeak', thereby setting one opposition group against another.

Despite the impressive power of Cybercitizen Kane, the game is far from over. In these times of transition, when the difference between the rising and the setting sun is difficult to determine, the only constant factor is the uncertainty about the nature of the changes to come. This interlude, however, is a time for thinking about the fundamental principles that should govern the new technologies to be adopted and the policies to be followed. For there is no fatalism where technology is concerned. 'If, then, technology

is to make a political difference', said the political scientist Benjamin Barber, 'it is the politics that will first have to be changed' (Barber, 1997).

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Chapter 5
Public service broadcasting

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THE VERY NEWEST AND THE VERY OLDEST

As mass media, radio and television have always held a place between technology and culture. From the beginning, they have always utilized the very latest applications of technology in their routine operations: first radio technology, then electronics and now information technology. They have never been reluctant to take on new technology. This is as evident on the Asian continent and in parts of the Arab world, where there are mazes of satellite transponders and cable services, as it is in most of North and South America. While the new technologies have not yet been as fully developed on the African continent, many projects have already been initiated (see Chapter 13) and certain countries like South Africa are very much part of the emerging knowledge society, as are a number of African capitals.

Radio and television rely on time-honoured forms of expression: music, acting, live expression, storytelling and debate. They reflect the continuation of age-old cultural traditions. These two media are today the most important conveyors of myths in modern society. Radio and television combine technology-based change with a long history of cultural tradition and it is precisely this encounter between the very newest and very oldest that makes the audio-visual mass media a unique meeting point in the emerging information society.

Much has been written about the convergence arising from technological development. This is a complex phenomenon and it is not always entirely clear what is meant by it at any one time. Convergence refers most frequently to the integration of the technological bases of a variety of media. In other words, it means that various mass media are based on identical information technologies, replete with microchips, processors, bit flows and software applications.

Many believe that the integration facilitated by information technology will open up new development opportunities for both the communication

industry and for private individuals in their capacity as communicators. Convergence is also altering the marketing of programmes and information production. The rapidly expanding economic potential of convergence is leading major international companies to invest unbelievable sums of money in the fields of data-processing and communication, now thought to be the driving forces of the information society.

DIGITAL BROADCASTING: COMMUNICATION FOR ALL?

By definition, the mass media communicate to large groups. In European societies, the basic services of radio and television are available to everyone, and, in practice, all members of society fall within the sphere of influence of these media. The broadcasting media are the principal media of our age, and it is difficult to imagine the societies of the next millennium without them. One of the key questions posed by the emerging information society age is whether a digitized broadcasting media will continue to cover all members of society.

So far, only the terrestrial broadcasting media have been accessible to all households. It is true that there are a number of Western countries where cable television reaches virtually all (as in the Benelux countries) or most households (as in large countries such as the United States and Germany). Yet in 1996, even in affluent Western Europe, an average of 60% of households, and in Europe as a whole 67%, had access to terrestrial broadcasting only (see Figure 5.1). Moreover, even in the wealthy countries, apart from the terrestrial broadcasting media, there is no sign of a broadband distribution path which would reach every household. Although a satellite service can cover whole regions, not everyone has access to the technologies required to benefit from it. For example, in Finland, where there is otherwise a considerable will to invest in new technology, only one household in eight has a satellite connection. If the spread of digital broadcasting to households is to play a major role in building the information society, the key issue is whether society as a whole or only in part is to be included in the information society.

WHAT'S NEW IN NEW TECHNOLOGY?

Information technology is revolutionizing the world of broadcasting, and it is important to look more closely at the new features created by the converging technologies. Digitization is perhaps the greatest transformation ever encountered in radio and television. It is introducing elements and characteristics to the broadcasting media not previously associated with them, because digital radio and television are at one and the same time individual and mass medium.

The range of choices available to the individual listener and viewer is growing. Several sources of information are becoming available to the media consumer, and viewers are being offered new kinds of multimedia products in which interactivity plays a key role. It has been claimed that consumers of digital broadcasting escape the power of the programming planner and broadcaster since the viewer now chooses programme content.

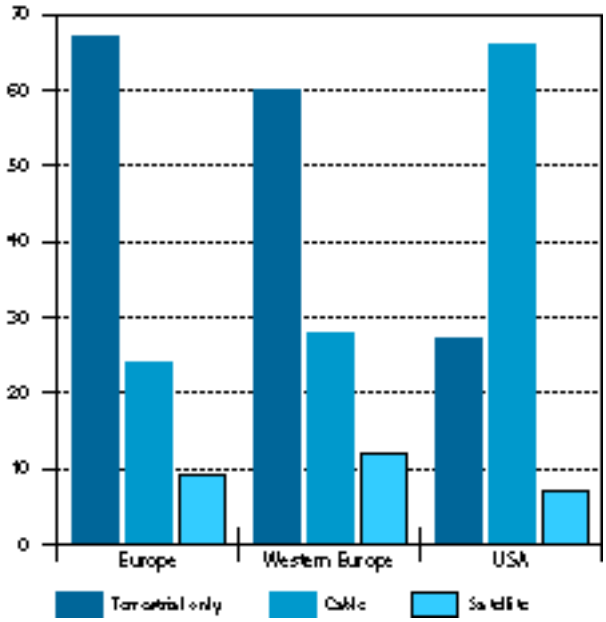
Information technology has nevertheless been making its way into radio and television production for several years now. In the western world, journalistic data have for some time been processed by computer. At the Finnish Broadcasting Company (YLE), the entire chain of production in daily radio journalism, from information storage to editing and transmission, has recently been digitized. A comparable electronic news processing system is currently beingbuiltforFinnishtelevision.MostEuropeanpublic service television companies make use of digitized studios. Broadcasting companies are also acquiring mobile, digital outside-production units. All these developments are in fact fast becoming routine productiontechniques.Investment anddevelopmentwork are starting to focus increasingly on the digitization of the distribution networks and receiver devices.

How is this development affecting the programmes themselves? What new features have the technologies brought along in their train? What does the digital future have in store for us? Briefly, it may be said that the three new key aspects are: listener and viewer choice, new multimedia content and interactivity.

One of the most significant features of digital distribution technology is the way in which it multiplies the available distribution capacity. This means that it will be possible in future to offer viewers and listeners a number of simultaneous services such as variously profiled general channels, thematic channels and niche channels, etc. The core goal of public service broadcasting has always been to promote diversity and nurture genuine freedom of choice and this increase in choice for the audience is therefore by its very nature a welcome development.

Converging media technology is also opening up a new landscape for creativity and aesthetics. One of the most significant aspects in broadcasting concerns the convergence of television and the Internet. This means not only the integration of distribution (distribution of Internet services on television and vice versa) but also new developments in the field of expression. Those involved in creating audio-visual culture must establish completely new screen aesthetics, dramatic storytelling and a language of expression in which the structures of the electronic network media and visual television merge together to generate a new media language. Whenever a new, common language has been created for large communication groups, new interpretations and new meanings have also been generated. New languages also introduce new definers of meaning into the world media community. These may be communicators who had previously been only marginally involved in the definition of meaning. Public service broadcasting should provide new perspectives on the world and furnish innovative interpretations of society, culture, politics and the surrounding world. This is why public service broadcasting must take up the challenge of promoting the new multimedia, new languages and new interpretations.

Figure 5.1 → TV access to households, by % (1996)



Source: European Audiovisuel Observatory (EAO), Strasbourg, 1998.

Another new element introduced into the broadcasting media by the new digital technology is interactivity. Apart from cable media – and even that to a quite limited extent – the traditional mass media did not allow for two-way communication. Today, ever larger sub-audiences are expecting interactivity from mass media services. Interactivity in journalistic products which interpret and analyse the world must include the use, inter alia, of growing information retrieval services to complement television journalism. For some other types of programmes, interactivity should increase the viewers' potential for greater participation. The success of Internet chat services indicates that they are meeting a genuine need for participation and exchange in modern society. Similar, new forms of interaction will also form part of the broadcasting environment in coming years.

CONTINUITY AND PERMANENCE

However, enthusiasm for the new opportunities afforded by technology often leads to an over-estimation of the significance and the pace of change in the mass media. As stated earlier, mass media behaviour is to a considerable extent anchored in everyday events, in routine habits and customs. The relationship of the broadcasting media to viewers and listeners has become deeply rooted in their personality and behaviour. These are factors opposed to change, and they favor constancy and permanence. For this reason, the mass media of the future should be examined from the standpoint of constancy as much as from that of change and revolution. The radio and television media incorporate a large number of key elements which hardly alter or which change very slowly. On this basis, the forecasts which seek to see beyond the new media revolution can be founded upon assumptions that emphasize continuity. A number of elements and success factors in the future of public service broadcasting are precisely of this kind and they are just as significant as are the opportunities for change.

Many researchers regard television as a manifestation and symbol of so-called modernized Western society. They claim that television has replaced the traditional 'user interfaces' which included a variety of socio-societal structures such as place of residence, social class, religion and profession. For audiences in Western societies, radio and television have become a value- and culture-specific arena which reinforces personal identity. Radio and television channels broadcast programmes with elements of familiarity, belonging and continuity. They provide their audiences with identifiable points to which they can relate personal memories, common experiences of delight and pleasure or of anguish and sorrow. The broadcasting media have thus become the single most important 'user interface' for personal identities and for experiencing what is perceived as being 'personal' in modern culture. In a recently published report, the Future Committee of the Finnish Parliament has stressed that experiencing something as one's own is one of the most important value bases of the information society. Unless people find intellectual, community, environmental or material values with which they can identify in the networking and diversifying media, change is likely to lead to confusion and chaos rather than to the moral strengthening of the community.

The strong influence of the broadcasting media on the everyday life of cosmopolitan societies is most probably based upon such feelings of personal recognition. In modern communities, people are increasingly experiencing in their lives solidarity and events which are familiar to them through the mass media. This goes a long way to explaining why people from very different backgrounds, spheres and professions follow the same programmes and events at the same time. Viewing television and listening to radio, people manifest their solidarity and feel that they belong to a group. Today, this belonging often concerns national or regional cultures, but it can also relate to global togetherness.

The principal broadcasting channels with a sense of responsibility must endeavour to meet the feeling and meaning of the audiences' common experience. Critical tensions between various groups in societies are heightened when the programmes put out by the mass media channels do not provide a real response to the need of individuals to experience something as their own. Under these circumstances, feelings of alienation and of cultural and social discrimination are reinforced. Broadcasting programmes can thus be socially 'dysfunctional', as witnessed in some countries where people's power took over the public media (the Philippines in 1986), set up alternative media (several independent newspapers in Nepal in 1990), or rejected the information put out by the official media. In 1990, when Gorbachev was seeking to keep Lithuania as part

of the Soviet Union, the public proclaimed loudly that the country had been independent since 1921. There are many more examples of the people exposing the inconsistency of official information expressed on public service channels in Africa, in Eastern and Central Europe and elsewhere.

PUBLIC SERVICE BROADCASTING AND THE VALUES OF THE INFORMATION SOCIETY

Pluralistic media are fundamental to the value systems of democratic societies. In order to exercise the basic values of freedom of speech and expression individuals must be able to obtain and acquire knowledge and information that is significant to them personally, created by the community itself and independent of those in power. Public service broadcasting, as it originated in Europe, was created to serve these goals. Its ideal was to provide citizens with media that would be independent of both government and economic control. Public service broadcasting has thus always emphazised the significance of public control, reflected in the fact that it is accountable to the audience in a way in which the commercial media are not, even when they are popular. The principle of accountability implies that audiences can demand that the media provide programming that is important and significant to them on a personal level. The corollary is that public service broadcasting is also based upon the concept of an active, developing and self-fulfilling human being. Public service broadcasting has traditionally been given the mandate to produce programming with informative, educative and also entertaining content. It has been expected to meet the needs of the various facets of the personality in a balanced way so as to provide a whole image of the individual.

Broadcasting technology spread to Africa and Asia, often as a part of colonization. For this reason, public service radio, and later television, tended to serve the interests of the colonizing powers and later those of the newly independent national regimes, rather than those of the general public for whom they were originally established. Thus historically, in many of these countries, the publice service mandate was often subservient to the whims and caprices of those in power, and was viewed as a primary tool for ensuring continuance in power. During an International Seminar on Public Service Broadcasting and Editorial Independence held in Tampere (Finland), an African researcher put it this way:

> Unlike the situation in developed countries, many governments in Africa since the late 1950s have been either one-party authoritarian regimes or party-less military dictatorships. The single most important tool these regimes have used to the full is broadcasting under the control of the state. Given the new currents of multi-party politics in Africa based on democratic principles and ideals, the rôle of broadcasting as a public service utility has indeed become crucial (Polycarp Omollo Ochilo, 1997).

At the same Seminar, in summing up the situation in South Asia, the Rapporteur stated:

> In South Asia, one generally sees an entrenched government control over radio and television despite a colonial legacy of a BBC-type of public broadcasting code such as in India and Sri Lanka, along with a free press. But in other countries of the sub-continent, like Pakistan, Bangladesh and Nepal, one sees a situation similar to that in Eastern Europe, where some state broadcasters continue to work only as propaganda agents of governments despite the maturing of these democracies (ibid., p. 89).

In Nepal, in contrast, the government produced a communication policy paper in 1990, followed by a revised broadcasting act in 1992. Since then, several new FM stations have been granted a licence to broadcast, including Radio Sagarmatha, an independent station run by a consortium of NGOs. Their programmes do indeed reflect the community's concerns: environment, education, culture.

In view of the prospects opened up by developments in technology, it may be asked whether the

ideals set up by public service broadcasting are still sustainable. This question arises because audiences today can use advanced communication technology to access those media contents which they think will best meet their various communication needs. Communicating via network media and the Internet, audiences now have unrestricted access to those sources of information that were previously beyond their reach, behind, inter alia, a variety of media gatekeepers. It may be argued that communication built upwards does away with the need for public service broadcasting which, despite everything, is always constructed by programming planners and gatekeepers.

It is true that in the network society the individual has an unprecedented opportunity to obtain access to virtually any source of information – though this opportunity is not available equally to everyone. The Internet era has multiplied the individual's opportunity for accessing new, geographically distant sources of information which are not dependent on fixed-time programming schedules. The limits of time and space are disintegrating. In particular, the Internet has opened up the borders of the world to its users and promoted the unrestricted movement of information (or trade) in a manner that is without parallel in world history. It has also facilitated genuine debate among people united by a common topic or interest. Indeed, many information networks are complementing the diverse sources of news used by broadcasting. One of these is the International Freedom of Expression and Exchange Network (IFEX), and particularly noteworthy is the work of the Pacific Islands News Association, which issues news alerts concerning the media in this region. Examples include drawing public attention to members of parliament who accepted official per diem when attending the Olympic Games in Atlanta last year, the buying out of opposition newspapers by governments, and various reports on the harassment of jounalists. While some of these reports are not always welcomed by editors in the region, they do get wide circulation in the rest of the world. Small island states in the Pacific are no longer an isolated, marginalized segment of society.

According to the statistics available (see Chapter 12 and the Statistical annex) the number of computers connected to the Internet is still growing rapidly. In July 1998, there were 36.7 million computers connected to the Internet worldwide. In Finland, there were 100.53 computers per 1,000 inhabitants connected to the Internet.

However, the world-wide communication network and information gateways are, by their very existence, creating the need for the pendulum to swing the other way. As both the sources of information and the number of connections multiply, the need for meanings that unite also grows. One of the most important challenges of the information society, beyond making information available, is to enable analytical interpretation of it and to facilitate understanding.

IDENTITY AND SELF

In the networked information society, public service broadcasting should emphasize the contribution to its prestige made by the high level of interpretation and analysis which is part of its mission. Those working and communicating in the various networks need both knowledge and certainty about their own points of departure. Only a communicator who is certain about his or her own self can engage in a fully reciprocal communication process with others. The elements of public service broadcasting that are emphasized in the information society are pluralism, independence, and, finally, communication, which strengthens identity and instills understanding about the meaning of citizenship.

The sense of self and identity are reinforced when the members of a society and a culture are given the opportunity to obtain information that is relevant and important to them. The growth and vitality of

this sense is often simulated by fictional material and storytelling: films, serials and series, music, entertainment and humour. Public service broadcasting best carries out its mission in the information society when it provides all segments of the audience with cultural material to reinforce a positive sense of identity and self. Public service broadcasting must become more aware of this key characteristic and must emphasize it as a core element of its mission.

CITIZENSHIP

Citizenship in the information society also presents a challenge. Boundaries are being broken down, the roles of states are changing, many operations are being globalized and contexts are becoming more complex. Decision-making in matters affecting citizens is becoming more distant and is, in many cases, no longer recognizable. Political citizenship generally means that people are capable of understanding matters affecting them and their relationship to such matters. An integrating and globalizing world, where decision-making is often faceless, offers a particular challenge to the media. In order to enjoy full citizenship in the information society individuals must be able to obtain information on matters affecting them personally and to feel that they can influence such matters. This is quite a different matter from the consumers' opportunity to obtain the communication services which they require.

Citizenship in the information society also signifies that individuals can increasingly and naturally participate and do business electronically. Finland has sought to promote the conditions and opportunities for electronic public dealings and participation by citizens. The fulfilment of civil obligations, dealings with welfare services, study, library visits, relations with the authorities and other such matters will soon be managed remotely. Such forms of interactivity should also be promoted by public service broadcasting (see also box 8.1, Teledemocracy). In a democratic information society populated by active citizens, encouraging the ideals of citizenship and of civil duties and rights is particularly important and should therefore be a core element of the future mission of public service broadcasting.

RELEVANCE AND RELIABILITY

Citizenship in the information society implies that individuals have the right to relevant and reliable information. Under these circumstances, the number of sources of information is less important than the reliability and relevance of the information to which citizens have access. Citizenship is closely tied to equality, and all members of the community must have an equal opportunity to obtain basic information service. On the eve of the information society, we should re-assess what is meant by basic information services.

For example, is equal access to communication networks one of the basic rights of the citizen of the information society? If so, how is it to be implemented? Can it be achieved only through relatively expensive hardware investments, or can equal connection and basic services be implemented by means already available to the overwhelming majority of the public? As far as public service broadcasting is concerned, all these questions are significant.

This raises the original question of whether the information society is for eveyone, or for only a few. In operational terms, the question is whether there are realistic and practical governmental and entrepreneurial policies and strategies to ensure that networks and services are expanded to reach all countries, or whether these polices and strategies are market driven and profit based. If profit is the sole or principal motivation, are decision-makers deliberately excluding large segments of the world's population by consciously employing a policy of social exclusion? This would undoubtedly run counter to the ideals and

objectives of public service broadcasting and related media. Furthermore, such policies would be self-defeating since they negate the objective of universal access to information and communication media and are not even favourable to the new concept of global marketing!

The ethics of communication are an important aspect of the relevance of information. Because digital broadcasting technology allows for new ways of registering and monitoring communication, it is all the more important that the privacy of individual citizens as communicators be respected. Individuals can be equal players in the public political arena only if they can be certain of respect for their privacy and integrity. Political systems must be able to guarantee this protection if they are to earn the trust of their citizens. In a multiple-source and increasingly complex situation, the ethics of communication should also require journalism to be firmly based on reliable and objective argumentation. In a multi-channel world, the prestige associated with reliability for all channels will increase and will also be subject to more critical exposure.

THE NEW TECHNOLOGY AND PUBLIC SERVICE BROADCASTING

In recent years, public service broadcasting the world over has seen economic resources diminish. Nevertheless, over the next few years, digital technology will require appreciable financial investments in both technology and programme content. Even for many large companies, such expenditures present a difficult financial problem. In this context, it has been suggested that the public service broadcasting companies ought not to invest too much in digital technology, but rather focus for the time being on dealing with the basic analogue broadcasting media. This choice would nevertheless be fatal for both public service broadcasting and for society as a whole. Without the slightest doubt, the basic point of departure must be that public service broadcasting should not only enter the digital era, but should take the lead in exploring the new possibilities which the information society offers to all media.

Digital technology allows public service broadcasting to carry out its mission more effectively and in a more focused way. Digital broadcasting technology can provide public service programming to several different audience groups simultaneously. Some countries are developing digital services in the belief that new digital channels targeting niche audiences will complement and enrich the programmes already offered by the basic channels, but will neither displace nor replace the full service programmes. For the cultural and value reasons discussed earlier, viewers and listeners will continue to feel the need for general channels in the future. At the same time, their demand for in-depth and even highly detailed information which can be supplied via special channels or via digital television user-oriented network services will increase.

Public service broadcasting companies should be involved in creating a new audio-visual communication culture in which traditional broadcast products converge with new media and multimedia products. In the public service range, these products can be presented either in parallel or as specific elements of programmes. Audiences are expecting public service broadcasting to play a prominent and visible role in the new media. Several public service broadcasting companies have developed, *inter alia*, Internet services, and their success has been encouraging. For example, the BBC's Internet services are the most popular network services at the moment. The appeal of the public service companies' Internet pages is based on the fact that the audience has an image of these companies which stresses reliability, diversity and quality. In the chaos of the media world, consumers are on the lookout for organizations or 'portals' through which they can access reliable, interesting and significant sources of information.

PUBLIC SERVICE BROADCASTING AND THE NETWORKING APPROACH

The changes in both the content and programming structures of public service broadcasting represent a major operational challenge which will affect not only the operating and production methods within companies, where digitalizing production technology is creating new opportunities, but also the relationship to the content production sector operating outside radio and television.

Public service broadcasting companies will survive the challenges of the digital era only if they are able to create collaborative networking with both the new media technology sector and the content production sector. Many sectors of society can contribute more than can be imagined to content production for the digital broadcasting media. It is natural that in the past, education, social services or the science sector, for example, did not perceive themselves as being close to the audio-visual production sector. Today, however, they are already producing a variety of ambitious new-media audio-visual products, which could well form one part of the new broadcasting content (see also Chapter 10).

The public service companies must now invite new organizations in society to co-operate in digital production. To a large extent this is a question of motivation and example, and public service broadcasting should take on a pioneering role particularly in the areas of culture, science, education and welfare.

This role should also to extend to making information society services available to citizens and households. One universal obstacle to the advancement of the information society is the reluctance of citizens to use the new electronic services and information technology in general, even though the benefits of such use are clear (simple, advantageous and timesaving). The fears of and negative attitudes towards electronic information ought not to be underestimated. Public service broadcasting should, as a part of its information society role, provide new services that emphasize the citizens' point of view, and this in turn will encourage an adaptation of public service broadcasting to the environment of the future. Moreover, the image of reliability, independence and public accountability associated with public service broadcasting offers a good basis to start moving in this direction.

PUBLIC SERVICE BROADCASTING: TAKING THE LEAD

For many members of the broadcast audience, the transition to an information society is still an abstract, or even unacceptable, vision. They are concerned about the undermining of human interaction and about the possible increasing alienation of large, less affluent segments of our societies. In many countries, those retiring from active life in 1999 will live, on the average, for about twenty years in the emerging information society, and it may be asked whether their needs will have been taken properly into account. Others are concerned about the over-emphasis on the commercial and marketing aspects of the digital future (it should be noted that in expressing these concerns, such observers do not necessarily wish to deny the importance of market revenue in financing research and development). However, for many, the so-called information society represents new opportunities just for huge global businesses.

Public service broadcasters will undoubtedly understand the importance of market revenue in developing new services. However, the value base of the information society – just as for any society of whatever period – should not be business oriented, and public service broadcasters should take an intellectual lead in the public debate on these matters. Such a debate should not be an abstract discussion

of the objectives and structures of the information society, but should include concrete demonstrations of services which viewers and listeners can utilize every day in public service broadcasting programmes. In providing a well-balanced and structured range of old and new services to the audiences, public service broadcasting should present an understandable and approachable view of what the information society means in the audience's everyday life.

As is the case with existing public service broadcasting, it would be difficult – and even undesirable – to try to define in detail which concrete operations and services these new products should provide in the future. The public service mission is not a list of quantifiable tasks. A society defines what public service broadcasting means in each particular context and this is often expressed as a broadcasting law. The statement ratified by the member states of the Council of Europe (Prague Resolution, 1994) defines public service broadcasting as an essential factor in pluralistic communication accessible to everyone and hence as a central factor of social cohesion in the information society. This guideline is also valid for the production of new digital and multimedia services.

New services based upon information technology proposed by the public broadcasting service should thus take the needs of households and individuals with a shared cultural identity as their point of departure. The challenge is to grasp the new, inevitable changes which technology offers without undermining the needs of audiences and societies everywhere for cultural continuity, an identity and intellectual framework.

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Chapter 6
Impact on the media

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The fast-evolving information and communication technologies of this decade offer a wider and wider range of choice to media consumers. The number of media offerings has been increased to such an extent that the information rich are experiencing real cases of information overload, and this trend has proved to be a bane for many media owners among whom insecurity is commonplace, because the new and changing technologies create uncertainties which may not be clarified in the near future. Nevertheless, for both media owners and consumers, quickly-evolving technologies signal the arrival of unlimited possibilities for innovation and growth.

CONVERGENCE AND GLOBALIZATION: IMPACT UPON MEDIA OWNERS AND CONSUMERS

Two words, 'convergence' and 'globalization', simultaneously arouse both hope and fear among media owners and concerned consumers of information. Convergence implies the dismantling of boundaries between the main types of media; and globalization breaches political borders and gives rise to international media organizations, which operate free from local supervision. Convergence and globalization are the result of digital technologies operating together with satellite broadcasting systems. Since media affect the lives of a majority of people, these two phenomena will have far-reaching consequences.

These are both disturbing and exciting times for media owners and consumers. The new technologies present them with opportunities to reinvent the industry if they so wish. If the choice is not to innovate but instead to consolidate, the new technologies are also making tools available for minimizing costs and maximizing efficiency.

Integration and expansion

The increasingly interconnected nature of the mass media industry has encouraged integration in a complex variety of reciprocal connections. The first set of logical mergers were between different types of media, such as television with radio and the press to create multimedia conglomerates. Mergers of media entities across countries and regions also occurred in order to attain the critical business strength needed to reach global markets.

A few hardware manufacturers made strategic moves to purchase media houses producing films, music and other media products. The strategy has paid off in recent years through co-ordinated releases of new generations of hardware, such as Digital Versatile Disk (DVD) players, digital television receivers, and digital music recording devices, together with media products and software to be played back on these new devices. The synergy is mutually beneficial. There would have been no demand for the hardware had there been a lack of attractive media products to play on the devices. Without the devices, the media companies would not have been able to launch a new generation of both old and new releases which help to produce a new stream of revenue for the existing libraries of intellectual properties owned by these media companies.

In an interesting new twist to integration and convergence, a major television sports broadcaster has mounted a takeover of one of the most famous soccer teams in the world. The business strategy is to acquire full control of broadcast and merchandising rights through the outright purchase of the team. If this proves to be a profitable move, it is not impossible that media companies may begin to purchase properties as diverse as universities and restaurants in order to secure publication copyright for scholarly titles and courses, and broadcast licences for cookery programmes.

There are two sides to integration and convergence. The case against concentration of ownership can be seen within the printing sector in the United States, where extensive research shows that the twelve largest newspaper conglomerates control almost 50% of all circulation in the largest market for news in the world (Gitlin, 1996). In book publishing, nearly every one of the major commercial publishing companies has also been bought and assimilated into larger businesses, while independent bookstores are being forced out of business by a handful of powerful national chains.

On the positive side, the sale of some cable television companies, again in the United States, helped raise much-needed financial investment to upgrade distribution systems. The merger of Cable News Network (CNN) with the Time Warner group led to the pooling of extensive complementary intellectual properties, particularly in politics, which has resulted in service on the Internet which offers more depth and data than either company alone could have provided in the print and television media (Rattner, 1996).

The expansionary trends of the media conglomerates, coupled with media technologies which ignore political borders, have forced government-owned media organizations in newly developed and developing countries to respond. Within Asia, the response has generally been to privatize state-owned media in an effort to make them more competitive and attractive to domestic audiences. However, the privatization has been structured in such a way as to protect, preserve and empower traditional cultural values and maintain key government controls at the same time (Richstad, 1998). The Association of South-East Asian Nations (ASEAN) plans to launch a regional direct satellite television broadcast channel, but these plans have been delayed by the financial problems affecting the region.

Cross-selling

When several large media organizations merge, they create media giants with huge audiences. This is an

invaluable asset which helps in maximizing advertising revenue, the life-blood of media. The merger also pools strategic market information, such as subscriber and advertiser databases which are used to cross-sell media products and advertising across the organizations within the merged group.

Direct selling

This is probably the showcase innovation of the private sector on the Internet, and Amazon.com is the current undisputed star in this area. Amazon began by selling books over its Internet site and subsequently added music CDs to its virtual bookstore. A strictly e-commerce company, it has captured the imagination of media organizations because it has so far dealt exclusively with media products. Indications are that it will diversify rapidly to include a large variety of consumer products. Every media company with tangible products must at some time have reviewed Amazon's methods for possible emulation. The arithmetic of direct selling to consumers worldwide without having to incur high distribution and sales discounts is an irresistible idea, and an increasing number of media organizations with such product offerings have launched websites to test the feasibility of an Amazon-like sales outlet.

Attracting less public attention, but perhaps more exciting in its technological concept, are the direct sales facilities of newspapers, journals, bulletins, and electronic book publishers. Amazon uses the Internet only to promote and process payment for a product before resorting to fairly conventional means for delivering a traditional tangible media product to the consumer. In contrast to this, specialized publishers are offering articles and information from databases for instantaneous downloading over the Internet immediately after a payment has been made at the site. Book publishers will be interested in the mass consumer response to several electronic book (e-book) devices introduced recently into the market and which approximate the size and feel of a book. They lend themselves to the direct sales of books bought and delivered over e-commerce systems. The North American book distributor Barnes & Noble has negotiated with various publishers to offer more than 1,000 titles of books for downloading into the devices which have a capacity to store anything from about 1,000 to 500,000 pages at any one time. The e-book is an extremely attractive proposition to book publishers because they do not have to commit expensive print-runs and warehousing expenses up front; the risks are therefore minimum. This may encourage publishers to accept a larger number of manuscripts for publication. It is likely to facilitate the release of traditionally short-run titles, which have been rejected in the past because they were not viable as expensive paper editions. The e-book is a viable alternative to currently available publish-on-demand technology, which deploys high-speed photocopying machines linked to collating and binding machinery.

The music industry may be on the verge of making similar direct sales. A new device which downloads and stores audio digital recordings from the Internet for repeated playback by consumers was cleared for public sale, following a court hearing in California (USA) to determine if such a device threatened the preservation of intellectual property rights. The legal endorsement for the device has set the stage for music to be sold directly to consumers, a song or 'cut' at a time, rather than as a compilation on longer-playing discs.

NEW BUSINESS MODELS, PRODUCTS, AND ECONOMICS

The evolution of a new generation of media technologies has presented the industry with many possibilities for developing new products and services. One of the key factors, which will help in identifying the final list of possibilities for sustained development, is the parallel evolution of business models applicable to these possibilities. The successful candidates must operate with a business model acceptable to the

consumers, and attractive enough to engage media operators. The private sector has long been the primary source for funding of media operations in North America, Europe, Latin America and parts of Asia. With the trend towards the privatization of state-owned media in developing countries, the importance of feasible business models has become critical in the determination of how technologies will be deployed, and what content and software will be offered.

Large audience base

This long-established business model continues to dominate for traditional mass media such as radio, print and television. It has also become one of the most important models for Internet-related operations where 'portal' sites offering search and directory services to the vast World Wide Web have drawn the largest number of users and attracted the keenest interest of investors and entrepreneurs. As with most broadcast organizations, portal sites do not charge for their services but instead derive revenues by selling advertising. In this model, the number of people served by a particular Web site or broadcasting station is crucial in determining the pricing of its advertisements, and eventually its revenue. The same applies to the print media products, which are often priced for the recovery of production and distribution costs only, while profits and creative costs derive from the sale of advertising space. These numbers will take on added importance when members of the audience become customers and shoppers on interactive television and electronic commerce Web sites. New audience-tracking technologies and sophisticated audience research methodologies enable these numbers to be desegregated into groups with a high propensity to purchase certain goods and services. These advances are a boon to advertisers and will pose a challenge to media operators, who, in the past, were required simply to broadcast advertisements for large groups. The tougher requirements are already apparent in advertising at Web sites where operators are required to broadcast advertisements in the style of banners at the top or bottom of specified Web pages, and the cost of advertising was determined by the number of people accessing the page and seeing the advertisements ('eyeball exposure'). This simple formula became a little more complicated when the cost was computed on the basis of the number of people who clicked on the banners and visited the Web site linked to the advertisements (referred to as 'click-throughs'). The third formula which is evolving will very likely be based on a sales commission on the actual business transacted as a result of exposure, click-throughs and other services rendered at a particular Web site or page.

Electronic commerce

This model has captured the imagination of the industry as the most appropriate for the Internet with Amazon.com as the premier prototype company. Amazon has demonstrated both the potential and the problems of this model. Although it is popularly cited as the most successful electronic commerce company, it has not shown a profit since it started. On the contrary, Amazon consistently incurred losses until the end of 1998. Researchers who have tracked the company's exponential growth blame the losses on high operating costs. Its economics also reveal a staggering scale of business. One study estimated that Amazon must generate $1 billion in annual sales just to break even (Junnarkar, 1998). The electronic publishing model has been given a boost with the introduction of secure electronic transaction software and systems which permit payments for purchases made over the Internet to be securely debited from credit card accounts. Further progress is expected in the near future when 'smart cards', which enable payment purchases using secure computer codes, are launched worldwide.

Subscription access

Subscription access was widely thought to be a promising model for the electronic publishing of

newspapers, magazines, journals, and newsletters. The typical electronic subscription begins when a person makes a lump sum payment to the publisher, who then provides the subscriber with a unique password, which then permits access to each new edition at a Web site.

Although the model was based on very sound logic, it was not well received by people on the Internet. For the present, it appears that the founding principle of the Internet for the free sharing of information still persists. Major content providers have indefinitely postponed plans to charge for access to their sites. To replace this, some providers require visitors to their Web sites to register themselves, or encourage them to click on the advertisement of a corporate sponsor, as a kind of surrogate payment. This has caused extensive revisions in the business plans of media companies started for the exclusive purpose of publishing and selling information over the Internet.

Conventional media, such as television news networks, newspapers, and magazines, which extended their dissemination by recycling selections from their products on the Internet, have enjoyed more prosperity (see box 6.1, Newspapers on line). Their sites regularly clock up millions of visitors each month who in turn each read several Web pages and help to generate a total of many millions more 'page views' for the sites. While people visiting the sites do not pay for their visits, the media organizations running the sites benefit in several ways: firstly, by promoting or cross-selling their flagship on printed or broadcast products via free access to excerpts at the Web site; secondly, by offering archival information such as previously published articles or transcripts of old broadcasts for sale through an automated system of database searches and electronic commerce; and lastly, by exposing people to this new outlet for their products and developing a global audience for future sales of a new generation of products and services. The Economist and The Wall Street Journal now publish simultaneously on paper and on the Internet.

Box 6.1 → Newspapers on line

There are many sites on the Internet that provide news. One type are the special Internet news sites, often provided by the Internet Service Providers (ISPs). Others are sites maintained by already-existing newspapers as a complement to the printed product. One can find daily newspapers and news-oriented periodicals from almost every country in the world, representing a mixture of national and regional/local press, as well as news targeting specific groups in terms of language and/or ethnic belonging. One significant result of this development is that, whereas the possibilities of access to traditionally disseminated press were limited, especially concerning regional and local press, news via the Internet means worldwide dissemination. Some examples of estimated number of newspapers and periodicals available by country of origin are given in Table 6.1.

Table 6.1 → Estimated number of on-line newspapers/news magazines (daily, non-daily and periodicals) for some selected countries, March 1999

Country	No of papers
Developing countries	
Angola	3
Botswana	2
Brazil	81
Egypt	11
Malaysia	11
Pakistan	23
Venezuela	18
Developed countries	
Australia	80
Denmark	24
Lithuania	2
Slovenia	6
Spain	35
Yugoslavia	15

Source: www.webwombat.com.au/intercom/newsprs/index.htm

The former provides subscribers to the printed product and free access to the Internet edition. The latter sells subscription access to both versions. Some newspapers have used their Internet editions to enhance the attractiveness of their classified advertisements by offering package deals, which place such advertisements simultaneously on both printed and Internet editions.

As a result of the financial crisis of 1997/98, media organizations throughout Asia, Latin America and Russia are struggling to stay solvent. The media in these regions have been hit by high increases in repayments of bank loans and other forms of business financing, increases in the price of newsprint, and significant drops in advertising revenue, as companies have trimmed their advertising budgets as part of cost-cutting measures.

Internet services providers have suffered from the crisis as well, because the values of local currencies have fallen in relation to the US dollar in which the cost of telecommunications connections are calculated. At the same time and for the same reason, the cost of imported networking hardware and software has also increased. Many media companies will therefore consider the new technologies with an eye on costs and their potential contribution to cost cutting.

SEIZING NEW OPPORTUNITIES IN DEVELOPMENT

The tendency to use new technologies to meet commercial objectives is problematic for people and regions without the necessary financial resources to attract companies to fulfil their needs. The challenge is made harder by the need for stable telecommunication links and electricity to power nearly all the new technologies. Both are in short supply in the poorest regions.

The case of developing countries illustrates the way in which technology evolves and is diffused at different speeds across the world. Whereas new technologies are represented by state-of-the-art digital innovations in the developed world, for parts of the developing world telephones, television or even radio may be the latest technologies. It is in this context that two recent innovations in radio broadcasting represent important advances in the medium.

The clockwork (or wind-up) radio is the first. Communication specialists in development have been aware of the problem faced by isolated communities in obtaining dry-cell batteries to power radio receivers for several decades. Crystal-sets and solar-powered receivers have not proved to be entirely successful. The clockwork radio is powered by a patented power source, which with a few minutes of winding-up will keep a receiver playing for about an hour. It is an exciting invention which has been adapted to work on lap-top computers and other devices, which previously depended on batteries for electrical power. For the present, the relatively high-costs of these radio sets prevent their extensive diffusion across the developing world.

The other innovation is at the broadcaster's end. UNESCO has taken the lead in helping to develop affordable low-power radio transmitters for operating community broadcasting services. These transmitters are assembled from generic components by local technicians, who also assist with maintenance. Such services facilite the decentralization of media control to the community. They help promote participatory communication, which empowers communities, and support the planning and implementation of sustainable development programmes. The main hindrance to the spread of this technology is legislative. Most developing – and even developed – countries discourage community broadcasting by limiting access to radio frequencies and to a broadcasting licence.

A classic example of a new technology converging to support an old predecessor is the technology to stream sound over the Internet. This is the developed world's version of the developing world's

evolution towards community broadcasting. The technology is very affordable at both ends. People can receive such Internet radio broadcasts with a relatively low investment while broadcasters can be 'on the air' broadcasting literally to the whole world at very minimal cost.

These technologies represent an extremely small fraction of the total number of innovations introduced into the media industry. The developing world with its highly limited purchasing power has sustained minimal research and development efforts to increase their access to relevant content and channels of mass communication. A study in the Philippines found that where privatization of media has been the norm, programming is not meeting the needs of local populations (Kenny, 1996). This sentiment may extend quite widely across the developing world.

Transmission frequencies are a very valuable resource in some areas of the world where finding a frequency for broadcasting to minority groups is a daunting uphill battle, since regulatory authorities and established media companies have vested interests to protect. The introduction of digital television broadcasting technology with the capacity to place four channels in the same space that one analogue channel used to occupy, will soon make plenty of new broadcasting space available. A significant amount of this newly freed-up space should be reserved for minority interest broadcasting, which is now limited. Developing countries will probably have to wait for several years before the cost of digital technologies reaches an affordable level. The early users, namely the developed countries, should therefore establish a precedent for safeguarding minority interests and those of disadvantaged groups by reserving such open digital spaces for them. Spaces must be held in trust, not only for minorities, but also for the common good in areas such as education, science and culture, which are not very profitable, but are socially vital.

NEWS AND NEW EXPECTATIONS

The latest technologies, with their capacities to move multimedia content anywhere in the world in a matter of seconds, provide the perfect tool for gathering and disseminating news. They have become available at a time when the demand for news is rising rapidly, fuelled by the globalization of trade and national economies. The increasing demand is not only for a greater quantity of news, but also for higher speeds in reporting. This in turn presents developers of technology with demands to increase further the capabilities and speed of technologies creating a powerful iterative spiral, which will lead to even more, exciting technologies.

The demand for news worldwide is obviously not uniform. Television ratings are a good yardstick by which to gauge demand. News dominated the top ten television shows in the United States; soap operas of different origins seem to be the most popular in many other countries such as Brazil, China and South Africa (The Economist, 1998). The demand for news over the Internet appears to be more consistent, with nearly all news sites registering the most number of visitors and Web pages downloaded (page views). Sites operated by newspapers around the world commonly serve millions of page views per month. While most newspapers continue to provide only text and static images on their Web sites, radio, television and other integrated media conglomerates now offer multimedia content which includes text, and sound and video clips of headline news items. Several financial publications operate Web sites with access to constantly updated databases and expert systems software to work out investment computations and projections.

The exponential growth of the Internet as a channel for distributing news can be seen in the meteoric growth of Microsoft National Broadcasting Company (MSNBC), a joint venture between Microsoft and the National Broadcasting Company (NBC) in the United States. By the first quarter of 1998, the news

site served an average of 300,000 users a day with the occasional peak of 900,000 users. Together, they read 200 million pages a month. Measured by reach, it is the fifth largest daily newspaper in the United States. The top four Internet news sites in the country, MSNBC, USA Today, CNN and the American Broadcasting Company, collectively serve up 700 million pages of news every month (Brown, 1998).

The twenty-four-hour news cycle

Direct satellite broadcast television news channels and the Internet benefit people around the world who want and need to have constantly updated access to news at all times of the day and night. This has caused an insatiable demand for the latest news, which has in turn created the twenty-four-hour news cycle. News operations in the past were governed by deadlines fixed by printing schedules, in the case of newspapers and magazines, and airtimes for conventional radio and television news. Now that the audience is global, every moment of the day and night is the deadline. All news programming is by definition perpetually incomplete and in a state of being constantly updated. The concept of 'the edition' has been replaced by devices such as 'breaking news' when regular programming is interrupted in television broadcasts, to show raw, unedited, live coverage about a still-evolving news item. On the Internet, a similar device is the 'latest' button, which provides a link to a usually brief write-up of a news event in the making.

Instant journalism

The race to be the first on the air or the Internet with the latest news has created an approach to news reporting which concentrates on the immediate, the gathering of eye-witness accounts, and a follow-up of the event as it unfurls and draws to a conclusion. Attention to analytical writing is on the decline. The twenty-four-hour news cycle, and the quickly changing news agenda discourages reflection, research and analysis which take up time, and time is what the editorial departments no longer have to spare. The result is sometimes news reporting which is disconnected from history and the broader geo-political context. Merrill Brown, editor-in-chief of MSNBC, is mindful of the shortcomings of journalism on the Internet: 'Those of us producing for the Internet haven't always been as thoughtful as we might about putting today's incremental developments into perspective' (Brown, 1998). Andrew Heyward, the News President of Columbia Broadcasting System (CBS), one of the dominant North American television networks, is equally conscious of television's shortfalls. He identified 'the seven daily sins of television news' as imitation, predictability, artificiality, laziness, oversimplification, hype and cynicism (Heyward, 1997).

Minimizing costs

Although not as profitable as the owners would like, the media is now big business. During the concentration of ownership, large financial investments were made; owners are now eager to recover them. At the same time, profits at many media organizations have shrunk. Together, these considerations have driven media organizations to cut costs and this has harmed the quality and diversity of news services. Among the elements which have been slashed are foreign news bureaus and the amount of original reporting undertaken (Hickey, 1998). News editors are also less inclined to dispatch their own reporters, photographers and camera crews to cover an event, preferring instead to rewrite wire service stories and tap into news footages from large television news agencies.

The impact of this trend is a significantly reduced plurality of perspectives, especially where international news items are concerned. The same television news clips are broadcast by stations around the world, while the same wire service dispatches are carried in the newspapers. This provides the handful of international news agencies which feed the media

organizations around the world with an oligarchic grip on the flow of news and views. This phenomenon is called 'consonance'. Research has shown that the further the geographic origin of a news story from the editorial headquarters of a media organization, the higher the level of consonance (Carroll et al., 1997).

Accuracy of information has also suffered as a result of cost-cutting. Reduced resources to research and confirm facts often lead to the release of not completely accurate news and content. Because of the concentration of media organizations, the effects of these errors are sometimes multiplied across several types of media.

Participatory journalism

The Internet has helped to inject a level of participation in news commentary that did not exist in the past. This has taken the form of on-line polls of audiences and readership using customized software which operate at media Web sites. Although the samples reached in such polls are obviously not always representative, they are nevertheless a good beginning in getting the audience involved in developing opinions about issues. Current methods of polling offer audiences a limited number of choices, identified by the media, which may not always reflect the full spectrum of opinion. Perhaps more useful are facilities at certain Web sites for visitors to post their comments. The Internet version of a phone-in comment is tremendously popular with interactive radio stations. A few international radio and television broadcasters have also started to use audience postings of comments at Web sites and e-mail, as a channel for the audience to participate in live panel discussions. The low cost of using the Internet by the audience permits this form of live participation at the global level on a sustained basis and, if facilitated effectively, will contribute towards enriching the diversity of perspectives in all types of media.

In participation of a different sort, newsmakers now use the Internet to reach out directly to the audience, bypassing the media. Court judgements have been posted directly on to the Internet, as have copious copies of original reports of powerful government-appointed investigating authorities. Such events are being multiplied in a myriad of other events, ranging from the birth of a child to an expedition on Mount Everest.

Instrument of freedom

Quick-thinking editors and their lawyers have found an interesting innovative use of the new technologies in the defence of the freedom of the media. United States media organizations subpoenaed for information in their possession, and faced with prospects of losing the legal challenge (and the principle of freedom of expression which goes with it) when no important information is involved, have been known to publish photographs or broadcast footages so that they can honestly claim that they have not surrendered any unpublished material to the prosecutors. The new technologies allow news stories and pictures to be rushed out into the public domain over the Internet. Television companies, faced with the need to place uninteresting and insignificant footage in the public domain, have been known to broadcast this material in the middle of the night using an idle satellite (Gartner, 1998)!

New vulnerabilities

The danger of spreading unreliable information via the new technologies does not emanate solely from the information providers. The Internet is particularly vulnerable to interference from third parties. Skilled and determined computer hackers have been known to gain unauthorized access to all sorts of information serving systems to make disruptive, and sometimes malicious, alterations to the information posted. A stunning example of this occurred at the Web site of The New York Times on a Sunday in September, 1998, when a community of hackers mounted a co-ordinated attack. Technicians at the newspaper fought

with the hackers for the control of the system before being forced to shut down the Web site for nine hours (Shutz, 1998). The hackers launched the attack to retaliate against a reporter at the newspaper for having written a story about an imprisoned hacker which they had found unacceptable.

CONCLUSION: TECHNOLOGIES FOR THE NEXT MILLENNIUM

There is every indication that the exciting technological changes which have taken place over the past decade are just the beginning of an accelerated phase in the evolution of the media. The near future may possibly witness several trends.

People will 'de-link' from their personal computers. Innovations which will decentralize the access to new forms of digitally-encoded media content, away from the personal computer, may be introduced. Dedicated 'set-top boxes' and devices which connect to the television set, radio receivers, automobiles, and telephone handsets, which will permit ready access to new media content, will probably be developed and sold on the market.

The keyboard and mouse, two devices which many consumers find difficult to use, may be replaced by voice-activated control devices or greatly simplified key-pads or remote control units. Software, which acts as the interface between users and media-accessing devices will be further refined so as to become truly user-friendly and stable. All of this should facilitate increased access to the new hybrids of media products which have already been offered, or will be offered in the future to the consumer.

Delinking will also take place in terms of the portability of equipment; the smallest device for the present is the palm-top, which will fit quite conveniently into a large pocket. The next stage will be wearable devices, which may resemble present-day watches. They may be the ideal instruments for accessing financial information services, travel and leisure guides, weather reports, and e-mail connections. Such wearable technologies present a myriad of possibilities when developed and used in connection with global cellular connections being provided by telecommunications companies.

One of the main challenges in developing wearable technology, capable of connecting to a cellular network, is the design and manufacture of miniature batteries, or alternative power sources, which can power data wireless modems and other components in these devices. One of the main obstacles to widespread use will be the cost of the devices, batteries, telecommunication links, and the price of media services and products. When such devices, services and products become available, market forces will no doubt put them within the reach of wealthy consumers who can afford the high prices normally associated with new products. This will be an irony, because the people who will probably need these devices most urgently, and stand to gain the most from them, are in isolated communities in the developing countries with no other access to media or channels of communication, and for whom the latest technologies seem best suited. This will be a challenge very much worth addressing for all managers and practitioners in the years to come, as they plot the future paths of the industry.

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Chapter 7
Information services, libraries and archives

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A WIDE AND DIVERSIFIED FIELD

The overall picture of institutions in this area is varied. Archives and libraries are usually owned and run – or at least strongly supported – by federal, state or local authorities. Information services, defined here as separate enterprises or as parts of a large organization, are usually privately owned. Some, however, may be public or semi-public organizations working under market conditions. There are also great variations in size, ranging from enterprises owned and run by one person, to small local, public and school libraries with tiny collections and a part-time staff member, to large multinational producers and vendors of information services and massive national archives and libraries with millions of documents and hundreds of specialized staff. Geographic and economic factors also add to the variations among institutions. These widely differing situations clearly have an impact on progress in the use of modern information and communication technologies (ICTs).

This chapter will examine different aspects of ICT – use in archives, libraries and information services sectors, where it is already well implanted. Such an approach allows for the study of problems already present in many institutions and likely to become problems for a much larger number of institutions in the near future. Professional and institutional rather than technical issues will be examined. The aim is to focus on the impact on professional principles and practices in a large majority of institutions, providing information services, and on their users.

IMPACT ON SERVICES

A problem as old as the sector itself is lack of space, because of the growth in the number of items in the collections. This is true not only of archive records and printed material, but also of various sound recordings, films, videos, etc. The problem has been solved, or attempts have been made to solve it, either by more compact arrangements of the collections,

weeding out or by reducing the size of the documents (using microfilm for example). Computer technology has opened up tremendous possibilities for reduction because of the storage capacities of computers in or outside the institutions.

Another feature of computer technology is the speed with which large quantities of data can be manipulated. This offers a possible solution to the problem of retrieving a small number of relevant documents from among the thousands available on the subject of interest to the user. The efficiency of communication channels means that the content of documents may be accessed in a very short time regardless of their physical location and the opening hours in different time zones. Later on, the problems of handling the large and growing quantity of information on the Internet will be examined.

The term 'information services sector' covers the whole field of archives, libraries and information services. While this sector is a clear candidate for their use, it must also be recalled that ICTs are driven by market forces. This is one of the factors which leads to the well-known imbalances in the use of ICTs between the developed and the developing countries, and within countries between sectors, for example, between those dealing with military matters, space research or business, and those devoted to artistic and leisure activities. This pattern of development has been characteristic since the introduction of the computer shortly after the end of the Second World War.

Another important feature of the ICTs is that they are more and more oriented towards individual use at home or at work. This contrasts in many ways with information institutions where services are basically collective and one book is read by many people. Individualization is obvious in the use of the telephone, whether traditional or mobile, and related services such as telefax. The same is true for television and information services, such as teletext, for sound recordings and for videos, and now for the computer which has become a 'personal computer' (PC). These individually-oriented technologies and products can all be linked together via digital technologies and can be used wherever signals can be transmitted.

Historically, there have always been and still are shorter or longer transition periods during which technologies intended for individual are used collectively. Even in countries with many telephones, there are telephone boxes for collective use and it is still possible to watch a football match on television, together with friends and strangers, in a local bar. The collective and individual use of books has existed for centuries, and the collective and individual uses of the more recent audio-visual technologies have co-existed during this century. In countries where the use of individual technologies is less advanced, it is clear that the most collective use possible will optimize scarce resources. This can cause problems, however, as will be seen later. It should also be added that some types of collective use, for instance in public libraries, are a part of the social functions of these institutions and should therefore be maintained regardless of the individualization of technology. As in all institutions and enterprises, the individually-oriented technologies are used by staff in the information services sector for internal and external communication. These aspects will not be analysed in detail here. The focus will be on the digital technologies used in computers and the related communication techniques used in the specific activities of the information services sector.

FREE OR FEE

In libraries there is an ongoing discussion about payment for services. Private suppliers of information in the form of either materials or services engage in no such debates, because market forces decide the prices. There are two ideological stances on payment for library services: one argues for equal and easy access to free services; the other insists that market regulation mechanisms favour payment. Access to free services is generally backed by the library environment and the political system.

Where computer technology is concerned, the question of payment takes on two further aspects. Firstly, it is possible to measure the individual use of the electronic services, which means that prices are much easier to set than for traditional, mostly collective library services. Secondly, institutions face economic problems. They must continue to provide traditional library materials and at the same time buy computer equipment and pay for licenses for electronic services and the use of the telecommunication systems. These developments have nourished the debate about user payment in many countries and the possibility of differentiating between basic services and value-added services, or even between printed and electronic information, has been raised. The high cost of developing hardware, software and data collection has created very strong monopolies or monopoly-like conditions. As a result, prices are high and cause payment problems for institutions in developing countries, but also for most libraries in other parts of the world.

The first organized reactions are now getting under way. Staff in universities, libraries and archives, who are important suppliers of information to scientific periodicals, abstract publications, and so forth, are becoming more active as actual producers of works such as electronic journals, leading to lower prices for these products. One example is the site known as the English Pilot Site Licence Initiative (PSLI), a consortium set up in 1996 to halt the trend of increasing prices of periodicals. Since January 1999 it has been continued as a new project, the National Electronic Site Licencing Initiative (NESLI) for three more years, and the aim is to include all higher education institutions in the United Kingdom into one consortium. After a European Union call for bids, the Swets and Zeitlinger company was appointed as the agent for the common interface and negotiations with publishers.

IMPACT ON TECHNIQUES

Preservation and storage

It is difficult to preserve all the different storage media, whether paper, tapes, video or discs, partly because knowledge about their durability (except for that of paper) is relatively limited. To this should be added the fact that the old media require some kind of playing device to access their contents, and these devices are disappearing from the market because there is less and less demand for them and spare parts cannot be found. Digitalization of print, images and sound provides new opportunities for preservation and storage, but the durability of the digitized media is also an unknown quantity. It is, however, possible to provide access to the contents of documents in archives via digitalization, thus avoiding the wear and tear on and possible damage to the original document. The digital media are really rather new, and no general regulations and standards for their use as preservation media have yet been established.

Searching tools

One of the first uses of computerization was for the compilation of library catalogues. At first computers were used as a part of the printing process, and later they entered into the process of designing on-line catalogues. Large indexes and abstract publications have followed a similar path, going from print, to print via computer, to on line and to CD-ROM. Computer technology has also led to the development of search tools such as citation indexes and concordances which are produced automatically. A number of search processes, such as Boolean operators, have been developed and refined over the last few years. They are very expensive, as are the connect-time prices for the databases. For many libraries the prices are prohibitive and one of the ways to solve the problem is to write contracts between the vendors and all the libraries in a country or with large groups of non-commercial institutions. Such types of negotiations, which also

Box 7.1 → The development of new information technologies for libraries

Computerization for libraries

Libraries were very quick to computerize their management systems. Since the invention of Machine-Readable Cataloguing (MARC) in the mid-1960s, many countries have adopted national versions of that format. Nearly all libraries in developed countries are now equipped with computerized management systems, particularly software for cataloguing and lending operations. Computerization is steadily eliminating card indexes in favour of Online Public Access Catalogues (OPAC). In the 1990s, with the development of the Internet and more recently of the Intranet, the distribution of catalogues on CD-ROM is tending to be replaced by direct access via those networks to constantly updated files.

Interconnection of catalogues

The adoption of sufficiently compatible cataloguing rules and formats makes it possible to interconnect catalogues via the Z39.50 (International Organization for Standardization, ISO 23950) common communication protocol. This protocol fixes a standard for communication between software programmes and controls dialogue between the requesting computer (client) and the answering computer (server). Such dialogue requires, among other things, the indexed fields to be defined in the same way in each system. When that is the case, a reader in any library may search catalogues functioning under that protocol anywhere in the world using the set-up and computer language with which he is fully familiar, those of his own institution.

Digital collections

In the last few years, major libraries have begun building up digital collections, either for purposes of conservation or in order to facilitate access to documents that are rare or national treasures. This trend is so powerful that sites devoted to digital collections have been created on the Internet. Indeed, the movement has recently been further stimulated by the G7 programme Memoria Universalis, in which both UNESCO and the European Commission are involved as observer members. (http://portico.bl.uk/gabriel/bibliotheca-universalis/digit.htm)

Among the flagship programmes are:

→ The INIST (Institute of Scientific and Technical Information), a French documentation centre that was the first to scan 1,500 international scientific journals systematically in order to computerize the procedures used in document delivery. The programme began in 1990 and is still continuing, processing 1.5 million pages per year. (www.inist.fr)

→ The National Library of France has launched a programme for the computer storage of 100,000 works of French literature (30 million pages, essentially in image mode) and 300,000 illustrations. Documents in the public domain are made available on the Internet. (www.bnf.fr)

→ The National Digital Library Project piloted by the United States Library of Congress began in 1995 and is scheduled for completion in 2000. It is a co-operative project involving numerous large research libraries. The aim is to store in digital form one million heritage documents (texts, photographs, sound recordings and films) relating to the history of the United States of America. These documents are made available on the Internet. (http://lcweb2.loc.gov/amhome.html)

→ Archivo general de Indias is a programme launched in partnership with IBM for the computerized storage of ten million documents from the Seville archives. (www.mcu.es/lab/archivos/AGI.html)

→ The computerized storage policy of the German libraries: the Deutsche Forschungsgemeinschaft (DFG) has been subsidizing programmes since 1997 for the storage of the collections of German university libraries in digital form. This national project assigns responsibility for digitization, by chronological period and by theme, to the various libraries in exactly the same way as the Sonder Sammel Gebiete distributes acquisitions by research field among the university libraries. In 1997, two technical centres for digitization were set up, one in Munich and the other in Göttingen (ww.gvb.de), which test the scanners, develop technical standards in the field of library science, study computerized document management systems and issue recommendations for German libraries.

→ On behalf of UNESCO, the International Federation of Library Associations and Institutions (IFLA) is carrying out a major survey of digitization programmes in libraries and other cultural institutions. (www.ifla.org/VI/2/p1/miscel.htm).

Scientific electronic publishing

In parallel with commercial electronic publishing, which has been gradually introduced over the last five years by major international publishers (Elsevier, Springer, Academic Press, Kluwer, etc.), research communities and university libraries are developing electronic publishing facilities for their own scientific production (preprints, theses, symposia) and for distance learning technologies (courses, educational software). These productions are processed in more elaborate formats than the image mode that was preferred for the digitization of paper documents. The formats are of the Standard Generalized Mark-up Language (SGML) type, in particular Hypertext Markup Language (HTML) and Standard Markup Language (SML). The Description of Type of Document (DTD) of the Text Encoding Initiative (TEI) is the basis for all recent operations aimed at classifying academic documents in the social and human sciences in America and in Europe. The Z39.50 protocol has now been extended so that a Standard General Markup Language (SGML) type structure can be used directly to search within documents. (See also Box 7.2.)

Acquisition of published electronic documents

The supply of electronic documents is currently posing a great many problems for libraries. Certain publications appear only in that form, and it is clear that libraries need to acquire them or at least to have access to them. However, the regulations now being introduced regard the acquisition of electronic documents as equivalent to a licence to use the contents, and require a bilateral contract. The legal issues are at present the centre of international attention (see Chapter 8). In essence, libraries set access to documents via the publisher's server or a service provider which may be a subscription agency (Swets, Dawson, Blackwell's, etc.) or a cooperative network (OCLC, Pica, etc.). The delivery of electronic documents to the local site of a university or consortium of libraries is still at an experimental stage, but seems to be the most promising solution for making use of published scientific literature.

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cover vendors of electronic periodicals and other products, will be of growing importance to the information services institutions in the future.

Use of full text documents, sound and images

The data storage capacity of computers has made it possible to store not only the bibliographic data on a publication, but the full text of the publication itself. Older, originally printed or even hand-written texts are scanned and digitized, thereby making the works of great authors available to all. The texts can be read page by page or, by searching with a combination of words, certain parts can be selected.

One of the major problems for the information services institutions in relation to full text documents, sound recordings and images is the complexity of copyright issues. In most countries, copyright regulations have developed over the centuries, and the use of printed material by libraries is adequately regulated for all parties. However, as far as the digital media are concerned, there are no such fixed practical arrangements, not only because of the short time they have been in existence, but also because of the difficulties of protecting against unlawful copying. Huge sums of money are involved in this area and private copying is very easy and fairly cheap as the technique is rather simple. Recent developments in the area of copyright and neighbouring rights are discussed in Chapter 8.

Electronic journals

In the first edition of the Directory of Electronic Journals, Newsletters and Academic Discussion, published in 1991, there were 27 electronic periodicals, seven of which were peer-reviewed. The 1997 edition lists 2500 periodicals of which more than 1000 were peer-reviewed (see also Box 7.2, p. 110).

Electronic periodical services were offered by the large agents in 1997. Swets and Zeitlinger has already been mentioned as the agent in the United Kingdom project; Blackwell is also offering such services, as is Reed Elsevier, the largest publisher of scientific periodicals, but only for its own periodicals. The

Electronics Collections Online full text database of the On-line Computer Library Centre (OCLC), also introduced in 1997, is a Web-based service containing more than 1000 periodicals from 30 publishers.

Records management

All administrative routines in the information services institutions can be automatized. Both documents and users can be identified with pin-codes; documents can be ordered automatically and bills for on-line searches are printed out by the computer. All these operations have an archive-related dimension, as institutions need to be able to trace historical data in their files, and public institutions are usually obliged to keep their records for some years before transferring them to the archive system. There is thus a certain demand for back-up systems and for safety copying, in the case of electronic processing. Even the selection of books and other material for library collections is done electronically. Archives must make appropriate choices concerning delivery formats for data, the media on which data are stored and the principles for selection.

THE INTERNET

The use of computers is revolutionizing working processes in libraries and archives, and the network of computers known as the Internet, is a revolution of similar importance. It is now possible to retrieve information independently of time zones and geographical location, and to obtain the most up-to-date information, because the printing and editing processes are either no longer necessary or have been considerably reduced.

The system of e-mail provides a communication facility which, to a great extent, replaces the traditional mail and fax systems formerly used by institutions, thus saving time for the user. The World Wide Web (WWW) can be regarded as a huge reference base, with all types of information available, either as metadata or full text, sound and images. Issues related to the illegal use of information technologies, more particularly the Internet, are discussed in Chapter 8.

The World Wide Web, which is one part of the Internet, is useful in many daily activities involving the transmitting of information which in the past could be found only in print or by teletext and – as can be seen in Chapter 2 – there are many kinds of useful sources of information for education and research on the Internet. Such activities can be said to have laid the foundations for the worldwide electronic information and communication networks. Individual institutions also have the opportunity to create their own Web sites to inform users about their services and to guide them through the organization. Different Web sites are linked together so that one entry or access point will lead on to several others.

Libraries and their catalogues can also be accessed via theInternet. The most recentOnline Public Access Catalogs (OPAC) Directory, published in 1998, which is a guide tocatalogues onthe Internet, contains 1434 entries worldwide, but 888 are from the United States and most of the remainder from Australia, Canada, New Zealand and Western Europe.Developing countries and Eastern European countries have few or no entries. The information in the guide was collected in the spring of 1996, and since then the number of libraries with Internet-accessible OPACs has grown considerably in Western Europe andCanada. Denmark, for example, had 11 entries in the 1998 guide, all of them university libraries. At the end of that year, there were more than 125 libraries with OPACs in Denmark, and among them, 75 public libraries.

The Internet has made new activities possible. Electronic conferences or informal discussion groups can be arranged with limited or open access, and surfing on the net has become the equivalent of zapping on the television or browsing through the shelves in the library.

The Internet uses sensitive and vulnerable techniques, so there are many possibilities for mal-functioning to occur. This is particularly threatening

Box 7.2 → Electronic publishing in science

Electronic journals create added value in publication that has great appeal to scientists and publishers, and the number of electronic journals in science, engineering and medicine – refereed and unrefereed – has increased dramatically in recent years. But electronic publishing, with its greater flexibility and variety of presentation, challenges conventional norms and practices. How will the existing culture and practices associated with publication in science be affected? What standards should apply in the electronic environment?

To explore these and related questions, an international workshop was organized from 12-14 October 1998, under the auspices of the American Association for the Advancement of Science (AAAS), the International Council for Science (ICSU), and the United Nations Educational, Scientific and Cultural Organization (UNESCO) to examine the application of electronic methods to the publication of scientific journals with a view to encouraging the development of internationally recognized practices and standards. The Workshop was intended to build on the work of the international conference of 'Experts on Electronic Publishing in Science' that was convened by ICSU Press and UNESCO in February 1996. A major recommendation emerging from that meeting urged the convening of a forum involving scientists and their organizations 'to formulate codes of ethics and of conduct for electronic publication which would spell out the reciprocal obligations of the scientist and the community on such matters as peer review, citation, integrity and authentication of material and archiving.'

Wide variations in the practices and traditions of scholarly publishing across disciplines suggests caution in attempting to construct generalizations intended to apply broadly. Nevertheless, the Workshop was able to identify a number of issues that merit attention by the scientific community at large. They are the following:

→ Defining a Publication. Digital processing facilitates the production and preservation of several public versions of a document or scientific paper, and the Workshop recommended that each publicly available version of a document carry a full specification of its status laid out in a visible and readily understandable manner.

→ Citation. Because of the possible existence of multiple versions of a document, the Workshop recommended that the scientific community become involved in the development of standardized citation practices that are friendly to science, include appropriate metadata, are capable of automatic assignation and are easy to use.

→ Peer Review. The ease of publication in electronic media reinforces the case for adequate quality control in terms of both the scientific content and the presentation. Scientific societies and/or journals should therefore establish and distribute guidelines in order to maintain the quality and integrity of the review process.

→ Scientific misconduct. Any reduction in the controls applicable to electronic publication increases the opportunities for scientific misconduct, such as the falsifying of results and plagiarism, although the technical features of electronic publication (such as the ease of automatic scanning and searching for similarities) raises the chance of detection. Research into the application of electronic methods for the detection of scientific misconduct should therefore be encouraged.

→ Open Access. The Workshop considered the conflict between the needs of scientists for ready access to large databases and collections of scientific observations, and the requirements of the aggregators for commercial reward for their endeavours. The results of publicly funded research should be clearly recognized as a 'public good', and full and open access to the data collected was essential for scientific advancement. This does not necessarily mean 'free' access by research workers, since thepartplayed bypublishers, aggregators, librarians and other facilitators merits adequate recompense if they are to continue in their valuable roles (see also Chapter 8 on this issue). The Workshop recommended that the attention of the scientific community, funding agencies and legislators be drawn to the fact that the scientific enterprise is crucially

dependent upon the ability of research workers to make use of collections of facts and observations and that measures that limit access to such material are contrary to the public good. Legislators are urged to provide for a mechanism permitting 'fair use' of large databases in order to promote full and open access to critical data for scientific research and education with little adverse effect on the commercial interests of the owner.

→ Privacy. It is now possible for journal editors and publishers to collect detailed information on the nature of the material accessed and the usage, and to compile author/user profiles. The kind of information being collected should be clearly stated by journal editors and/or publishers, as well as the use to which it is being put. Specific information relating to individuals should not be divulged to anyone without the permission of the subject.

→ Archiving. A major factor restraining the adoption of electronic methods of publication was the lack of archiving facilities, for there is currently little assurance for authors and publishers that, with the advancement of technology, material issued electronically will remain available and readable in the decades and centuries to come. The establishment of archives, for the long-term preservation of electronic publications, should be encouraged as fundamental to scientific and cultural development.

→ Developing Countries. Electronic publishing represents a unique opportunity for developing countries to promote the advancement of their scientific communications. It has the potential for improving access to the world literature, for filling gaps in local collections and for improving the visibility of their own scientific contributions.

Source: AAAS/UNESCO/ICSU Workshop on Developing Practices and Standards for Electronic Publishing in Science, Final Report, www.aaas.org/spp/dspp/sfrl/projects/epub/report.htm

for institutions serving a great number of users or involved in large and expensive programmes, such as mass digitization, but can also have catastrophic consequences in small institutions. The traffic on the Internet and the number of Web sites are growing exponentially and this leads to problems with queuing and unacceptable answering times.

For the library and archive professions, there are other aspects of the World Wide Web which give rise to problems. The central issue with all electronic documents is that of authenticity (see also Chapter 11). Is there any certainty on the Internet that the document has in fact been produced by the author/organization that claims to have done so? Is the text today the same as it was yesterday and will it be so tomorrow? A thesis using references to electronic documents, without printing them out, runs the risk that they may be changed at a later date or even cancelled. These problems are being dealt with by specialists who are developing standards for electronic documents.

The second problem is that of searching in large quantities of data, because a search based on one or a few keywords easily leads to several thousand addresses. The search can be refined by using the tools developed for this purpose, such as Boolean operators, language or geographical limitations, provenance, etc. Problems will remain, however, because the Internet is, from this point of view, completely anarchic. Large parts of it are unedited and there are no general rules about the use of vocabulary. Searching in the areas of education and research may result in a large number of opinion papers with no academic quality control whatsoever. Published material in print and other media have usually been through an academic, professional and economic selection process, but this is not true of individual home-made 'information' products.

Much development work needs to be carried out by the information profession to address the concept of selectivity. This, however, raises the problem of censorship versus confusion and uselessness. Chapter 11, on the Internet, discusses some of these issues from a more general point of view.

THE VIRTUAL LIBRARY

The vision of gathering all human knowledge together in one place is very old and has existed in many civilizations: one example is the library of ancient Alexandria, and another the great encyclopaedic enterprises in the Arabic, Chinese and European civilizations. The aim is to achieve a total overview of the recorded knowledge, as with the Universal Decimal Classification system, or by means of one large computer. Recently and due to the growth of the Internet, this vision has manifested itself once again in the form of 'the library without walls', or the virtual library.

The assumption is that everybody will obtain instant access to all recorded information in the world through the nearest library. This phenomenon has been described in several ways, and the term 'electronic library' has often been used. Unfortunately, this expression could equally well mean a large database or further developments in library automation, or applications of hypertext on the World Wide Web. The preferred term within the profession is the digital library, which is not just a name for a collection of digitized media. First of all, the term refers to a library, which is not necessarily in a particular building, but a systematic organization where various professional operations, performed by a professional staff and directed towards specific user groups, are carried out. The collection or parts of it might be digitized and access to electronic and other networks provided. One of the most important items in the digital library is metadata, which describe the contents and attributes of the library collection. They are important to the process of searching among millions of documents. The most prominent example here is the so-called 'Dublin Core' which defines fifteen core elements to be used by authors as well as intermediaries. Another problem is naming, which means strings of characters that uniquely define digital objects and therefore form a part of the documents' metadata. A system of naming must be permanent, and this means that a name cannot be bound up with a specific location. The creation of such a naming or identifier system is organizational, not technical, and different systems have been suggested. Examples are Persistent User Requirement Languages (PURLs) developed by the On-line Computer Library Centre (OCLC), where a server looks up the corresponding Uniform Resource Location (URL) in a database; the Uniform Resource Name (URN) developed by the Internet Engineering Task Force (IETF) but still not in operation; and the Digital Object Identifier system (DOI) developed by the Association of American Publishers and the Corporation for National Research Initiatives. They all provide methods by which digital objects can be identified and accessed. Issues concerning the management of the intellectual property right have given impetus to the development of these systems.

National bibliographies are the cornerstones of the library system and they are facing many problems with electronic documents. Such documents do not have a permanent existence, and a hyper link may lead to an empty address. In principle, a similar problem can occur with printed material, when a card catalog refers to a document which has been lost or stolen. But the problem takes on a completely new dimension on the Web because of the large number of hyperlinks and the very transient nature of Web pages. A recent pilot project in Sweden aims at testing methods of collecting, preserving and providing access to on-line electronic documents in a way that allows them to be regarded as published. This is done by taking a 'snapshot' of the relevant Hypertext Markup Language (HTML) pages, but concerns only

static electronic documents. The Internet is not the virtual library, but constitutes an important part of it. In the library environment a slogan during recent years has been 'from collection to connection'. This is certainly a very precise description of the development, but the vision of the virtual or the digital library must include 'collection' as well as 'connection'.

WORKFORCE AND EDUCATION

The main reason for defining an information services sector is that there are several similarities in the tasks of the institutions therein and in the work of their staff. Archives preserve documents for future use; these items range from a unique rare manuscript to samples of mass documents such as census forms and tax reports. To this end, statistical sampling methods have been developed so that the number of items preserved is sufficient for various research purposes. The intellectual, technical and administrative work and the classification and filing of documents have merged so that this profession has extended its range and expanded its systematic approaches. The person carrying out this work is usually called a records manager. Libraries, for their part, are collectors of printed material and have developed systems for retrieval through catalogues and classification systems. Library work also includes selection, when purchasing or weeding out. With a growing focus on users, networks such as union catalogues and inter-library loan systems have been developed. Such systems have been further developed by the use of ICTs. The third group, information service enterprises, has its roots in the documentation movement from the beginning of this century, and services to decision-makers in business and industry are their main task. They use basically the same tools as libraries, but are highly focused on speed in the delivery of information; the use of ICTs responds very well to their needs. All types of personnel in the three groups perform similar tasks in the management of their institution or enterprise.

The common characteristic of the three areas, their institutions and their professionals, is that they are acting as intermediaries between documents (printed or electronic) and users. The ICTs have blurred the borderlines between the different types of documents. Computers are used for administrative purposes, and electronic networks have become more extensive, so that other types of institutions such as museums are also performing similar activities. This leads to professional specialists being replaced by generalists capable of mastering the ICTs, or by new professionals such as designers of home-pages and webmasters, who combine different specialities, which may include both aesthetic and information training. A general trend in the development of relevant education for the sector is to put more emphasis on the ICTs, first of all on their use, but in several educational institutions on programming and technical skills as well. Computers are used in education and research in all fields, and students through their e-mail addresses and Web sites become adept in the regular use of technology and the opportunities it provides.

Bibliography courses used to focus on printed bibliographies, supplemented with on-line data-bases. Now the situation has been reversed. Professional education also puts the emphasis on theory and methodology rather than practical skills, because developments are so rapid that the reality will change between the beginning and the end of an educational programme. Methodological knowledge for its part has longer durability and produces a more versatile workforce.

User friendliness is an important aspect of the ICTs, but there is still a strong need for user-education in libraries. Users must improve their skills in the digital systems and the different OPACSs should be designed not only for the professionals but also for ordinary users, whether they visit the library or have electronic access from their home or workplace. The changes in professional work and in the educational

programmes are illustrated by the labels and titles used. For example, 'librarianship' has changed to 'libraryscience'andfurther to'libraryand/orinformation science' to 'information systems and information management', and those seeking employment in this area include Webmasters and Web designers.

A number of new jobs have been created in the private and public sector for professionals who are capable of mastering ICT use. Moreover, their traditional background with its systematic approach is an advantage. Software developers, designers of information systems for all types of enterprises and organizations, consultants on Internet issues, specialists in teaching and training and in marketing and sales, who work in the information institutions, are all a far cry from the traditional archivist or librarian. The general trend is very much in favour of the information professions, but of course economic recession, whether local or more widespread, can call into question such optimistic future perspectives. It is nevertheless clear that the rapid development of ICTs will require the information professionals, like professionals in many other fields of activities, to commit themselves to lifelong education and require educational institutions and professional associations to develop adequate programmes and facilities.

A PARADOXICAL FUTURE

The growth in the use of ICTs has some built-in paradoxes. On the one hand, access to information and communication is becoming easier, and PCs are better, faster and cheaper. These factors may be considered as a global trend in democratization. On the other hand, the development of technology, software and data processing requires more and more capital investment, and this is leading to global monopolies among producers and vendors.

Another paradox stemming from the enhanced access to ICTs is the emergence of a new type of illiterates, those who have not grown up with the technology and are therefore at a disadvantage on the employment market. From this point of view, the use of a PC may be compared with the mastery of a foreign language which requires regular practice. Libraries can play an important role in fighting this form of illiteracy by giving all users access to PCs and to the networks. In some Western European countries, there is an ongoing discussion about whether public libraries should give free access to the Internet to all users.

The development of ICTs has taken place principally in the capitalist world and within the framework of capitalist economies. In this context, one driving force is the substitution of relatively expensive labour by machines, leading to reductions in the costs of production and services. However, developments are so rapid that there is a general lack of qualified personnel. This gives qualified groups of professionals opportunities for very good salaries and working conditions. As the ICTs spread to other parts of the world, such as Eastern Europe and developing countries, there will also be a lack of professionals in these regions and the situation may well get worse, if market forces tempt qualified personal to move to Western Europe and North America. Another issue here is that American English may achieve a more dominating position in international communication, as has been discussed in Chapter 3.

The quality of information raises the problem of retrieving relevant and accurate information among the millions of documents available on the Internet. Some years ago, large databases were already nicknamed GIGO-systems ('garbage in/garbage out') and the problem has become more acute with the linking of 'all' databases. This is one of the main issues which the information professionals of the future will have to tackle. The changeability of electronic documents presents the profession with further difficulties. Authencity must be defined if solutions to the problems of filing, retrieval and intellectual property rights are to be found.

Digitization means that all forms of information,

whether print, image or sound, are stored and transmitted in the same physical form (see Chapter 10). This convergence is also reflected in convergence among institutions and professions, since all those working in this environment deal with media stored and exchanged in identical ways. In the future, there may well be convergence between information producers and the intermediaries.

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Articles on new developments may be found in periodicals such as:

Records Management Journal
The Electronic Library
International Journal on Digital Libraries
Internet Research

And last, but not least, see the Web sites of the organizations and enterprises in the field.

Chapter 8
Governing information and communication technologies

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Global computer networks promise to make the circulation of information easier, cheaper and faster than ever before; new digital technologies are transforming the production and distribution of media of all kinds. The social and economic consequences of the emerging digital communications technologies are, however, not yet clear. While commercial and legal systems designed to manage analogue communications and the movement of physical cultural objects are slowly adapting to the new digital environment, the place of governments and nation states in this process is still uncertain, as is the functioning of democracy. National governments have historically exercised strong controls over telecommunications and the distribution of books, films, and other so-called 'packaged' cultural materials across their borders. Where necessary, as in the case of international telecommunications, governments successfully co-operated in the formulation and implementation of technical standards and common industry practices. In most countries, the electronic media and telecommunications were directly owned by governments or subject to interventionist government regulatory regimes well into the 1980s. As a result, national cultural and economic policies shaped the development of the world's communications for over a century.

Some theorists of the digital revolution suggest that nation states will lose their relevance in a borderless future cyberspace, where transactions and communications will occur beyond the reach of government regulation or control. There are two common versions of this particular view of the future. Some see the decline of national regulation as a positive step towards the exercise of greater individual freedom in communications and more direct democratic participation (see also Chapter 4 on this issue). A variant of this view is that a digital enfeeblement of government will only strengthen the powerful transnational commercial interests that are already dominant. The latter view serves as a reminder that

it is national governments which constitutionally represent the individual citizen.

An alternative approach is to see the new technologies as 'embedded in the real world', as the Internet was once described by one of its pioneers. Without ignoring the potential of new communications systems, this approach emphasizes both the economic, legal and policy factors that influence the emergence and adoption of these services. Innovation in communications occurs within a longer historical pattern of evolution. Recognizing the fact that few, if any, governments will have the capacity or inclination to control every aspect of increasingly sophisticated communications systems does not mean the end of long-standing responsibilities. Governments will need to balance the potential benefits of new information and communication technologies with the threats that they pose. Questions of preserving privacy, protecting children, and enforcing the rights of authors are more complex in the new media, but they have not disappeared.

Are national governments fighting 'a lost battle', as the Spanish sociologist Manuel Castells has put it (Castells, 1997, p. 259)? If so, it is striking that governments around the world have themselves been vigorous in highlighting the economic and social ramifications of technological change. This chapter considers the relations between nation states, citizens and the new information and communication technologies in a range of important legal and policy fields. The rapid emergence of a wide spectrum of new global communications systems has without doubt created new challenges and opportunities for governments and communities which will be examined in this context.

NEW MEDIA

Traditional mass media are going through a process of transformation, as described in more detail in Chapters 5 and 6. The transition to digital broadcasting transmission systems in developed societies, and the proliferation of subscription television, is likely to lead to much greater diversity in media services, including interactive data transmission, high definition television, more targeted special interest programming, pay-per-view programming and electronic commerce facilities. The technical key here is the expansion of bandwidth, the capacity of a communications channel to convey information. The shortage of frequencies is much less a factor in limiting services than in the past. This factor has important ramifications for policy: in the context of a generally more liberal, market-oriented approach to media and telecommunications, spectrum scarcity can no longer function as a primary rationale for close government regulation of electronic media. At the same time, the diversification of electronic media appears to challenge the traditional unifying, 'nation-building' missions of public sector broadcasting services (see Chapter 5).

Revolutions in the computer industry have also had a major impact, as Chapters 9 and 11 of this report explain. Global computer networks have only recently become mass communication systems in their own right, with the worldwide spread of small, cheap and easy-to-use desktop computers, which are now in use in almost all areas of human activity. New telecommunications technology made it possible to adapt the telephone system for data transmission. New kinds of software expanded enormously both the variety and the purpose of networked information: beyond their traditional messaging and database functions, computer networks became systems for publishing and distributing information of all kinds.

As their sophistication increased, networks ceased to be strictly text-based.High-resolution colour images, video, and sound documents have become commonplace network resources. Applications in the form of browser plug-ins, Java 'applets' and proprietary components are also becoming commonplace. At the same time, the world's computer networks have become more interconnected, and therefore more

readily accessible. The network of networks that has evolved into the Internet uses a decentralized, packet-switched architecture to link computers in over two hundred countries. Proprietary online services – the self-contained, subscription-based, market-oriented systems of the early 1990s – were by the mid-1990s forced to connect to the Internet since many were failing to compete with the larger, freer, public system.

But while these technologies have developed quickly, and the ultimate objective of an accessible, low-cost global information infrastructure has become available, the consequences of their diffusion will take much longer to recognize and respond to. Actual applications and benefits remain hazy. It is not yet clear that greater diversity in services will deliver greater diversity in content. Critical issues which are yet to be resolved include the scope of the public domain in the digital environment, and the ability of governments to adapt existing systems of regulation. These questions are discussed later in this chapter.

POLICY RESPONSES

Since the beginning of this decade at least, governments and international organizations around the world have devoted substantial resources to understanding the implications of 'the digital revolution' in communications. Indeed such is the volume of this material, and the enthusiasm with which it embraces technologically-driven change, that we can scarcely doubt that the very concept of an 'information revolution' must be in part the product of official policy discourse, despite the advocates of a cyberspace without rulers.

The phenomenon of governments embracing new communications technologies has several facets. In highly industrialized societies, the early and middle years of the 1990s were characterized by a 'visionary' fascination with the promise of future interactive broadband delivery systems. National government documents such as Denmark's Info-Society 2000 (1994), the United States' National Information Infrastructure and Global Information Infrastructure reports (1993), and Singapore's IT2000 (1992) fell into this category; at the international level, the European Union's Bangemann Report and the G-7 summit's Information Society conference were comparable (see also Chapter 18).

William H. Melody argues that these visionary information policies 'tend[ed] to be more statements of aspiration than realistic policies aimed at achievable goals' (Melody, 1996, pp. 243–59). Yet these grand if somewhat unfocused visions still shape information policies around the world. New technologies were seen as the key to improved delivery of essential government services, especially in health and education. They were also seen as major driving forces for economic growth, offering improved productivity and new demand for skilled labour. In general terms, governments accepted without critical scrutiny the potential benefits of information technology, focusing on the perceived need for a broadband infrastructure. At the same time, the absence of this infrastructure was uniformly seen as a significant disadvantage from which other problems flowed: deficiencies in technological skills, uncompetitive industries, low growth rates. The analysis was circular (see Chapter 1 and Part Three).

A broadband infrastructure was not, in fact, necessary for many practical improvements in communications, either in the West or elsewhere. The success of the narrowband Internet, for example, rests on its accessibility through standard twisted-pair telephone lines and comparatively inexpensive modems. The rise of the Internet has made possible the proliferation of network computing earlier than the most ambitious prophets of the information revolution imagined; but it has done so without the expensive broadband infrastructure which was so widely considered a prerequisite for information societies.

Nevertheless, the best of these broad policy statements have had a number of important effects. First, they gave information policies greater political priority. What was once an obscure dimension of

Box 8.1 → Teledemocracy

Teledemocracy is the adaptation of Internet-based information tools by government, business, and civil society to create an advanced participatory form of democracy. In its purely theoretical form, teledemocracy is the use of the Internet to produce an informed and publicly active citizenship. But in its current form, teledemocracy is a misused and misconstrued term: while the prefix tele explicitly means 'distance' or 'way of', adding the conception of the Internet gives teledemocracy a more technical characteristic.

Empowerment is the foundation of teledemocracy. In order to fulfill the ultimate goal of empowering citizens, two measures must be put in place:

- → All citizens must have access to information tools. This highlights the importance of universal access to knowledge and participation in the Information Society.
- → Government, business, and civil society must have a strong and committed Web presence. Teledemocracy cannot advance properly without the necessary balance between these three groups.

How does teledemocracy work? In existing democracies, the process starts locally with a virtual administrative body which consists of Web sites sponsored by local governments to facilitate exchange between elected officials and local citizens. Experiments of this kind are being carried out all over the United States, in parts of Europe, and other democratic countries. The Web sites are a dedicated forum for public policy debate, government outreach program, and in some cases, replace conventional mail with e–mail. Teledemocracy is further promoted through cyber-neighbourhoods, which are connected communities with access for each individual family, and cyberparties, which are representative groups that encourage on-line public participation. Both serve the function of increasing citizen partnership, through direct, active lobbying by citizens. On-line lobbying is no longer restricted to government and business; informed and empowered individuals may take an active role in voicing their opinions.

In non-democratic countries and governments in transition, teledemocracy is practiced differently: through teledemocratization, which is the use of Internet-based information tools to promote knowledge-sharing among citizens and to organize citizen opposition groups. In turn, it may be used to circumvent oppressive regulatory efforts and facilitate discussion among civil societies, government and business. The effect of teledemocratization cannot be underestimated: the technical aspects of the network allow for technical solutions to offset government propaganda, censorship, and other repressive measures. Such is the case with Radio B92 in Belgrade. When shut down for its anti-government broadcasts, the station moved onto the Internet, and was rebroadcast into Yugoslavia by Radio Free Europe and Voice of America. It has become the sole source of independent reporting in Yugoslavia and a rallying point for democratic opposition.

Teledemocracy is only beginning to gain recognition for what it is: a valuable tool to produce an empowered and active society. While the theoretical evolution is still in its infancy, functional teledemocracy is already spreading to many parts of the world. Virtual local administrations are being envisaged and constructed, citizens are becoming more active in communities through cyber-neighbourhoods, and government regulations are circumvented by the technical solutions offered by the Internet. In step with the advancement of information and communication technologies, teledemocracy may well be a fast-developing, governing characteristic of the Information Society.

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industry, media and cultural policy, has slowly come to be seen as a coherent set of objectives, both at national and international levels. Governments have begun to make strategic connections between issues that were hitherto fragmented across traditional administrative boundaries – issues such as data protection, intellectual property, electronic commerce, and computers in school education.

Second, some of these early government responses did adopt a wider social perspective on the possibilities and consequences of the new communications environment. Denmark's Info-Society 2000 policy, for example, looked beyond the provision of infrastructure. It was concerned with how a future 'info-society' might retain the distinctive Danish characteristics of equity, democratic participation, and openness. It was much more concerned with applications than the supply of technology, and addressed the ways in which the public sector could co-operate with business. It emphasized the need to consider questions of access to government information. These issues were developed alongside an agenda for micro-economic reform, which concentrated on the need to liberalize Danish telecommunications (Munk Ris, 1997, pp. 424–56).

Third, the wide-ranging information policies developed in the mid-1990s have led to more concrete, if somewhat scaled-down, programmes for change. The aspirational thinking of the mid-1990s may have diverted attention from such practical policy questions as access to the Internet, improvements in basic telecommunications, and the development of real services and industries. But these issues have recently become the focus of policy attention, especially since the emergence of the Internet as the most important and fastest-growing global computer network. Singapore's IT2000 plan provides an example. Like so many other visions of the information age, IT2000 was aimed squarely at a universally accessible broadband network. The rise of the Internet changed this priority, forcing Singapore's National Computer Board to concentrate on the emergence of markets for interactive services rather than the development of the enabling technologies. This in turn meant an analysis of Singapore's particular strengths in fields such as logistics, transport and government information provision.

The increasing pervasiveness of information and communication technologies in the everyday activities of citizens has spurred governments to develop policies aimed at ensuring maximum community participation. In A Strategic Framework for the Information Economy (December 1998), the Australian government states its commitment to provide all Australians with open and equitable access to information available online as a way of securing 'a strong democratic, informed and inclusive society', and to avoid 'a social polarization between the so-called "information rich" and "information poor"'.

The challenge highlighted by the Secretary-General of the United Nations is to use the technologies to make information available to all and harness its democratizing power (Secretary-General Says . . ., 1998). However, as discussed later on, citizens in many countries do not have the opportunity to share in the benefits of the new technologies. Participation of developing countries, in particular, is being impeded by a lack of adequate communication infrastructure and relatively high computing costs. These issues were highlighted at a seminar sponsored by the United Nations Population Fund and the Government of Turkey in December 1998. The seminar also discussed the need for policies to address social and gender inequality to prevent information and communication technologies from further marginalizing disadvantaged groups (Expert Seminar Supports . . ., 1998).

Even so, available information and communication technologies are being used in developing countries as tools in advocacy and to promote social change. For example, in the area of reproductive health services, new media are being used to build political commitment and community support. In Senegal, youth leaders have organized cyber-cafes

where young people can discuss life-planning skills and connect with the world's youth. Ecuador has a service using the Internet to provide news to community radio stations. There is a website linking a network of Turkish NGOs against gender-based violence. In South America, distance learning programmes are offered on population and reproductive health. A cellular phone network serves rural communities in Bangladesh.

FRAMEWORKS FOR GOVERNANCE AND DEMOCRATIC PARTICIPATION

Rights to freedom of expression, information and communication among citizens and with the state are essential components for democracy. New communication technologies provide comparatively decentralized and open environments which appear to promote these rights. Networked environments like the Internet allow individuals to create their own content and interact with a large audience worldwide at relatively low cost. This in turn increases the diversity of information and views that are expressed by and accessible to users around the world. In particular, information and communication technologies can assist the democratic process by facilitating greater accountability and transparency of governments: official documents are increasingly being made available on line and opportunities for direct communication with elected representatives are being created (Rabb, 1997, p. 165). A concomitant of this situation is that the medium may be used to generate and disseminate content, which may itself be seen to be anti-democratic and offensive to many that receive it (see Box 8.1, Teledemocracy).

The characteristics of the new media mean that, unlike traditional broadcast media, there are higher expectations of individual freedom and autonomy. However, as more parts of the networked world and the real world overlap, the need for governance increases. Numerous commentators have highlighted the difficulties of governance in a computer-generated public domain that has no territorial boundaries or physical attributes and is in perpetual use (Longworth and Grainger, 1998). Further, democratic governance requires public interests and values to be reflected within the rule-making processes. In attempting to meet these challenges and retain the democratic characteristics of networked environments, there has been a tendency toward a governance model that is decentralized or self-regulatory in nature, especially in Australia, Canada, Japan, the United Kingdom, the United States and many European countries, particularly under the influence of the European Commission.

A number of international organizations are also influencing the emerging framework for governance of new information and communications mediums, including the United Nations (UN), the Organization for Economic Cooperation and Development (OECD), the World Trade Organization, the International Standards Organization, and the World Intellectual Property Organization. UNESCO's strategy is described in Box 8.2.

The OECD is actively contributing to a global framework for electronic commerce. A Ministerial Conference on electronic commerce held in October 1998 in Ottawa proposed an action plan to bring notions of physical world governance into the networked world. The action plan is organized along the following lines:

- → building trust for users and consumers, so that the safeguards which provide confidence in the physical marketplace are adjusted to instill equivalent confidence in the digital marketplace;
- → establishing ground rules for the digital marketplace, including providing protection that is as effective as that provided by legal and commercial frameworks in the physical world;
- → enhancing the information infrastructure for electronic commerce, including creating effective competition in telecommunications markets;
- → maximizing the benefits of electronic commerce.

Box 8.2 → UNESCO and cyberspace

The emergence of an information society, with new systems and modes of expression, representation and action, is a major challenge for UNESCO and its Member States. As part of its response to this phenomenon, the Organization is striving to 'help its Member States frame integrated policies and strategies, taking account of the convergence of telecommunications, information technology and the electronic media, which will enable them to adapt themselves to this new technological environment and take advantage of the opportunities it offers' (Medium-Term Strategy 1996–2001).

The most striking aspect of this new environment is cyberspace, which is also known as 'information highways'. This new electronic space, open to all forms of expression, information exchange and transactions, is becoming progressively accessible to an increasing number of people, whatever their age, geocultural origins or occupation. The ICTs which form the infrastructure of cyberspace, more particularly the Internet, are used for many different purposes, for the best and the worst. This new environment transcends state borders and largely escapes national juridictions.

UNESCO's governing bodies, the General conference and the Executive board, have urged the Organization to take a leading role to ensure that education, science and culture are given adequate intellectual space on the information highways. UNESCO's strategy is being developed around two complementary main lines of action. The first is to encourage international interdisciplinary reflection on the ethical, cultural, legal and social issues which characterize the emerging information society and, second, to promote the use of information technologies for the development of education, science, culture and communication.

In collaboration with producers and users of the ICTs and providers of cyberspace information and services, the Organization promotes the ethical values and legal principles essential for a democratic and participatory information society. In particular, UNESCO's efforts are directed towards promoting universal access to information and creating the conditions under which the information society can guarantee respect for privacy and personal data, enrich all lives, include the excluded and disadvantaged, ensure cultural pluralism and be free from violence, pornography, paedophilia, racism, alienating ideologies and criminality. These are the objectives of the Project on ethical and sociocultural challenges of the new information society.

The Organization is also working to ensure that ICTs are used more effectively to foster freedom of expression, the free flow of information, access to knowledge for all throughout life, scientific research, artistic creativity, the protection and enhancement of the heritage and the common good. The programmes being implemented contribute to these ends in different ways and include: the diversification of educational services, especially through distance education; the establishment of networks and discussion forums on the Internet for educational, scientific and cultural communities; the digitization and on-line presentation of the cultural heritage, the organization of virtual curricula, libraries and laboratories; 'on-line governance'; the provision of computer hardware and software and means of access to networks; and the training of electronic network managers and trainers in informatics, telematics and multimedia.

Together with its international, regional and national partners, UNESCO has taken several initiatives in organizing a series of conferences and expert meetings worldwide. These include the African Regional Symposium on Telematics for Development (Addis Ababa, 1995), the Conference on Electronic Publishing in Science, organized with the International Council for Science (Paris, February 1996, see Box 7.2), the International UNESCO Symposium on Copyright and Communication in the Information Society (Madrid, March 1996), the second International Congress on Education and Informatics (Moscow, July 1996), the regional symposium on The Arab World and the Information Society (Tunis, May 1997), the Asia-Pacific regional meeting of experts on A Legal Framework for Cyberspace (Seoul, September 1998), the Expert Meeting on Cyberspace Law (Monaco, September 1998) and the two infoethics congresses held in Monaco in 1997 and 1998.

To fulfil its role as a platform for international debate, UNESCO has initiated an Observatory on the Information Society on the World Wide Web with a focus on ethical, legal, social and cultural aspects. For UNESCO's mission in general, see Box 1.1.

EDUCATION AND INFORMATION TECHNOLOGY

One key field where the governmental response to technology has had a major impact has been in education. This field demonstrates more clearly than any other the influence of information policy, and the efforts of governments to address the problems identified by information policy. Chapter 2 of this report provides many examples of government efforts in this respect. The recent OECD Information Technology Outlook (1997) made an explicit link between increased government emphasis on information technologies and the transition of OECD economies to 'knowledge-based' economies. According to the report, it was imperative for nations that their people have the knowledge and skills needed for participation in a knowledge-based society.

Policy initiatives such as those mentioned in Chapter 2 are new developments. They indicate not only the aspirations of governments, but also how little has been achieved to date. For example, in the United States, which is often to assumed to be far advanced in the introduction of information technology into the classroom, a recent Federal Report noted that 'few schools have adequate numbers of modern computers or access to the Internet, and relatively few teachers are prepared to use technology effectively. Further, access to computers and other technologies is not enough; integration of technology into the curriculum is also needed'.

DEALING WITH THE 'DOWN SIDE'

A recent Irish government report describes what it calls the 'down side' of new technologies. A host of potentially illegal uses of the Internet have emerged as major issues for national policy and international co-ordination. These include:

- Piracy of intellectual property: the infringement of copyright in cultural property; the infringement of moral rights of authors; and the illegal distribution of copyright works such as books or videotapes.
- Gambling: the emergence of unlicensed and unregulated Internet casinos.
- Invasion of privacy: unsolicited electronic communications; misuse of personal information in databases; theft of personal information; unauthorized interception of personal communications.
- Commercial crimes: fraud, including credit card piracy.
- Harmful communications: illegal material, including child pornography, violent material, and racial or religious vilification; defamatory publications.
- Hacking or cracking: illegal entry into private or government computers; theft of data or malicious damage to data.

One of the great attractions of the Internet remains its capacity for comparatively free global communication, including communication to and from countries where open discourse may be suppressed. It can collapse geographical space, apparently transcending boundaries. But as the United States scholars Brian Kahin and Charles Nesson have written, 'with this empowerment comes enormous potential for unbalancing, even upending, social, business, political and legal arrangements' (Kahin and Nesson 1997, p. vii).

CONTROLLING ILLEGAL AND HARMFUL MATERIAL

Perhaps the most significant area of need for regulating new information services is in the field of illegal or harmful material. A recent UNESCO Expert Meeting on Paedophilia on the Internet (see Box 8.3) is one example in this area. We know that whether information is considered harmful or not depends on the cultural, religious and social context in which it is circulated. Within and between nations, these

standards vary enormously. At local, regional and national levels, governments have long sought to control the distribution of material deemed harmful. Clearly the task has become much more complicated in the age of global digital networks. It is no longer possible for government censors to mandate the classification of all the material that may be available in any jurisdiction. It is no longer possible to physically police the information that crosses jurisdictional borders; and while screening technologies may be effective in some circumstances, data has the capacity to slip across a frontier in many forms and from many sources including international phone lines, Internet services, satellite transmissions and broadcasting. In the face of this more open global system, how are local, legal and cultural standards to be sustained?

Moreover, many countries have constructed classification or censorship systems which work by making distinctions between different kinds of analogue media, based on assumptions about the different patterns of circulation of, for example, books and broadcast, free to air television. How are these graduated systems of classification or censorship to be applied to digital media? The question which arises is whether it is too simplistic to merely insist that 'what is illegal off line is illegal on line'. There are dilemmas in balancing the principle of freedom of expression against citizens' rights to be protected from illegal or harmful material.

A recent Human Rights Watch report demonstrates the range of methods employed to control content on the Internet (Freedom of Expression on the Internet, 1998). Some countries, such as Ireland and Australia, are moving towards the adoption of co-regulatory structures, sharing responsibility between national agencies and industry for raising public awareness, responding appropriately to illegal material when necessary, and providing effective complaints procedures. Co-regulation is being facilitated by technologies that make the development of tools such as content labelling and complaint hotlines possible. Other national authorities, such as those in Saudi Arabia, Bahrain and Malaysia, seek to control the Internet more tightly, often by restricting access to the global network through a limited number of gateways which may then be monitored and configured to block access to sites considered harmful or undesirable (see Chapter 4).

The report notes the widespread international endorsement of technical tools to assist in the regulation of content on the World Wide Web. In particular, the labelling technology known as Platform for Internet Content Selection (PICS), first developed by the World Wide Web Consortium, has attracted great interest in Europe, Australia, Asia and North America. PICS provides a means for the labelling, and subsequent filtering, of Web content which may be both more standardized and more powerful than simple site-blocking software. One of its features is that such labels may be generated, published and used by anyone: it brings an effective classificatory apparatus within the reach of schools, libraries, community groups, parents, or any interested party.

The PICS protocol can support a variety of ratings and labelling systems so they can be tailored to the needs of each user, and allows content rating to reflect the vast range of cultural perspectives on appropriate access to certain material. In this way it belongs to that tendency of thought about the Internet which stands in opposition to the notion of a distinct and remote digital space, separated from the daily circumstances and places of its use. Instead PICS works from the assumption that 'the Internet is embedded in the real world'. Supporters of PICS have pointed to its feature of enabling, and in fact encouraging, a multiplicity of classification standards as the means to retain local control and responsibility over content. PICS is therefore seen, in the European Union and elsewhere, as a means of preserving cultural and social diversity within a global system.

Organizations in several countries have established labelling schemes designed for use by parents

Box 8.3 → Paedophilia on the Internet

Violence and pornography have invaded the Internet. Photos and videos of children and young teenagers engaged in sexual acts and various forms of paedophilia are readily available. Reports of children being kidnapped, beaten, raped and murdered abound.

The information and communication technologies have not only changed the rules of the game, they have also moved the playing field. Save our Children, a California based child protection organization, has identified over 8,000 Internet sites dealing with paedophilia. A Japanese wire service reported 500,000 pornographic sites, based in Japan, of which a considerable percentage contain paedophliac images. The danger is not that children will accidentally happen on to theses sites. Most of the blatantly illegal sites are well hidden to escape detection by the police. The real danger is that other public sites continue to increase in number and to perpetuate paedophilia and the production of pornography all over the world. One such site addressed to 'boy lovers' has links to over 800 other sites – all of them with 'legally acceptable' images of children.

The Internet has in many cases replaced the media of such paedophiliac magazines, films and videos. It is a practical, cheap, convenient and untraceable means for conducting business as well as for trafficking in paedophilia and child pornography. The Internet has also become the principal medium for dialogue about paedophilia and its perpetuation.

Fully aware of the need to safeguard freedom of expression, UNESCO nonetheless seeks to make the Internet a safe place for children. It is in this context that the Director-General of UNESCO convened a meeting of experts at UNESCO Headquarters on 18–19 January 1999. More than 400 specialists and institutions, from over 40 countries attended. The participants adopted a Declaration and a Plan of action. UNESCO, as the UN agency with a primary role of catalyzer, was asked to take the lead in 'breaking the silence'.

In accordance with its mandate, UNESCO proposed to use its educational, cultural, social and communication expertise to contribute to providing safety nets for children online. This means:

- → setting up an electronic clearing house for NGOs, researchers, media, judiciary services and other actors to inform and be informed, to seek advice and resources in total transparency. As there are already several networks in operation, this should be rather an electronic interactive index of child care organizations and networks.
- → the creation of two electronic watchtowers. One will act as an on-line helpline for young children to obtain advice and help. The other is for reporting illegal contents or sites, and will enable quick links to appropriate police forces regardless of the country where the sites are hosted, or the country reporting the crime.
- → a polyglot glossary of terms covering all the themes of this meeting.
- → generating funds and using this first circle of donor partners from the private sector to create what the Director General has referred to as a strategic group of personalities and leading citizens to lend resonance to the work, to marshal resources, and to state the case of children to the world.
- → promoting and supporting the design of handbooks and safety brochures for children, teachers and parents.

Website: www.unesco.org/child_screen/conf_index.html

and schools that conform to the PICS standards. Many of these are based in North America. They include the Recreational Software Advisory Council labelling scheme for the Internet (RSACI), SafeSurf, Cyber Patrol and SurfWatch. The Internet Content Rating Alliance (ICRA) was formed in October 1998 with the signing of a Memorandum of Understanding between Internet Watch Foundation (IWF), eco (the German Internet service provider association) and the Recreational Software Advisory Council (RSAC). Formerly the International Working Group on Content Rating (IWGCR), it is now working 'to develop an internationally acceptable rating system which provides Internet users worldwide with the choice to limit access to content they consider harmful, especially to children', and is currently developing for this purpose a consultation paper, which could be used to obtain input from different countries and cultures about the range of matters which an international rating scheme could address.

Whether PICS will achieve the promised results remains uncertain: technical solutions have a tendency to be quickly hacked. One important limitation of PICS is its restriction to the Web: it is not designed for other Internet services, although work is underway to expand the application of PICS to newsgroups and e-mail. But PICS has been criticized mainly on other grounds. As a tool, it can of course be used in many different ways, including the suppression of free speech. While it is true that PICS enables specific communities and organizations to manage Web content, it can also be applied at the level of State control. In Singapore, the National Internet Advisory Committee has recently recommended that a PICS-based rating system be mandatory for all Internet users, with the effect that sites which were not rated would become inaccessible from Singapore-based Internet Service Providers.

Reporting hotlines are also an important element in schemes dealing with illegal or harmful content on the Internet. Hotlines exist in a number of countries including Belgium, Malaysia, the Netherlands, the United Kingdom and the United States. These hotlines have been set up by industry associations, children's interest groups or police bodies. The hotlines generally have links with a range of relevant law enforcement and industry bodies, and some have developed procedures for the removal of Internet content by Internet Service Providers, once they have been notified.

COPYRIGHT AND NEIGHBOURING RIGHTS

Transmission through electronic networks raises problems in the field of copyright and neighbouring rights (of performers and producers of phonograms) and it is widely recognized that international co-operation and co-ordination is necessary to solve them. To explore these problems and be able to advise Member States accordingly, UNESCO organized an International Symposium (Madrid, 1996) and three regional Committees of Experts on Communication and Copyright in the Information Society (Bogota, 1996; New Delhi, 1996; San Remo, 1998) and published a number of articles on these problems in UNESCO's Copyright Bulletin. A crucial role has also been played by the World Intellectual Property Organization (WIPO). Having organized four international forums and eight Committees of Experts to draw up a draft of two new international instruments to govern the digital transmissions, this organization also convened a Diplomatic Conference of States in December 1996 which adopted a new WIPO Copyright Treaty (WCT) and WIPO Performances and Phonograms Treaty (WPPT). The solution proposed by these treaties was to extend the existing right of 'communication to the public' (the term 'public' was initially interpreted as referring to an undetermined number of people) to digital networks transmission (which may be considered as communication to private persons/subscribers) since the latter make the protected subject matters available to the public 'in such a way that members of the public may access

from a place and at a time individually chosen by them' (Article 8 of the WCT and Article 10 of the WPPT). The treaties also aim to provide additional protection for copyright owners in the digital environment by sanctioning the abuse of technological copyright protection measures, such as hardware or software locks or other encryption mechanisms. Sanctions are also provided against any deliberate tampering with 'rights management information', the ownership data which may accompany digital works. Largely as a result of argument from African countries at the 1996 Diplomatic Conference, these measures do not restrict the existing cases of 'fair use' or of limitation of and exception from this protection.

The new treaties, and their policy background, were discussed in UNESCO's 1997 World Communications Report (Chapter 6) and in UNESCO's 1998 World Culture Report (Chapter 13). It remains to be seen whether adequate legislation is enacted in member countries in the near future. The challenge for policy makers in this field has been the preservation of an appropriate balance between the rights of owners, and the public interest in the free circulation of information. There has been criticism, particularly from developing countries, that enhanced copyright protection inhibits equitable participation in the information society because it further increases the cost of accessing content and applications. It is also important that international copyright agreements do not conflict with the more general principle of freedom of expression, which is guaranteed in the Universal Declaration of Human Rights, by article 8 of the European Convention on Human Rights and Fundamental Freedoms and in relevant conventions. A major achievement of the 1996 WIPO Diplomatic Conference in Geneva was the recognition in the preamble to the treaties of the importance of this balance. Copyright law is not merely a legal means to protect the rights of copyright owners: it is directly concerned with the wider goals of enhancing education, science and culture (Mason, 1997).

OWNERSHIP OF DATA AND THE FUTURE OF THE PUBLIC DOMAIN

Copyright laws around the world have been designed to protect original intellectual works, although the definition of what constitutes originality in this context varies considerably across jurisdictions. Beyond the problem of protecting creative works, however, there are also major policy issues concerning the ownership of factual information or data, such as environmental information, which in itself is usually unprotected by copyright. The new information economy means that what was once a recondite legal question is now a pressing policy issue at an international level. Information once freely exchanged between countries and organizations is now increasingly seen in a commercial light, with serious consequences for those smaller countries dependent on information – such as meteorological data – which has been gathered by others. This is particularly the case where countries have privatized the public sector organizations that used to collect and distribute information in the past.

Governments around the world are grappling with the question of who should own data and what rules should govern public access and use. The new global networks have made data more valuable than ever before. The market for information has increased enormously as expensive proprietary databases have been replaced by ubiquitous public standards. But these same public networks are also seen as a threat to the data that they carry. In Europe and the United States, database publishers claim that they are now at greater risk of data piracy and attacks from hackers. They argue that tough new laws are required to protect existing databases, and provide sufficient incentives for the industry to grow. They highlight the vulnerability of data, pointing to the ease with which large quantities of digital information can be copied and redistributed internationally. A database worth

millions of dollars, they say, can now be pirated and resold at minimal cost over the Internet.

After various discussions held at the international level, agreement has been reached that the provisions of the Berne Convention dealing with copyright protection of compilations of various materials, originally relating to compilations in printed form, should also cover the compilations in electronic form, i.e. databases. The criteria for the protection should be the same as for the compilations in printed form: they are protected by copyright only if by reason of selection or arrangement of their contents they constitute intellectual creations. This was further expressly confirmed under the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIP) adopted in 1995 under the aegis of the former GATT and at present annexed to the World Trade Organization Treaty, and the above mentioned WIPO Copyright Treaty and WIPO Performances and Phonograms Treaty adopted in 1996. According to these two new international instruments, the exploitation of compilations/databases in digital environment is subject to the copyright owner's authorization in virtue of his/her right of communication to the public. Before the adoption of the treaties the notion 'public' related only to an undetermined number of people. Although in the digital environment exploitation of the contents is made by individual subscribers, i.e. private persons, digital transmissions were considered to be the equivalent of communication to the public, since the contents are made available to members of the public who may access to the protected subject matter 'from a place and at a time individually chosen by them'. As in the case of original intellectual works, not only the entire compilations/databases, but also their substantial parts cannot be used without the authorization of the copyright owner. The latter will be determined under national copyrightlaws.However, the treatiesfailed to resolve the extremely important question of whether the traditional 'fair use' cases or limitations of copyright protection should apply in the digital context.

The above solution only partially resolved the problem. Producers of unstructured databases, those relating to remote sensing for example, which do not correspond to the copyright criteria of 'compilations' also insist on their protection under intellectual property laws to better protect their investment and ensure development of the market. In this respect there were three closely-related proposals to deal with this problem, from the European Union, the United States, and the World Intellectual Property Organization (WIPO). Europe has progressed the furthest, with a Directive (adopted in March 1996) that was largely implemented in member countries by the beginning of 1998. Apart from the provision dealing with the copyright protection of structured compilations/ databases it also provides for sui generis protection for those databases which do not correspond to copyright criteria of compilations, but where 'there has been qualitatively and/or quantitatively a substantial investment in their obtaining, verification or presentation of their content'. Owners of such databases are granted the right 'to prevent extraction and/or reutilization of the whole or of a substantial part' of the contents of the database. In the United States, the initial proposal was strongly opposed by the scientific communities which considered it as limiting the access to and dissemination of scientific information. Compromise legislation on the matter providing for minimal, simpler and more transparent protection is currently being debated in Congress. The problem remains on the agenda of WIPO and has been discussed in a number of their meetings.

The prevailing opinion of the participants in these meetings (governmental representatives and observers from various intergovernmental and international non-governmental organizations), including a representative of UNESCO, was that some kind of protection should be granted to the 'non-original' (unstructured) databases to protect the economic interests of their developers. However, the protection should not hamper the specific interests of scientific

and educational circles working for the benefit of the society at large and interested in free access, exchange and dissemination of information. In this respect, UNESCO also suggested that a clear distinction be made between the databases produced with public funds and those produced by private enterprises. The former must be freely accessible to all users, excluding only their exploitation for commercial purposes, and therefore the rules for their protection should not be derived from the logic of competitive exploitation relevant only to databases financed from private funds. At the last meeting held in November 1998, the Permanent Committee (specially created in the framework of WIPO) asked the International Bureau of WIPO to organize, before it meets in May 1999, regional consultations on the problems, update its documents on national solutions and approaches and prepare a study on the economic and scientific import of the protection of databases for the developing and least developed countries. Therefore, the problem is likely to be discussed for some time, and no new international treaty on this subject should be expected in the near future. Much will depend on the solution to be adopted in the United States which tends towards the creation of a new kind of intellectual property right, specifically tailored for developers and publishers of databases founded on the notion of 'substantial investment' in the production of a database. It remains to be seen whether this solution is sufficiently flexible with regard to the public interest and 'fair use' cases to strike a balance between the private interests of producers of databases and the interests of the scientific and educational communities in the free circulation of ideas and information.

The new database rules should not have the potential to restrict the scope of fair use or free use. As indicated earlier, the 1996 European Directive provides for *sui generis* protection similar to that established under the Berne Convention. Librarians, scientists and educators have expressed concern at both national and international levels that any proposed new database rules should not significantly inhibit researchers seeking to reuse and combine data for publication or for research, or educators wishing to use portions of data sets for instructional purposes.

The new rules are being prepared at a time of increasing fiscal pressure on educational and research institutions in many countries. Governments around the world increasingly look to these bodies to adopt a more commercial approach. The new information technologies provide them with an infrastructure for commercialized data services. Laws along the lines of the current proposals would provide a stronger regulatory infrastructure. But the consequences of this approach, particularly for the public sector and developing countries, are far from being fully understood.

CONCLUSION

Developments in information and communication technologies are promising and delivering new opportunities for the exchange of ideas and access to information. In addition to the added convenience that these technologies bring to people's lives, they can significantly enhance democratic processes by promoting freedom of expression, interaction and information sharing. As recognized by policy statements of governments worldwide, the benefits derived from the new media will largely depend on the ability of individuals to access the technologies and approaches to the governance of networked environments. Although governance in a computer-generated domain is difficult, it has been argued that the new technologies are 'embedded in the real world' and that governments, as the representative of citizens, still have responsibilities to address issues such as privacy, copyright, content and access to information. Approaches at national, regional and international levels have tended toward decentralized or self-regulatory models of governance to allow for flexibility to accommodate changing networked environments and to maintain the democratic nature of the environment.

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Part Two

Evolution of information and communication technologies

Chapter 9
Two years of technological progress and innovation

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OVERALL CONTEXT: INTERNET PROTOCOL AND INTEGRATION

The drive towards the globalization of Information and Communication Technologies (ICTs) which involves computer hardware and software, radio and television receivers, broadcasting and telecommunication equipment and networking and multimedia systems, has created new technologies, products and services. The years 1997 and 1998 saw an unprecedented number of such innovations.

This chapter describes those innovations which have a strong impact on the trend toward technological convergence. A complete book on the subject would not be sufficient to present an adequate picture of the whole reality, and many important areas, such as the mainframe segment of computing, RISC processors, parallel computing or questions of security, have not been included. Another constraint is the difficulty in drawing a clear line between hardware and software in technological innovation. Many developments in scientific computing, data base handling and network use which might have been included have been omitted for reasons of limited space. Nevertheless, it is hoped that this survey will help the reader to understand the accelerating pace of innovation in all information and communication technologies, which seems to be driven by the two phenomena of globalization and integration.

Integration is taking place in the form of large numbers of virtual communities. Such communities are identified by specific unifying themes which allow planners to identify a range of products, systems and services to address the needs of the community members. Products resulting from the technological convergence of computer, broadcasting, telecommunication and consumer electronics are examined to determine how services in the immediate future will be shaped by the present product innovations, especially for the generation, transmission and use of content.

A singular technological feature of the two years in question, which is a turning point for ICTs, is the pre-eminence of the Internet Protocol (IP) for communication, around which ICTs are reorienting and growing. This versatile connection-less protocol is a method by which data is sent over the Internet as packets from one computer to another, each having a unique address. Different packets may be delivered through different routes to their destination, where they are re-sequenced by the Transmission Control Protocol (TCP) and put back in the right order.

The Wide Area Networks (WAN) which are identified as Internet (international networks), Intranets (corporate or intra-organizational networks) and Extranets (extra-organizational networks) are all IP-based. IP has left its imprint not only on Metropolitan Area Networks (MAN) and Local Area Networks (LAN), but also on equipment such as the network computer, workstation, work group server, media server, Web server, cable TV networks, wireless 'last mile link' to the customer premises, set-top-box and even a kiosk.

This review will centre on two sub-themes concerning such systems, equipment and devices: the technologies driving the content markets and new products of the past two years which are likely to shape services in the near future. Leading technology brands cited here are to be regarded as representative illustrations of trends from a fleeting market.

COMPUTER HARDWARE

The technologies driving the content market have brought about new developments which have increased the speed, capacity and versatility of computer hardware. Moore's Law has predictably doubled the performance of microprocessors every 18 months and personal computers (PCs) have become increasingly powerful with the introduction of new devices such as cache, more effective architecture and bus interfaces as well as extensive instruction sets. The introduction of the Slot-1 interface in the second generation of the Intel Pentium family of chips, from the first generation 296-pin Socket-7 interface, made a 242-Contact Slot Access available through a cartridge with a single edge contact. This innovation will ensure a smooth upgrading from one model of the chip to the next without having to change the PC design extensively. The result is a designer's paradise for minimizing user problems, while upgrading the capacity of PCs frequently to accommodate an ever-growing range of content. The low cost medium speed entry-level Covington allows designers to create a plethora of product lines from a single mother board. Mendocino is increasing the 128K of L-2 Cache on the processor chip at processor speeds. The Celeron chip has the capacity to produce further growth in the content market. The three leading chip manufacturers, AMD, Cyrix and IDT, are marketing K6, MXi and C6 chips respectively in competition with Intel, and will strengthen their position by early 1999 with the introduction of K7, Jalapeno and C7. By then, Intel will be expanding its processing capacity with Katmai and Merced Chips with a 64-Bit instruction set for the server and workstation markets.

Hand-held computing is becoming a useful tool for the collection of data in the field. Battery-operated receptacles of wireless information, integrated PDA chips like Intel's Strong Arm-1100 running at 200 MHz consuming only 200 milliwatts to power a hand-held PC, 3Com's Palm-III with an infrared receiver and wired modem for connecting to the Web, and Novatel Minstrel's Wireless Modem, which integrates both data and voice communication, are forerunners in this area. Optical Read Only Memory (OROM), with up to 128 MB of storage and no moving parts, provides extra storage in the hand-held PC. Philips Nino Palm PC which runs pocket versions of Microsoft applications is already available, although the battery power pack at present does not last for more than a few weeks. A close competitor, Windows CE, is gaining momentum.

PERIPHERALS

The main problem in home automation is the communication among various devices and appliances. A possible solution appeared with several technologies using existing home ac wiring for telephone, and computer and appliance control utilizing the X-10 Standard module available for most types of appliances. Consumer electronics and PC industry companies have also agreed upon a new consumer electronics bus standard (LE bus), marketed, for instance, by Home Plug and Play, which is an improvement on the X-10 standard followed previously. Software for controlling modules of either of these standards is available. Ethernet PC network with CE-Bus controllers can be connected to PCs and home entertainment systems.

The desk top Sedona offers a versatile tool for content searching which groups file system, Web browser and e-mail client into a single graphic user interface – a trendsetting concept developed by the Intel Architecture Lab (IAL). Sedona can locate items selectively and find files, e-mail, Web pages or news items of interest without any active input. It can also correlate a message or a document that has been opened with other relevant stored information.

New audio standards have been introduced which allow multimedia to provide real-life, 3-D sound for content developers of titles encoded with Dolby digital. This can add depth to sound, almost to the point of immersion. Multimedia titles can now be encoded with information that creates the illusion of 3-D sound with just headphones or a pair of PC speakers. Direct sound and Direct sound 3-D from Microsoft allows for the mixing of multiple audio streams and programme-surround channels. As multimedia require larger and larger files, the 1.44 MB capacity of the floppy disk is becoming less appealing and is giving way to three typical competing technologies for removable drive: IOMEGA Zip Drive, Sony-Fujifilm HiFd and LS-120, tending towards the goal of inexpensive 100 MB adequate for multimedia presentation applications, and of course compatible with the existing 3.5 inch floppy disks.

MEMORY

There is a shift from compact disc-read only memory (CD-ROM), towards digital versatile disc read-only memory, version 2 (DVD-ROM-2) drives which can read CD recordable or CD re-writable media. Though better than DVD-ROM-1, at present, they lag behind the fastest CD-ROM drives in overall performance. The sheer enormity of DVD capacity will be useful for storing raw data. It is possible to make feature-length, documentary films using DVD, using high-resolution MPEG-2-standard video compression, immersive Dolby-standard audio compression and extensive 3-D graphics. Everything from high density needs to theatre quality audio and video has become possible. Compared to the 650 MB peak capacity of CD-ROM, contemporary DVD-ROM media can store nearly 5 GB of data per side, and this quantity will soon attain 17 GB. MPEG-2 has now surpassed the quality of laser disks. An interactive geographic Map Atlas, giving a terrain database of the entire surface of the earth at 1 km intervals with MPEG-2 video, has now become a possibility.

COMPUTER SOFTWARE

In 1998, the software industry reached a turning point: the decisions made will determine the direction to be taken by software architectures of the future. This trend is accelerated by the convergence of computer, communication and consumer electronics. The once-dominant operating system, such as Windows 3 booted from DOS, will make an exit. Windows NT is now on the verge of addressing the need to support inexpensive computers and a limited range of device support. Microsoft has begun certain development efforts which will make Windows NT usable as a consumer operating system, thereby making Windows

a more stable platform. A 64-bit architecture, the next paradigm shift in computing, is another new development. To the more than 4 billion bytes of space in a 32-bit address, 4 billion more bytes are being added. Thanks to the memory-mapped file system, programmers will not be required to open, close, read from or write to files any more. The operating system will move the bytes between disk and memory as required to get the data structure from the operating system that contains the data in the file. The new architecture will also allow for the use of integers instead of floating point numbers in many applications, thereby increasing the processing speed and simplifying programming efforts.

USER-FRIENDLINESS AND USER INVOLVEMENT

The year 1998 also saw the beginning of a shift away from professional intermediaries by associating users directly with their software. As a result, users will be required to learn how to express their problems, set up and adapt computations and carry out tasks such as configuration, upgrade, back-up and recovery. To attain this goal, software system designers have had to re-define user-friendliness. As a result, software carriers like the Web, Integrated Office Suites, Interactive Environment and Visual Basic, which create their own environment from locally available resources, have become popular because they allow users to create or modify software to correspond to their needs. The setting up of stand-alone processes that can run unmonitored requires an open-ended set of computations – independent processes in mail filters, automatic cheque payment and Daemons, which are sets of software routines and instructions for automating network management tasks.

In another move to user-friendliness, sparked by the concept of a hyper-linked design of the World Wide Web, the user interface on personal computers has begun to imitate human perception. The Graphic User Interface is inventing software products that organize information graphically in more and more intuitively appealing ways. Continuous speech recognition programmes from International Business Machines (IBM), Dragon Systems and others, have started a process whereby speech recognition will be added to the existing programmes like the speech-enabled version of Lotus Notes.

DATABASES

The development of Object-Oriented Data-base Management Systems has accelerated to overshadow the traditional Relational Data Base Management (RDBM) software development. Object-Oriented databases allow new data types to be created with traditional attributes found in relational models as well as built-in functions, methods and objects which are convenient for applications requiring video and image content. However, the growing popularity of data mining (the 'mining' of numerical data in repositories such as spreadsheets and databases) and data warehousing (the gathering of data from legacy mainframe and PC server databases into gigantic centralized databases) has made it possible to keep RDBMS in use. The inter-operability of the Distributed Component Object Model (D-COM) and of Java running on Common Object Request Broker Architecture (CORBA) made databases capable of mixing and matching data in an unprecedented manner. These two trends have brought about a hybrid technology that patches object capabilities on to traditional RDBMS products.

Data visualization is a new graphics application which displays in a graphical form the trends that the numbers represent. The evolving Extensible Markup Language (XML) and dynamic Hyper Text Markup Language (HTML) are being integrated to give better graphics on the Web, and new graphics software is being developed for data mining to bring out any hidden information. PCs featuring 3-D graphics and exceeding current performance are actively being developed which will increase immersive experience, as if sound and graphics were surrounding the user.

VIRTUAL REALITY

Virtual Reality (VR) is now regarded as a natural extension of interactive multimedia. New immersive interfaces like Vision Dome and Immersive Work Bench allow several workers to co-operate and interact in conducting simulation experiments on virtual prototypes. With high-speed networks and the World Wide Web, work may be carried out from almost any geographical location. Architects and furniture wholesalers have already begun using VR on the Web in 3-D by using Virtual Reality Modeling Language (VRML) to give customers a wide selection of simulated prototypes from which to choose.

During 1997 and 1998, there was a rush to create World Wide Web-enabled Software that could be used over theInternet, Intranets andExtranets for exchanging data, with a web site to run programmes, control experiments remotely or publish documents on a network. A significant software-related development has been a shift towards the Web-centred work environment and the electronic distribution of information. One major deficiency of the Web, namely the limitation of HTML in dealing with mathematics, has been reasonably solved. Instead of the past practice of representing equations as embedded graphics, which proved highly inefficient, an extension of HTML, called MathML, has beendeveloped. Many new developments have encouraged the electronic publication of journals, some of which have replaced the paper versions.

One of the most significant developments of software applications in 1997 and 1998 saw the rise of the Enterprise Resources Planning (ERP) package, offering a completely new opportunity for organizations to plan their resources around growing customer demand and to offer leading-edge solutions, reduced turn-around time, increased efficiency and improved profit margins. ERP integrates the entire enterprise from suppliers-retailers to customers, and covers departments as functionally independent as finance, production and distribution.

NETWORKING FOR VIRTUAL COMMUNITIES

In 1997 and 1998, the concept of network-based virtual communities, which will redefine the relationship between companies and customers, gained ground. The emphasis is shifting away from the retailers and is allowing customers to deal directly with wholesalers for the purchase of products and services by capturing and managing information themselves. This is promising to become a beneficial situation for both customers and wholesalers.

Virtual communities will act as agents for their subscribers who will receive adequate, accurate and timely information on products and services; they can purchase at a lower price and with better quality, while this same medium – so supporters claim – meets the social need for communication. The wholesalers will find the virtual community to be a powerful vehicle for expanding their markets, since the very concept is oriented away from brand images. They will also benefit from the increased propensity of customers to buy, and from reduced marketing costs of customer searching. Wholesalers will also receive a better statistical picture of changing customer tastes and choices and be able to target products to a subset of customers judged more likely to purchase. Above all, the overhead of building retail outlets will be minimized, while an online networked environment will reach a much broader customer base with no geographical limits.

The virtual community requires a technological strategy based on speed and leverage, with the emphasis on modular technology architecture and a focused information infrastructure. The choice of the network platform is between participation in an online service or the Internet. The strength of the Internet lies in its enormous diversity of resources assembled in one networking environment, and the TCP/IP and HTML standards offer more opportunity for growth and innovation than proprietary platforms.

Widespread developments of new technologies are taking place to make the Internet the best choice for the virtual community.

Thousands of millions of dollars invested in conventional networks, with voice-dominant circuit-switched analog networks, are being threatened by the widespread popularity of the IP-based data networks. The IP packet as the natural medium of exchange was adopted so quickly that the growth of data and voice-over-data traffic increased sharply in 1997 and 1998. It is estimated that worldwide data traffic is multiplying by an annual factor of ten or more.

LOCAL AREA NETWORKS

In the local area networks, or LANs, switching technology has resulted in Fast Ethernet in the range of 100 Mb/s and Gigabit Ethernet in the range of 1 Gb/s. Asynchronous Transfer Mode (ATM) has proved useful in full backbone networks as well as in Synchronous Optical Networks (SONETs). According to a worldwide survey conducted by Dell's Oro Group, the market for ATM switches and concentrators increased by 77% from 1996 to 1997, and 60% from 1997 to 1998. ATM is also a leader in the MAN/WAN for inter-building and intra-campus connectivity, and is becoming an important infrastructure for public carrier networks. Such ATM networking is bringing significant synergies to the operation of IP networks, allowing for true integration of multiple traffic types on the same network infrastructure. Wireless LANs have strengthened only in areas where optical fibre networks with high band-width are either absent or deficient. Wireless systems have provided good solutions to the last mile problem in MANs. For this, the Multi-channel, Multi-point Distribution System (MDS) in the two GHz band and as the Local Multi-point Distribution System (LMDS) in the high-frequency band between 26 GHz and 30 GHz have found wide acceptance. With cellular phones, the digitalization process is gaining ground.

DATA TRANSMISSION

Trends in Europe are towards the growth of Integrated Services Digital Networks (ISDN), which is not the case in North America. The speed and reliability of ISDN at a typical data transmission rate of 128 Kb/s has made it attractive for homes and small businesses. A serious competitor for ISDN is Asymmetric Digital Subscriber Line (ADSL) technology, which allows data to flow downstream towards the subscriber at rates of up to 6 Mb/s. Both are suitable for Internet access.

SATELLITE TELECOMMUNICATIONS

Although INMARSAT-A was first launched in 1991 as an alternative to VSATs by offering high transmission speeds from a miniature ground terminal, the latest version called INMARSAT-B Duplex High Speed Data (HSD) service has now become commercially available in all oceanic regions. It supports high-speed file transfer, store and forward video, video conferencing as well as voice, fax and data transmission. A large number of users including government agencies, international organizations, multinational companies and broadcast service providers have found the services useful.

Many of the above-mentioned development, like ATM and SONET, have led to the creation of networked multimedia systems, which offer several advantages for transmitting still and moving images, graphics, texts and sound; a number of content-rich applications are pushing multimedia communications forward.

Motorola's $3,400 million Iridium venture, with a constellation of 66 satellites and ground links to hand-held phones, was the beginning of a new race among the giants of the satellite business. Competitors such as Loral's 48-satellite Global Star System, the Echostar System and Hughes Electronics Constellation, among others, will probably place ten times the present number 150 commercial satellites into orbit

over the next decade. From the present $9,000 million annual revenue from satellite services, the year 2000 is expected to see nearly $30,000 million. Such Low Earth Orbiting (LEO) Satellite systems (they orbit about 1,000 km above the earth) and Medium Earth Orbit (MEO) satellites will bring about a revolution in global voice, paging and fax systems, as well as usher in the next stage of broad-band multi-satellite systems offering fast Internet and video. Compared to the $30,000 million invested in the cable television industry over the past two decades, the satellite telecommunications industry has invested more than $20,000 million in the past five years and has lined up $60,000 million for the next five. One of the keys to making satellites pervasive has been the reduction in the cost and size of user terminals by concentrating power more intensely on smaller geographic areas and by re-using precious frequency spectrums many times over. The growth of the Internet and other distributed networks is making star networks less and less effective. Consequently, in 1997 and 1998, commercial satellites with on-board processing, allowing signals to be switched between spot beams in the satellites, began to appear.

THE WORLD WIDE WEB

The World Wide Web is a window open to the tens of millions of pages available online. In addition to being a provider of video services, the Web is a major market driver for broad-band networking. At the beginning of 1997, an estimated 30 million users worldwide used the Web for work, education and recreation at home. With the increase of multimedia applications, Web content is becoming more and more tailored to fast networks. Web browsers have already become universal Graphical User Interfaces (GUIs) for narrow-band services like e-mail, file transfer, transaction processing, Web surfing, and so on. The technology of the Web browser has been extended to broad-band GUIs.

The strong signalling requirements for networking systems imposed by Web access saw the beginning of a signalling crisis in 1998, because not all network types could comply with the signalling requirements necessary in broad-band systems. One way of solving this problem was to move from pull mode to push mode data. Push mode allows the servers and networks that provide content to make more efficient use of the available bandwidth and processing time. An important application of push mode data is software updates received from Web Servers. In push mode, the service provider can control content and timing, and it is therefore becoming popular with advertisers.

TELEPHONY

Voice-over-data and IP telephony (VOIP) systems grew exponentially in 1997 and 1998 with a perceptible reduction in telephone tariffs, though at the cost of telephone quality. At present, the IP networks, including the Internet, are not ready for voice-over-data traffic on a very large scale. While waiting for the advent of broadband Internet-II to offer long term solutions, users will continue to experience the effect of overloading on voice quality.

IP telephony includes voice-over LANs, Internet, Intranets and Extranets. Both real-time and store-and-forward fax traffic can also be addressed as can unified messaging over the Web. In private networks, voice with IP over Frame Relay (FR) or ATM is being used to accommodate multimedia and sophisticated collaborative computing.

IP-BASED CONSUMER ELECTRONICS

Personal computers and digital TVs are converging into one integrated product. Current PCs are constructed with video receiver cards, whereas televisions, with embedded microprocessors required for electronic programme guide (EPG) and digital de-coding, have already been built on a pilot scale. Only a small

incremental cost is required to add more power and memory to transform a television set into a computer. Services such as Web TV from Microsoft and Intercast are already narrowing the gap between the Web and television. Efforts are under way to establish a consistent link between the Web television so that broadcasters can create a new form of entertainment. High Definition TV (HDTV) is a high-quality digital TV development, delivering data services and multiple channels.

Super-high definition image system (SHD), with a resolution equal to that of a 35-mm film and data capacity four times that of HDTV, has been introduced to make it possible to read stored newspapers even when they are displayed at actual size. This SHD image system may be combined with a Digital Network Library system to provide versatile applications such as a Digital Museum. A seamless video environment can be created by employing ATM-based 150 Mbps HDTV encoding SHD large-screen display technology and tandem HDTV screens with minimal gap between the screens.

In this context, it should be pointed out that data broadcasting standards remain problematic. It may be assumed that Web standards will prevail, but adapting Web standards to a purely broadcasting environment is proving difficult.

Video on demand (VoD) is an emerging service currently under trial. VoD enables consumers to order films, documentaries and educational broadcast/ content over a network. As a pull-mode service, no two subscribers are likely to be watching the same film or using the same VCR control such as 'rewind' and 'fast forward'. Separate data flows can therefore be established for each viewer using a band-width allocated to a single consumer. With digital compression as one of the enabling technologies for VoD with MPEG, a film of television broadcasting quality can be stored in 3 GB of memory and then played out at 3 Mb/s. A variation, called near video on demand (nVoD), is also at the pilot stage.

Over the past two years, the set-top-box has gained consumer popularity as a supplement to the televison set. The set-top-box is used to provide capacity not present in the TV or VCR by including a slot for 'additional functions', along with a tuner appropriate for the transmission medium. Transmission can be by cable, direct broadcast satellite (DBS), microwave TV, multi-channel, multi-point distribution service (MMDS), cellular TV that uses 28 GHz wireless cable service, or other such devices. Current services made possible by the set-top-box are navigation and interactive programming systems that use on-screen images and cursor-like devices to allow subscribers to select and interact with other services including home shopping, video on demand, electronic games, educational programmes, electronic publishing and telecommunication services like the Internet.

The set-top-box and even television sets have been developed with an embedded network computer (NC). Whereas networked PCs provide each user with local storage and processing with much of the data located within the mainframe, NC goes a step further by distributing data, programmes and computing power across many nodes on the Internet or Intranets. TCP/IP protocol, Inter-programme communication, a mobile code like Java and data representation and retrieval such as HTML and structured query language (SQL) allow for a distributed architecture. NC provides a lower cost alternative to standard PCs for Internet communication. The user needs an appropriate access device to browse the information and call up the functions available on the network.

CONCLUSION

During 1997 and 1998, information and communication technologies underwent a sea change with the emergence of the Internet Protocol (IP) as the de-facto standard for both network systems and digital equipment. The protocol made it possible to integrate digital technologies leading to the convergence of

computer, broadcasting, telecommunication and consumer electronics.

Speed, capacity and versatility of computer hardware doubled in accordance with Moore's Law. The Bus interface in computer architecture ensured smooth upgrading from one model of the chip to the next without having to modify the PC design extensively. Hand-held computing is becoming a useful tool for the collection of data in the field. Home automation saw the introduction of a consumer electronics Bus plug-and-play standard for connecting PCs to home appliances. Peripheral equipment, such as sound recording and reproduction, external storage devices and data compression techniques made similar progress.

In 1998, leading software manufacturers influenced the direction to be taken by the software architecture of the future. Microsoft has set in motion certain development efforts which aim at making Windows NT useful as a consumer operating system. Along with these trends, 64-bit architecture, which is the next development in software, is emerging. Users are being more directly associated with their software. In the same vein, the user interface on PCs, encouraged by the concept of a hyper-linked design of the World Wide Web, moved closer to human perception simulation. Software packages for continuous speech recognition became a consumer item. On the database front, object-oriented data base management systems accelerated to overshadow traditional relational database management software.

The significant software-related development has seen a shift towards a Web-centred work environment, and electronic distribution of information over the World Wide Web.

Network-based virtual communities are changing the relationships between companies and their customers by allowing customers to deal directly for the purchase of products and services. In local area networks, switching technology has led to very high data-transmission capabilities. ATM has proved useful in full backbone networks as well as with SONETs. The integration of multiple traffic types on the same network infrastructure is progressively taking place and wireless systems have provided good solutions to the last mile problem in medium-area networks (MANs). European trends in ISDN are catching on fast in North America and Asia.

The launching of Motorola's Iridium venture started a new race among the giants of the satellite business, with applications in global voice, paging and fax as well as the next stage of broad-band multi-satellite systems offering fast Internet and video. Commercial satellites with on-board processing, allowing signals to be switched between spot beams in the satellite, were also developed in 1997 and 1998. The Web has become a major market driver for broad-band networking with an estimated 30 million households worldwide using the Web for work at home, education or recreation in 1997. From narrow-band services like e-mail, the technology of the Web browser is being extended to become broad-band Graphical User Interfaces.

Personal computers and digital TVs are converging into one integrated product. Services such as Web TV are already narrowing the gap between the Web and television. Efforts are under way to establish a consistent link between the Web and television for the creation of new forms of entertainment. Video on demand, on computer networks, is an emerging service which is currently under trial. In 1997 and 1998, the set-top-box gained consumer popularity as a supplement to the television set. On the Internet, navigation and interactive programming systems that use on-screen images and cursor-like devices to allow subscribers to select and interact with the system are facilitating the rapid development of services such as home shopping, video on demand, electronic games, educational programmes, electronic publishing and other telecommunication services. Browsing on a television set has become possible with a set-top-box.

In the near future, there will be a further spread

of the ubiquitous Internet Protocol bringing about an accelerated convergence of computer, broadcasting, telecommunication and consumer electronics. This convergence occurs within the context of a strong competitive environment, since all the actors on the scene want to reach the average consumer (and his money) and thus enter into wide-scale marketing at national, regional or international levels. In this context, the Internet has been one of the main driving forces, either directly through improvements of Internet related technologies like Internet telephony, Network Computers or Java, or indirectly, through the development of concurrent technologies such as Video on Demand or the set-top-box. It is very likely that this competition will continue and that a wide range of technological innovations affecting all the components – hardware and software – which are used to produce, record, store, process, transmit and broadcast information in the widest meaning of these words these will appear in the coming years.

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Chapter 10
Multimedia: products and markets

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THE MULTIMEDIA REVOLUTION

This chapter aims to give an overall picture of the multimedia industry today: a picture which in fact easily eludes our grasp. Multimedia is situated at the crossroads of a large number and variety of technologies and economic sectors. Furthermore, the industry is developing all the time, and available statistics therefore quickly become unreliable and out of date. This problem is compounded by a lack of coherent definitions, which obscures both factual and conceptual analysis. On many points there are differing opinions, and it is not the purpose of this brief overview to support any particular view, but simply to provide the reader with the information needed to understand the ways in which this rapidly expanding sector is developing.

The basic and fairly limited definition of multimedia, is that of 'media in which spatial data (text, image and sound) are merged with temporal data (voice and video), by means of a unifying object – the computer'. On the basis of this definition, a much broader one with the accent on the transformation of the media could be suggested. In this light, the multimedia revolution is seen to result from the development of the following three types of media:

- computers: thanks to high-level languages such as Hypertalk, Lingo and Java, multimedia producers no longer need to be computer experts to create documents which combine text, sound and image on a compact disk-read only memory (CD-ROM), CD-Interactive (CD-I), Digital Versatile Disk (DVD) or the Internet.
- digital video: television is moving towards interactive television (I-TV) and video on demand, offered by cable distribution networks.
- network superhighways carrying Internet traffic and the information of the future, on which all kinds of interactive services such as electronic mail, voice telephony and videoconferencing, electronic commerce are already flourishing, and soon, perhaps, television on demand.

Multimedia can also be defined in terms of industries. In this context, it can be said to be a result of the convergence of several 'traditional' industries, mainly computer science and communications, and the 'content' industries, such as the audiovisual, publishing, sound recording and media industries. As was seen in Chapter 1, businesses in these different sectors are merging or forming partnerships and alliances, thus blurring the boundaries between sectors which used to be relatively autonomous.

Lastly, this multifarious revolution has had a number of political and economic consequences: decompartmentalization of the media industries following the deregulation of the communications industry, convergence of networks, globalization of the cultural industries, and the creation of major multimedia conglomerates which control both content and the vehicles for providing that content (see also Chapters 3 and 6 for discussions on these questions).

FROM HYPERTEXT TO INTERACTIVE MULTIMEDIA

Hypermedia came into being in the 1980s with the 'Hypertext' of Apple computers, and subsequently spread to all types of data (graphics, fixed images, video sequences, animations, sound) which could be digitized. But it was the 'hyperdocument', closely identified with a given language and material, which became what we now know as 'multimedia', and applied not only to off-line productions such as CD-ROMs or interactive terminals, but also to applications available on networks and on the Internet in particular.

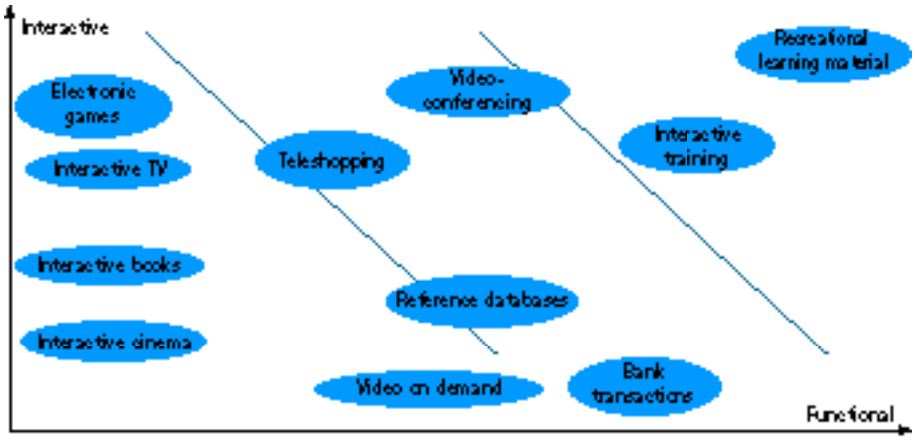
The development of 'hypermedia' was made possible by the following three basic processes:

Digitization. In multimedia, the computer's main function is no longer calculation, but management, creation and publishing of vast masses of digitized data – both content and services – in text, graphic, audio or audiovisual form. The original media through which these data were transmitted were extremely diverse. Today, digitized electronic data is the single medium and a computer is the common processing tool. This creates an entirely new environment where the possibilities for creation and use are endless, and probably as yet largely unexplored.

'Multimediation' of data. It may be appropriate here to establish the difference between audiovisual and multimedia material. Audiovisual producers work on documents containing data in several formats, for example image, voice/sound, text and graphics. It is not possible to merge all these data, however, because they are organized differently and use different languages. Producers therefore piece the data together in the form of a 'collage', rather than, accurately speaking, merging them. For example, a film with sound or a slide show requires separate editing processes and meticulous synchronization. Hypermedia, on the other hand, digitizes all the data and stores it in memory. It is therefore the computer, with its high-level languages, which controls all the operations involved in production, processing and reading. Although there is a single basic medium, hypermedia allows a whole range of formats to be used in an integrated manner, from the creation of the product through final use. People who use, consult or work on multimedia products do not do so sequentially, i.e. from start to finish, as when reading a book or watching a film. They move around in this universe of knowledge, guided simply by their intuition, the questions they ask, association of ideas or sensations. They 'navigate' their way around knowledge!

Interactive language. The power to navigate in a non-linear fashion, i.e. by association of ideas, within a relational database, is greatly increased by the ability to act at any given moment. The designers or users of hypermedia products have an ongoing 'dialogue' with the product they are designing/using via their computer. The interactivity of the new systems opens up vast possibilities for human partners who are able to control operations and anticipate results at all times. The key idea of the computer as

Figure 10.1 → Positioning of multimedia products and services along the main axes of added value



Source: Groupe SECOR.

a knowledge navigator should be recalled here: knowledge has many paths since the nature of memory is topographical, after all, and knowledge can be likened to a complex search operation in all directions. In other words, a multimedia application is defined as a product or service designed for entertainment, information, communication, promotion, education or transaction, which combines text, sound and image (fixed and moving) in the form of digitized data. Multimedia applications are also characterized by interactivity, the degree of which may vary considerably according to content.

THE BLURRED BOUNDARIES OF THE MULTIMEDIA MARKET

The provisional definition of multimedia proposed earlier is bound to change rapidly and spread to all media. The interactive counterparts of the traditional media are flourishing: interactive television, interactive cinema, interactive press, etc. All cultural industries will soon be 'invaded' by multimedia. Furthermore, everyday the Internet makes further inroads into the areas of commerce, business and industry, resulting in the development of an increasing number of multimedia products such as intranets, extranets, electronic commerce, reference databases, and so on.

Multimedia represent one stage in the development of traditional methods for producing, processing, sending and disseminating data. One of the main characteristics of multimedia is its added value in the case of games, reference works, promotional tools, bank and commercial transactions, training and communication. Multimedia can also be a way of creating innovative concepts. The evolution of supply and demand for these new types of products and services will be closely bound up with technological developments and the adoption of multimedia technologies. Between 1997 and 1998, the introduction of all-digital data turned the multimedia production and distribution landscape upside down.

Two main axes – the functional and the interactive – relating to this 'added value' can be distinguished. The first is a measure of the increased degree of productivity and efficiency compared to those of traditional methods, and the second is a measure of the level of interactivity, simulation and real-time use. This classification provides a basis for assessing the value of multimedia and the positioning of the different products and services likely to be offered in the short and long term, as well as establishing the likelihood of their penetrating the market. For example, applications which are high on both the functional and interactive axes, such as recreational learning applications (which teach as well as entertain), interactive training, etc., are the most complex and difficult applications to set up.

Figure 10.1 illustrates the positioning of different types of applications along these two axes.

As described in Chapter 1, all players involved in the multimedia industry are affected by the changes taking place. There have been a great many acquisitions and mergers; firms have restructured; new players and production companies are springing up all the time; geographical 'areas of excellence' are growing and new products are constantly being developed. The consequences of this constantly-changing market are so great that the usual definitions and data do not adequately reflect the true economics of multimedia. Instead, they are an illustration of 'imperfect' statistical systems inherited from the past, which have difficulty in keeping up with the changes brought about by the transformation of the media and cultural industries. For this reason, it is important to identify methodological signposts and the market trends.

A DESCRIPTIVE MODEL OF MULTIMEDIA PRODUCTION

Figure 10.2 and Table 10.1 summarize the descriptive model adopted.

The added value process of today's communications industries is strongly influenced by the impact of multimedia. It may therefore be said to be 'technology-driven'. This is shown by the vertical central arrow in Figure 10.2, which illustrates the major repercussions of digitization and convergence on multimedia products and services. The market is made up of three main sectors of targeted end-users: individuals and consumers, companies and economic organizations, and institutions (national and local governments, and the public sector).

The central driving force of the model consists of the notions of vehicles (the result of telecommunications and computer technologies) and content (cultural products in the general sense of the word) which correspond to a process that develops horizontally, from one end of the system (upstream) to the other (downstream). Between the two, the idea of integration has been introduced to reflect a sector which acts as a packager, or distribution/dissemination intermediary, between vehicles (computerized systems and networks) and content (media, new media, and cultural industries) (see Table 10.1).

Table 10.1 shows that multimedia is present in all fields: from the media to the arts, education, consultancy services and museums. However, it is very difficult to pinpoint the extent to which products in these areas can be said to be truly 'multimedia'. Similarly, it is difficult to estimate the economic weight of multimedia in its various forms. In museums, for example, multimedia may account for only one particular aspect of a specific work or exhibition (such as production of a CD-ROM or an interactive system). The degree of multimedia found in the above-mentioned fields is small but growing, although it is often difficult to determine the percentage of true multimedia activity. For example, there is multimedia content on the Internet, but the Internet as a whole cannot be said to be multimedia, since at least 80% of its content consists of on-line text, i.e. electronic data in text form. It is very difficult, or even impossible, to determine the exact percentage of true multimedia activity as the concept of interactivity is infinitely elastic, and there is a world of difference between the interactivity of a video recorder and that of a video-game console. Similarly, although there is much talk now of interactive television, very few households actually possess this technology and, as a result, there are as yet no statistics on the subject.

MULTIMEDIA PRODUCTS

Multimedia products can be developed on various types of media, such as diskette, CD-ROM, CD-I, DVD-ROM, interactive terminals, and 'closed' or on-line networks. However, they tend to be grouped into two broader categories: on-line media and off-line applications. On-line products can be consulted via telephone networks, cable or broadband networks known as 'information superhighways' such as the Internet. Off-line multimedia contents are not

Figure 10.2 → Technology-driven 'added value' process

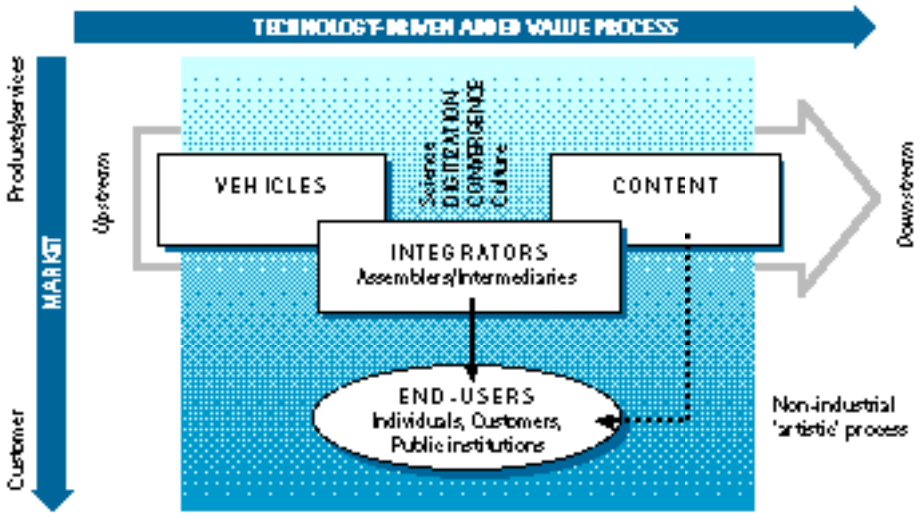


Table 10.1 → Examples of activities involved in the descriptive model (Figure 10.2)

VEHICLES	INTEGRATORS	CONTENT
Design and manufacture of computer equipment/systems and networks	Distribution	Creation of on-line content
Design and manufacture of electronic consumer products and systems (television sets, disk drives, etc.)	Programming for radio broadcasting and cable distribution	Consultancy services
Operation of networks	Development and publishing of electronic content	Design of printed material
Radio Broadcasting	Publishing and distribution of printed material, audio products and software	Photography
ICT laboratories	Photographic, sound and audiovisual studios and/or technical laboratories	Audiovisual production
	Audiovisual screening (cinemas) and productions (concert, theatre, music, dance)	Audio production
	Portal sites	Radio
		Art and design
		Design (graphic design, architecture, 'object' design)
		Performing arts
		Music, opera, dance
		Heritage (museums)
		Education and training
		Sports

Table 10.2 → Distribution of world sales of multimedia applications (in thousands of millions of $), 1995–2000

	North America	Europe	Pacific	Total
1995	4.1	3.3	1.7	9.8
2000	6.1	7.4	5.5	22.2
Annual growth	8.3%	17.5%	26.5%	17.8%

Source: Frost & Sullivan, 1994.

transmitted directly via networks, but are pre-recorded. In other words, they are contained on a tangible medium such as a diskette or compact disc.

According to Canadian data for 1995 (DJC Research, 1995), most multimedia applications are still designed for diskette or CD-ROM. The third most common medium (37% of users) for multimedia applications is the interactive terminal, followed by closed and on-line networks. However, mixed applications (part on-line, part off-line) are coming into use: Internet sites twinned with a DVD, for example (the DVD serves as the mass memory and contains the majority of data, while the Internet site makes it possible to update information, and communicate with the network). However, as on-line multimedia services flourish, the proportion of off-line applications, such as CD-ROMs, should decrease. Some believe that optical discs will eventually disappear as the popularity and capacity of networks increase.

Interactive kiosks are another way in which multimedia products can be used by the general public. For example, Canadian job centres have installed interactive kiosks in public places in order to advertise job vacancies. Similarly, a growing proportion of venues of cultural interest and tourist attractions are equipped with such kiosks to promote their products and services, as are department stores and shopping malls.

Different sources of information on sales of multimedia products and services all show a marked increase in the income generated by this sector since the beginning of the 1990s, and this increase is set to continue over the next ten years. The international study by Frost and Sullivan – World Multimedia Application Market – points to a significant increase in this sector.

The overall growth in the market is reflected both in the demand for products on optical media and in the use of on-line services. The demand for multimedia products is mainly concentrated in North America, where in 1994 sales of applications totalled approximately $4,000 million – nearly 50% of world sales. However, as Table 10.2 shows, the share of international revenue generated by the American market will decrease over time to the advantage of other geographical regions, in particular the Pacific.

Table 10.3 summarizes the types of applications to be found on-line and off-line.

Off-line products

Demand for multimedia products and services is currently measured in terms of the use of optical discs, since this is the most common support medium used for multimedia products and services. Direct, on-line access to these services is, in most cases, still at the development stage.

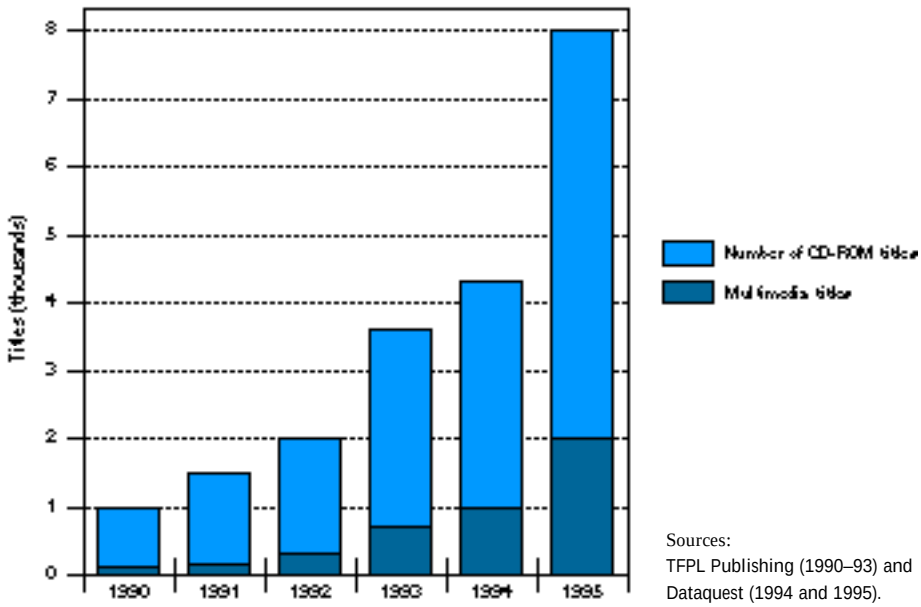
Worldwide sales of CD-ROMs (databases, images, sound and multimedia) totalled 8 million units in 1993, 16.5 million in 1994 and 53.9 million in 1995. The number of CD-ROMs available on the market also showed a staggering increase of 800% between 1990 and 1995, yielding an average annual growth rate of 51%. It should be said that multimedia productions in 1995 accounted for only 25% of the total number of CD-ROMs in circulation (75% of all CD-ROMs presumably contained other data). However, on the basis of the growth trends shown in Figure 10.3, it can be assumed that the proportion of interactive CD-ROMs will continue to grow steadily in the years ahead.

As we have seen, the United States is the main

Table 10.3 → Types of applications produced on-line and off-line

TYPE OF APPLICATION	OFF-LINE	ON-LINE
General public: leisure		
Film/Animation	Video (CD or DVD)	Video on demand
Games	Video games, CD-ROM and CD-I	Games on demand
Museums/tourism	Collection on CD-ROM Virtual guided tours	Remote consultation of works Info/reservation/payment
Books	Interactive books	Publishing and ordering of books on demand
General Public: information		
Press	Compilation of newspapers on CD-ROM	Information on demand
Library	Works/books on CD-ROM	Remote consultation
Reference	Encyclopaedias/dictionaries on CD-ROM	Remote searching/retrieval
General Public: commercial		
Purchasing	Catalogues on CD-ROM	Remote orders/payment
Advertising	Promotional material on CD-ROM	Interactive on-line promotional messages
Bank	None	Management of accounts and transactions
Companies		
Communication	Presentation of company on CD-ROM	Videophone
Training	Training packages on CD-ROM	Videoconferencing
Information	Databases on CD-ROM	On-line databases
Education		
Teaching	CD-ROM and CD-I teaching packages	Tele-education, tele-classes, distance teaching
Reference	Encyclopaedias/dictionaries on CD-ROM	Remote searching/retrieval
Recreational learning	Educational games on CD-ROM	On-line educational games

Figure 10.3 → Number of CD-ROM titles in circulation worldwide (1996)



Sources:
TFPL Publishing (1990–93) and Dataquest (1994 and 1995).

geographical market for multimedia applications. In 1994, 55% of all optical disk drives were used in the United States, compared to 19% in Japan, 14% in Europe and 12% in the rest of the world. The number of these drives – a variable which is directly related to the size of the market – has grown at a rate of 56% per year since 1992 in the United States.

On-line products

The enthusiasm for multimedia applications has also led to a significant rise in demand for on-line services, especially for data communications networks and direct-access databases. The Internet is the main data communications network on a world scale, and links some 100,000 networks in more than two hundred countries; more detailed statistics are given in Chapter 12 and in the Statistical Annex. It is clear that the explosion of this network has created a huge market of users of multimedia products. Unfortunately there are no reliable data on the subject.

CONTENT OF CD-ROMS

It is very difficult to compare differences and similarities between different countries regarding the use of multimedia products with any accuracy owing to the lack of reliable data and clear definitions at present. The following are very difficult to classify, for example: video games for children, recreational applications, erotic productions, tourism CD-ROMs, PlayStation CDs, Nintendo cassettes, vocational training CDs and educational CDs.

Despite these difficulties, several major trends can be distinguished – at least for the time being – in the world market of multimedia products for the following types of applications: computer games; dictionaries, encyclopaedias, knowledge databases, technical literature, etc.; arts and culture; educational and training software; and professional applications (advertising, representation, public relations).

In the United States, according to the study carried out by the Information Workstation Group in 1993, most of the revenue from the multimedia sector came from professional and business applications. Products for the general public in the leisure and reference sector (dictionaries, encyclopaedias, information, etc.) account for 34% of the market, while educational products make up 12% of sales. At first sight, these results may appear dubious, since electronic games, which are reputed to be a strong point in the United States, come second in the list of the most widely used consumer CD-ROMs. If this is the case, one can only assume that PlayStation, Saturn and Nintendo applications were not taken into account in this study!

As regards sales of CD-ROMs in France (1997 figures), most products on the market fall into the categories of games, art, literature and cinema productions, and applications for children and professionals. Games account for only 49% of sales, five points down on the previous year. Most new products on the market fall into the 'education' category, and CD-ROM sales in this category – which have been boosted by the arrival of electronic encyclopaedias and dictionaries – have accordingly tripled in one year, from 7% in 1996 to 22% at the end of 1997, making this the highest-growth sector of all. The third-ranking sector, 'Art and culture', accounts for only 15% of sales of CD-ROMs, despite a 38% increase in the number of CD-ROMs issued. The category 'Practical information and tourism' has seen an increase similar to that in educational applications: 12% of sales in 1997, compared to only 7% in 1996.

According to a study by Industrie Canada (DJC Research, 1995), Canadian multimedia production seems geared primarily to the business, government and education sectors. However, given that most applications found on the market originated in the United States, these data do not give an accurate picture of the use of multimedia products and services.

The areas in which Canadian enterprises wish to develop multimedia applications in the coming years are shown in Table 10.4.

Table 10.4 → Breakdown of multimedia applications produced in Canada, by category, 1995

Content	Percentage
Education	23
Entertainment/games	21
Training	19
Information/reference material	17
Sales/presentation of companies	13
Other	7
Total	100

Source: DJC Research, 1995.

CONTENT ON THE INTERNET

Information is a vast category, covering stock-market transactions, financial information (such as the Dow Jones), daily news services such as Reuters, and databases such as Nexis and Lexis. According to Simba Information, this market is worth $11,000 million, but at present not all these services can be accessed via the Internet – far from it! For example, in the field of financial services, the research company Forrester estimates that the volume of financial transactions taking place on-line this year will be worth $111,000 million, and that this figure will have reached $474,000 million by the year 2000. Swarb, a San Francisco stockbroking firm, estimates that one sixth of its business last year was done on line, accounting for a total of 700,000 transactions. A further thirty broking firms offer similar services.

There are hundreds of journals and magazines on the Internet, and several major newspapers already have electronic versions, whether these are partial or total, adapted or identical to the paper version (see Box 6.1). Some operations were amazingly successful, such as Hot Wired (the Web site of the American journal Wired), but other magazines closed when the electronic version proved stronger than the paper version. It should be added that not all on-line information is of a multimedia nature; only a very small proportion does in fact combine text, image and video sequences in an interactive language.

Erotic content sells well when the confidentiality of transactions is ensured. The research firm Forrester states that 10% of sales via the Internet are of a sexual nature, whether in the form of books, video-clips, photographs, on-line interviews, or other items. These sales amount to $52 million, and there are thousands of sites on the Internet. The Seattle-based Internet Entertainment Group has 50,000 subscribers paying for its on-line service, the same as the number of subscribers to the Wall Street Journal!

Travel is another sector which is becoming increasingly important on the Internet. Most airline companies have a Web site through which they sell seats directly, often offering a discount of 5%, the equivalent of the travel agent's commission (as is the case, for example, with Northwest and Continental airlines). However, Expedia, the leader in its category, has total sales of nearly $1 million, with Internet sales accounting for at most 1% of its total revenue. According to Forrester, again, sales in this sector are set to increase by 50% over the next three years.

Retail trade is also making a considerable breakthrough, but companies specializing in catalogue sales have realized that the operation will be long and difficult. These firms make only a small fraction of their catalogue available on line, since creating an interesting and attractive on-line catalogue is still a difficult and time-consuming task.

CDs and books sell well on the Internet. CD sales are set to reach $20 million, with profits in the region of $200,000, according to The Red Herring. However, MCI, a telephone company, has just closed its 1-800-Music-Now site, after spending $40 million and selling only 400 CDs. . . . Nevertheless, the research firm Jupiter predicts that in the year 2000, $186 million – 2% of total revenue – will be generated in this way in this sector. Two major American sites,

Barnes & Noble and Borders, are competing with the British Bookshop site. However, more optimistic predictions put the figure for revenue generated via on-line networks in the year 2000 at 8%, not 2%, citing the unprecedented success of the Amazon Web site.

Automobiles are also sold via networks on sites such as Auto-buy-tel, which was set up by Peter Ellis in California. For a monthly fee of between $250 and $1,000, 1,400 people posted car-sale advertisements on the site, generating revenue of $6.5 million for the company. Out of 15 million cars sold in the United States, 2 million vehicles were bought after just one visit to the sales room, which indicates that purchasers know exactly what they want (and could have bought on the Internet). Chrysler sold 1.5% of its cars through its Internet address, and believes it can increase this figure to 25%. It costs customers only $25 to buy a car through a Web site.

Advertising and marketing are well represented on the Internet, as each day thousands of corporate sites, featuring multimedia to varying degrees, are created. However, this does not mean that all these marketing operations are effective. Just because a company advertises on the Internet does not mean that it necessarily wins 50,000 new customers!

THE COSTS OF PRODUCTION AND MARKETING

The cost of a multimedia application varies enormously according to the type of product. Two main factors influence the total costs and how these costs are broken down: the quality of the finished product (high- or low-quality item), the type of product and the market sector for which it was designed (consumer product, educational product, or corporate product), and lastly, the scale of the finished product. To give an idea, it may be said that production costs vary between $135,000 and $4 million. Of these figures, 60% represents the cost of the production itself, with the rest divided between pre-production, post-production and miscellaneous costs (SIMBA, 1994).

It should be remembered that some dictionaries and encyclopaedias cost from $1 million to $4 million to produce, if the years of research necessary for finalizing the content are taken into account. Apart from the overall costs, how costs are broken down according to different components varies according to the type of product. For example, a 'game'-type application requires much more programming than an educational application (see Table 10.5).

Table 10.5 → Breakdown of cost according to different components by percentage

Component	Educational	Games	Information	Commercial
Management	10	8	10	5
Design	15	15	25	10
Research/editing	20	5	10	10
Transfer, master copy and test	5	2	10	4
Production and animation	25	10	–	49
Graphics and text	10	5	–	8
Programming	10	40	35	10
Integration	5	15	10	4
Total	100	100	100	100

Source: Innovitech, 1995, Canada.

Table 10.6 → Breakdown of sales of multimedia products, by distribution network

Distribution	Percentage
Computer distributors	65
Hypermarkets	20
Bookshops	10
Mail order	5
Total	100

Analysing the distribution of CD-ROMs is often difficult. It is not always clear whether they should be classed as computer products, literary or artistic works, or video games. In the United States, 40%–45% of all CD-ROMs are 'bundled' – in other words offered free with the purchase of multimedia equipment or specialized journals. When CD-ROMs are sold individually, most are distributed through specialist computer distributors, as shown in Table 10.6.

In France, sales from hypermarkets are not increasing as much as they are through other market channels. Hypermarkets now account for only 34% of all software sold, compared to 40% in 1996. Most sales are now made in specialized computer hypermarkets, which sold 39% of software in 1997, compared to 36% in 1996. Two other categories of distributor have seen their market shares rise. These are games and CD specialists, which now sell some 11% of leisure software, compared to 9% in 1997, and toy specialists, with 5% of sales, compared to 3% the previous year (see also box 10.1).

The issue of copyright in the area of multimedia is dealt with in Chapter 8 and only two points will be mentioned here. Firstly, since digitization means that works can be transmitted, used and perfectly reproduced very easily, one may suppose that the authors of protected works will need new mechanisms to control the use of their works to calculate and ensure receipt of royalties and to protect themselves. Secondly, the fact that previously separate media may now be fused makes the question even more complex. Thus, the producer of a CD-ROM containing music, a newspaper article, visual material and sequences from a television programme must obtain authorization from each copyright holder in order to use the relevant extract. This applies to all rights involved.

CONCLUSION

The multimedia industry is expanding rapidly, but it is very difficult to identify exactly what percentage of cultural products can be labelled 'multimedia'. To illustrate this point, in the case of Canada, the Ministry of Industry put the total revenue of the content industries for the year 1994/95 at $13,000 million, broken down as follows: 51% for publishing, 15% for film and visual material, 8.4% for sound recording and 25% for radio and television. For electronic content (multimedia, databases, electronic publishing and video games), experts claim that 8-10% should be added. IBM, meanwhile, claims the on-line business sector was worth $15,000 million in 1997, and will be worth $70,000 million in 2001.

It has already been noted how difficult it is to set clear boundaries in this industry. There are several reasons for this. First, multimedia is not simply a new content industry: to a large extent, it revolutionizes both the content and the vehicle of other cultural industries (for example, CD-ROM encyclopaedias compared to paper encyclopaedias, and news on the Internet compared to news in newspapers or on radio and television). In the long term, what proportion of publishing will be in multimedia form? How quickly will television become interactive? With the arrival of DVD, when will film become a multimedia product? When will networks be able to support truly multimedia applications? Furthermore, problems of methodology mean that it is impossible to obtain reliable statistics, since multimedia products can be classed as belonging to the computer industry, the cultural industry, the leisure industry (games, tourism, erotica, etc.), or the business world (electronic

Box 10.1 → Young people, new media

Research teams from twelve countries, co-ordinated by the Media Research Group at the London School of Economics under the direction of Dr Sonia Livingstone, have recently conducted extensive research on children's personal ownership and use of old and new media. Approximately 15,000 children and young people have been surveyed in Belgium (Flanders), Denmark, Finland, France, Germany, Israel, Italy, the Netherlands, Spain, Sweden, Switzerland and the United Kingdom. The comparative research was conducted by most countries on 4 age groups (6-7, 9-10, 12-13 and 15-16) making it inappropriate to quote a single figure for all children. The case of 12-13 year-olds is taken here as paradigmatic of that for the other three age groups.

Findings show that, although television in the home is more or less ubiquitous, the numbers of young people having their own set differs greatly between countries (see Table 10.7). In Denmark and the United Kingdom, children and young people are more likely to have a television set in their own room than in other European countries and they also tend to spend more time watching television on the average (see Table 10.8). In the United Kingdom in particular there is a 'screen entertainment' culture with children and young people being more likely to own their own equipment.

The number of homes with up-to-date computers varies from almost two thirds in Belgium and Denmark to just over one quarter in the United Kingdom. Personal ownership by young people of such computers is comparatively rare. Despite its lead in the distribution of entertainment-oriented screen technologies, the United Kingdom, together with France, lags furthest behind as regards both home provision and personal ownership of up-to-date PCs by children. Internet access in the home is the most common in Belgium, where half of all

Table 10.7 → Access to television, TV-linked games machines, books, PCs with CD-ROM and Internet by children aged 12-13

	Television		Games machine		Books		PC with CD-ROM		Internet link	
	% in home	% in own room	% in home	% in own room	% in home	% in own room	% in home	% in own room	% in home	% in own room
Belgium	97	30	69	22	99	89	63	12	49	4
Denmark	98	72	38	24	96	83	61	19	27	5
Finland	95	42	47	22	93	88	54	18	31	8
France	98	30	65	35	98	94	31	8	12	4
Germany	100	48	39	24	95	88	44	18	10	1
Israel	94	44	42	21	90	74	57	32	34	18
Italy	95	52	53	34	90	74	37	23	11	5
Netherlands	100	39	58	23	100	96	47	3	15	0
Spain	96	37	62	42	96	89	41	13	11	4
Sweden	94	51	69	41	93	89	52	16	33	8
Switzerland	92	15	45	18	95	88	48	11	18	2
United Kingdom	99	69	64	42	84	64	28	6	8	1

Table 10.8 → Mean average number of minutes spent per day on television, games machines, books, PC and Internet by children aged 12-13

	Television		Games machine (at home)		Books (not for school)		PC (not for games)		Internet	
	Users	All	Users	All	Users	All	Users	All	Users	All
Belgium	105	100	19	10	23	20	23	13	5	1
Denmark	158	156	49	25	21	17	24	18	15	10
Finland	156	156	22	15	42	37	16	15	7	6
France	N/A	91	N/A	N/A	N/A	N/A	N/A	N/A	N/A	18
Germany	105	103	N/A	N/A	23	20	20	10	5	1
Israel	129	124	40	N/A	39	28	48	28	30	23
Italy	N/A	N/A	38	30	N/A	N/A	44	23	11	4
Netherlands	134	122	13	8	25	23	18	14	4	1
Spain	134	134	34	19	N/A	N/A	30	17	9	4
Sweden	141	138	26	16	21	18	32	26	19	15
Switzerland	92	90	56	32	35	33	19	12	10	3
United Kingdom	164	164	32	21	32	17	26	10	11	3

homes have it, followed by the Scandinavian countries and Israel where around a third have access. Once again the United Kingdom and France lag behind, as do Germany, Italy and Spain.

There is some evidence of a trade-off between watching television and reading books in leisure time (see Table 10.9). Swiss children spend the least amount of time watching television and read more. The reverse also holds true: the least amount of time is spent reading in the United Kingdom and Denmark, where children spend larger amounts of time watching television. However, other factors are clearly influential: young people in Finland manage to spend time both with television and books, while Swedish children, who spend only average amounts of time with television, spend comparatively little time reading. Interestingly, provision of books both in the home and in the child's bedroom is lowest in the United Kingdom, where there are more homes with television sets than a shelf of books, and as many children own their own TV sets as books (see Table 10.7). Israeli children are particularly likely to own a multi-media PC and thus, unsurprisingly, spend considerably more time on serious PC use than any other group of young people with the exception of those in Sweden, where around half have access to a family PC with CD-ROM, and in Italy, where personal ownership by children is also high. Time spent on the Internet is also highest in Israel.

For more information, consult:
www.psych.lse.ac.uk/young_people ; Special Issue of the European Journal of Communication, Vol. 13, No. 4, December 1998.

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commerce, training, marketing, etc.). Lastly, the technology and art of multimedia is constantly developing. Applications show varying degrees of interactivity. For example, on the Internet, it is not easy to distinguish between interactive content and non-interactive content.

Today, the multimedia sector is creating its own market as it develops, which presents a major obstacle for all companies working in the field. The industry's rapid growth may also be seen as an obstacle. The fast progress and development of the multimedia industry means that products often have a very short shelf-life, as they are constantly being updated and rapidly become obsolete.

As regards production, the difference in cost between amateur products and top-of-the-range products is enormous: costs range from $25,000 to $4 million. As far as copyright is concerned, multimedia is creating a completely new situation, since this industry is one of recycling and re-using existing media of all kinds, a practice which calls into question the role of collection companies, the evaluation of the audience actually reached, the definition of the right to transform products, and so forth.

The multimedia industry risks irreversibly transforming cultural industries (as regards production and distribution), the world of business and industry (electronic commerce, intranets and telecommuting) and the world of public and private services. This is both very exciting and more than a little worrisome.

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Chapter 11
Evolution of the Internet

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Most people around the world who encounter the Internet consider it to be a vibrant medium of exchange that supports a wide variety of uses, most of them commercial. Many also know that, having been created with support from the United States Government, Defense Advanced Research Project Agency (DARPA) initially, and later the National Science Foundation (NSF), the Department of Education (DOE) and other agencies and departments, the Internet has its roots in the research and development community. In recent years, the private sector has made extensive investments in building Internet capabilities, and its recent growth has been almost entirely fueled by such private sector initiatives. However, as recently as a decade ago, the Internet was still the private enclave of the research and education community. At that time, few in the telecommunications business believed that the private sector would come to play such a critical role in leading its continued development and that the Internet would come to play such a central role in the United States (and indeed the world's) economy in the short span of ten years.

This article begins with a brief summary of the developments that led to the widespread availability of the Internet. Consideration will then be given to some of the key transition issues in moving the Internet from the province of United States Government control to the private sector. The need for effective management structures and standards will be highlighted, together with the need for continued awareness on the part of governments concerning the Internet and its operation. Finally, some of the longer-term needs of the user community, as well as those of Internet service and equipment providers, in addressing the possibilities for the future, are discussed.

BACKGROUND

The Internet is a collection of networks around the world that inter-operate seamlessly via an open

architecture and its associated protocols. The first three networks in the Internet were the Advanced Research Project Agency Network (ARPANET), packet radio network, and packet satellite network, all sponsored by DARPA several decades ago. Each of these three networks was individually designed and implemented, but most importantly, the Internet architecture was created to be independent of the detailed design or implementation of any of its constituent networks. As a result, the technology for networking could evolve and change, and the latest technology could be integrated with the prior technology simply by adding new networks.

The success of the Internet was therefore heavily dependent on the underlying computer communications technology that had been pioneered in the ARPANET. The basic notions of packet switching were already well known by the late 1960s and had been successfully demonstrated in the ARPANET project by the early 1970s. In addition, the notion of layered host protocols, also demonstrated in the ARPANET project, allowed for building new applications and services on top of existing ones, and has been carried forward to the present as a basic paradigm for protocol implementation.

To get to the Internet architecture was not a completely straightforward path, however, from the early network developments. In fact, the original implementation of the packet satellite network equipment assumed it would be integrated into upper memory of an ARPANET IMP (Interface Message Processors), and not be a separate, externally accessible network. This was perhaps the first of many cases where the network management required close co-ordination with network architecture and raised the basic issue of overall governance of the 'network of networks'. As is now known, there is no single entity responsible for the overall performance of the Internet, as there is no entity responsible for the performance of the world economy. Some perceive this as a fatal weakness; others, as a principal strength. Whatever their views, all the participants have a fundamental interest in the success of the system and will generally do their part to contribute to it, while recognizing that they may need to work together on certain problems and issues that cannot be resolved in isolation.

Networking development over the past four decades may generally be categorized as follows:

→ The period of the 1960s, in which basic ideas emerged for computer networking, particularly those of packet switching and the possibilities for sharing resources over computer networks.

→ The period of the 1970s, when packet switching technology was developed and demonstrated in several experimental and commercial networks, beginning with the ARPANET at speeds of 50 Kbps. This was mainly a period of technological development, including the development of local area networks like the Ethernet and small computers such as the Xerox Alto for individual users that presaged the personal computer as we now know it.

→ In the 1980s, widespread deployment and commercialization of the technology began. Networking was extended to the entire research and higher-education communities. Industry took to manufacturing and selling personal computers andworkstations, local-areanetworks, and related software. Transmission Control Protocol/ Internet Protocol (TCP/IP) became the standard protocol for computer communications. The National Science Foundation Network (NSFNET) replaced the ARPANET as the backbone of the Internet at speeds of 1.5 Mbps. By the late 1980s, there were thousands of networks and tens of thousands of hosts on the then emerging Internet. Most of these were local and regional networks that had been formed during the decade.

→ The 1990s has been the decade of commercialization of the Internet. Beginning with the first experiments to link commercial e-mail

systems to the government-supported (and, at the time, still-dominant) portion of the Internet, the desirability of allowing commercial interactions on the NSFNET grew. The ARPANET was decommissioned. The Boucher Bill, passed by United States House of Representatives in early 1993, opened up the National Science Foundation Network (NSFNET) to commercial use. A few years later, sufficient private sector networking capability was deemed to exist, and US Federal government support for the NSFNET ceased. Although the Internet was growing at 100% per year prior to 1993, the introduction of the Mosaic browser for the World Wide Web caused usage of the Internet to accelerate dramatically (see Statistical Annex, Section 3). It is now widely assumed that, by the end of this decade, approximately 100 million users will have access to the Internet. A decade later the number might easily be a factor of ten larger, representing perhaps 10% of the world's population.

TRANSITION TO THE PRIVATE SECTOR

While the decision by the United States Government to privatize key parts of the Internet, such as the Domain Name System (DNS), became embroiled in debate across many continents, this is not a new phenomenon. Indeed, the move to privatization has been taking place steadily over many decades. In the late 1970s, DARPA began to involve the research community in the decision-making process for ARPANET standards, and by the mid-1980s, this basic responsibility had been assumed by the research community. As part of its strategy from the beginning, NSF encouraged and, in several cases, funded the development of local and regional research networks by the private sector. With support for the Internet Engineering Task Force (IETF) and the Internet Assigned Numbers Authority (IANA, www.iana.org/faqs.html), NSF empowered these groups to take responsibility for leading the effort to establish standards. In working with the Internet Society and various diverse groups from many quarters, it recognized the role that private-sector bodies had to play in the overall organization and governance of the Internet.

At this point, with respect to the evolution of the Internet, the essential function of the United States Government, in co-operation with other governments, should be:

- → to ensure that a fair process is set up for the evolution of the Internet at the local, national, regional and global level;
- → to provide supervisorycapability inthe event that private-sector efforts fail to ensure fairness or guarantee the effective working of the Internet;
- → to remove any bottlenecks, barriers and other obstacles to progress;
- → to support advanced research, as appropriate; and
- → to address policy issues concerning the Internet, and to encourage or otherwise stimulate progress in the Internet towards the general well being of society.

With the possible exception of the last two, these functions can be quite difficult for governments to carry out effectively. The notion of fairness is likely to be elusive among competing parties, and, left to their own devices, private sector organizations will be more inclined to tilt the process in their own favour whenever possible. The private sector may provide supervisory functions, but these too must be watched closely, if only in the public interest. Finally, it may be difficult to identify many of the barriers and bottlenecks, let alone to find effective ways to overcome them. Itis important that the harbingers of changenot be hindered by established ways of doing business.

Governments cannot effectively solve these problems unilaterally, but they can and should draw upon input from the private sector. Research is the key to

unlocking new capabilities. While industry has the incentive to carry out short-term research, often in the process of product development, with few exceptions, it will not invest for the long-term. Since the break-up of the Bell System in 1984, the amount of long-term industrial research has remained low. Only states seem able to make the commitment to long-term research funding (see UNESCO's Draft World Declaration on Science and the use of Scientific Knowledge, www.unesco.org/science/wcs/eng/declaration_e.htm). The US President's Information Technology Advisory Committee (PITAC) recently recommended that funding for long-term information technology research be significantly increased. This advice is likely to be acted upon positively in the US Congress, although the exact amount of the increase over time will not be known for some time.

At a time when the role of government appears to be diminishing, the issue of Internet governance is also being discussed with some fervour. The notion of a single organization or party being responsible for the overall operation of the Internet seems as unusual as that of a similar body for governance of the world's economy. Each network operator will be subject to one or more governmental regimes and legal systems, and standards that enable interoperability must be maintained and allowed to evolve. This requires collaboration and interchange. While groups such as the Internet Society and IETF, and more recently the World Wide Web Consortium (W3C) and the Internet Corporation for Assigned Names and Numbers (ICANN) (www.icann.org/faq.html) represent efforts among many interested parties to work together, the first steps toward collaboration among the Internet Service Providers were taken during the past decade. Specific examples are the formation of the Commercial Internet Exchange (CIX) in the late 1980s to facilitate the exchange of traffic among commercial internet service providers, and more recently the formation of the Internet Operators Group known as IOPS.ORG to work on problems and issues concerning performance of the Internet. The formation of ICANN to co-ordinate issues of naming and addressing is merely the most recent development for keeping watch over a portion of the Internet governance problem in a private-sector organization.

TRENDS, NEEDS AND REQUIREMENTS

In this section, some of the trends, needs and requirements for the Internet in the coming years are briefly discussed. This discussion is necessarily incomplete as the Internet offers opportunities in virtually every direction and dimension. Nevertheless, the following are likely to be central to any such developments.

Higher Bandwidth. In the span of three decades, the speed of network lines has increased from 50 Kb/s to 10 Gb/s. Today, the typical user can access the Internet by dial-up connections at 56 Kb/s or with special local access provisions such as Integrated Services Digital Networks (ISDN) at 128 Kb/s, Cable modems at 10 Mb/s (shared with other cable users on his part of the system), or via various levels of Digital Subscriber Lines (DSL) from the telephone companies at dedicated speeds up to about 6 Mb/s. The cost of such local connections in the United States ranges from about several dozen dollars per month up to a few hundred, for the most advanced DSL services. At these access speeds, the long-haul portion of the Internet typically costs from a few dozen dollars to a few thousand dollars per month. Yet very few users, if any, have access to the gigabit-per-second throughput capabilities available from some carriers. There are simply no provisions to supply them to individual users unless they spend considerable sums to commission such services to be provided on an individual case basis (at a cost that can easily run into the hundreds of thousands of dollars or more). So gigabit speeds are economically impractical for most users at present. For businesses, where the investments can be shared among many users and

considered as a business expense, the situation is more manageable, but there is little incentive to make these investments unless the traffic or the applications demand it. If inexpensive local access with consumption-based pricing of long-haul services can be provided, then high-speed capabilities may become affordable for businesses. Computer and software companies will then have an incentive to produce the needed hardware and software for gigabit applications.

Wireless Connectivity. The rapid growth of paging, cellular telephony and other wireless applications (including wireless Local Area Networks, or LANs, and Internet access) have caused the prices for wireless devices to drop almost to the level of commodities. Palm-sized devices with computing capabilities approaching those of full desktop PCs (but with limited display, storage and battery life) have recently emerged and will eventually dominate the market. It is not unlikely that most of these devices will have wireless connections and still remain commodity priced.

The ability to stay connected, if one chooses, wherever one goes, is likely to be the norm. However, small size will ultimately dictate the refinement of speech input technology as a means of controlling computer interactions. Innovative means of display are likely to emerge, as are methods for pointing and selecting within these new contexts. Wireless access at speeds up to 1.5 Mb/s in the next decade seems destined for those who can afford the high cost, but much higher-speed wireless access in the local environment is also possible. Economics, among other things, will determine if it is practical to provide this capability using wireless technology in place of fibre or to replace copper. Finally, satellite access will continue to be attractive for certain applications, including access into the fixed telecommunications plant at nearby points, or for world-wide communications that do not depend upon the terrestrial communications plant at all (see, for instance, Chapter 13).

Ubiquitous IP. The current Internet Protocol provides a 32-bit field for addresses. This field, which was once considered by its inventors as overkill, since it could designate several trillion machines or end devices, is now close to saturation from the widespread proliferation of personal computers. Efforts to accommodate this growth have focused around the development and deployment of IPv6, a 128-bit version of the protocol that augments the original version in several important ways. Although it may seem hard to believe now, we may ultimately find that even such huge numbers as 10^{40} (which is about how many devices can be addressed with 128 bits), are not large enough. This size will enable every device known to have a network address. With ubiquitous chip-sized computation available for pennies or less, every refrigerator, toaster, oven, furnace, light switch and doorknob can, in principle, be monitored and/or controlled by the authorized parties on the Internet.

Proliferation of Digital Information. E-mail has been a fixture on the network since the earliest days of the ARPANET, as have computer files and the ability to move them between machines on the network. The World Wide Web has greatly simplified the mechanics of specifying files as a single string (known as a Uniform Resource Locator, or URL) consisting of the machine name followed by the file name. Furthermore, the Web design took some of the best features of Standard General Markup Language (SGML), a graphics markup language pioneered by the publishing community, and produced a simplified version called HTML that was easier to learn. Files written in HTML could be more easily manipulated by computer for presentation on many screens than could files formatted in many different, perhaps even arbitrary ways. Many users connect to the Internet simply to send and receive e-mail and to access the Web. These two functions are a first important step in making digital information available on the Internet. Recent efforts to create repositories of digital objects that can persist over long periods of time and

that can be accessed with precision through sophisticated search mechanisms are almost within reach. These systems, part of an open-architecture approach known generally as 'digital object infrastructure', have the ability to encompass the Web as well as most other information systems.

E-commerce. The ingenuity of entrepreneurs is nowhere more likely to be exploited than on the Internet. Almost every day, there are new and innovative approaches to the use of the Internet in ways that astonish even the most experienced observers. Business on the Internet currently amounts to several thousand million dollars per year and is anticipated to grow to over a trillion dollars early in the next century. Recent estimates are that the Internet phenomenon was responsible for approximately one-third of the economic growth in the United States during 1998. Concern about security of credit card numbers has been greatly alleviated by the scarcity of serious problems, and by the credit card companies taking the major part of the responsibility for fraud, thus protecting the end-user to a great extent. The main concerns are now focused on matters such as authenticating parties to any given transaction, resolving privacy and security issues, and finding the means to resolve general classes of disputes. There is currently no more debate on Internet-based taxation. Over the long-term, as the Internet economy continues to grow, the need to have a solid means of administering taxes to supplant lost local taxes, or to displace them in some effective way, will loom as large issues that may require international co-operation. Essential to this area of discussion will be the need for better information about the Internet, its operation and its use, much of which is simply unavailable at present. Analysis and interpretation of the data will probably be subject to many interpretations by different groups over time.

Current needs and requirements for further progress will be focused on the following issues.

→ A widely-available and internationally-accepted means of certification. This may involve governments at some level, including the certification of government information. For non-governmental certification, this service can be provided by the private sector.

→ A means of managing intellectual property in the network environment (see also Chapter 8). First, it is essential to be able to identify intellectual property consistently and coherently. The technology for incorporating independently-developed identification systems is basically available, but the ability to mark digital information to render it tamper-proof, or for which certain information is hidden, is still being explored by researchers. Rights and interests in intellectual property are primarily those covered by patent, copyright and trademark. Nevertheless, it remains difficult to identify those rights and interests, or to know what, in general, can be done with digital information obtained over the Net. A method based on stated operations for digital objects was described in a report by the Cross-Industry Working Team. Languages have been developed for automating the negotiation of certain uses. However, for the most part, rights holders are still reluctant to make their valuable resources available on the Internet for fear that the information will be widely disseminated free of charge, and will thus adversely affect their revenue.

→ Security technology is becoming fairly widespread on the Internet today, especially with the use of powerful encryption for handling credit cards and for interchanges between authorized parties, such as banking and other financial institutions. Further, restrictions that had been placed on the general use of encryption technology using 56-bit keys are no longer in effect, but do remain in effect for stronger modes of encryption. While such technology offers great power to protect information, it may also

introduce serious impediments to usage of information even by authorized users, and introduces significant overheads in the secure management of keys as well as of overall systems. Laws vary widely from country to country on this subject.

→ Fighting viruses (worldwide). The spread of viruses can occur with great speed; steps to detect and fight them will require the co-operation of many parties. In some cases, there may not be time to establish working relationships with other countries to deal with such attacks, and prior plans for co-operation will be essential. In the United States, the Computer Emergency Response Team (CERT) at Carnegie Mellon University tracks most known security threats and alerts responsible bodies, as it finds appropriate. This kind of information exchange has been extremely effective to date, and will become increasingly important to maintain over time.

→ Execution of contracts. Unless well-known means are available for two or more parties on the Internet to enter into contracts, the ability of the Internet to support the growth of electronic commerce will be greatly impeded. Legal documents in most countries still requires ink signatures, or facsimile backed up by ink signatures. Digital signature technology has progressed to the point where it can replace ink signatures, provided the administrative means of managing it is deployed and maintained. Failure to adjudicate disputes cannot be allowed to depend on lack of ink signatures or the ability to verify digital signatures. Simply stated, there must be confidence that courts in the various countries will recognize the legitimacy of such contracts and treat them accordingly.

→ Building digital libraries and means of dissemination. Significant progress has been made in the digitization of material and in making it available via the Web. Yet most of the collection of the world's information is still inaccessible by computer. Further, the large body of information which is available on line is not accessible except by browsing or through some other trial-and-error search fashion. It is becoming a critical requirement to rectify this problem, most likely through innovative cataloguing and indexing techniques still in the early research stage, so that access to information on the Internet will become relatively straightforward (see box 7.1).

FOR THE FUTURE

The future rarely plays out the way we imagine it will, and in the full knowledge that any such predictions are likely to be disproved by practice, the following possibilities may nonetheless be proposed.

E-commerce will continue to flourish, with a move away from prepackaged buying options prepared by sellers, to more opportunities for customization and other user-defined products and services. Intermediate organizations on the Internet will find better ways to match the needs of potential customers and suppliers of goods and services.

Better means for locating all kinds of items will be developed, including the ability to locate individuals (primarily those who wish to be found, but possibly some who do not), to locate sources of goods of all kinds including new and used components, and even to trace the history and performance of selected goods and services (and/or their providers).

Building worldwide markets is largely a non-technical problem, but technology can greatly assist in this domain. The organization of marketing forces on the Internet is still in its infancy and will probably only increase in sophistication over time.

Collaboration is one of the largely untapped gold mines on the Internet. The applications in which groups or individuals at different locations, and even at different times, work together on missions of common purpose, are potentially enormous, and difficult to carry out effectively via other means.

From applications such as IP video and teleconferencing, which have early prototypes on the low bandwidth of today's Internet, to joint manufacturing design and development, to strategic planning by teams of experts, the field of possibilities is large. Furthermore, applications that involve or even stimulate the development of information as malleable content, to be further worked on by others, while respecting the rights of the original creators, could open up new modes of creativity.

Finally, the potential for the use of sensors, activators and control mechanisms of all kinds on the Internet has remained largely unexplored. Improvements in weather prediction resulted directly from the use of global satellite monitoring systems. It is possible to imagine weather instrumentation deployed on virtually every building, vehicle and individual which is able to report local conditions. The utility of a three-dimensional fine-grained grid of such weather information, combined with mathematical prediction models could improve our long-range prediction abilities by days, or even weeks. The ability to use the Internet for facilities and operations of all kinds could become routine. The remote operation of manufacturing plants is one example; the possibility of collaborative telemedicine is another. Distributed simulation experiments used in connection with real systems offers further possibilities here.

CONCLUSIONS

The Internet is creating a revolution in society just as significant as the Industrial Revolution. It may be suggested that the technology resulted from far-sighted investment by the United States government and the active involvement of the research community, later amplified by contributions from industry and a supportive government policy. Since current applications on the Internet have focused increasingly on electronic commerce, the need for careful consideration of the many public-policy issues has grown. Many of these will not be amenable to rapid solutions and will require continued involvement of governments around the world in co-operation with the private sector. Basic operation of the Internet has long since moved to the private sector, but its continued evolution will depend on providing the kind of universal connectivity for data exchange with generally accepted open standards that the current users have come to cherish. Issues of sovereignty and conflicting legal systems will continue to define the limits of what is and what is not possible, but increased co-operation and collaboration over the Internet may have the effect of bringing our various systems closer together. The rights of all parties making use of the Internet will ultimately require careful consideration in the world's deliberative and law-making bodies. While the Internet will surely continue to contribute to economic growth, it will take both strong resolve and commitment to avoid the inequities which would result from having technologically created a world of haves and have-nots.

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Part Three

Information and communication technologies throughout the world

Chapter 12
A worldwide view

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The main goal of this chapter is to present a brief overview of the global situation of information and communication technologies (ICT) and to discuss the most significant trends. In this context it is important to understand that these technologies pursue two main goals: processing information (i.e. presenting it in various forms, storing it, searching for it, reproducing it, etc.) and transmitting information from one geographical point to another, from one person to another, to a group of people or to the whole community. So in a certain sense the development of ICTs reflects the development of human beings throughout history. In this chapter, however, only factual material concerning the short life of ICTs over the last few years will be presented.

The second half of this century has witnessed the global phenomenon of an information explosion. The development of different electronic technologies has made it possible for millions of people to have fast access to huge information resources stored in different places on the planet, to communicate with each other and to handle information presented in various forms (text, graphics, video, sound, etc.). These technologies offer brilliant prospects together with dramatic social challenges as seen in Chapter 1.

Yet for the great majority of people in the world, traditional information technologies (postal services, press, radio and television) are still playing and no doubt will continue to play in the near future a much more important role than the ICTs such as electronic mail, multimedia and global computer networks. There are two main reasons for this : on the one hand, the use of these ICTs requires certain investments (the purchase of a computer, for instance) that still are too high in relation to average incomes in poor countries and, on the other hand, the ICTs need an adequate communication infrastructure, including telephone lines in sufficient number and quality.

For this reason, in this chapter the focus is on the main contemporary information and communi-

cation technologies, both traditional and modern, in an effort to understand their development and accessibility in different regions, as well as their prospective development and the ways in which they influence each other.

The relations between the various technologies are complex. Postal services, for example, provide a channel for press distribution, in the same way that telecommunications channels provide an infrastructure for digital networks. Some technologies are more concerned with transporting information, while others are more concerned with its production. Radio and television simultaneously produce and convey information, and are therefore of a different nature. This complex set of relations is the basis for the structure of this chapter, which is divided into five sections: postal services, the press, telecommunications, digital networks and radio and television.

POSTAL SERVICES

Postal service as a technology for conveying written messages from one person to another is the most traditional communication technology among all those discussed in this chapter. The Persians were the first to establish a formal network to transmit messages across their empire, so the postal service is an ancient working technology. It also plays an important role in the life of contemporary society because it is not only a media for a person-to-person communication, but also a media for the distribution of printed materials (newspapers, journals, magazines, advertising material, etc.).

Clearly, the significance of postal service as a means of person-to-person communication is steadily declining, since contemporary technology offers much faster, more reliable and cheaper solutions. For example, it takes only a few hours, or even just minutes, to deliver an e-mail message over the ocean, and it costs a few cents. Sending the same message to the same address by postal service takes days and costs dollars. The mail function of the postal service will, nevertheless, continue to play an important role at least in the near future, even in highly industrialized societies, as it is the only communication technology which can ensure the delivery of originals documents (for example, legal matters). Of course, modern Internet technologies also offer some solutions in this area, such as the delivery by e-mail of digitally signed messages, but these solutions are yet to be legally recognized by the great majority of countries (see Chapter 11).

The second function of the postal service as a means to distribute newspapers and other printed material in a community will no doubt survive, despite the development of modern technologies. Even the most devoted Internet users can hardly imagine themselves at the breakfast table looking at a computer monitor, rather than a newspaper, for a news item.

One of the main indicators of the state of the postal services in a given region is the number of letter-post items posted per capita. The source of the following data, as well as the other numerical data in this section is the Universal Postal Union (UPU). Table 12.1 illustrates the rates of change in the number of letter-post items posted per capita by domestic and by international service dispatch per year. The table shows that the figures of letter-post items posted per capita has remained more or less stable during the last ten years, with the exception of Europe and Commonwealth of Independent States (CIS), but there is an obvious political explanation for this. The sharp reduction here (approximately five times!) is no doubt a result of the disintegration of the former Soviet Union, Yugoslavia and East European Communist Block (Warsaw Treaty Organization). The table also demonstrates that the exponential development of ICTs in industrialized countries has had practically no effect on the domestic postal service: the number of letter-post items posted per capita by the domestic services in industrialized countries has been growing steadily since 1985. However, the slight reduction in the number of international post items in indus-

Table 12.1 → Number of letter-post items posted per capita, 1985–1995

	Domestic service			International service dispatch		
Region\year	1985	1990	1995	1985	1990	1995
Industrialized countries	311	367	380	6.5	6.4	6.0
Developing countries:						
Africa	6	6	6	1.0	1.1	1.1
Latin America and Caribbean	12	12	16	1.2	1.1	1.1
Asia and Pacific	17	15	17	0.5	0.4	0.5
Arab countries	6	5	5	3.7	2.7	2.6
Europe and the CIS	148	152	31	1.6	1.8	1.6
World average	75	80	69	1.8	1.7	1.6

Source: UPU.

trialized countries could be a consequence of the development of Internet mailing and fax messaging.

Table 12.1 also indicates a sharp disproportion between industrialized and developing countries in the availability of postal services. This could be the result of a whole group of factors, one of which is the higher illiteracy rate in some developing countries.

The economic importance of the postal service should not be underestimated. As a public service, it has been considered for many years to be a state monopoly. However, the recent development of private delivery services has certainly created an entirely new situation, which puts strong pressure on traditional services.

THE PRINTED PRESS

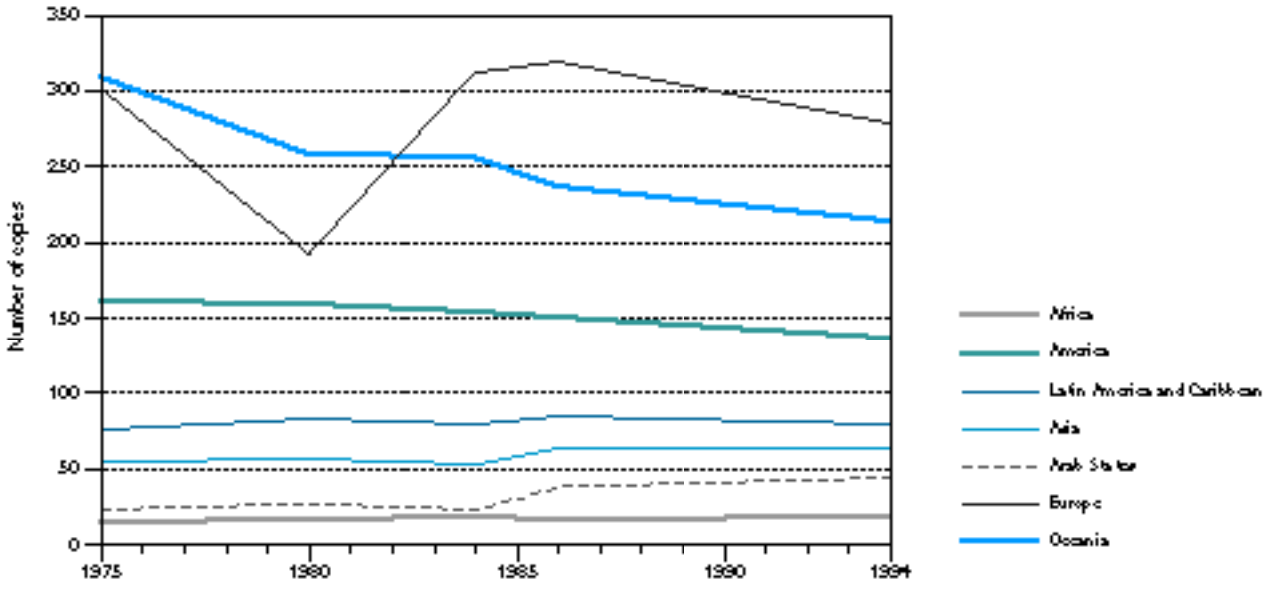
The printed press is quite another type of information technology. Whereas the postal service is primarily used for of person-to-person communication, the main goal of the press is to deliver information to a large group of people, such as the population of a town or country. Daily newspapers may be considered as a most significant part of the press, because they offer the latest information. The publishing of daily newspapers requires a highly-qualified staff of journalists and editors, as well as important infrastructures for the quick printing of a huge quantity of material, and fast and reliable delivery services.

For this reason, the number of titles of daily newspapers as well as figures for their total circulation are good indicators of the situation of the press in the various regions of the world. These data clearly reflect the situation of the press at large. Figure 12.1 shows circulation statistics for daily newspapers (i.e. the number of copies circulated per 1,000 inhabitants) by region from 1975 to 1994. It shows that from 1985 to 1994 the figures remained more or less stable, or decreased slightly.

Figure 12.2 shows changes in the number of titles of daily newspapers in different geographical regions from 1980 to 1996. The source for these data is the UNESCO Statistical Yearbook 1998, in which the corresponding figures for different countries are listed. Since much of the data is incomplete, they were extrapolated and then aggregated by regions by the author. The resulting figures are thus very approximate. Figure 12.2 shows that during the period considered, the main figures which reflect the development of the press remained more or less stable, with the exceptions of Asia and Europe.

The significant increase in circulation figures and in the number of publications from 1980 to 1990 in Asia is due mainly to India. According to the data from the UNESCO Statistical Yearbook 1998, the number of daily newspapers in India in 1990 exceeded the 1980 figure by more than two times the number of titles and one and a half times the number of copies: 3,037 against 1,173; and 22,969 against 14,531, respectively. The decrease in figures of total circulation

Figure 12.1 → Daily newspapers: circulation per 1,000 inhabitants, 1975–1994



Source: Unesco Statistical Office, 1998.

of daily newspapers in Europe between 1990 and 1994 (see Figure 12.1) could be explained by the dramatic political changes: the former Soviet Union and state support of the press disintegrated, and circulation rates decreased significantly because of the new economic situation in the CIS countries. For example, according to data from the UNESCO Statistical Yearbook 1998, in 1990 in the Russian Federation, 328 daily newspapers with a total circulation of approximately 105 million copies were published, as compared with 285 newspapers with a total circulation of approximately 16 million copies in 1996. A seven-fold decrease in circulation!

Figure 12.2 shows nevertheless that the number of publications (titles) of daily newspapers in Europe increased slowly between 1980 and 1996. As a result of political changes in Eastern Europe, the circulation of daily newspapers dropped but the variety available increased.

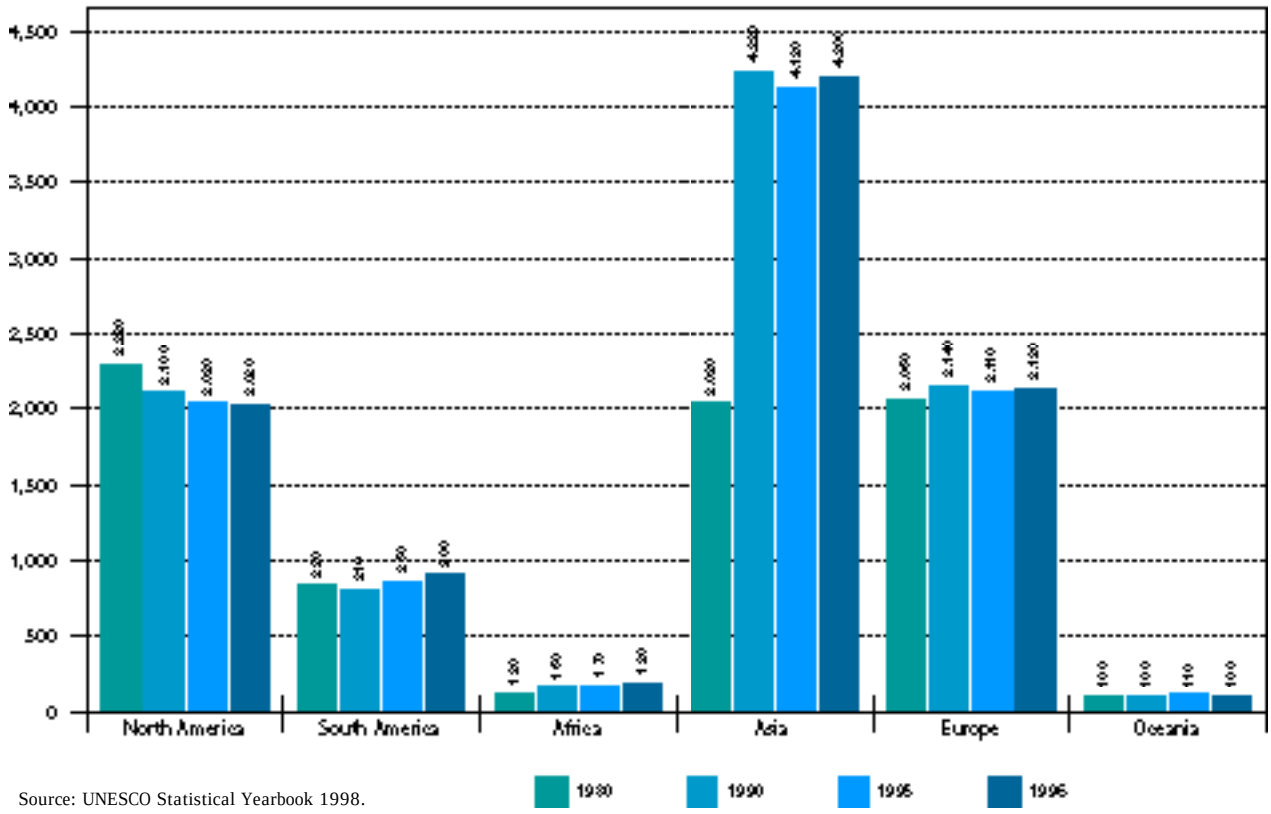
Comparing the data of Figure 12.1 with the annual rate of population growth in the world since 1985, leads to the conclusion that the number of copies of daily newspapers per capita has remained more or less constant in different regions and groups of countries, with the exception of Europe and the industrialized countries. In the latter the figures in question are decreasing slightly, which could be a possible impact of the ICTs (see Figure 12.3).

TELECOMMUNICATIONS

The term telecommunications was first used for wired telephony. Today, telecommunications are one of the most important of the contemporary ICTs. They include wired and wireless telephony; different mobile services, such as cellular telephones and paging; voice and data transmission; and Integrated Services Digital Networks (ISDN), which provide a very high quality of voice as well as high data communication rates. Existing telephone networks are now also used as a complement to computer networks, including the Internet and other wide area networks (WAN).

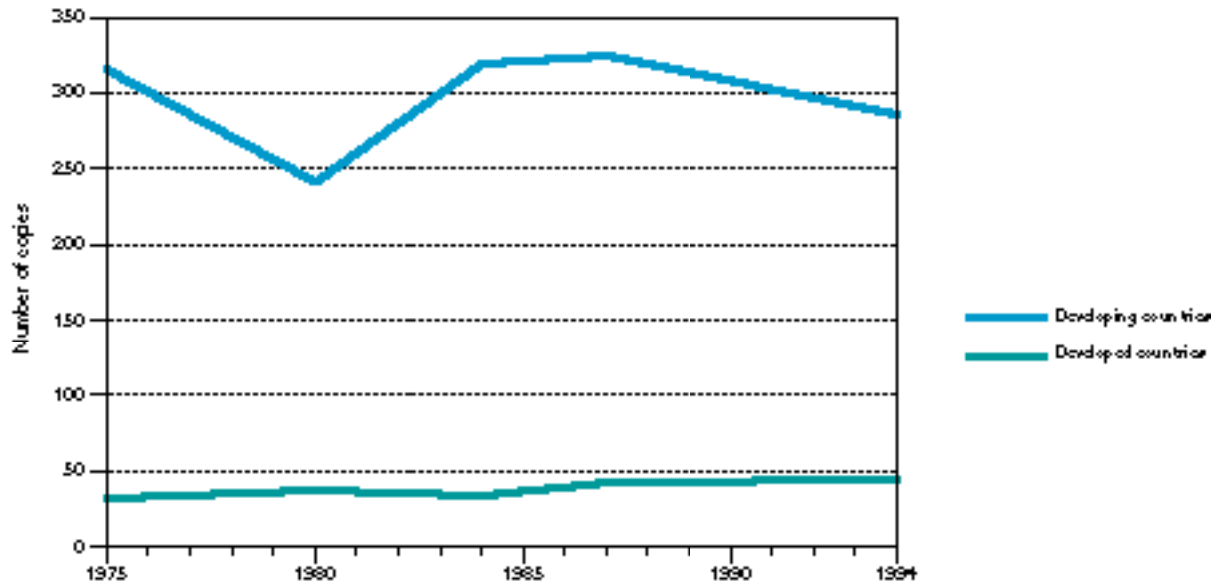
Yet since their very origins at the beginning of this century, the main goal of telecommunications has remained that of providing better, faster and more reliable person-to-person communication. This is why radio paging is usually considered to be a telecommunications service, in contrast to videotext for example, which is considered by many experts to be a television service. For a technical introduction to

Figure 12.2 → Daily newspapers: number of publications (titles)



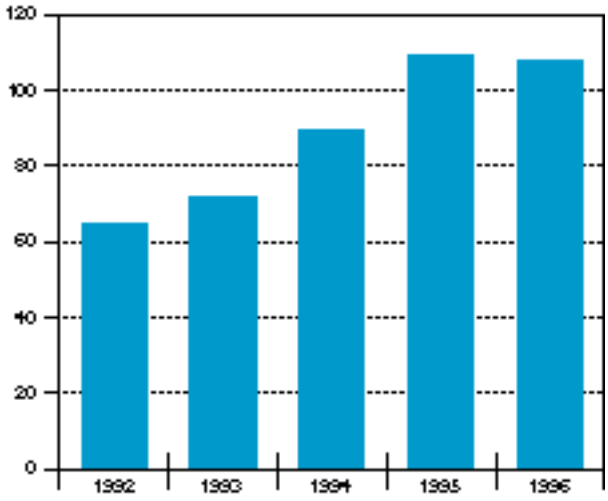
Source: UNESCO Statistical Yearbook 1998.

Figure 12.3 → Daily newspapers: circulation per 1,000 inhabitants, 1975–1994



Source: Unesco Statistical Office, 1998.

Figure 12.4 → Exports of telecommunication equipment worldwide in billions of $, 1992–1996

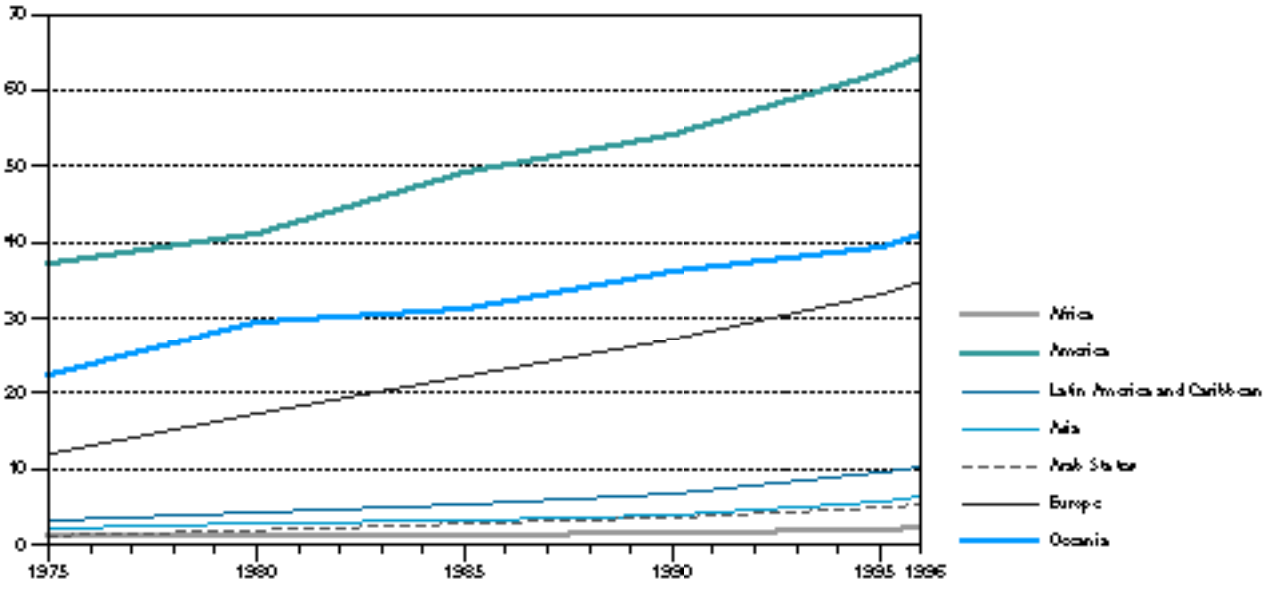


Source: International Trade Centre: www.intracen.org

telecommunication technologies the reader is referred to Chapter 17 of the World Information Report 1997 (UNESCO, 1997).

Telecommunications are a rapidly developing and highly profitable business (see Chapter 1). For instance, according to the available data from the International Telecommunication Union (ITU), in 1996 the world total telecommunication investment was about $109,670 million, whereas the world total telecommunication revenue was about $515,490 million (source: World Telecommunication Indicators, ITU, Geneva, 1998). Telecommunications revenues are generated mainly by two sources: equipment trading and communication charges. According to the International Trade Centre data (see Statistical Annex, Table A.6 and www.intracen.org), the top ten major world exporters (manufacturers) of telecommunications equipment are: the United States, Japan, Germany, the United Kingdom, Sweden, Singapore, France, China, the Republic of Korea and Canada. It may be noted that the list of the top ten major exporters and importers of telecommunications equipment is identical, except for Hong Kong, which replaces Sweden in the list of the top ten main importers. The world development of trade in telecommunication equipment from 1992 to 1996 is given

Figure 12.5 → Main telephone lines per 100 inhabitants, 1975–1996



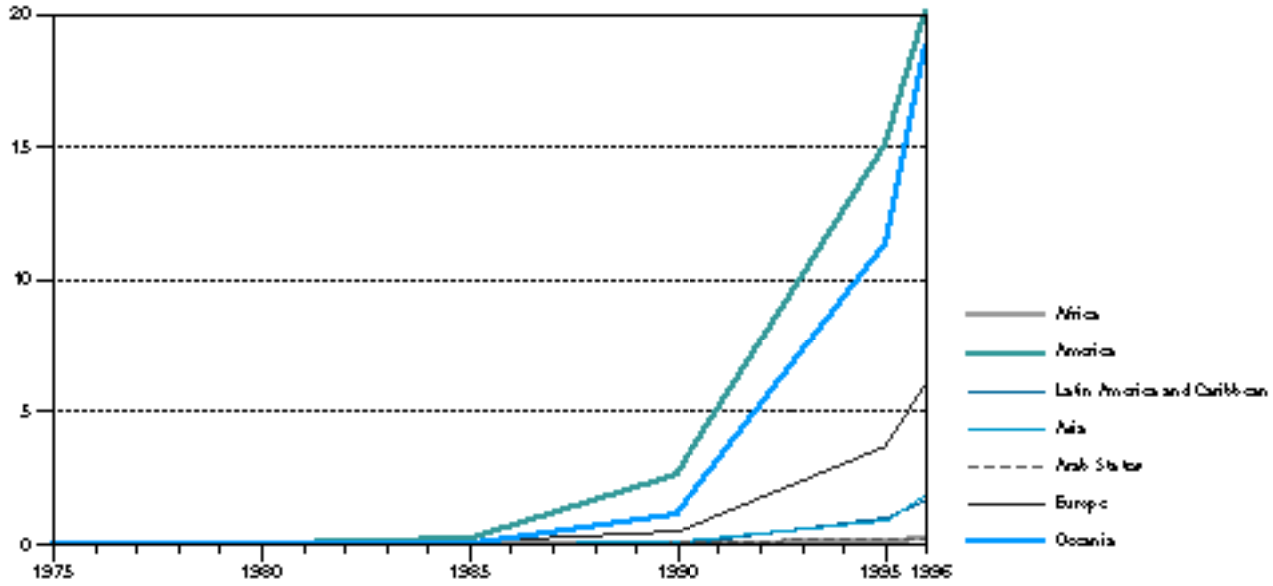
Source: International Tecommunication Indicators, ITU, Geneva, 1998.

in Figure 12.4, which indicates that exports nearly doubled during this period.

The development of the global situation concerning the availability of telecommunication services may be characterized by the growth in the number of telephone lines (both main and cellular) per capita in different geographical regions. Figure 12.5 shows smooth and almost linear growth in the number of main telephone lines per 100 inhabitants in different regions of the world during the last twenty years and Fig. 12.6 shows exponential growth of the number of cellular subscribers per 100 inhabitants over the last 10 years. The diagrams also demonstrate the sharp difference in the availability of telephone services (both wired and cellular) between developed and developing countries.

Cellular telephony is becoming more and more popular throughout the world, mostly in the developed countries. In 1997 according to data from Ericsson, one of the world's leading manufacturers of telecommunication equipment, the total number of cellular subscribers in the world increased from 70 million to 207 million. Among them more than 112 million are subscribers to digital cellular networks and about 95 million are subscribers to analog cellular networks. The highest number of cellular networks subscribers is in North America, with about 60 million, followed by Western Europe with 57 million, Asia and the Pacific (without Japan) with 40 million, Japan with 29 million and Latin America with 13 million. The rest of the world numbers 8 million subscribers. Ericsson forecasts there will be 830 million subscribers to cellular networks by 2003, and an average annual growth rate between 1998 and 2003 of 27%. Ericsson also forecasts that by the end of 2003 nearly 15% of the world's population will subscribe to cellular telephone networks. Among them will be almost 60% of the population of Japan, more than 50% of the population of North America and about 50% of the population of Western Europe. Today the highest rate

Figure 12.6 → Cellular mobile subscribers per 100 inhabitants, 1975–1996



Source: International Tecommunication Indicators, ITU, Geneva, 1998.

of cellular subscribers is in Finland, with about 50% of the population (source: Nokia Group).

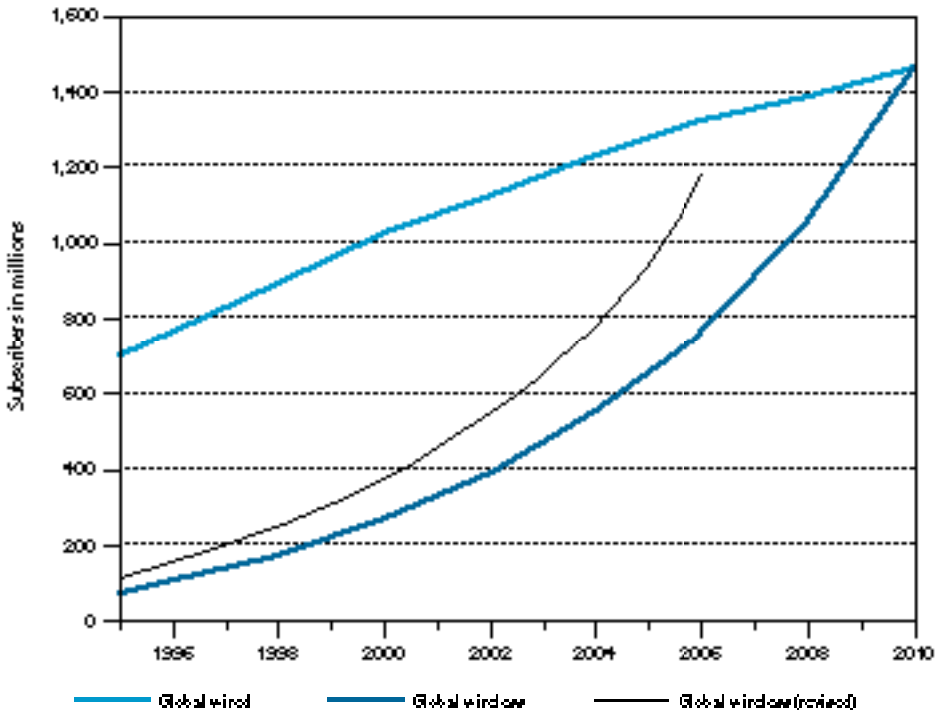
Another forecast for global wired/wireless market trends is given by Lucent Technologies/Bell Labs Innovations. They predict that by 2010 the number of subscribers to wireless telephony will exceed that of subscribers to wired telephony (see Figure 12.7).

Another popular mobile telecommunication service is radio paging. It is cheaper than mobile telephones, which usually include a radio paging mode. Radio paging is most popular in Asian countries. In 1996, according to the ITU data (World Telecommunication Indicators, ITU, Geneva, 1998) in 1996 Singapore and the Republic of Korea had the highest number of radio paging subscribers per 100 inhabitants – 35 and 28 respectively. In comparison, for Hungary which has the highest number in Europe, the figure was 17. It is interesting to note that the ITU data show that normally in those countries where figures of cellular subscribers per 100 inhabitants are high, the corresponding figures for radio paging subscribers are relatively small, and vice versa. The situation in the European countries confirms this observation.

Cellular telephones and other mobile services are now a top advantage of telecommunication technology. Integrated services digital networks (ISDN) are another leader. As with cellular telephones, the use of ISDN in a given region reflects the state of development of the most contemporary telecommunications technologies.

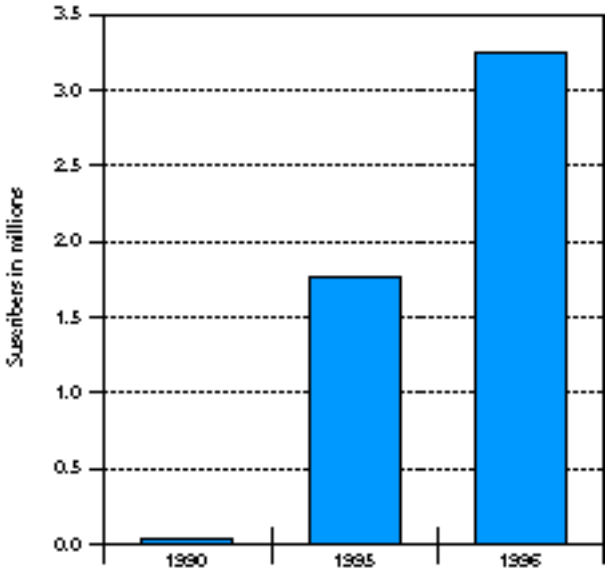
In 1996, according to the ITU data (World Telecommunication Indicators, ITU, Geneva, 1998), there were more than 12 million ISDN channels in the

Figure 12.7 → Wired/wireless trends, in millions of subscribers



Source: Lucent Technologies/Bell Labs Innovations.

Figure 12.8 → Number of European ISDN subscribers (millions), 1990–1996



Source: ITU, World Telecommunication Indicators, 1998.

world and about 4 million ISDN subscribers. About 75% of all ISDN subscribers are in Europe. There are 22% are in the United States and 3% in the rest of the world. The world leader in the number of ISDN channels and subscribers, in 1996, was Germany, with 5,150,000 channels and 1,945,000 subscribers. The rate of growth of ISDN subscribers in Europe from 1990 to 1996 is illustrated in Figure 12.8.

It may be concluded that telecommunication services, especially modern ones, are now growing exponentially, but only in the industrialized countries. There is very slight development in the rest of the world, and a sharp disproportion between industrialized and developing countries in the availability of telecommunication services, even such traditional ones as wired telephony. However, the example of China shows that some developing countries have great potential in manufacturing telecommunication equipment, and are thus capable of improving the availability of telecommunication services.

The development of telecommunication services in a given region has a vital impact on the development of the Internet for which they provide the necessary infrastructure, as they do for other wide area networks (WANs).

THE INTERNET AND OTHER WIDE AREA NETWORKS

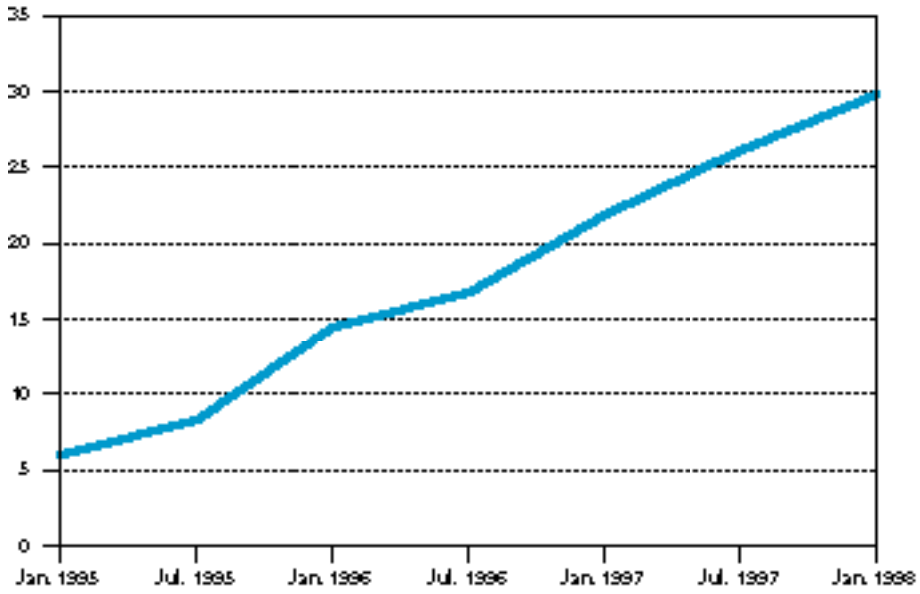
It makes sense from a technological point of view to treat digital networks separately from the other telecommunication systems available. Digital networks include the Internet, intranets and WANs and share several features including the large amount of data transmitted, the high speed of transmission and the use of digital technologies and data transmission protocols. While these features make digital networks different from the other telecommunication networks, they are not isolated from them. For instance, the 'last mile' by which a user reaches the Internet is often the common telephone wire. Furthermore, it is convenient to distinguish the Internet, which is based on the TCP/IP protocol, from other WANs, which are most often based on other protocols such as X.25 or the asynchronous transmission protocol (ATM). There are also gateways among the networks.

For instance, a subscriber to America On Line (AOL), which is a private commercial WAN, can access the Internet, and conversely Internet users can, under certain conditions, access various other WANs. Private WANs based on TCP/IP protocol are called intranets and can also be linked to the Internet and other WANs. The above distinctions, which are important from a technological point of view, may or may not be apparent at the service level.

When data from different sources are analysed, it is sometimes difficult to ascertain whether a given source refers to all public and private networks, including intranets and the Internet. Possible errors are not, however, of concern here, since the principal aim in this chapter is to provide a global overview of the use and availability of ICTs in the world and the figures of network computers adequately reflect the situation.

The major indicator of development of the Internet is the number of hosts providing users with access. Figure 12.9 shows the annual rate of growth

Figure 12.9 → Estimated number of hosts (millions), 1995–1998



Source: Network Wizards, www.nw.com

of the total number of Internet hosts in the world. Table 12.2 shows the annual rate of growth of Internet hosts in different geographical regions from 1995 to 1996. It should be noted that Figure 12.9 seems to demonstrate a linear growth in the number of hosts in recent years in contrast with the exponential one of earlier years (cf. Figure 1 in Chapter 18 of World Information Report 1997). The number of hosts per country varies widely: from several hundred thousand in highly industrialized countries (or even millions in the United States), to very small numbers in developing countries.

In an international market forecast published in 1997 (see the Statistical Annex, Table A.8), the International Data Corporation estimated that the total compound annual growth rate of the purchase of products and services related to the use of Internet between 1996 and 2000 would be 49.5%. Other sources give different estimates for the Internet turnover in 1996: the total varies from $9,000 million to $10,000 million, including from $500 million to $530 million for retail trade, about $600 million for business-to-business trade, $200 million for information and the same figure for financial services. A forecast for the year 2000 suggests that the total turnover will be between $190,000 and $200,000 million; $7,000 million for the retail trade; $66,000 million for business-to-business trade; $37,000 million for information; and $23,000 million for financial services. Some IBM top managers propose similar estimates.

The main indicators of the Internet and other WAN development appear to demonstrate extremely high annual growth rates, but the divergence between industrialized countries and the rest of the world still remains significant. According to various sources, the Internet is little by little becoming less exclusive. Nevertheless, leaving aside political issues connected

Table 12.2 → Estimated number of Internet hosts, by region, 1995–1996

	1995	1996
Sub-Saharan Africa	51,588	104,158
Asia	743,947	1,585,295
Arab States	2,759	9,119
North America	6,428,458	10,717,487
Latin America	565,390	164,362
Europe	2,177,637	3,521,825
Oceania	363,290	599,744

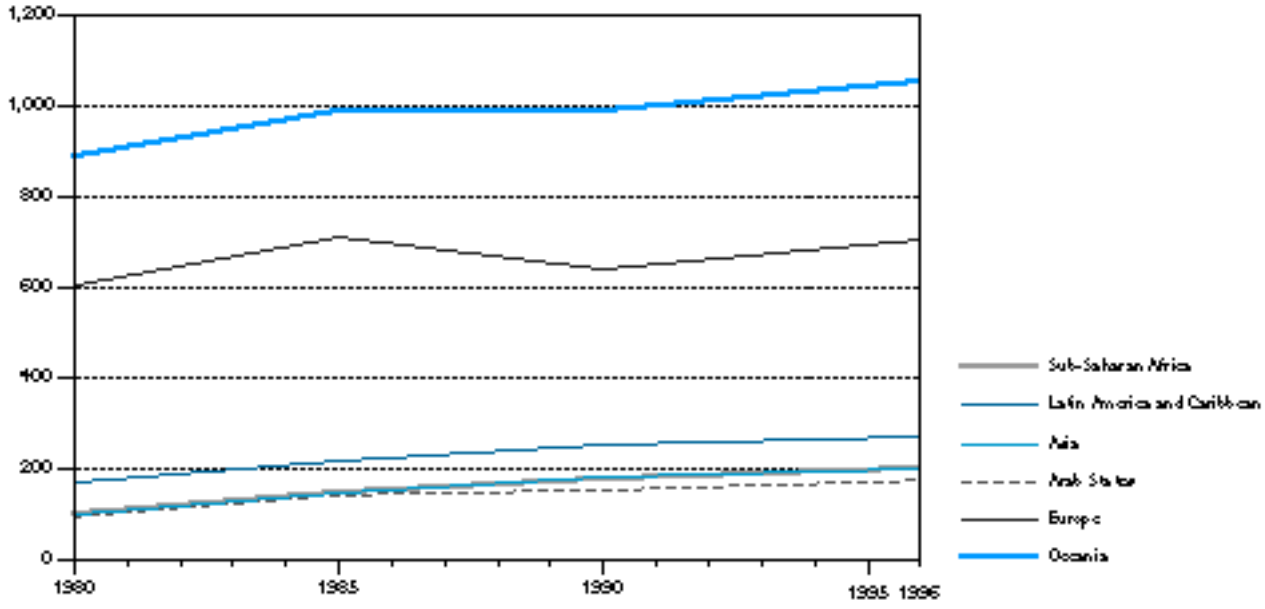
with the free circulation of information 'across borders', the successful development of the Internet in a given region still depends on the adequate development of telecommunications infrastructures and sufficient per capita income. More data on the Internet can be found in Section 3 of the Statistical Annex.

RADIO AND TELEVISION

Both radio and television produce and distribute information via their own channels. In both, although ICT production is technically separated from distribution, the two processes do coexist in these media. It may be that the educational levels of radio and television audiences are lower in comparison with those of newspaper readers or Internet users: a subscriber to a newspaper cannot be illiterate, in contrast to a radio listener or television viewer. It is also true that listening to the radio or watching television is less costly than subscribing to a newspaper or using the Internet. Radio, for which it is sufficient to make a fairly small investment only once, is the cheapest. Finally, poor communities need not invest in their own radio or television industry since they may listen to radio or watch television programmes produced by other countries. All these considerations explain the fact that radio and television are the most available and widespread ICTs in the world, both in developing and developed countries with radio in first place. This is apparent in Figures 12.10 and 12.11, which are worth comparing with the data from the printed press section.

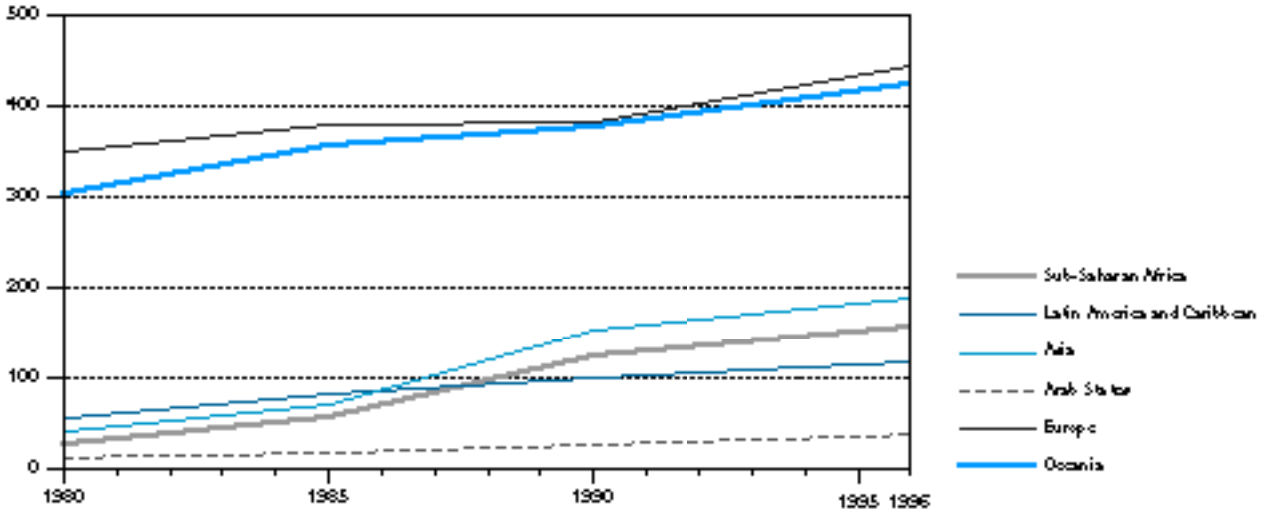
The difference between the developed and developing countries in the availability of radio is not so sharp as in the case of printed press. Moreover, the share of developing countries in the list of the top ten world manufacturers of television receivers and radio receivers is quite large. The top ten television exporters are Mexico, the Republic of Korea, Malaysia, Japan, the United Kingdom, Singapore, Thailand,

Figure 12.10 → Number of radio receivers per 1,000 inhabitants, 1980–1996



Source: UNESCO Statistical Office, 1998.

Figure 12.11 → Number of television receivers per 1,000 inhabitants, 1980–1996



Source: UNESCO Statistical Office, 1998.

France, Germany and Spain; the top ten radio receiver exporters are Malaysia, China, Singapore, Japan, Mexico, the United States, the Netherlands, Portugal, Germany, Belgium-Luxembourg (see Statistical Annex, Tables A.3 and A.2).

According to BIPE Conseil data, in the European Union Countries, television and other home appliances such as VCRs and camcorders still represent about 58% of expenditures on hardware equipment for home use, whereas expenditure on special hardware for multimedia is only 1%. This implies that multimedia per se is of very little interest for the population of this region and is more commonly used with computer equipment. Since multimedia is basically a form of representing information, this situation is not surprising. In addition, expenditures on personal computers for use in the home are only slightly less than expenditures on television sets (38% and 40% respectively in EU countries). This seems to indicate that the home software industry and home use of the Internet have a bright future in industrialized countries (see also Chapter 10 on these issues).

Radio and television are clearly the most available ICTs in the world, and their development still has good prospects in both industrialized and developing countries.

ICTs IN THE WORLD

In this chapter the availability and use of both traditional (postal services and press) and modern ICTs (radio, television, telecommunications and digital networks) have been considered in different regions of the world and groups of countries. Radio and television are both channels providing information and producing technologies. The data analysed here leads to the following conclusions:

→ In recent years, the consumption of the traditional ICTs per capita has remained more or less stable or only slightly changing in different regions of the world as well as in groups of countries, with the exception of Asia and Eastern Europe. As for Eastern Europe (including the CIS), the significant reduction is a result of dramatic political changes there, whereas the

growth of press consumption in Asia is due mainly to India.

- → There is a high rate of growth of indicators which characterize development, use and availability of modern ICTs in industrialized countries.
- → There is a sharp difference between industrialized countries and the rest of the world in use and availability of the most modern ICTs, such as ISDN networks including the Internet, as well as in the development of these ICTs.
- → The development of channels providing technologies in a country or region is a necessary condition for a successful development of information-producing technologies (the present situation may change in future with the further development of projects like Iridium, which will probably offer cheap and easy-to-access channels through a system of satellites).
- → The most available and the most widely-used ICT in the world is radio, followed by television. One of the reasons for this is the low demand in terms of literacy made on the audience, relatively cheap hardware and the availability of existing broadcasting channels.

It is difficult to escape from the conclusion that if the present trends continue, the gap between information-rich and the information-poor will continue to widen.

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www.comfm.fr/index.htm (television and radio live on Internet)

www.isoc.org (Internet Society)

www.wrn.org (World Radio Net)

Chapter 13
Sub-Saharan Africa

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GEOGRAPHY

This chapter covers the 47 countries and territories of sub-Saharan Africa (SSA), but not the five North African countries even though they are aligned with the rest of Africa through the Organization for African Unity (OAU). The sub-Saharan countries are often divided into the socio-geographic groups of East, West, Central and Southern Africa, of which West Africa is the most populous. There are also many other country groupings around areas of common interest. The most important of these are the Economic Community of West African States (ECOWAS), Common Market for Eastern and Southern Africa (COMESA), Southern African Development Corporation (SADC), Central African Customs and Economic Union (UDEAC), East African Co-operation, the Customs Union of the Southern Africa (Botswana, Lesotho and Swaziland (SA-BLS) states), L'Agence de la Francophonie, the Commonwealth and the Lomé Convention African Caribbean and Pacific (ACP) countries.

The region's population was estimated at 636 million people for 1998 – about 9% of the total world population of 5.7 billion. Nigeria has by far the largest number of people at 122 million. Ten countries have populations above 15 million, with the five largest countries comprising 50% of the subcontinent's total population. Growing at 3% annually, an additional 20 million people a year are being added to the subcontinent. Population density is relatively low – only 24 people per square kilometer – compared to a world average of 43 and an Asian average of 110. At the same time, the degree of urbanization is low – only 32% of the region's people live in cities, as compared with 78% for high-income countries.

There is a high level of ethnic and linguistic diversity: several thousand identifiable ethnic groups and about 1,300 distinct spoken languages characterize this region. The national boundaries of most of the countries were imposed by the colonial powers and as a result language groups overflow them. This has partly contributed to the high degree of civil strife

from which the region still suffers. Christianity, Islam and Animism are the most common religions. The proportion of actively practicing worshippers is substantially higher than in most developed countries.

DEVELOPMENT LEVELS AND ICTs IN SUB-SAHARAN AFRICA: THE BACKGROUND

Access to information and use of communication tools in SSA have until very recently been almost entirely in the hands of state monopolies. Now that the trend towards democracy and more liberal market-oriented policies has become established on the continent, there has been a marked improvement in the availability and diversity of information and communication channels. Rates of telephone line growth are at their highest levels ever, hundreds of new media outlets in print, radio and television have emerged in the last couple of years and in 1998 the Internet was locally available in the capital of every country in Africa (see Figure 13.1 and Statistical Annex, Table A.9).

These changes coincide with an estimated average 4.7% growth in Gross Domestic Product (GDP) in 1998. After years of stagnation, these growth levels are close to those in Asia, and in the wake of the Asian financial turmoil, it is likely that Africa may even surpass Asia as the fastest growing region in the world. The information revolution is often said to be Africa's 'last chance to catch up' and it is already clear that a number of African countries have committed themselves to joining the Global Information Society.

Most of the advances have taken place only in the latter half of this decade and are not yet reflected in many of the official statistics available, for which 1995 is the latest year published. As a result, the degree of change is not been as evident as it should be. This has in part given rise to efforts by progressive African leaders such as Presidents Museveni and Mandela to declare an 'African Renaissance' which, if present trends continue, suggests a degree of optimism for the future of the African public that is unsurpassed in recent history.

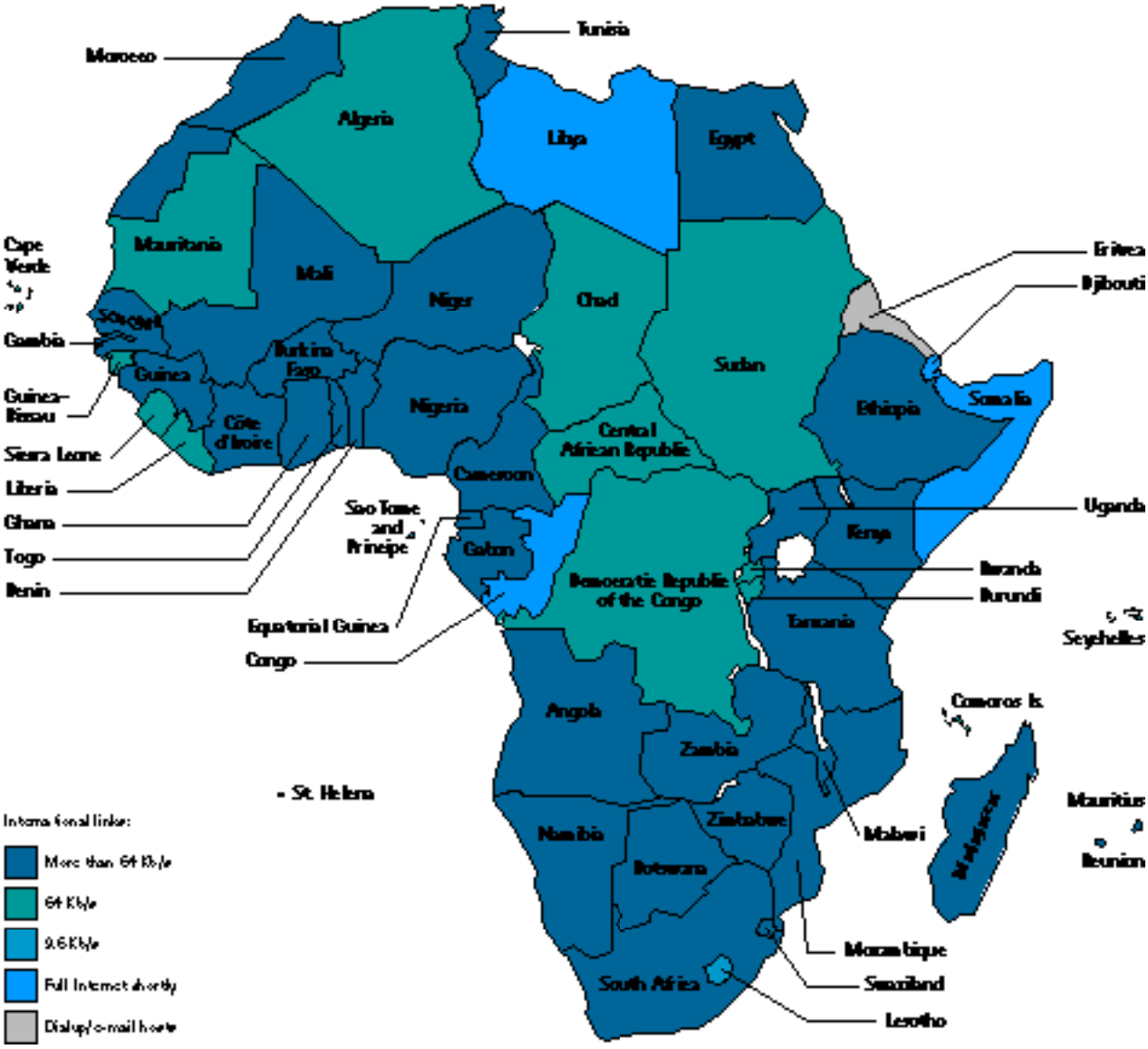
Nevertheless, change is occurring from an extremely low base, and the subcontinent has a daunting degree of transformation to effect before living standards come even close to world averages. The region has 33 of the 48 countries classified as 'least developed'. There are no 'high-income' countries and the only countries classified as 'upper-middle income' are Gabon, Mauritius, Reunion, Seychelles, and South Africa. There are six lower-middle income countries (Botswana, Cap Verde, Djibouti, Namibia, Senegal, and Swaziland) and by far the majority of countries in the region – 39 of the 48 nations – are classified by the World Bank as 'low income'.

Development statistics for the region often include South Africa and North Africa and as these are much more developed areas, their inclusion can obscure the true extent of the development gap. The average 1995 per capita GDP for SSA excluding South Africa was $386 per year, which is over thirteen times lower than the world average of $5,104 and an astonishing 66 times lower than the high-income country average of $25,809. It is not surprising, then, that child mortality is particularly high and that average life expectancy is low. A third of the population is unlikely to reach the age of 40. In 1995 almost a quarter of the population (24%) was classified by UNESCO as technically illiterate and about 40% of the population lived on less than $1 a day. The region's share of world trade has fallen from 5% in 1980 to less than 2% in 1997. UNDP's 1995 Human Development Index integrated these and other factors and put 34 of the sub-Saharan countries in the 'low human development' category. African countries occupy 18 of the bottom 20 positions of the index.

ICT INFRASTRUCTURE

Although encouraging trends have emerged in the last few years, the differences between the development levels of SSA and the rest of the world are even wider

Figure 13.1 → Internet in Africa: international links



Source: Mike Jensen.

in the area of ICTs than they are when more traditional measures of development are used. The majority of the population has never even made a telephone call, only 2.5% of the world's televisions are on the subcontinent, and just one person in 9,000 has access to the Internet (excluding South Africa) compared to a world average of one in 38.

Irregular or non-existent electricity supplies are a common feature of the sub-Saharan landscape and a major barrier to an increased use of ICTs, especially outside the major towns. Many countries have extremely limited power distribution networks, which do not penetrate significantly into rural areas, and power sharing (regular power outages for many hours) is a regular occurrence, even in some capital cities such as Accra and Dar es Salaam. Furthermore, most tax regimes still treat ICTs as luxury items, which makes these almost exclusively imported commodities all the more expensive, and thus unobtainable by the majority.

Radio and television

It is not therefore surprising that radio is still by far the most dominant mass medium in Africa with ownership of radio sets being far higher than for any other electronic device. In 1995, radio ownership was estimated by UNESCO at close to 18% of the population (3.5% owns a television and only 0.3% a personal computer). Comparisons with world averages are shown in Table 13.1.

It should also be noted that many people listen to the same radio or watch a television at the same time. In fact, large scale sharing of information resources is a dominant feature of the African media landscape – readership of newspapers is often above 10 and it is not uncommon to find most of a small village crowded around the only TV set, often powered by a car-battery or small generator. It has been estimated that over 60% of the population of the subcontinent are reached by existing radio transmitter networks, while national television coverage is largely confined to major towns. Some countries still do not have their own national television service.

Following liberalization of the sector in many countries, an increasing number of commercial stations are being established. However, the news and information output of these commercial stations is usually either a re-broadcast of the national (state-controlled) news, or that of an international broadcasting service or news agency. Local news and current affairs, especially that focusing on events outside the capital, is rarely broadcast. Community radio has been slow to take off in the region. Genuine community radios are often seen by governments as a threat. Pressure is also being put on community radios – usually by the donor organizations which helped to create them in the first place – to become financially sustainable.

Among the multinational broadcasters, the BBC World Service radio programming is the most widespread, redistributing its signal locally on FM and AM bands in 25 countries and 46 towns in the sub-Sahara. The BBC's coverage is followed by that of Radio France International (RFI) and the Voice of America, all three of which are actively competing for the African radio listener via terrestrial re-broadcasting.

The battle is being carried to the satellite television market as well, with the BBC and Canal+ focussing an Anglophone and Francophone audiences respectively. Portuguese colonial history is similarly reflected in services of the national television, RTP, being re-broadcast in the Lusophone countries.

For many years the South African company MultiChoice has been distributing its South African subscriber channels (M-Net) through local terrestrial broadcasters in 39 countries in SSA. Its recently launched music channel, Channel O, claims to be the most watched television station in Africa. In 1995 M-Net launched the world's first digital direct-to-home subscriber satellite service called DSTV which carries over 30 video channels and 40 audio programmes on C-band to the whole of Africa and on low-cost KU-band to Southern Africa south of Lusaka. This year the South Africa public broadcasting Corporation (SABC) launched Channel Africa, a new

Table 13.1 → ICT density in Africa as compared with world averages in percentage of population owning the device

	Sub-Saharan Africa	World
Radio (1996)	17	36
Television (1996)	3.5	23
PCs (1996)	0.3[1]	4.4
Fax (1995)	0.02	na

1. This figure is an independent estimate, and should be used with caution.

Sources: UNESCO Statistical Yearbook 1998, UNESCO, Paris, 1998. International Telecommunication Indicators, ITU, Geneva, 1998

satellite-based news and entertainment channel aimed at the subcontinent. However, the audience for satellite broadcasts are confined to the elite who can afford the equipment and subscription fees. In 1998 some parts of northern sub-Sahara started receiving DTH Television broadcasts from Nilesat, the continent's first locally owned geostationary satellite, operated by the Egyptian Radio and Television Union (ERTU). World-Space has finalized its digital radio service, which began broadcasts in early 1999 and will make a suite of five audio channels available to anyone on the continent who can afford $200 for the special digital radio that has been manufactured.

Telecommunications

In most sub-Saharan countries the telecommunication networks are being expanded and modified, with the number of main lines growing at about 10% a year. Nevertheless, the overall teledensity in 1996 was still only about one telephone line per 100 inhabitants (1.4 per 100). In addition, much of the telecommunication network is analogue and many sections are operating at saturated capacity or are highly unreliable, especially during rainy seasons. Furthermore, 50% of the available lines are concentrated in the capital cities, where only 10% of the population live.

On a worldwide basis, the sub-Saharan countries can be seen to have by far the least developed infrastructure. In 1996 the region contained almost 10% of the world's population, but only 0.4% of the world's telephone lines (2.9 million lines). The penetration of phone lines on the subcontinent is five times worse than for the average low-income country.

However, there is a high level of variability among countries in the state of their existing telephone networks. Some such as Botswana and Rwanda have made telecommunications a priority and are installing digital switches with fibre optic inter-city backbones and the newest cellular and mobile technology. At the other end of the scale, countries like Madagascar and Uganda have largely unreliable analogue telephone systems and poor national links between urban centres. Surprisingly, the proportion of digital lines on the subcontinent in 1996 was 69%, close to the world average of 79%.

On a sub-regional level, the countries of the Sahel and Central Africa, such as Mali, the Niger and the Democratic Republic of the Congo have less than 2 telephone lines for every 1,000 people. North Africa and South Africa have a teledensity of around 35 per 1,000, West and East African coastal countries have densities of between 2.5 and 10 per 1,000.

Telephone

A much smaller proportion of the population can actually afford their own telephone: the cost of renting a connection averaged almost 20% of the 1995 GDP per capita, as compared with a world average of 9% and only 1% in high income countries. It should be noted, however, that there is wide variation among countries in the charges for installation, line rental and call tariffs. In 1996 the average sub-Saharan business connection cost $112 to install, $6 a month to rent and $0.11 per 3-minute local call. But installation charges were above $200 in some countries (Benin, Mauritania, Nigeria and Togo), line rentals ranged from $0.8 to $20 a month, and call charges varied from $0.60 an hour to over $5 an hour. Local call tariffs in some countries have increased even further, to over $10 an hour, making extensive residential use of the World Wide Web (WWW) in these countries unaffordable to all but a tiny elite. Because of high tariffs and the large number of international calls, telecommunications operators enjoy above-average profits on their lines.

Mobile cellular telephony has experienced very rapid growth in the SSA. As well as providing an alternative to the limited public telecommunications networks, the cellular market has usually involved the private sector which has been able to institute more aggressive start-up plans. Cellular services are now available in 38 countries, supplied by over 65 oper-

ators who provide access mainly in the capital cities but also in some secondary towns and along major trunk routes. The number of cellular subscribers in 1997 was estimated by the International Telecommunications Union (ITU) at over 225,000 outside of South Africa, where the cellular market outpaced all expectations, reaching over 2 million in 1998.

Data communication

Traditional data communication services based on X.25 are available in half the countries (27), most prevalently among those which are francophone where the use of the Minitel was adopted before the Internet became available. SITA, the airline co-operative, has by far the largest X.25 network in Africa. SITA's commercial division, SCITOR (recently renamed Equant), which was formed to service the non-airline market, now operates dialup points of presence in 39 SSA countries. These are used by a variety of multinational organizations. Subscribers to Internet service providers (ISP) in Europe and North America who are members of IPASS (a group of ISPs, including SITA, who share their points of presence, or POPs) can also access their home ISPs via these points of presence for about $0.22 a minute (see www.ipass.com).

X.25 packet-switched based services were in the past the most popular method of establishing wide-area data networks in Africa, but because of their high-cost, traffic-based tariffs, they are now mainly used by banks and other large corporations requiring secure real-time low-volume data transactions such as credit-card verification.

The only country in the region with an X.400 service is South Africa. Other advanced services such as Integrated Services Digital Networks (ISDN) and video conferencing are generally not available.

Internet

By contrast, the Internet has spread rapidly through the region over the last two years: at the end of 1996 only eleven countries had local access; but by the end of 1998, according to ITU (1998), all African countries had some access to the Internet. But Internet services are still largely confined to the capitals and major towns. To address this situation ten countries have made the decision to provide local call Internet access across the whole country using a specific area code. A few countries (Angola, Benin, Botswana, Ghana, Kenya, Namibia and the United Republic of Tanzania) do have POPs in some of the secondary towns, and South Africa has POPs in about 70 locations.

Most African capitals have more than one Internet Service Provider (ISP), and in mid-1998 there were over 265 ISPs across the region (192 excluding South Africa). The total number of computers connected to the Internet in the sub-Sahara excluding South Africa was estimated at just over 5,000 in mid-1998 (up from 290 in 1995), but the figure may be closer to 6,000 or 7,000 due to the measurement technique, which does not count hosts which are not fully referenced in domain name servers. Africa's share of Internet host sites worldwide was only 0.025% in 1997, and this had fallen to 0.022% by the beginning of 1998 due to Internet growth worldwide.

The opening up of the Nigerian Internet market will probably change the picture as the national telecommunications operator (Nitel) has big plans to provide Internet countrywide. With a fifth of sub-Sahara's population, until mid 1998 Nigeria, which has been one of the slumbering giants of the African Internet world, had only a few dialup e-mail providers and a couple of full ISPs operating on very low bandwidth links.

The rapidity with which most African public telecommunication operators (PTOs), have established Internet services is noteworthy. In the last three years PTOs have brought full Internet services on stream in 31 countries, and similar moves are afoot in three others. In many francophone countries the PTO operates the major value-added service provider as a joint venture with France Cable and Radio, called

Box 13.1 → Mauritius

The Mauritian government has a strong commitment to increase the use of ICTs and has made a number of efforts in addressing the regulatory and legal framework for ICTs. Several bills have already been drafted, and with the passing of the Copyright Bill at the National Assembly in July 1997, the legal challengesposedby theuse ofICTs will bereduced significantly.

The National Computer Board (NCB) was established by government in late 1996 as a para-statal institution whose aim is to assist in the diffusion of ICTs in the various socio-economic sectors of the country. One of the NCB's major areas of activity is the use of the Internet in government, as well as the more general issues of privacy, security and intellectual property. The NCB has established an extensive web site which acts as the home site for information on other government ministries (ncb.intnet.mu).

NCB is the programme manager for the National IT Strategy Plan (NITSP) which is currently under active development as part of the Mauritian government's strategic objectives to move the country toward an information-age economy.

Hon. Sarat Lallah, appointed Minister of the newly created Ministry of Telecommunications and Information Technology (MITI) in July 1997 (http://ncb.intnet.mu/mtit.htm and it@intnet.mu), declared: 'Government is determined to ensure the widest participation in the formulation of any policy bearing in mind the nation's interest and the will to push Mauritius forward as an info-communications hub in the region'. http://ncb.intnet.mu/mtit/whitepap.htm

Two flagship practical projects proposed in January 1998 are a Government Information Infrastructure (GII), and a Population Database & National Identity Card. The first initiative will improve the communication capability of the government and improve awareness among the civil service in the use of ICTs. The GII will provide the electronic mail and publishing facilities for the Government to create a responsive and 'paperless' environment. It will also aim to provide information and services to the public round-the-clock via the Internet. Over time, the GII is also expected to evolve into an electronic backbone and infrastructure to meet the future public sector connectivity needs.

The purpose of the second project is to create a central repository of data on the citizens of Mauritius. It was felt by the task team that without this foundation, it would be extremely difficult to identify an individual, and offer and co-ordinate services across the board. The Identity Card will be upgradable to become more secure and useful in a wider range of applications, facilitating transactions and movements of people. As this project will affect the majority of the population, it was felt that it offers the best means to alter the public's perception about ICTs.

The Information Technology (Miscellaneous Provisions) BillandCopyrightActpromulgatedbyMITIwerepassedin1997 to modify existing legislation to take into account ICTs, such as the use of electronic documents in court (http://ncb.intnet.mu/mtit/itbill.htm and http://ncb.intnet.mu/ncb/copyrite.htm).

The telecommunications sector is regulated by the Mauritius Telecommunications Authority (MTA) and will be advised by a newly-created Telecommunications Advisory Council (TAC).

The Public Telecommunication Operator (PTO), Mauritel/MTS, is currently a monopoly but is engaged in a slow process of liberalization and tariff rebalancing which is expected to be completed by the end of 2004 when the entire sector will be opened up for competition as outlined in the recently published Telecommunications White Paper. Congruent with the NITSP, the more interesting policy objectives of the white paper are:

- → A revised legislative mandate so that Mauritius can fulfil its commitments under the WTO Agreement on telecommunications.
- → Access to an affordable universal service for the whole community (in Mauritius, Rodrigues and the Outer Islands) with
- → The creation of an environment conducive for Mauritius to become the information, financial and services hub in the region.

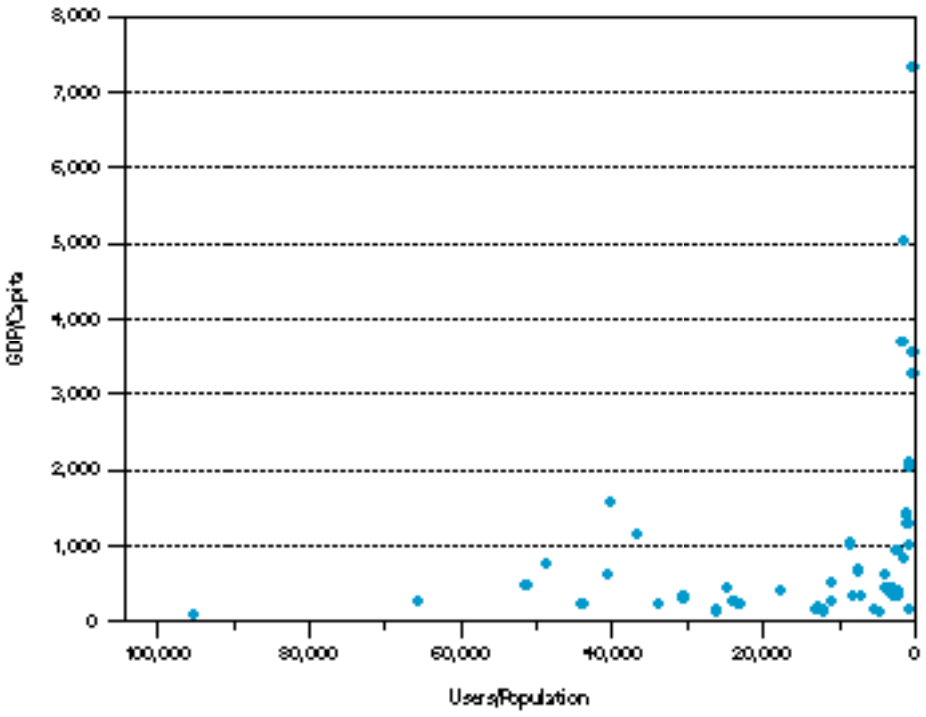
Mauritius has a far better telecommunications infrastructure than most other countries in Africa. As part of its national strategy to become the 'Singapore of Africa', it has made telecommunications and data services a high national priority for some time now, and this is reflected in the availability of ISDN services in some areas, relatively short waiting times for the installation of new telephone lines (especially for businesses) and a rapidly emerging range of data communications services such as Internet, X.25 and EDI. Three SDH fibre optic rings have been built in Mauritius to improve thelocaltelecominfrastructureandtoprovide a high-bandwidth connection to the main groundstation in Port Louis. Mauritius will be connected by fibre optic cable to the global backbone in 1999 when South Africa's Far-East (SAFE) project links Cape Town to Kuala Lumpur and Singapore via submarine cable.

Telecom-Plus in many countries and DTS in Madagascar. Usually the PTOs operate the international gateway and leave the resale of end-user Internet access to the private sector, but, in a few countries, the PTO operates the gateway in competition with the private sector. Most of the service providers are small businesses, often started by technicians who learned the skills at university and who then enter into partnership with a local entrepreneur. Some national ISPs are operated by universities (such as ZamNet) and others have been established by larger companies, mostly already associated with the ICT industry. Three multinational ISPs are active in Africa: UUNET, Swift Global and AfricaOnline, now a subsidiary of the United Kingdom-based Africa Lakes (www.africaonline.com).

Due to high tariffs and lack of capacity, obtaining sufficient international bandwidth for carrying out interactive activities over the Internet is still a major problem in most countries. Many Internet sites are hosted on servers that are located in Europe or the United States.

Few of the countries outside of South Africa had international Internet links larger than 64Kbps until last year, but 128Kps connections are now becoming increasingly common. More than 256Kbps of international bandwidth is currently present in only eleven countries. Most of the international connections are carried via satellite. The exceptions to this are the marine optic fibre link from South Africa to the cross-Atlantic hub in the Canaries, and Djibouti which has access to the SEA-ME-WEA cable. By far the majority of international Internet circuits in the region connect to the United States, with a few to the United Kingdom and France. The major international Internet suppliers are American Telephone and Telegraph Company

Figure 13.2 → African Internet users: user density compared with GDP ($), 1998



(AT&T), British Telecom (BT), Global One/Sprint, UUNET/AlterNet, MCI, NSN, BBN, Teleglobe, Verio and France Telecom/FCR. A number of other links are provided by PanamSat and Intelsat direct to private and PTO ground stations in the United States and the United Kingdom, circumventing local PTO infrastructure.

Generally, ISPs must pay the entire cost of the connection to Europe or the US, which effectively gives the developed country ISPs free access to the continent's network and further increases the costs of ISPs in Africa. Fifty African countries met in Cotonou (15–17 December 1999) with the assistance of The United Nations Development Programme (UNDP) and the Agence de la Francophonie. They adopted a project to install a regional register for Internet addresses, AFRINIC, similar to those existing in other regions. Reflecting the high telecommunication costs and the small markets, often supplied by a single operator, ISP charges for dialup access are generally higher in Africa than elsewhere: the average cost of using the Internet for five hours a month in Africa comes to about $60 per month.

In response to the high cost of full Internet–based services, and also because of the overriding importance of electronic mail, the e-mail-only store and forward services with dialup connections to the Internet are generally continuing to attract subscribers. There is also growing interest in telecentres, kiosks, cybercafes and other forms of public Internet access, such as adding PCs to community phone-shops, schools, police stations and clinics, which can share the cost of equipment and access among a larger number of users.

Computers and data processing

Demand for various services on the Internet is expected to increase only when there is a broader penetration of computers and data processing equipment on the subcontinent. Although the limited levels of equipment penetration are readily apparent, accurate estimates of the quantity of this equipment in use are notoriously hard to gather. There have been few effective centralized systems of monitoring, and high duties and sales taxes in many countries discourage the declaration of imports and other transactions. In addition, convergence and rapid change in the technologies makes the categorization of equipment types even more difficult.

Most recent estimates for the number of PCs in the sub-Sahara put the average at about 3 per 1,000 people in 1996. However some studies, such as the 1995 survey carried out by the Agence de coopération culturelle et technique (ACCT), indicate that this figure may be between 3 and 6 times too high, making the average closer to less than 1 per 1,000. Some countries such as Botswana, Mauritius and South Africa have significantly higher levels of penetration, at least 5 per 1,000, perhaps to 20 per 1,000. At the same time, account should also be taken of the number of users sharing a single computer, which is much greater than in more developed regions.

Generally, the penetration of computers is much lower in the public sector, with by far the majority of PC equipment being used by the private sector for accounting and word processing. Spreadsheets are used to some extent for forecasting or as a simple database application. The small number of database systems often use Microsoft Access, but many national documentation centres and archives, as well as small university and NGO libraries, use the UNESCO-developed micro CDS/ISIS package for bibliographic data, or the functionally similar package of International Development Research Center (IDRC). Geographic Information Systems (GIS) and digitization facilities are beginning to be installed by planning departments and municipalities.

Outside of South Africa, there are only a handful of mini- and mainframe computers, and most of these are confined to Ministries of Finance for government payroll, and a few of the larger para-statal organizations, telecom operators, banks and insurance

companies. The Millenium Bug, or 'Y2K problem', has gained significant attention across the subcontinent, especially because there are large numbers of older machines in use and very limited resources or skills to ensure their compliance.

USE OF ICTs

The vast majority of people in the sub-region rely almost exclusively on radio for information, with smaller and more elite groups in the cities and towns also making use of television and newspapers. There were about 175 daily papers and 300 weekly or monthly general news journals in the SSA in 1996, but this number is thought to have increased substantially in the last two years.

As mentioned earlier, the majority of Africans have not yet made a phone call. But interestingly, the use of international lines is much higher than the world average, partly reflecting the large size of the African Diaspora and the arbitrary borders within the region. In 1996 the SSA average for international outgoing calls was 233 minutes per line per year, compared to a world average of 93, and 113 for high-income countries.

Current estimates put the number of sub-Saharan Internet users at about 870,000. Most of these are in South Africa (about 800,000) leaving only about 70,000 among the remaining the 638 million people on the subcontinent. This works out at about one Internet user for every 9,200 people, while the world average is about one user for every 38 people, and in North America and Europe, the figure for Internet use is about one in every 4 to 6 people, depending on the country. There are now about 20 countries in the subcontinent with over 1,000 users, but only about 7 countries with over 3,000 (Ghana, Kenya, Mozambique, South Africa, Uganda, Zambia and Zimbabwe). South Africa's Internet community is 30 times larger than any other in Africa, being among the top 20 countries in the world when ranked by the number of Internet nodes.

The definition of a 'user' or 'subscriber' may vary, however, since the number of accounts being shared in Africa may be much greater than in more developed regions. A recent study by the UN Economic Commission for Africa (UNECA) found on average that there were 3 users for each computer with an Internet or e-mail connection. This could mean that the number of e-mail users outside South Africa is over 200,000.

Evidence gathered by UNECA suggests the average level of Internet use in the SSA is about one incoming and one outgoing e-mail per day averaging three to four pages, in communications which are almost always with people outside the continent. Surveys indicated that 25% of the e-mails replace faxes, while 10% replace phone calls and the other 65% are communications that would not have been made in the absence of an e-mail system.

Surprisingly, it can be observed that the French-speaking SSA countries have a far higher profile on the World Wide Web and greater institutional connectivity than the non-French speaking countries. This is due to the strong assistance provided by the various francophone support agencies and the Canadian and French governments, which are concerned about the dominance of English on the Internet. As a result, the anglophone and lusophone countries have considerable 'catching up' to do to reach the same levels of connectivity and representation. ACCT's BIEF (Banque Internationale d'Information sur les États Francophones) and AUPELF-UREF/REFER (Association des Universités partiellement ou entièrement d'expression française–Universités des réseaux d'expression française/Réseau éléctronique francophone pour l'enseignement supérieur et la recherche), which are building Web sites of local information as well as providing access, are the two dominant content developers.

On a sub-regional basis, Southern Africa is the most advanced region in terms of use of ICTs, followed by East and West Africa, with Central Africa lagging furthest behind. Universities were initially at the

Box 13.2 → Ghana

A draft national communications policy has been developed by the Ghanaian National Information and Communications Committee (GNICC), which comprises representatives from the academic, research, government and private sectors and is co-ordinated by the University of Ghana, Legon, Balme Library (www.ug.edu.gh).

The Library was chosen in part for its long standing experience with e-mail access and CD-ROM use, the latter which has in part been assisted by the sub-Saharan African Program of the American Association for the Advancement of Science (AAAS) (www.ug.edu.gh).

Support for the GNICC has been widespread, including from government, with participation from the ministries of environment, science and technology, education, information, transport and communication. The Ghana Government has indicated its support for promoting access to ICTs in all segments of society, particularly in the educational system. The Minister of Finance in his 1997 budget statement made the following declaration: 'In view of the positive effects of the application of information technology on development, Government will ensure that key institutions of state machinery are linked to the Internet. All the science resource centres will be connected to the network as and when they are commissioned. The program to link the Universities together and to the Internet will also be pursued.'

UNESCO has since agreed to fund the $250,000 project, with the primary local partners being the Ministry of Environment, Science and Technology and the Ministry of Transport and Communication. One of the initial goals will be the establishment of the Ghana Academic and Research Network (GARNET).

The government has requested the Bank for Institutional Development Fund to implement a network to connect the Office of the President, Parliament, the Ministry of Information and some other key ministries.

The technical sub-committee of the GNCIC has been charged with designing the specifications of a national networking backbone. Within the context of the GNICC/GARNET project it was originally envisaged that the University of Ghana would form the hub for GARNET's Internet links to the other Universities and research centres. The university is installing a fibre optic campus network with support from the Danish International Development Agency (DANIDA). It is located about 12 km from the centre of Accra, using a wireless link to the local Internet hub operated by NCS. With the emergence of NCS's national Internet backbone with POPs in three cities, along with its active support for academic networking, and furthermore Gilat's interest, a joint private/public sector networking project may emerge.

The Ministry of Transport and Communications (MOTC) established the Accelerated Development Programme (ADP) for telecommunications in 1995 to address the stagnant growth in the sector. The ADP is a reform program involving the establishment of a centralized regulatory body, the National Communications Authority (NCA), as the agency responsible for regulation of the telecommunications sector (www.communication.gov.gh).

At the same time Ghana Telecom (GT) was separated as a commercial entity from the Ministry of Posts and Telecommunications, with a 30% stake sold to a Malaysian consortium for $38 million and the availability of a second national operator's license was announced. The license was subsequently awarded to a consortium proposing a $10 million investment headed by the Ghana National Petroleum Corporation (GNPC), with the African Communications Group and Western Wireless (Cambridge, Mass, US). GNPC is working with the Israeli company Gilat to deploy a VSAT-based telephone network around the country. Both GT and GNPC have 20-year exclusivity licenses (www.gnpc.com.gh and gnpc@ncs.com.gh).

The MOTC plans to divest a further 21% of Ghana Telecom. It also hopes to exploit Ghana's strategic location at the centre of the ECOWAS region and intends to position the country as a hub for trade and commerce-driven telecommunications services.

Currently, Ghana's telephone network still reflects a poor state of development, but it is undergoing a process of rapid modernization. Many of the exchanges in Accra are now digitized, providing advanced services such as password, abbreviated dialing, call transfer, three-way conference, wake-up and call waiting. Motorola was awarded a contract in 1996 to expand GT's wireless local loop system to 13,000 subscribers.

vanguard of Internet developments in the sub-Sahara, and at the very least, most countries have e-mail connectivity. In late 1998, fifteen countries had universities with full Internet connectivity. However, Internet facilities are mostly restricted to staff. Although there are a few notable government Web sites, such as those of Angola, Mauritius, Mozambique, Senegal and Zambia, there is as yet relatively little government use of the Internet for existing administrative purposes. In the UNECA study mentioned above, it was found that the highest number of users surveyed belonged to nongovernmental organizations (NGOs), private companies, and universities. The ratio of nationals to non-nationals varied between countries. Most users were male and well educated.

E-mail is used for general correspondence and document exchange, technical advice, managing projects, arranging meetings, and exchanging research ideas, although its use is still limited for accessing formal information resources. Across the continent, users report that e-mail has increased efficiency and reduced the cost of communication, but as yet is used almost exclusively for contacting individuals in other regions, and the Web is still a relatively under-utilized resource.

In the area of local content development, the SSA Web-space is expanding rapidly, and almost all countries have some form of local or internationally-hosted Web server unofficially or officially representing the country with varying degrees of comprehensiveness. However, still relatively few institutions are well represented on the Web. While increasing numbers of organizations have a Web site with basic content and descriptive information, many are hosted by international development agency sites and very few sites actually use the Web for their activities.

There are about 120 electronic mailing lists and UseNet newsgroups on the Internet (almost entirely hosted off-continent) which discuss issues related to SSA. There is a list for almost every country as well as others on more general topics ranging from African Cinema to Post Colonialism.

Two web search engines specializing on Africa have emerged over the last year: Woyaa (www.woyaa.com) and Orientation Africa (af.orientation.com). As with other similar services elsewhere, these are run by commercial companies which generate revenue through advertising.

The news media are now relatively well represented on the Web. The African Studies department of Columbia University in the United States has identified over 115 different newspapers and news magazines in the region that are now available on the Internet, of which over 60% are published on the subcontinent, in about half of the countries. Also of note are the efforts of the ISP AfricaOnline to host daily newspapers on their web sites.

There are two major continent-wide African news agencies, both of which extensively use electronic media: Inter Press Service (IPS) and the Pan African News Agency (PANA). Sub-regionally, Southern Africa has the only active news agencies using ICTs, the Southern African Broadcasters Association (SABA) and the Media Institute of Southern Africa (MISA). In other regions use of ICTs among the media is much lower, but in West Africa, WANAD (West African News Media and Development Centre) is assisting journalists and media outlets to adopt the use of ICTs.

Of course international news correspondents in SSA are heavily dependant on ICTs to deliver material to their operations in the United States and Europe. Cable News Network (CNN) and the other international television news companies regularly rent temporary space segments all over Africa with the local representatives of IntelSat and PanamSat to deliver reports and live coverage. Radio journalists (even freelancers) are now sending edited sound files by e-mail to agencies such as the BBC World Service.

Across the subcontinent, there are as yet few

locally-developed electronic information repositories of national or sub-regional significance, and none of the existing ones are currently available on the Internet. This is partly because national archive and library systems are extremely poorly resourced and many have had little opportunity to obtain ICT skills or equipment.

Although statistics-gathering operations are also at a very low level due to insufficient support, many statistical offices are now using common standards and new tools. With the help of e-mail and fax, the collection of statistical information is no longer confined to the largest urban centres. The number of studies aiming at better knowledge of the structure and functioning of the socio-economic sectors is growing and price indices now cover rural areas.

RESTRUCTURING AND PRIVATIZATION OF THE TELECOMMUNICATION AND MEDIA SECTORS

There has been a gradual wave of restructuring in telecommunication and broadcasting sectors in sub-Sahara over the past five years. Ten countries, including Côte d'Ivoire, Ghana, Guinea, Senegal, South Africa and Uganda have partially privatized national telecommunications operators and fifteen more, including Cameroon, Madagascar, Malawi and the United Republic of Tanzania, intend to do so shortly. The cellular sector, which is almost completely private, already comprises about 20% of the market. World Trade Organization (WTO) Multilateral Trade Negotiation commitments have been made by Côte d'Ivoire, Ghana, Mauritius, Senegal and South Africa. By the beginning of 1998, twenty African countries had established independent or quasi-independent regulatory bodies for the telecommunication sector.

Telecommunications

The liberalization of the sectors in some of the countries will undoubtedly improve the prospects for increased investment in ICTs over the next few years. However, many governments still see the media as an organ of the state and the telecommunications sector as an important part of their general revenue base. This means that public network operators are not free to re-invest their profits in network development. Furthermore, much of the existing revenue for telecommunication operators comes as a result of the existing accounting rate system, which currently channels significant sums of international telecommunication revenue to African PTOs. The pending reform of the accounting rate system could deprive PTOs and/or their governments of vital investment capital just when they most need it.

However, the international telecommunication industry is waking up to the fact that Africa is the world's largest untapped market, and with governments desperate for ways to radically modernize telecommunications systems, new alliances are being forged between the private and public sectors. There are nevertheless concerns that little consideration is being given to the medium- and long-term implications, more particularly because when it comes to deregulation of the telecommunication sector, the assumption of many governments is that liberalization models, which have worked in the North, can simply be applied wholesale to the South.

Broadcasting

In the broadcasting sector, emerging legislation is often silent about the control of the public broadcasting service; in some cases their licences may not even be under the authority of the regulator, but of the Minister of Information. Moreover, commercialization of broadcasting, without adequate reform of the public broadcasting sector, has done little to promote plurality and diversity on the airwaves. Given the extent of rural poverty, profit-driven entrepreneurs have little or no interest in broadcasting to these more marginalized communities.

The establishment of commercial broadcasting

in eastern and southern Africa has shown that, in the absence of properly constituted independent regulators, licences have by and large been given to urban-based broadcasters. More often than not, these broadcasters have then been granted re-broadcast licences to other heavily-populated areas, which increases the stations' appeal to advertisers, but contributes little to the diversification of broadcasting in the country. These new commercial broadcasters have tended to be either owned by the ruling party or by staunch supporters of that party. These public broadcasters are also increasingly under pressure to make a profit inorder tosave onalreadyover-stretched national budgets. In order to compete with newly-established commercial stations, public broadcasters have little choice but to act and think commercially. This inevitably puts pressure on national broadcasters which leads them to neglect their less commercially viable public service mission, which usually includes a duty to inform, as well as to educate and entertain.

Sub-regional collaboration between countries in the development of strong regulators and legislation may be one important means of addressing some of these issues. To this end the Southern African grouping of thirteen SADC countries have agreed to a legally binding Protocol on Communications which includes commitments to Universal Service and adopting the model policy and telecommunications legislation that has been developed.

PROSPECTS OF THE REGION FOR THE MOVE TOWARDS THE INFORMATION SOCIETY

ICTs are at a critical strategic entry point for development in SSA. Innovations in this area could help accelerateSSA'seconomicgrowthandalleviatepoverty, but these tools make large demands on an underlying infrastructure that is currently incapable of servicing them. The infrastructure is steadily improving, but not fast enough to accommodate the growth in demand for the multitude of services now available. In particular, the need for high bandwidth infrastructure for the Internet creates serious pressures on the telecommunications networks in Africa. But the Internet is just one of a number of forces that will have an impact on telecommunications operators in the region. There are many others, such as international pressures on regulating accounting rates charges, and the growing presence of callback technology.

The challenges in this area focus on issues such as expansion of the local network and tariff rebalancing (for national operators); the erosion of international revenues (through, for example, callback systems, the Internet and the breakdown of the accounting-rate system); regulatory weaknesses that need to be addressed to ensure a level playing field and to attract investment; the need to provide rural services; the shortage of skilled personnel; and the need for customer focus in terms of quality, service coverage and price. In telecommunications alone, investments totaling at least $6,000–8,000 million would be required in SSA (excluding South Africa) over the next four years to add an additional 4.5 million lines. This would improve the teledensity in a significant way, even though it will remain the lowest in the world. There have nevertheless been an increasing number of indications that the sub-region's decision-makers are committed to achieving substantial change.

One of the most important events, which helped to accelerate moves toward increased adoption of ICTs in Africa, was the Addis Abeba Symposium on Telematics for Development, organized by UNESCO in April 1995. This meeting brought together almost all of the major forces in international computer networking development projects. One of the results of this Conference was the development of a framework document entitled the African Information Society Initiative (AISI), which was adopted at the subsequent meeting of the Conference of African Ministers in May 1996. AISI calls for the formulation and development of a National Information and Com-

munication Infrastructure (NICI) plan in every African country, driven by national development priorities, and proposes co-operation, linkage and partnership among African countries to share successful experiences. The countries that have so far begun the process for developing in-depth national information infrastructure and communication development plans are Benin, Burkina Faso, Cameroon, Comoros, Ethiopia, Lesotho, Namibia, Mozambique, Rwanda, South Africa and Uganda.

Combined with the Abidjan African Regional Telecommunications Development Conference, AISI has created significant internally-generated pressure from ministries to urge their administrations to adopt appropriate regulatory, tariff and service provision policies. Since then, communications ministers from over forty African countries have provided high-level endorsement for the telecommunications development policies encapsulated in the common vision document they have produced called the African Connection, whose target is to lay 50 million lines in Africa over the next five years (see www.telecom98.co.za for details).

In conjunction with efforts to built new infrastructures and improve the existing facilities, there are innovative efforts to improve accessibility to services through the use of shared public access facilities, which exploit the convergence of technologies to provide cost effective services in under-serviced and isolated areas. Commonly called community telecentres, the concept has received considerable support from the ITU and other members of the international community, as well as a number of national governments and PTOs. This has resulted in over 20 pilot telecentres across the subcontinent set up to test different models, means of implementation and mechanisms for sustainability.

The region's links to the rest of the world are also due to undergo substantial change, with a large number of international telecommunication-infrastructure building initiatives having been announced in the last 2-3 years: AT&T's Africa One, the SAFE project (South Africa–Far East) in collaboration with Malaysia Telecom, the SAT-3/WASC (South Atlantic Telephony/West African Submarine Cable), a West African coastal marine fibre cable and the East African Co-operation (EAC) project. In addition, the African satellite consortium owned by the African PTOs, RASCOM, has advanced plans to launch its own satellite before the year 2000.

LEO satellite networks, namely Iridium and Globalstar, hold particular promise for the subcontinent's widely dispersed population. One reason for this is that these services will derive most of their income when passing over developed countries, but will still have to pass over the developing regions such as Africa, where tariffs will be reduced to encourage demand.

INTERNATIONAL AND REGIONAL CO-OPERATION AND DEVELOPMENT ASSISTANCE RELATED TO ICT

With the worldwide recognition of the importance of ICTs in accelerating development, a number of recent international development assistance initiatives have improved the prospects for wider access to information and communication networks on the continent. In relation to the AISI initiative described above, a study on future information infrastructure-building activities in Africa was conducted through a collaboration between IDRC, BellaNet, UNECA, UNESCO and the ITU, called the African Network Initiative (ANI). It identified almost 100 ICT related development projects being planned or in process in Africa. To address the growing need for co-ordination, donors and implementing agencies involved in ICTs in Africa have agreed to establish an ongoing forum for information exchange on such projects called Partnerships for ICTs in Africa (Picta). A summarized list of projects in Africa continues to be updated at their Web site (www3.sn.apc.org/africa/projects.htm).

Many of these initiatives are part of the AISI Framework Sub-programme on Connectivity and, of the projects identified, among the potentially most influential are:

- The UN Secretary-General's System-Wide Initiative on Africa, which includes ICTs as one of the major components in a $11.5 million programme called 'Harnessing Information Technology for Development' (HITD/SiA), and is supported by the various UN partners.
- The United States Agency for International Development (USAID)/Leland Initiative which is assisting with developing Internet connectivity in 20 African countries in return for agreements to liberalize the market to third-party Internet service providers and to adopt policies which allow for the unrestricted flow of information. New initiatives for Leland announced by US Vice President Al Gore recently include a programme for 1 million PCs for Africa, 1,000 schools connected and 100 Universities connected.
- The ITU's programme for Africa which involves various rural, community telecentre, health and satellite projects emanating from the Buenos Aires Action Plan, is being conducted in co-operation with UNESCO, IDRC, World Health Organization (WHO) and others.
- The World Bank which has activities to assist in telecommunication and ICT development in about 25 countries in Sub-Saharan Africa. Initiatives include the African Virtual University (AVU), Economic Toolkit and Workshops for Internet Connectivity in Africa, the Rural Telecommunications Field Trial and Commercialization Pilot in Kenya, and the Global Connectivity in Africa Conference.
- IDRC's Acacia programme which has allocated 60 million Canadian dollars over the next five years to developing the use of ICTs in communities in Africa.
- The commerce-oriented TradePoint initiative of the United Nations Conference on Trade and Development (UNCTAD) which has made Africa the priority region for the next two years. UNCTAD has obtained a commitment from the European Union for 30 million euros for the regional development of local trade efficiency networks in Africa.
- The multi-donor InfoDev fund established by the World Bank, which has supported the South African Telematics for African Development Consortium and the $1 million African Virtual University Project.
- UNESCO is according a high priority to telematics and informatics initiatives in Africa through support for the Regional Informatics Network for Africa (RINAF), which has already received more than $2 million in extrabudgetary and regular funds and is developing into a self-governing programme. UNESCO has also recently established the Creating Learning Networks for African Teachers project to assist teacher training colleges develop literacy in ICTs and their use for education, and to connect them to the Internet. The project, already being implemented in Zimbabwe, is being initiated in Senegal, and is intended to be extended to twenty countries with extrabudgetary support.
- UNDP's Africa Bureau has agreed to a $6 million fund to improve Internet connectivity in Africa in a project called the Internet Initiative for Africa (IIA). The countries currently participating are Angola, Burkina Faso, Cape Verde, Chad, the Democratic Republic of Congo, the Gambia, Mauritania, Namibia, Nigeria, Saõ Tomé et Principe, Swaziland and Togo. UNDP's Sustainable Development Networking Programme (SDNP) has 10 operational nodes in Africa in Angola, Benin, Cameroon, Chad, Gabon, Malawi, Morocco, Mozambique, Togo and Tunisia. National SDNP projects are funded for two to three years and are expected to provide seed money towards

sustainability, either through sale of services or adoption within government budget.

- → The United Nations Environment Programme's (UNEP) Mercure project which uses VSAT technology to establish an environmental information exchange network in Africa. UNEP is co-operating with the ITU to examine the possibility of using the spare bandwidth of the network for other functions.
- → The UN Office for Outer Space Affairs is proposing through the COPINE project to donate groundstations and transponder time to African research institutions.
- → The various activities of Agence de la Francophonie and related international organizations such as the Office de la Recherche Scientifique des Territoires d'Outre-Mer (ORSTOM), AUPELF, UREF, REFER, which are providing support for ICTs in Francophone countries, most of which are in Africa. Recently the AFRINET project was launched which is providing web servers and related support at a ministerial level to Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Madagascar, Mali, Mauritius, Mauritania and Senegal.

CONCLUSION

The overall funding coming from international and regional co-operation and related to ICT shows the importance that the international community attributes to this sector. But in Africa as in the rest of the world, the development of adequate infrastructure is only the first step in the right direction. Adequate policies should ensure that such progress will not widen the gap between the information-rich and the information-poor. The risk may be greater in Africa than in other parts of the world, since the initial situation is more critical than anywhere else. As pointed out at the beginning of this chapter, indicators such as literacy rate, life expectancy and other factors related to human development are very low. It is to be hoped that the commitment of the international community combined with the efforts of the national authorities will assist the continent which witnessed the birth of the human species to reach an adequate level of development through the use of the appropriate ICTs.

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Chapter 14
Arab countries

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THE ARAB COUNTRIES: ECONOMIC AND SOCIAL CONTEXT

Information and communications technologies (ICTs) are affecting all countries, whether developed or developing. The Arab countries are no exception. They are also struggling to meet the challenge of ICT's multiple impact on the social, economic, cultural and political aspects of life. This paper focuses on the penetration and use of information and communication technologies in the Arab region. It begins with a brief presentation of general economic and social data in the Arab countries and concludes with a look at future prospects for the development of ICT within this regional context.

The first striking feature in the Arab region is the wide variation among countries in terms of population, gross national product (GNP) per capita, education and use of ICT. The total population (Table 14.1) is over 260 million, according to 1997 estimates. The population of individual countries ranges from 0.6 to 62.5 million, with four countries numbering over 20 million inhabitants and one country, Egypt, more than 60 million. Nine countries – Bahrain, Djibouti, Kuwait, Lebanon, Mauritania, Oman, Palestine, Qatar, United Arab Emirates – are below 5 million. Three of them are found in the Gulf area and have populations below 1 million.

In the period between 1970 and 1995, annual population growth rate in the region ranged from 0.8% to 9.6%. Lebanon's rate was the lowest, but this is expected to rise after the civil war has ended. By contrast, in Qatar and the United Arab Emirates, the annual population growth rate was very high, 6.6% and 9.65% respectively, due to the large number of immigrants needed to improve the quantity and quality of the labour force in these two oil-producing countries. Growth is expected to decline between 1995 and 2015 in all countries except Lebanon. There are a number of reasons for this trend. Many countries are adopting family planning, terrorism in Algeria is

also affecting the rate, and the end of the building boom in oil-producing countries is reducing the need for imported labour.

Per capita GNP in the region ranges from $260 to over $17,000 in the Gulf area, where oil revenues support a small population, as shown in Table 14.1. It is below $500 in two countries, but above $2,000 in two others and above $5,000 in three oil-producing countries. According to the World Bank (World Development Report, 1997), no country in the region has an annual growth rate exceeding 2%.

In some countries, only 10% of the land is inhabited; the rest is mostly desert. In such an environment, where literacy levels are also low, the new communication technologies, including television, can be very useful.

Illiteracy remains a challenge for some Arab countries in spite of the campaigns which have been launched in the last few decades. Table 14.2 shows that where data are available, most countries have an illiteracy rate between 20% and 50%. Women's literacy in all countries of the region is lower than men's.

Table 14.1 → Arab countries: general descriptive data, 1997

Country	Estimated population in millions	Area in 1,000 km^2	Population density per km^2	Annual population growth rate, as %		Gross national product (GNP) per capita	
						in $	Average annual growth rate, as %
	1997	1995	1997	1970–1995	1995–2015	1995	1985–1995
Algeria	29.47	2,382	12	2.9	2.0	1,600	(2.4)
Bahrain	0.62	0.661	938	3.8	1.6	na	na
Djibouti	0.63	22	29	5.8	2.3	na	na
Egypt	62.5	1,001	62	2.3	1.6	790	1.1
Iraq	21.18	441	48	3.1	2.7	na	na
Jordan	5.77	89	60	3.5	2.9	1,510	(4.5)
Kuwait	1.81	18	75	3.3	2.1	17,390	1.1
Lebanon	3.14	10	302	0.8	1.4	2,660	na
Libya	5.78	1,927	3	4.1	3.2	na	na
Mauritania	2.39	1,026	2	2.5	2.4	460	0.5
Morocco	27.52	447	42	2.2	1.5	1,110	0.9
Oman	2.40	212	9	4.6	3.9	4,820	0.3
Palestine	2.76	0.379	7,266	na	na	na	na
Qatar	0.57	11	50	6.6	1.5	na	na
Saudia Arabia	19.49	2,150	8	4.7	3.1	7,040	(1.9)
Somalia	10.22	638	16	na	na	na	na
Sudan	27.9	2,536	11	2.7	2.1	na	na
Syria	14.95	185	81	3.3	2.4	1,120	0.9
Tunisia	9.32	164	57	2.3	1.5	1,820	(1.9)
United Arab Emirates	2.38	84	32	9.6	1.6	17,400	(2.8)
Yemen	16.48	528	87	3.5	3.5	260	na

Sources: UNDP 1998, Human Development Report; ITU 1997, World Telecommunication Development Report; World Bank 1997, World Development Report.

Table 14.2 → Literacy and education an Arab countries, 1995

Country	Adult illiteracy, as %	Adult literacy rate, as % 1995		Combined first-, secondary and third-level gross enrolment ratio, %		Gross enrolment ratio in primary education		Gross enrolment ratio in secondary education		Higher education as a % of all education phases
						Total,[1] as %	Females as a % of males	Total, as %	Females as a % of males	
	1995	Female	Male	Female	Male	1995	1995	1995	1995	1990–1995
Algeria	38	49.1	73.9	62	66.7	107	89	62	89	na
Bahrain	na	79.4	89.1	85.9	78.1	108	102	99	103	na
Djibouti	na	na	na	na	na	38	75	13	73	14
Egypt	49	38.8	63.6	63.4	68.9	100	87	74	85	36
Iraq	na	45	70.7	45.4	55.1	na	na	na	na	21
Jordan	13	79.4	93.4	66	66	94	101	na	na	34
Kuwait	21	74.9	82.2	57.9	52.6	73	99	64	100	16
Lebanon	8	90.3	94.7	75.1	66.1	109	97	81	109	na
Libya	na	63.1	87.9	89	85.5	106	97	97	na	na
Mauritania	na	26.3	49.6	33.4	41.4	78	85	15	58	20
Morocco	56	31	56.6	40.6	50.7	83	76	39	75	16
Oman	na	46	71	58.1	60.1	80	95	66	94	6
Palestine	na	na	na	na	na	na	na	na	na	na
Qatar	na	79.9	79.2	72.8	65.2	89	95	83	101	na
Saudia Arabia	37	50.3	71.5	54.4	55.1	78	96	58	87	18
Somalia	na	na	na	na	na	na	na	na	na	na
Sudan	na	34.6	57.7	28.8	33.1	54	81	13	86	na
Syria	na	55.8	85.7	57.8	61.2	101	90	44	85	na
Tunisia	33	54.6	78.6	66.4	67.6	116	94	61	94	19
United Arab Emirates	21	79.8	78.9	72.1	66.1	94	96	80	111	na
Yemen	na	39	39	26.9	67.7	79	40	23	22	na

1. The enrolment ratio exceeds 100% when the actual age distribution of pupils extends beyond the official school ages.

Sources: UNDP 1998, Human Development Report; World Bank 1997, World Development Report.

In schools, the gender balance is somewhat better. The high enrolment rate in primary education suggests that literacy rates could improve dramatically over the next generation, provided the high number of dropouts were reduced. The total enrolment rate ranges from 38% to 116%. It was above 80% in all but six countries in 1995, and higher than 90% in nine countries. The percentage of females to males is over 80% except for two countries. In secondary schools, enrolment rates decrease. In a few countries they never exceed 25% of the registration achieved in primary education. Overall, enrolment rates in secondary school vary from 13% to 99%. In ten countries the percentage is above 60%, and in six of them it is above 70%. The number of females registered as a percentage of the total number of males registered in secondary school is above 80% in twelwe countries. As for higher education, the limited data available shows that the overall enrolment rate rose to 30% in only two countries, and reached 20% in four countries. However, the rates for females and males enroled in higher education are about equal in most countries.

Significant progress has been made is recent years in the development and strengthening of higher education in Arab states. This has led to more equitable representation of different social groups among graduates. In addition, the recent initiative for the establishment of an Open Arab University, which should be quite effective considering the geographic and social conditions of the region, has raised new

hopes throughout the region. Finally, in spite of free education and literacy campaigns, achieving United Nations (UN) goals for the year 2000 remains a major challenge.

STATUS OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN THE ARAB REGION

In order to organize the presentation of ICT in the Arab countries, we have adopted the model proposed by Kobayashi (1986) which suggests five main categories. The first category, called 'human interface', covers the technologies involving interaction between the machine and human beings, such as radio, television, the telephone, personal computers (PCs) and connections to the Internet. The second category refers to all ICT networks, including broadcasting, telecommunications and computer networks. The third category deals with ICTs used in government and administration, and the fourth concerning those found in education and research. The last group deals with information and knowledge services, such as decision support systems, the world wide web and all printed – or 'typographical' – information as it is called by Kobayashi.

Human interface technologies

Table 14.3 provides data for the main technologies in this category: radio, television (TV), telephone lines, PCs, Internet, and fax machines. As expected, radio shows the highest penetration rates. Five countries show over 400 radio sets per 1,000 inhabitants, and four of these rise above 450 radios per 1,000 inhabitants. Only three countries are below 150 sets per 1,000. Television is the second most common communication technology, with a range of 13 to 457 sets per 1,000 inhabitants. Seven countries show a penetration rate above 250 sets per 1,000 inhabitants, and eight are below 100. Telephone lines are expanding. In 1997, these ranged from less than 1 line for 100 inhabitants in Somalia to more than 35 lines per 100 inhabitants in the United Arab Emirates. Fifteen countries are above 4 per 100 inhabitants.

Within the region, therefore, it is therefore possible to distinguish three groups of user countries in terms of telecommunications development. The first group comprises the Gulf countries with teledensities well above the world average and where almost every household has a telephone. The second group, comprising the majority of the countries, shows a teledensity a little above 4%. The third group includes countries with teledensities below these levels.

The personal computer is the most important terminal used with a human interface: it allows for a high level of interaction, and makes it possible to do co-operative work online. It may include the use of a CD-ROM, as well as general Internet connectivity including e-mail and many other functions. Data on the penetration rate for personal computers are limited, but those available show that the level of 50 PCs per 1,000 inhabitants has been reached in two countries in the Gulf. The lowest rate is found in the Syrian Arab Republic with 0.1/1,000.

Data on Internet users are limited to eleven countries in 1995 and the rate ranges from 0.1 to 2.1 users per 1,000 inhabitants. Internet data in Table 14.4 show a subscriber boom between July and December 1997, with a significant growth by the end of the year. Table 14.4 also compares the number of Internet hosts in the Arab region from January to July 1998. The total numbers almost tripled during this six-month period. In many countries the number decreased, yet in one country, the United Arab Emirates, the number increased dramatically. The total number of Internet users almost doubled in most countries during the six-month period extending from July to December 1997.

In the Arab countries, 98% of the Internet users are men, which is a disturbing figure. Users are evenly split among those who use the Internet at home and those who use it from their place of work.

Table 14.3 → Radio, television, telephone, fax, PC and Internet users in Arab countries, 1995–1997

Country	Radio receivers per 1,000 inhabitants	TV receivers per 1,000 inhabitants	Main telephone lines				Number of PCs per 1,000 inhabitants	Number of Internet users per 1,000 inhabitants	Fax machines per 1,000 inhabitants
			Total telephone lines (thousands)		Per 100 inhabitants				
	1995	1995	1995	1997	1995	1997	1995	1995	1995
Algeria	238	71	1,176.3	1,400.3	4.21	4.75	3	0	0.2
Bahrain	575	439	140.9	152.3	25.69	24.57	50.3	1.7	10.8
Djibouti	80	73	7.5	1.31	1.33	1.33	na	0.2	0.2
Egypt	312	126	2,716.2	3,452.7	4.7	5.57	na	0.3	na
Iraq	224	74	675	675	3.3	3.28	na	na	na
Jordan	251	175	317.4	402.6	7.3	6.97	8	0.2	7.4
Kuwait	473	373	382.3	411.6	23.15	22.74	56.2	2.1	20.7
Lebanon	891	268	330	460.6	8.2	14.93	12.5	0.6	na
Libya	231	138	318	380	5.88	6.79	na	na	na
Mauritania	150	58	9.3	13.1	0.42	0.55	na	na	0.1
Morocco	226	145	1,158	1,375	4.3	5	1.7	0.1	na
Oman	580	61	169.9	200.6	7.9	8.35	12.7	na	na
Palestine	na	na	na	120	na	4.35	na	na	na
Qatar	438	457	122.7	141.9	22.3	24.94	na	1.8	17.1
Saudia Arabia	291	269	1,719.4	2,285.4	9.58	11.72	na	0.1	na
Somalia	42	13	15	15	0.17	0.15	na	na	na
Sudan	270	86	75	151	0.3	0.54	na	na	0.2
Syria	264	89	969	1,312	6.8	8.78	0.1	na	0.3
Tunisia	200	156	521.7	654.2	5.82	7.02	6.7	0.1	2.8
United Arab Emirates	271	263	672.3	835.1	29.1	35.09	48.4	1.1	10.5
Yemen	43	267	187	220.3	1.35	1.34	na	na	0.1

Sources: UNDP 1998. Human Development Report. ITU 1995. World Telecommunication Development Report. ITU 1997. World Telecommunication Development Report. UNESCO 1997, Statistical Yearbook.

Table 14.4 → Internet subscribers in selected Arab countries, 1997–1998

Country	Number of internet subscribers			Estimated number of actual users		Internet hosts	
	July 1997	Nov. 1997	Dec. 1997	July 1997	Dec. 1997	Jan. 1998	July 1998
Tunisia	0	1,400	1,750	na	2,993	69	57
Jordan	4,000	6,000	7,350	11,840	20,213	249	360
Qatar	2,800	5,185	6,289	8,262	17,295	189	23
UAE	15,250	27,000	32,201	45,150	88,552	1,940	13,519
Oman	3,860	6,490	7,595	11,425	20,888	670	666
Kuwait	1,000	14,000	15,400	29,600	42,350	4,057	5,597
Lebanon	12,000	15,000	15,938	35,520	43,828	1,143	1,400
Bahrain & Saudi Arabia	13,000	16,000	16,923	38,408	46,538	375	379
Egypt	12,000	14,500	15,255	35,520	61,021	2,013	2,013
Yemen	920	840	882	na	2,426	10	10
Total	64,830	99,015	110,483	251,254	322,898	10,715	24,024

Sources: Commercenet research center (www.commerce.net); Network wizards (www.nw.com).

Regarding electronic commerce, a survey conducted in 1998 by the magazine Internet Arab World, published by Dubai Information Technology, showed that only 4% of users in Arab countries made a purchase through the Internet during the year. Among the factors affecting the penetration of electronic commerce, one can mention the fact that this kind of commerce is relatively new in the region, that it lacks a critical mass of consumers and has to overcome a conservative attitude regarding the security of electronic transactions. However, Arabic software companies expect to generate 33% of their sales through the Internet in the next two or three years. Some observers expect electronic commerce to grow by 100% over the next 12 months.

The fax machine is complementary to the telephone, whether it is used directly on the telephone line or through a PC. Existing levels of penetration range from 0.1 per 1,000 inhabitants to 20.7 per 1,000. As the Internet expands, e-mail may rapidly replace fax since it is more user-friendly and supports multimedia message delivery.

Telecommunication and computer networks

As was seen in Table 14.3, radio, television and telephone are the most widespread communication technologies. The situation is more diversified for broadcasting. Available radio frequencies have reached the saturation point in most Arab countries in the last decade. On the other hand, TV channels and telecommunications have expanded greatly with the creation in 1967 of ARABSAT, the Arab Satellite Communications Organization (www.arab.net/arabsat/contacts.html). The purpose of this enterprise is to invest in and operate the Arab space sector; arrange and secure extended communication of telephone, faxes, telexes, and pictures; arrange radio and TV broadcasting; offer paid consulting services in the area of satellite communication; and encourage Arab industries to invest in satellite communication.

Table 14.5 → ARABSAT use data, 1997

Country	Total minutes of international use (in millions)	Minutes per subscriber	No. of unfulfilled demands
Algeria	79	68	675,716
Bahrain	89	632	0
Djibouti	4	530	3
Egypt	100	37	0
Jordan	72	227	128,978
Kuwait	126	33	0
Lebanon	34	541	0
Libya	47	148	0
Mauritania	5	na	1,472
Morocco	130	123	93,326
Oman	54	318	0
Qatar	76	620	450
Saudia Arabia	537	313	1,262,479
Sudan	na	107	na
Syria	60	65	2,292,282
Tunisia	78	150	129,274
UAE	504	709	1,319
Yemen	23	123	75,306

Source: ARABSAT report to co-ordination committee, 1997.

The first satellite was launched in 1985. The available channels were used by Arab information ministries (broadcasting and TV) as well as telecommunication ministries and in co-ordination with the ground networks. ARABSAT worked as a business organization and was able to finance all successive projects. During this first generation experience it manufactured three satellites and bought two more (in orbit) to meet the increasing demand. Then it launched two second-generation satellites to expand the area covered. The first satellite of the third generation was launched on 27 February 1999 and will cover both the Arab region and Europe.

ARABSAT's activities are expanding all the time. Details of use, according to the 1997 ARABSAT report to the Project Co-ordination Committee, are shown in Table 14.5. The total amount of time spent for international calls ranges from 537 million minutes in Saudi Arabia to 504 million in U.A.E, but it goes down to 4 million in Djibouti and 5 million in Mauritania. The number of minutes of satellite link used by each individual subscriber for international communication

is quite high, at 709 minutes in U.A.E., 632 in Bahrain, and 620 in Qatar. In Egypt and Kuwait, however, the number adds up to less than 40 minutes per subscriber. Unfulfilled demand is quite high: it reaches over 2.2 million minutes in the Syrian Arab Republic and over 1.2 million in Saudi Arabia. According to ARABSAT, these data would seem to encourage additional investment in telecommunication, especially for more optical fibre networks in the Arab countries. As for the cellular mobile telephone, ITU data show the total percentage increase between 1995 and 1997 in Arab countries to be 62.8%, probably due to the privatization of this service. The Egyptian satellite NILESAT was launched in April 1998 to provide digital TV and radio broadcasting, Internet services, and distance education at different levels and in different languages. It covers the Middle East region from Baghdad to Rabat, and parts of southern and northern Europe. Several Arab countries such as Bahrain, Kuwait, Iraq, the Libyan Arab Jamahiriya, Oman, and Tunisia are channel providers.

With respect to computer networks, many organizations are moving away from centralized information systems or local area networks (LANs), a change which often implies the revision of administrative structure. Some large organizations have started thinking of establishing Intranets based on the Transmission Control Protocol/Internet Protocol (TCP/IP).

Heavy demand for telecommunication networking pushed some countries like Egypt to begin privatizing this sector. Public data networks are being enhanced from the X.25 standard to Frame Relay and Asynchronous Transmission Mode (ATM). Internet connectivity uses a variety of methods, whether through satellite links or optical fibre. Total channel capacity to access the Global Internet has reached around 12 Mbps, of which 2.5 Mbps are used by the Egyptian Universities Network. This capacity also serves various governmental sectors, and more than 40 Internet Service Providers (ISPs) are distributed among 16 governorates. Some of the remote ISPs in upper Egypt use very small aperture terminals (VSATs) for their local connections.

A regional communication network, RITSENET, has been planned by the Egyptian government, but implementation is still in progress. Efforts to link Algeria, Morocco, Tunisia, Mauritania and the Libyan Arab Jamahiriya to the network have begun. Some discussions also are underway about establishing backbone networks at the local, sub-regional, or regional levels in order to offer a more cost-effective means of supplying Internet connectivity.

Government and administration

In most Arab countries, attempts to computerize government offices began during the mid-1980s. Since then, the building of data bases and networks within different departments and local organizations has continued to grow. Because of the non-latin alphabet of the Arab language, fax communication, introduced more than two decades ago, is still widely used despite the spread of e-mail.

The classical applications known as clerical automation and management information systems (MIS) have now matured and include accounting, inventory control, financial information, personnel and planning. The Arab League ICT Regional Arabic Institutes have tried to stimulated these countries' interest in adopting ICT through studies, workshops and conferences organized at the national level.

Geographical Information Systems (GIS) were introduced in Egypt in 1996. The systems were designed with a long-term perspective that would allow progressive implementation and continuous monitoring. Priority was given to environmental applications, infrastructure building, municipal administration, socio-economic studies, and information and mass communication.

With support from the Islamic Bank, efforts are underway to improve productivity and strengthen industrialization in the field of electronics, informatics

and communication, by linking data input, operations research, modelling and implementation. Decision Support Systems (DSS) have been installed in different Arab countries since the mid-1980s. An Egyptian centre for DSS was set up in 1985 and is expanding its activities to include training and other services.

The National Information Centre in the Syrian Arab Republic was established in 1991. It has a comprehensive mandate for developing and managing information systems. It also collects, analyses, processes and stores data with the aim of providing statistical information to researchers and decision-makers in such fields as informatics, politics, economics, law, social, military, and cultural affairs. These services are in addition to promoting awareness and participating in drawing up a draft development plan for the country.

Arabization, however, is a critical factor in developing information systems, but with the increasing investment in ICT and the increase in the number of users, companies are also responding faster. Microsoft introduced an Arabic version of Windows 98 in October 1998 in Dubai, just five months after introduction of the English version. Each year there are also conferences and exhibitions in different Arab countries which address particular issues such as expert systems, modelling, virtual reality, but it is too early to evaluate the results. Finally, the number of businesses in this field is expanding and the number of software companies linked to multi-national firms, or specialized foreign companies in the same sectors, such as GIS or banking, is also increasing. A high percentage of systems are designed and implemented by foreign companies.

With regard to management and administration, many national services in the Arab countries have been automated and are improving: from customs, taxes and licenses, to reservations, check payments and, to some extent, information retrieval. National activities that have direct relation with international facilities such as airports, maritime ports and financial service cards are the most advanced in this respect since they require only a single node to be linked to a global network. National identification numbers similar to the social security number in western countries will soon facilitate the collection of statistics and improve interactions between government and the population.

Research and education

Within the research community, ICT is becoming an essential tool, particularly with respect to the retrieval of scientific information. Moreover, specialized institutions involved in informatics are being established. In some cases, they participate in supervising the dissemination of scientific knowledge at the national level. In Saudi Arabia, for example, King Abdul Aziz City of Science and Technology is supervising the introduction of Internet connectivity in Saudi Arabia. It has licensed 37 companies to provide Internet access, and 85,000 subscribers are expected by the end of 1999.

In Egypt, the Academy of Scientific Research and Technology is facilitating the access to scientific library material and patent databases. The Egyptian Universities Network is serving Egypt's top-level national administrators. The Information and Decision Support Centre (IDSC) is supervising the introduction of Internet services to the governmental sectors and also licensing Internet access to the private ISPs. The electronic Research Institute in Cairo and the Mubarak City of Science and Technology have established special departments for dealing with Informatics. Similar examples can be found in Algeria, Morocco and Tunisia.

As for university education, the task of co-ordinating information among Arab institutions is being undertaken by the Union of Arab Universities. Almost all Arab universities are connected to the Internet, although there is not yet an Arab Backbone Network. In some countries, universities are all connected to a single network. For example, Egypt's

twelve universities are linked through the Egyptian Universities Network, together with Al-Azhar and the American University. Since Tunisia, Kuwait and Egypt were the first Arab countries to have Internet connectivity, they have accumulated more experience in using this technology in the university context. Nevertheless, the United Arab Emirates and Lebanon have recently witnessed a sharp increase in Internet penetration.

Many universities already have separate departments for computer engineering and computer science. In some cases, separate colleges for Information and Computer Science have been established. Distance learning is becoming more important as pilot projects are being implemented using ARABSAT and NILESAT.

For precollege education, four types of computer applications can be identified. The first type concerns the introduction of computers at schools to let students, teachers, and administrators grasp the fundamentals of information technology. The second type is the use of computers in a multimedia environment to support the teaching of different subjects and to experiment with new methods of cognitive-based education and learning. The third type is the use of Internet as a means of enhancing collaboration between Arab students and their fellows all over the world, and also to experiment with Web-based education and learning. The fourth type concerns teacher-training and the support of education administrators through the use of videoconferencing networks. For instance, all the regional teacher-training centres in all the governorates of Egypt are linked to the main centre at the Ministry of Education through a videoconferencing network. Prototype multimedia-based educational material is being tested in Saudi Arabia and Egypt.

However, it should be emphasized that computer penetration is still low in Arab countries, and more funding and teacher training are essential. Additional efforts are required to produce educational material in the Arabic language and which reflects the cultural values of the region. On these issues, see also Chapters 2 and 3.

Printing and publishing

The printed word has had a significant impact on the history of humanity and should continue to do so for many generations to come. Printed products – books, newspapers, magazines, scientific periodicals, dictionaries and encyclopaedias, black and white pictures or coloured images – still represent a basic tool for diffusing information, knowledge, and news.

The interaction between printing and ICT is quite strong. For instance, it is now possible to receive news on-line and in real time from all over the world, to store it, to communicate it worldwide and to make it accessible on demand. Editors and publishers can now revise in parallel with the authoring process, saving precious time. Authors and writers now have at their disposal a number of time-saving tools for retrieving information and data, or to assist them during writing. A great number of journals are accessible on the Internet. A number of encyclopedias and dictionaries are in electronic form, some of them as hand-held devices. ICT paved the ground for remote printing, allowing newspapers, journals, and periodicals to be on time all over the world and in the form required. Libraries are also automated and equipped with CD-ROMs. The era of the electronic library is on the way. All these changes are also taking place in the Arab region. Table 14.6 provides data on magazines and daily newspapers.

The total number of newspaper and magazine titles adds up to 421. The highest figure, 101, comes from Lebanon, and five countries publish over 30 titles each. Morocco has the highest number of daily newspapers at 20, but the highest distribution rate is in Kuwait, with 387 papers per 1,000 inhabitants. There are a number of Arab newspapers published abroad, mainly in the UK and the USA. Most of the Arab countries also import a number of magazines and newspapers from abroad, although their

Table 14.6 → Newspapers and periodicals in Arab countries, 1995–1996

Country	Total number of newspapers and magazines	Daily newspapers			Importation and exportation of newspapers and periodicals (amount in millions of $)		
		Number of daily newspapers	Circulation		Exports	Imports	Balance
			Total (in thousands)	Distribution of daily newspapers per 1,000 inhabitants			
	1996	1995	1995	1995	1995	1995	1995
Algeria	11	8	1,440	51	1.7	0.9	0.8
Bahrain	7	3	70	126	na	na	na
Djibouti	na	na	–	–	na	na	na
Egypt	53	15	2,373	38	2.4	3.6	(1.2)
Iraq	6	4	530	26	na	na	na
Jordan	12	4	250	47	na	na	na
Kuwait	39	9	655	387	0.3	5.5	(5.2)
Lebanon	101	14	330	110	na	na	na
Libya	4	4	71	13	na	na	na
Mauritania	na	1	1	0.5	na	na	na
Morocco	21	20	630	24	0.3	3.5	(3.3)
Oman	12	4	63	28	0.2	2.1	(1.8)
Palestine	9	na	na	na	na	na	na
Qatar	10	4	80	146	na	na	na
Saudia Arabia	63	12	1,060	58	0.0	0.8	(0.7)
Somalia	na	1	10	1	na	na	na
Sudan	15	5	650	24	na	na	na
Syria	6	8	274	19	na	na	na
Tunisia	15	8	270	30	0.5	6.5	(6.1)
United Arab Emirates	36	8	310	140	na	na	na
Yemen	1	3	230	15	na	na	na

Sources: Egyptian State Information Service; UNESCO, 1998. Statistical Yearbook.

distribution is limited to a small number of cities. There is also a union for distributors of Arab newspapers and an Arab union of journalists, founded in 1964. The latter contributes quite actively to upgrading the profession, through a number of courses and seminars including, lately, the use of modern technology and the Internet.

Arab civilization has been closely linked with the production of books and other printed matter. Historically, its efforts in translation have been instrumental in transmitting the works of ancient writers, and Arab contributions in many fields of knowledge are well known. Today, the publishing situation is different and the basic production is translated from western sources. Most of the textbooks used at university level in certain faculties are in English or French, even if the original is Russian or Japanese. Table 14.7 on book production shows that in seven countries, the total number of titles published ranges from 293 in the U.A.E. to 3,108 in Egypt.

An important exchange of books is taking place among the Arab countries, including those in the western region. This is facilitated in part by the use of a common language. As for school texts, the data are limited, but surely the primary, preparatory and secondary schools in all Arab countries have their own books in Arabic, except for private schools that have science and mathematics in English or French and, sometimes, in German. The Arab region imports more books than it exports, resulting in a negative balance in this respect. In Arab countries the number of libraries is limited, but many campaigns have been

carried out for their expansion. These programs were first intended for children but are now aimed at a wider audience. An Arab Publishing Union has been established and is quite active in preparing and expanding the presence of Arabic editions in different countries, including participation in book fairs in other regions.

ICT AND ARAB COUNTRIES: GENERAL TRENDS

The Arab region appears to favour the simultaneous promotion of industrialization and communication technologies. However, there seems to be more focus on ICT. ICT systems are being upgraded at many levels, but this is especially apparent in efforts to increase efficiency and thus improve productivity. Some of the countries, however, are only just now becoming familiar with ICT. Nevertheless, education at all levels is a top priority throughout the region, and computers and modern communication technologies are considered key tools in preparing all countries for the 21st century.

Studies are being conducted to establish optimum ways of using ICT to improve literacy. At

Table 14.7 → Book production in selected Arab countries, 1995

Country	Book production (Number of titles)										
	Total	General	Philosophy	Religion	Social sciences	Philology	Pure sciences	Applied sciences	Arts	Literature	Geog./ History
Algeria	323 [94]	22 [94]	21 [94]	9 [94]	97 [94]	4 [94]	42 [94]	14 [94]	10 [94]	72 [94]	32 [94]
Egypt	3,108 [93]	289 [93]	58 [93]	329 [93]	220 [93]	238 [93]	190 [93]	280 [93]	118 [93]	378 [93]	176 [93]
Jordan	465	15	9	74	106	10	19	26	22	128	56
Morocco	940	275	8	58	273	12	9	37	24	134	110
Oman	na	na	na	na	na	na	na	na	na	na	na
Qatar	419	21	5	70	84	36	120	40	5	16	22
Tunisia	569 [94]	18 [94]	26 [94]	11 [94]	130 [94]	4 [94]	9 [94]	39 [94]	11 [94]	286 [94]	27 [94]
United Arab Emirates	293 [93]	na	3 [93]	68 [93]	2 [93]	83 [93]	99 [93]	9 [93]	2 [93]	na	27 [93]

Country	Book production: total number of copies	Production of school textbooks		Importation and exportation of books and pamphlets (in millions of $)		
		Number of titles	Number of copies	Exports	Imports	Balance
Algeria	na	na	na	na	8	(8)
Egypt	108,042 [93]	735 [93]	41,149 [93]	4.9	10.6	(5.8)
Jordan	na	na	na	15.1	6.7	8.4
Kuwait	na	na	na	0.8	8.5	(7.8)
Morocco	2,861	na	na	1.3	22.6	(21.3)
Oman	na	na	na	0.2	3.4	(3.2)
Qatar	na	259	na	na	na	na
Tunisia	na	49 [94]	na	1.5	12.9	(11.5)
United Arab Emirates	5,117 [93]	na	na	na	na	na

Source: UNESCO, 1998, Statistical Yearbook.

the strategic level of management, the focus is now on decision-making methodology to make better use of the tools already available. Below the strategic level, some organizations are studying the newly introduced data warehousing platforms, together with some data mining techniques that sometimes use expert-system methodologies. There is also an urgent need to support the creation of public information systems and to make them accessible to the general public. The launching of the last ARABSAT satellite will greatly contribute to the improvement of telecommunication, broadcasting and access to information. Local wireless loop services may be developed as a complement. The satellite will also facilitate broadcasting news about events of common interest to Arab and Islamic countries, whether conferences, cultural events, or sports. NILESAT-2 is also expected to be launched at the end of 1999. Finally, an internal expansion of telephone subscribers is taking place in most countries of the region.

FUTURE PROSPECTS

In spite of globalization, it is generally acknowledged that governments and their associated institutions have a key role to play in formulating and implementing ICT strategies. There are fundamental and complex issues that have to be addressed, and the benefits that some countries have obtained from this successful experience should be considered. Increasingly, ICTs are an integral part of the overall national strategy and this interdependence between them both is a precondition for their common success. Arab countries rank ICTs as a high priority within their development objectives. They are seen as an essential element in education, communication, and technology transfer. The strategic plans have to become more systematic in order to develop integrated information systems that would support greater co-operation between enterprises at different levels across the country. But in order to achieve positive results and increase efficiency, the quality of the data, their definition, and the agencies responsible for their collection and validation must also improve. Network technologies are to be applied not only for data and information, but across the board. Some of the programmes for ICT at the European Union could be used as a model for the Arab countries. The type of co-operation that is already taking place for broadcasting should be extended.

ICT is making radical changes in teaching and learning in higher education, both on campus and in distance education. The Open University is just starting in the Arab region, but provides a model that should help modernize other sectors and promote continuous learning.

Electronic commerce is new in the region and consumer resistance can be overcome gradually with appropriate information campaigns. The integration of ICT into the different activities will help ensure a positive outcome.

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Chapter 15
Asia and the Pacific

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THE ASIA CRISIS AND INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT)

The current 'Asia Crisis' has had a negative impact on economic and social life in most of Southeast and East Asia. It has jeopardized the human development gains made in the health and education sectors in recent years. It has also brought to the fore new concerns relating to ethnic tensions, social unrest, an increased lack of peace and security, women's rights, poor health conditions and hunger as countries slip into rampant unemployment and inflation pushes millions of households back into poverty.

Despite the crisis, the use of electronic media, telecommunications and Internet are continuing to increase throughout the region as a result of globalization. Governments and business are expanding their activities in radio and television, satellite broadcasting, telecommunications and digital production, while individuals and organizations are making their own decisions about investing in various information technologies.

The prognosis is that bandwidth and new communications technologies are becoming cheaper as governments gradually liberalize their telecommunications sectors. Consequently, the foundation for distance education and open-learning systems in the 21st century will already be in place, and within the next two decades even remote Asian villages will be linked to the global communications network. Electronic communication and programmes brought via networked media systems and instructional technology in community centres and Internet kiosks will be the new channels for educating, informing and training those in the rural and urban areas.

Since 1997, Bhutan, Papua New Guinea, Laos, Cambodia, and Viet Nam have been wired into the Internet for the first time. Apart from Myanmar, most countries in the region now have some form of presence in this global network. Nevertheless, with the

Box 15.1 → India

India has been the largest democracy in the world since its independence in 1947. Today it is a country undergoing a massive transition with far-reaching consequences not only for its more than 900 million citizens, but for the entire globe. After a delay of nearly three years, and mired in litigation and controversy for over a year, the long-awaited ISP Policy has been announced and the process of issuing licenses has begun with gusto.

On 22 November 1998, Prime Minister Atal Bihari Vajpayee inaugurated SatyamOnline, the first private-sector Internet access service in Hyderabad, and at the same time the first phase of the Hi-Tec City project near Hyderabad. The highlight of the ISP policy is that licences will be issued for 15 years and there will be no licence fee or any limit on the number of licences awarded.

The railways, state electricity boards and the National Power Grid Corporation are all allowed to provide Internet backbone services. ISPs can set up their own international gateways but require a security clearance from an inter-ministerial committee. The norms for security clearance have not yet been worked out. Foreign equity of up to 49% in an ISP is permitted. Several large Indian industrial groups such as the Ambanis, Hindujas Mittals, Modis, Nandas, and Rais are reportedly undertaking ISP feasibility studies. India currently has an installed base of only 2 million PCs and less than 500,000 Internet users. The demand for PCs and Internet connections is expected to increase significantly due to the new services being launched.

While Internet is not new in the country thanks to the efforts of the Education Research Network (ERNET) and UNDP, it has been limited to those associated with educational institutes or R&D organizations. Previously, access was highly controlled and restricted, which limited its reach. In August 1995, Videsh Sanchar Nigam Limited (VSNL), a public-sector undertaking and the international telecom carrier, launched the first public Internet service in six major cities, which has today expanded to 42 cities and is expected to reach 70 cities by year-end. There is also a move to enable routing of calls at local-call rates from any of the 800 cities that have STD/ISD (long-distance calling) capability. Instead of setting up a local point of presence (POPs) in all cities, calls to the number 17222 will be directed to the closest Internet POP at no additional charge.

In the first year, 50,000 customers went online on VSNL's Gateway Internet Access Service (GIAS) and today the number exceeds 150,000. New Delhi and Mumbai (Bombay) constitute half the customers. The target is to reach one million users by the year 2000, but that seems unlikely even with the entry of private ISPs. One of the major factors limiting the expansion of Internet in the country is poor infrastructure, with problems such as the non-availability of telephone lines and an overloading of telephone circuits that were designed for voice communication. To partially overcome this problem, VSNL has installed routers at various telephone exchanges and linked them on dedicated 2Mbps circuits, thus bypassing the congestion. In the last five years the Department of Telecommunications (DoT) has successfully undertaken a mammoth job of converting telephone exchanges to digital/electronic exchanges and shifting to an optical fibre backbone. This has resulted in very good quality and stable connections, and a huge number of new phone connections. However, many more connections will be needed as India has achieved a teledensity of only 1%.

One of the greatest challenges India now faces is to improve penetration and broaden the access base. If the target of one million Internet subscribers is to be achieved, the entire infrastructure, especially data communication and telecommunications, will need to be overhauled. Another challenge in the short term will be a lack of expertise and talented workforce to handle ISP operations. A sizeable number of people are attracted to the field by world-wide growth figures and are thus jumping onto the ISP bandwagon, but they are often unfamiliar with the dynamics of the business.

India's software business, which relies heavily on computer networks for international operations, is reportedly poised to attain revenues of $6,000 million by the turn of the century. Exports would account for about $4,000 million of the total. Improved availability of the Internet will have a very positive impact on the software industry.

SUCHIT NANDA
(excerpted from The Pan Asia Networking Yearbook, 1998)

exception of Japan, it is still too early to consider these developments in terms of an 'Asian Internet'. The installation of such a network throughout the region will depend on a number of factors: the regulatory approaches of governments, the number of Internet Service Providers (ISP) or web hosts and approaches to providing infrastructure. The only constant is that every country in the region carries out these activities differently and is at a different stage of development.

Consider these examples. In Singapore, one of the most 'wired' countries in the region, there are only three ISPs, yet across the water in the Philippines there is a more relaxed approach to regulation that has spawned some 145 ISPs and countless walk-in access centres. In Cambodia, the government has allowed the two ISPs to offer a full range of Internet services and has no plans to censor content, but over the border in Viet Nam the authorities have implemented a firewall that intentionally blocks access to selected sites and unintentionally has caused numerous others to become unavailable because of technical problems. Further to the North, Laos has only just allowed its citizens to access the web after first experimenting with an e-mail-only connection. In the Himalayas, Nepal has a burgeoning Internet industry and some interesting local content programmes, while near-neighbour Bhutan is implementing an internal system – intranet – with only e-mail access to the outside world. In Mongolia, the locals are using their high levels of literacy and technical education to create an innovative network using whatever means possible: satellite, xDSL modems, radio modem and some creative fund-raising schemes. The list goes on throughout the region.

This same diversity is present when it comes to telecommunications, broadcasting and print media, and runs parallel to developments for the Internet. The Singapore government, for example, owns the two broadcasting companies, the Television Corporation of Singapore and Singapore Television. Competition is limited in telecommunications, which is dominated by Singapore Telecom, and there is only one print media outlet, the Singapore Press Holdings. By contrast, in the Philippines there are some 17 newspaper organizations, more than 100 television stations, and telecommunications have been opened up to foreign competition. Laos and Viet Nam, which have tried to prevent the inflow of certain content from the Internet, have similar policies for broadcasting and other media, whereas Mongolia opened up its media just before the arrival of the Internet – with the result that there are a flourishing number of print publications and satellite television channels now available in many parts of the country.

Despite this diversity, it is possible to categorize many of the countries into three broad groups. At one end are those that are moving to some form of broadband access and encouraging the use of high-bandwidth applications such as interactive multimedia and e-commerce. Included in this group would be Japan, Singapore, Australia, New Zealand, Taiwan (China), the Republic of Korea and increasingly, Malaysia. A second tier of countries have a well-established presence on the Internet and a diversified number of access providers, content providers and users. This group would include the Philippines, Indonesia, Thailand, Sri Lanka, China, India, Pakistan and Nepal. Finally, there are those countries that have only recently joined the Internet community. These third-tier countries have a very limited number of ISPs, few examples of local content, and access is confined to one or perhaps two main cities rather than throughout the country. Included in this group are Viet Nam, Bhutan, Laos, Papua New Guinea (PNG) and Cambodia.

Existing media structures, broadcasting facilities, telecommunications infrastructures and regulatory environments tend to conform to this classification of Internet connectivity. Nevertheless, some countries do not fit neatly into one of the three tiers, and even when they do, diversity is still the key feature, with each country taking its own culturally specific route to enter the information age.

INFORMATION AND COMMUNICATION TECHNOLOGY: INFRASTRUCTURE AND USE

The first tier: the newcomers

It is not surprising that countries only recently connected to the Internet have governments that have also taken a cautious approach to liberalizing their media and telecommunications sectors. Viet Nam, Bhutan, Laos, Papua New Guinea and Cambodia are all characterized by monopoly telecommunications carriers, low telephone densities, and government regulators who take a dim view of foreign ownership and outside influences. Because of this strict regulatory regime, there have been no private sector initiatives to connect to the Internet until recently. Even the academic sector – one of the catalysts for Internet access in the West and more developed Asian countries – has been slow to act. By contrast, the development sector has been very active. Four of the five countries mentioned – Viet Nam, Bhutan, Laos and Cambodia – all received support to connect to the Internet from Canada's International Development Research Center (IDRC) under a programme called Pan Asia Networking (PAN). The programme was launched in 1994 to promote South-South and North-South Internet networking. In the case of Papua New Guinea, the government started by opening up Internet access provision to the private sector.

The most recent entrant to the Internet, Bhutan, is not surprisingly the country that is perhaps the least open to the outside world. Bhutan has long had a policy of limiting tourism and has only allowed television transmission since 1997. The adoption of Internet is following this cautious approach, with the first connections allowing only e-mail access to the outside world and web access restricted to local sites. The Ministry of Planning's figures put the number of personal computers in the country at 4,000, 80% of which are in Thimphu. All telecommunications services in Bhutan are operated and maintained by the Ministry of Communications' Division of Telecommunications. The current telecommunication network is digital and is capable of supporting data communications and other non-voice services without major problems.

Laos also took a tentative approach to the Internet and started with e-mail-only services. More recently, GlobeNet, a subsidiary of Philippines-based satellite provider Globecom, has started to provide full Internet access in conjunction with the Ministry of Information and Culture. The information technology

Table 15.1 → Tier 1 (sample): newcomers to the Internet, 1997–1998

Country	GDP per capita in $, 1995	Estimated population, in millions, 1998	Main telephone lines per 100 inh., 1996	No. ISPs	Estim. no. of Internet users	No. of fixed-line telecom providers
Viet Nam	270	77.9	1.6	4	11,000	2
Cambodia	130	10.8	0.1	2	2,000	1
Bhutan	166	1.9	1.0	1	na	1
PNG	1,083	4.6	1.1	5	3,000	1
Laos	359	5.3	0.6	2	1,000	1

Source: United Nations Population Division and Statistics Division; ITU, International Telecommunication Indicators, 1998.

(IT) industry in Laos lags behind most Southeast Asian countries because of neglect and the effects of previous Western sanctions against communist bloc countries. A massive effort in training and in technology transfer is needed to develop a self-sustainable Laotian IT industry. Although such help is readily available in the Lao expatriate and resident IT communities, it does not seem to be readily accessed. There has been some urgency for Laos to adopt some effective means of mass communication, particularly as the offices of the Association of South-east Asian Nations (ASEAN) have adopted the Internet as the standard means of communication.

In Cambodia, Viet Nam and Papua New Guinea, the governments have been more accepting of the Internet, allowing full access to the outside world. Nevertheless each of the countries has a limited number of Internet service providers and coverage.

Full Internet services arrived in Cambodia in May 1997 with the establishment of CamNet, a joint venture between the Ministry of Posts and Telecommunications of Cambodia (MPTC) and IDRC. Shortly after, a second ISP, Big Pond Cambodia, a subsidiary of the Australian carrier Telstra in co-operation with MPTC, entered the market. As part of the license agreement with Telstra, MPTC is not allowing new ISP players until 2002. MPTC is both the telecommunications operator and the regulatory body. At present, there are no specific laws in the country relating to the Internet. The number of users hooked up to the two main e-mail-only servers, Open Forum Information Exchange and WorldMail, is low, numbering about 2,000. However, like other countries in the region, walk-in access centres are becoming a feature and will allow more widespread use in future. CamNet operates two public Internet centres, one to serve Cambodian research organizations and another aimed at expatriates and tourists. CamNet is working with various Cambodian organizations to publish their own material on the Internet. The Open Forum and Lidee Khmer, an association of Khmer professionals supporting Cambodian research and development, are spearheading attempts to create a unified system of Khmer coding that will allow the use of Khmer characters on computers (see Box 3.1).

Viet Nam first allowed commercial Internet services in late 1997, following more than eighteen months of indecision. An Internet Steering Committee has been set up, headed by the Minister of Science, Technology and Environment and representatives from the Ministries of Security, Culture and Information, Education and Training as well as the Directorate General of Posts and Telecommunications. Four companies were awarded licences to become Internet Service Providers: NetNam, Viet Nam Data Communications (VDC), Financing and Promoting Technology (FTP) Corporation and the Saigon Post Company. The ISPs must go through the monopoly gateway operator, VDC (a subsidiary of the country's monopoly carrier VNPT) for international connections and are not allowed to lease their own lines. A PAN project is also currently underway to help develop Vietnamese content and is being co-ordinated by NetNam in collaboration with organisations such as the National Centre for Scientific and Technological Information and Documentation (NACESTID) and the Ministry of Culture and Information. Like other countries in Asia, a significant problem in presenting local information on the world wide web is the lack of a unified coding standard for the local character set. NetNam has designed a utility that recognizes the various codes in use to display Vietnamese text. The utility can detect the six (out of about ten) most common formats that are in use.

In Papua New Guinea, government-owned Telikom PNG has a monopoly on telecommunications services in the country until 2002. Its network is made up of a series of microwave links with about 100 repeater stations throughout the country. In many areas, the final link is provided by High Frequency (HF) radio which can be unreliable for data transmission. Internet and telecommunications services

Box 15.2 → Pacific Islands

The Pacific Islands offer a complete contrast to the vast majority of Asian countries. Despite high levels of aid, the Pacific Islands region has experienced low growth and economic stagnation. This problem is attributed to high population growth, rural-urban migration, the restricted economic conditions of atoll life combined with the need to import a large number of goods and, finally, to high vulnerability to natural and economic disasters. Government is the major customer, employer and supplier of services in the islands, maintaining in many cases a monopoly. Given the unique geographical dispersion of theses countries, Information and Communication Technologies, particularly telecommunications, offer a real opportunity to diminish the adverse effects of isolation. The physical infrastructure for telecommunications seems well established. Three satellites can be accessed from every country (PeaceSat, Intelsat 174 and Intelsat 180), while other systems, such as telex and data transmission, cover only some of them. With the exception of emerging arrangements in mobile markets, telecommunications services are provided under state monopoly. But operations seem often to be inefficient. Coverage is poor in remote areas and consumer dissatisfaction is high. Teledensities (telephone lines per 100 inhabitants) are relatively low, with large differences between urban and rural areas. For instance, the figures for rural and urban teledensities are 0.09% and 7% in Tonga, while they are 18% and 27% in the Cook Islands. Fax, paging, cellular and Internet services have been introduced in the major urban centres.

Table 15.2 → Information and communication technologies in the Pacific Islands

Country	GDP per capita in $, 1995	Estimated population, in thousands, 1998	Main telephone lines per 100 inh., 1996	Estim. no. of Internet hosts/ 100 inh., 1996	No. of radio receivers/ 1,000 inh., 1995	No. of television receivers/ 1,000 inh., 1995	Local TV, 1997	Local radio, 1997	Internet access, 1997
Cook Islands	5,432	19(b)	na	na	705	184	Yes	Yes	Yes
Federated States of Micronesia	2,104	106(c)	6.5	0.03	na	na	Yes	Yes	Yes
Fiji	2,593	823	8.8	0.01	612	18	Yes	Yes	Yes
Kiribati	654	77.6(c)	na	–	212	9	Yes	Yes	No
Nauru	na	10	na	na	580	na	Yes	Yes	Yes
Niue	na	2.3	na	na	564	na	Yes	Yes	Yes
Palau	6,417	17(a)	na	na	na	na	Yes	Yes	Yes
Marshall Islands	1,649	63	5.9	na	na	na	Yes	Yes	Yes
Samoa	1,106	170	5.0	na	485	41	Yes	Yes	Yes
Solomon Islands	686	416	1.8	0.04	122	6	No	Yes	Yes
Tokelau	na	1,5	na	–	610	na	No	No	Yes
Tonga	1,787	97(c)	7.9	0.01	571	16	Yes	Yes	Yes
Tuvalu	na	9.7(c)	na	na	320	na	No	Yes	No
Vanuatu	1,289	183	2.6	0.0	296	13	Yes	Yes	Yes

(a) Data refer to 1990.
(b) Data refer to 1991.
(c) Data refer to 1994.

Source: United Nations Population Division and Statistics Division. ITU. International Telecommunication Indicators, 1998. Parsons Galloway Foundation. Pacific Island Involvement in the Global Information Infrastructure. Final Report submitted to the Forum Secretariat. May 1998.

E-mail services are popular with business customers and the extended family networks resulting from significant population movements.

Every Pacific Island country receives international radio. Some of them also have local radio stations. Most countries produce local television content, although in many countries this is limited to a few hours per day. The penetration rate for personal computers may vary between 1 and 30 personal computers per 1,000 inhabitants, with the exception of Niue, which has almost reached a rate of 80/1,000. There are no statistics for Fiji, the Federated States of Micronesia, Nauru and Palau. The University of the South Pacific provides distance education services using dedicated leased lines. Additional sites are planned in Kiribati and Samoa. But the limited communication infrastructure means that visual content cannot be distributed. Pacific Islands consumers pay high prices for international and domestic phone services, leased lines and Integrated Services Digital Network (ISDN) services. The monopoly situation and/or the small margins impose prices which are 25% to 58% higher than those prevailing in other environments.

There is an overwhelming consensus in multilateral agencies and regional political groupings to endorse liberalization of telecommunications in order to attain better pricing, service quality and access. Benefits would extend to both public and private institutions as well as the general public. Sixteen independent states located in the Pacific Ocean are grouped in the South Pacific Forum, an intergovernmental organization which includes the thirteen island states described in this box in addition to Australia, New Zealand and Papua-New Guinea. In addition to the regular budget made up of assessed contributions, eight developed countries and the European Union provide funding for operational assistance.

are controlled by the government policy regulatory authority, PangTel. The government is currently looking into content regulation but as yet has not formulated a policy. Full Internet services began in PNG in April 1997 with the licensing of five Internet services providers, all of whom operate from the capital, Port Moresby. Tiare, a subsidiary of Telekom PNG, is licensed to operate the country's only Internet gateway, also in Port Moresby, which is linked via satellite to AT&T in Sydney. Tiare is also planning to improve the Internet backbone in the country by upgrading links between Port Moresby, Lae, Mt. Hagen and Rabaul. The number of users is estimated to be from 2,000 to 3,000. One of the largest potential user communities for Internet is within the university sector. The University of Papua New Guinea (UPNG) and the University of Technology have recently commissioned fibre-optic campus networks that support Internet/Intranet services. In 1998, IDRC and the South Pacific Centre for Communication and Information in Development at the UPNG launched a project to establish a country-level information server that will carry PNG content from many PNG partner institutions.

The second tier: countries with rapidly improving infrastructure

The secondtier ofcountries contains thosewhere infrastructure has begun to move out of one or two major cities and into rural areas. In this group, competition has started to emerge in media and telecommunications, and local content is becoming a reality.

One country that has recently made the transition from state-controlled and restricted media, broadcasting and information technology to a more liberalized communications policy is Mongolia. While infrastructure in rural areas is still limited and competition in telecommunications not quite a reality, the country has made great strides in providing information technology to its people in recent years. In 1990, Mongolia switched from a communist state-

controlled economy to a democratic, market-based economy. Since then, the government has liberalized many sectors of the economy including data communications and the media. For a country that until recently had a heavily regulated media, the number of publications and available television stations in the country in 1999 is quite extraordinary. In information technology as well Mongolia has made great progress in catching up with other countries in the region. At the end of 1996, through assistance from IDRC's PAN programme and a government loan, the local networking company Datacom Ltd set up a satellite earth station and initiated the country's first Internet connection. Since then, a number of projects have seen Internet's reach extend in terms of coverage, usage and the amount of local content. For example, Datacom has been connecting Mongolian institutes and universities to the Internet through high speed radio modem links. Secondary schools are also being connected via satellite, with support from an IDRC grant. Part of this project will be an Educational Web Centre and an experimental information broadcasting network for provincial schools.

The Philippines and Thailand are examples of other countries that have a wide range of projects that aim to make greater use of information technology and to expand its reach to the general population. However, each country is achieving this end by different means. In the Philippines, where there has been a very open media sector and a dynamic private sector, it is not surprising that the government has taken a hands-off approach to the Internet. As a result, the private sector is the dominant force when it comes to providing Internet access, and unlike many countries in the region, it has been given a relatively free hand in establishing services and initiating international connections. The result is some 145 Internet access providers, many of which have country-wide points of presence, a burgeoning array of cheap, walk-in access centres, and some vibrant local content. This situation mirrors what can be seen in the print, broadcasting and telecommunications industries. There are 45 private telecommunications organizations as opposed to 7 public organizations; 86 private television stations compared with 33 government-owned stations; 466 commercial radio stations; and more than 20 daily newspapers.

The Philippines came to the Internet by a traditional route, with the initial connection being a product of the academic sector. The country's first Internet network, PHNET, was initiated in 1994 by the Department of Science and Technology and a consortium of Philippine universities and institutions. It is still the main academic backbone in the country and most recently is proposing to expand its coverage to 2,000 schools by the end of 2000. The resulting network will become the Philippine Science Academic and Research Network (RP-SARNET). In the long run, Internet in the Philippines is expected to be structured around several national backbones – one for government, one for schools and one commercial – each of which will be connected to the other.

In Thailand, the government has played a more direct role in providing access to information technologies within the country. National IT initiatives are formulated within the IT-2000 plan, which was put forward by the National IT Committee and approved by the National Economic and Social Development Board as part of its eighth national development plan. The three broad aims of IT-2000 are to build an equitable national infrastructure, invest in people and enhance government services and the information industry. National projects such as the academic Internet backbone, a government information network, and a proposed Thailand Software Park are all part of the IT-2000 plan.

Similarly, the government dominates Thailand's broadcasting industry, controlling nearly all radio and television stations, while telecommunications is split between two main government carriers (Telephone Organization of Thailand (TOT) and Communication Authority of Thailand (CAT)) and two private carriers

Table 15.3 → Tier 2 (sample): countries with rapidly improving infrastructure

Country	GDP per capita in $, 1995	Estimated population in millions, 1998	Main telephone lines per 100 inh., 1996	Telecom organizations	No. ISPs	Private TV stations	Govt. TV stations	Private radio stations	Govt. radio stations
Bangladesh	280	114.0	0.3	7	12	–	2	–	9
Indonesia	1,019	206.5	2.1	11	47	5	13	–	189
Nepal	203	23.2	0.5	1	3	–	4	–	7
Philippines	1,093	72.2	2.5	52	145	86	33	466	33
Sri Lanka	716	18.5	1.4	6	8	6	2	5	1
Thailand	2,896	59.6	7.0	18	16	1	10	–	477
Pakistan	504	147.8	1.8	1	50	10	6	3	24

Source: United Nations Population Division and Statistics Division; ITU, International Telecommunication Indicators, 1998.

(Thai Telephone and Telecommunications (TT&T) and Telecom Asia). The monarchy also plays a major part in the country's development, and in accordance with a long historical tradition a number of IT projects have been initiated by the king and other members of the royal family.

Indonesia has traditionally also taken a government-led approach to communications, but has suffered most from the economic crisis owing to internal political unrest and a devastated economy. Extending telecommunications to all 27 provinces and each main island is a daunting task, yet one which Indonesia has traditionally embraced as a means of creating national cohesion. This recognition of the need for communications for development and modernization occurred more than twenty years ago, in 1976, with the launch of Indonesia's domestic satellite, PALAPA. Indonesia's national information infrastructure is being created under a programme known as Nusantara 21 which calls for all major islands and cities to be linked either by submarine and terrestrial cable, or by satellite, by the year 2001. However, the current economic crisis has added a level of uncertainty to this project and to many government and business initiatives. The education sector in Indonesia is active in information technology and has suffered less from the economic fallout. More than half of the country's universities are connected to the Internet exchange of the Institute of Technology Bandung, which is connected via a 1.55 Mb/s link to the Asia Pacific AI3 backbone.

Despite government backing for Internet and other information technologies, the second-tier countries are still held back to varying degrees by regulatory provisions. These provisions are designed to protect monopoly telecommunications interests and lessen government fears about the impact of the Internet and other outside media. This approach can be seen in countries as diverse as Nepal, Bangladesh, Pakistan, India, China and Sri Lanka. In nearly all of these cases, Internet access must go through a monopoly carrier or designated gateway, resulting in increased costs to both ISPs and, ultimately, users. The situation is compounded by the lack of telephone lines that can be supplied by monopoly providers. For example, in Bangladesh, a country with only 0.4 telephone lines per hundred people, ISP networks are saturated due to a lack of access lines – and this is in the capital city, Dhaka. Trying to provide services to most remote villages is presently impossible owing to a lack of infrastructure. Even where infrastructure exists, government departments can be very reluctant to allow its use. A fibre-optic communications network owned and run by the Bangladesh state railway has been viewed by some ISPs as a possible means of gaining widespread connectivity. The transmission lines run alongside the major rail corridors and connect most major centres in the country, but its capacity is underutilized. However, the railway authority has been reluctant to let others use its dormant capacity. The regulatory situation in Bangladesh is a grey area, with no licensing document

or fee structure yet available for ISPs. A similar situation exists for electronic and print media, where existing laws are so outdated that they are irrelevant.

In Sri Lanka, the government imposes a licence fee of Rs3 million, which ensures that ISPs are operated only by large organizations. Many local observers have suggested that this prevents smaller niche players from providing services, many of whom would be able to start in smaller areas that are ignored by the larger organizations. There are currently eight licensed Internet Service providers in Sri Lanka and many more value-added resellers, although with only an estimated 12,000 users by June 1998.

Despite these regulatory impositions, there are signs that countries in this second category are gradually liberalizing telecommunications, broadcasting, and media – albeit slower than many in the private sector would like. In Nepal, for example, the government has recently allowed the private sector to operate its own satellite facilities rather than go through the monopoly provider, Nepal Telecommunications Corporation (NTC). This follows the setting up of an independent regulator, the Nepal Telecommunication Authority (NTA), in April 1998. One of the first decisions of the NTA was to open the market for very small aperture terminal (VSAT) satellite facilities, which will allow ISPs to obtain their own international bandwidth at a cost well below that offered by NTC. The regulator has indicated that other aspects of telecommunications will also be opened up to competition in the next two years, although there is no indication that broadcasting will also be liberalized. Nepal's four television stations and seven radio stations are all government-owned. By contrast, the Internet in Nepal was first introduced by the private sector, in 1993, and has flourished without any sort of public assistance. While there are only three ISPs, there are literally hundreds of walk-in access centres, a pattern that has previously been established for telephone and fax services, where Public Call Offices (PCOs) offer walk-in services. A group of more than 30 Nepali research organizations is also networking together to provide local research and development information on NepalNet, a PAN project.

In most of the countries mentioned, there are indications that telecommunications and the media are slowly being liberalized, with governments in the process of overhauling their regulatory structures to make way for the new information environment. A brief look at some countries provides an example. In Bangladesh, control over regulatory matters was recently moved away from the state-controlled Bangladesh Telephone and Telegraph Board (BTTB); China has recently restructured and merged its regulatory environment; India has removed the monopoly for providing Internet services enjoyed by the state-owned carrier, VSNL; Pakistan is privatizing its telecommunications carrier, and the list goes on. While some governments are slower than many in the private sector would like, the momentum to liberalize will certainly continue, in a manner deemed appropriate by each country.

The third tier: the broadband users

It is not surprising that those countries moving to broadband infrastructure based on technologies such as ATM (asynchronous transfer mode) networks – which allow for the convergence of voice, data, video, and Internet – are also moving at a more rapid rate towards the full deregulation of the media, telecommunications, and the Internet. The economies in this category – Australia, New Zealand, Singapore, Malaysia, Hong Kong, South Korea, and Japan – are also the most developed and prosperous in the region and have well-developed infrastructures and well-educated technical work forces. Each of these countries is also vying to become a regional hub for broadcasting and information technology, a fact which seems to further encourage liberalization and investment in infrastructure and services.

In recent years, Japan, Australia, and New Zealand have opened up their markets for telecom-

Table 15.4 → Tier 3 (sample): broadband users

Country	GDP per capita in $, 1995	Estimated population, in millions 1998	Main telephone lines per 100 inh., 1996	No. ISPs	Estimated no. Internet hosts per 100 inh.
Australia	20,046	18.4	51.9	600	3.8
Singapore	25,581	3.5	51.3	3	2.0
Taiwan (China)	na	na	46.6	>50	na
Korea, Rep. of	9,736	46.1	43.0	>20	0.3
Japan	41,718	125.9	48.9	2,600	0.8
Malaysia	4,313	21.4	18.3	7	0.2

Source: United Nations Population Division and Statistics Division; ITU, International Telecommunication Indicators, 1998.

munications services, while in Singapore, Malaysia, Taiwan (China), Hong Kong and the Republic of Korea this process is well underway and in some cases has been accelerated. In terms of Internet access, Japan, Australia and New Zealand are all in the top tier of nations globally. When the ratio of host computers is compared to GDP, New Zealand is the second most wired nation in the world, behind Finland. The New Zealand city of Wellington, according to the January 1998 survey by United States-based Network Wizards, is the world's most Internet-connected city, with 4,702 Internet-connected computers per 100,000 people. In Australia, according to the latest figures from the Bureau of Statistics, almost a third of Australian adults, or 4.2 million people, use the Internet, while the number of households with access to the Internet increased by 46% last year to almost 1.25 million (18% of households), giving it one of the highest Internet penetration rates in the world. This increase is backed up by the number of Internet hosts, which has been consistently among the top five nations, even though the population base is a mere 18 million.

In Japan, there were some 2,600 registered ISPs and 13 million users as of October 1998. In the year 2000 the number of users is expected to rise to 20 million. One feature of the Internet in Japan has been its spread into virtually all areas of the country-side through a multitude of small niche-market providers. Similarly, Japan's media and telecommunications industries are notable for the array of choices and the number of small players. For example, there are 121 daily newspapers in circulation as well as 291 community papers and 528 town papers, while in telecommunications there are some 4,726 providers of varying sizes and descriptions.

In Singapore, Malaysia, Taiwan (China) and the Republic of Korea the government has historically taken a prominent role in guiding the use and spread of broadcasting and media for both political and economic reasons. The introduction of Internet has followed this pattern, although there are increasing signs that these governments recognize the need to open up more than in the past. Nevertheless, the public sector is still instrumental in propelling these countries towards an information society. For example, Malaysia has made a number of well-publicized initiatives aimed at placing itself at the forefront of the global information economy, particularly through its Multimedia Super Corridor (MSC) project. The MSC is Malaysia's hope for becoming a knowledge-based society having developed country status by the year 2020. MSC incorporates two 'smart cities', an advanced telecommunications infrastructure and seven flagship application areas in government, education, medicine, finance, manufacturing, R&D and marketing. As part of its efforts to attract electronic commerce projects to the MSC, it is in the process of introducing cyberlaws that aim to create a regulatory framework for information and e-commerce services. Malaysia has approximately 205,000 Internet users. In addition to a number of national telecommunications backbones, many of the individual state governments are implementing their own networking projects, some of which involve extensive physical

infrastructure, while others are more content-based web projects.

Malaysia has partially deregulated its media and telecommunications industries but government influence is still strongly felt in all sectors. In telecommunications, deregulation has been limited to a handful of large players, while in broadcasting a number of private radio and television stations have emerged, although the government stations are still in the majority. In 1996, Malaysia launched its own satellite, the Malaysian East Asian Satellite (MEASAT). Malaysians can receive satellite transmissions only through this domestic service, rather than from other sources as an open policy would permit.

In Singapore, 'IT 2000: a vision of an intelligent island' is a masterplan for the introduction of IT into every aspect of Singaporean society. Initiatives such as the Singapore ONE broadband network are part of IT 2000 and are aimed at turning the country into an IT and broadcasting hub. The backbone of this network uses state-of-the-art asynchronous transfer mode (ATM) switches connected via fibre optic trunks that thread through the central business districts and residential neighbourhoods. Access to the network for individual users will be via asymmetric digital subscriber line (ADSL) modems and hybrid fibre-coaxial (HFC) cable modems, both of which can deliver Internet access at bandwidths of 2 Mbps or better. Once implemented, the network will be available to 90% of all homes. The total number of Internet users in 1998 was estimated at more than 400,000. In keeping with its approach to media in general, the government of Singapore has taken a hands-on approach to the regulation of Internet content. The Singapore Broadcasting Authority (SBA) regulates both ISPs and Internet Content Providers through the Internet Class Licence Scheme, which requires all providers and resellers to follow the SBA's Internet Code of Practice. Under the obligations of the code, Internet access providers are required to deny access to sites that have been prohibited by SBA.

In the Republic of Korea, the IT and electronics industries have been a successful part of the economy with many large high-tech manufacturers and exporters. The government is also involved in building capacity through the Korea Information Infrastructure (KII). The KII is intended as a broadband infrastructure and comprises two networks: a public network for the private sector and a government network for government or public institutions. The Ministry of Communications and Information plans to put this broadband infrastructure in place by 2010 through a combination of private and public sector investment. The number of Internet users was 2.5 million at the end of 1997. In advertising, there are approximately ten active companies and many others preparing to enter online activities. In publishing, book stores are opening cyber facilities, while data communications companies are also opening cyber bookstores as part of cyber shopping-mall initiatives. In the media, 'Internet only' journals that do not publish regular paper journals are also beginning to appear.

Basic telecommunications infrastructure in Taiwan (China) is well advanced and dominated by Chunghwa Telecom Co., which is in the process of being privatized. There are over 9 million telephone sets, extensive microwave radio relay trunk systems on the east and west coasts for domestic connections, satellite earth stations and submarine cables to Japan, Philippines, Guam, Singapore, Hong Kong, Indonesia, Australia, the Middle East and Western Europe. Currently, there are over 500,000 users from around 400 academic institutions, colleges and universities in the island who benefit from the Taiwan Academic Network's free services to promote academic research. The island's National Information Infrastructure (NII) plan was introduced in 1994 with the following priorities: network construction, education and training, electronic government, electronic commerce, social welfare,lifelonglearning,Chineseculturalrelicsonline, the study and revision of related laws and regulations and internationalization of Chinese networks.

The more economically developed countries are also at the forefront of changes in library culture. Today, libraries must redefine their roles if they are to survive and prosper in the new age of information-based societies. The dramatic capacity increase of digital media, the convergence of telecommunication and broadcasting, and the availability of information resources accessible through the Internet have driven home the realization that libraries must reposition themselves. The new vision sees libraries as part of networked environments, and the promotion of IT is an integral part of library services in meeting the changing information needs of users. Thus, the focus has been on developing the digital library, which includes identifying repositories of multimedia digital information resources and integrating the country's libraries and knowledge-based institutions through networking; establishing information resource networks or 'libraries without walls'; creating local content or databases – text (reports, publications, bibliographic databases), audio, video, maps, pictures, graphics – in digitized form, using image processing and character recognition among the technologies employed; making information resources accessible on the Internet; marketing library services through web pages; and providing Internet facilities and stimulating an Internet culture among the public.

INTERNATIONAL AND REGIONAL CO-OPERATION AND DEVELOPMENT ASSISTANCE RELATED TO ICT

While this chapter suggests that countries in the region are marked by diversity and cannot be covered by broad generalizations, some specific activities are more regional in nature. Satellite television is one of the obvious areas of regional activity and its reach and influence has been dramatic. In recent years a large number of local, regional and multinational satellite television companies have been set up in Asia. Prominent among these is Hong Kong-based Star TV, which beams programmes to 220 million households in the Asia-Pacific region. Increasingly, many of the programmes and channels are localized and broadcast in a variety of Asian languages. However, the use of such regional services varies from country to country, with some, such as India and Japan, welcome foreign programmes while others, including China, Malaysia and Singapore, restrict the entry of foreign programming.

In terms of telecommunications, satellite facilities are also providing regional coverage, most notably through regional systems such as AsiaSat, Apstar, as well as through international systems such as PanAmSat, Intelsat and the forthcoming Iridium and similar low-earth orbit (LEO) schemes. Taiwan (China) and Singapore have also co-operated to launch the ST-1 telecommunications satellite in 1998. Telecommunications networks using fibre-optic cable are also coming to the fore. Prominent among these are Fiber Optic Link around the Globe (FLAG), which links the rest of the world with countries including Korea, Singapore, Hong Kong and China, and SEA-ME-WE 3, which in Asia connects Singapore, Australia, Korea and Japan. Another regional telecommunications project known as ACASIA comes from ASEAN countries. It is aimed at providing multinational corporations with cross-country private network services.

Development agencies have been instrumental in helping developing countries in Asia adopt information technologies. IDRC's PAN programme, mentioned earlier, promotes South-South and North-South Internet linkages, while the UNDP also implements numerous technical co-operation programmes throughout the region. The UNDP's Asia Pacific Development Information Programme (APDIP) based in Kuala Lumpur, Malaysia, promotes the use of IT in the region and also focuses on Internet governance issues.

Another regional body involved with Internet governance and infrastructure issues is the Singapore-

Box 15.3 → China

China, officially the People's Republic of China, is the world's third largest country by area and the largest by population. Covering a total area of 9,596,960 square kilometres, China encompasses a diversity of landscapes extending from the Tibetan Plateau at the southwest extremity to the deserts in the Mongolian borderland of north central China and to the sub-tropical fertile plains of the Canton Delta to the south.

By the end of 1997, China had a population of 1,236.26 million (excluding the Hong Kong Special AdministrativeRegionandMacau),comprising56ethnicgroups. China's population density (126 people per square kilometre according to a 1995 sample survey) is relatively high. Distribution, however, is uneven: the coastal areas in the east are densely populated, with more than 400 people per square kilometre, while the plateau areas in the west are sparsely populated, with fewer than 10 people per square kilometre.

Telecommunication is one of the fastest growing industries in China. In 1997, aggregate postal and telecommunications volume totalled 177,900 million yuan, a 33.3% increase over 1995. Telephone lines have been increasing at an annual rate of 41.5% per year for the past seven years. Domestic and international telecommunication services are increasingly available for private use. By the end of 1997, the number of telephone lines had expanded to 120 million, with 9.55 telephones per hundred persons. The domestic system serves principal cities, industrial centres, most townships and is fast reaching villages. By 1997, 55.6% of China's villages were connected to the public telephone system. All cities above the county level in China now have programme-controlled telephones, and China ranks second in the world in the scale of its telephone network. By 1997, 14 inter-provincial fibre-optic trunk lines had been installed, while mobile communication networks and international services have been expanding rapidly.

The Chinese government encourages the development of Chinese software and formatted fonts facilitate the use of Chinese characters for digital communication. It is estimated that Internet users in China will exceed 2 million by the end of 1998 and reach 5 million in the year 2000. Yet considering China's population of 1.2 billion, the percentage of people accessing the Internet is and will be very small. For the whole nation to become 'wired', the geographic, professional, gender and economic obstacles to accessing the Internet would need to be addressed.

In China, major metropolitan cities and economically more advanced regions tend to have the best network facilities and therefore it is not surprising that most Internet users are based in Beijing, Shanghai and Guangzhou. Beijing also has the most ISPs. Ordinary people are still not very aware of the Internet, and current users are mostly in computer-related professions or have higher education qualifications. The average user is young – 80% are between 21 and 35 – and 88% of Internet users in China are male.

Placing great emphasis on the strategic importance of information/communication technologies to the modernization of China's economy, the Chinese government has made it a priority to build the national information infrastructure (NII), especially national economic computer network projects in the country's Ninth Five-Year Construction Plan (1996–2000). The government supports the expansion of Internet into China, though it maintains close control over content. While foreign ownership of any Chinese telecommunications and information infrastructure is strictly prohibited, the government actively seeks foreign investments to fund the rapid development of China's information infrastructure. The four major Internet backbone networks are all government sponsored and must use China Telecom links to connect to Internet sites in other countries. All ISPs must register with the police.

On 1 February 1996, the State Council issued Decree No.195, 'The Temporary Provisions of Internet Administration of the Computer Information Communication network of the P.R.China'. This mandated that the four established Internet networks – ChinaNet, CHINAGBN, CERnet and CASnet – should be separately administered by the Ministry of Posts and Telecommunications, the Ministry of Electronics Industry, the State Committee of Education, and the Science Institute of China.

In June 1998, the government restructured its information and telecommunications authorities. The Ministry of Information Industry (MII) was established by merging the Ministry of Electronic Industry and the Ministry of Post and Telecommunications. The new ministry is responsible for invigorating the manufacture of information products, telecommunications and software; formulating sectoral programmes, policies and legal codes; mapping out an overall plan for telecommunications trunk networks (including local and long-distance telecommunications networks), broadcast and television networks (including radio and cable television networks), and special-use telecommunications networks for military and other departments.

LI ZHANG
(excerpted from The Pan Asia Networking Yearbook, 1998)

based Asia Pacific Networking Group (APNG), which is dedicated to the advancement of networking infrastructure and the research and development of all associated enabling technologies. APNG has spun off several other Asian Pacific organisations such as the Asia Pacific Network Information Centre for Asian Policy and Legal Group (APPLe); the Asia Pacific Internet Association (APIA), and the annual Asia Pacific Regional Internet Conference on Operational Technologies (APRICOT).

A lesser-known agency is the Commission on Science and Technology for Sustainable Development in the South (COMSATS). Initiated in 1989 by Nobel laureate Professor Abdus-Salam, COMSATS is based in Islamabad, Pakistan and links thirteen centres of excellence in countries of the South as well as having significant networking facilities in Pakistan. COMSATS plans to computerize data related to science and technology for its twenty member countries, and has recently started an IT Training Institute in Islamabad.

MOVING TOWARDS AN INFORMATION SOCIETY

This chapter has highlighted the developments and applications in information technology in the Asia Pacific. In particular we have tried to show the extent of diversity in the region, where each country is adopting information technology in its own way and at a separate pace. At one end of the scale are countries that are only now joining the global information networks that will become prevalent in the next millennium, while at the other are those that are already seeing the convergence of their media, telecommunications, broadcasting, and information networks. As we have seen, new media and regulatory structures often take shape from existing patterns of media adoption.

At the opening of the 7th Annual Conference of the Asian Media Information and Communication Centre in May 1998, UNESCO's representative Mr Claude Ondobo observed that in education, information technologies must better respond to the different learning and training needs of society; in culture, multimedia technologies must promote cultural and linguistic pluralism; and in science, information highways must improve both access to scientific information and the sharing of research facilities on a large scale and in a more interactive way. This Asia-Pacific ICT report card seems to demonstrate these ICT goals.

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Chapter 16
Eastern and Central Europe

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FUNDAMENTAL TRANSFORMATIONS

Central and Eastern Europe (CEE) is generally understood to include post-Communist Central European countries (Albania, Bosnia/Herzegovina, Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania, Serbia and Montenegro, Slovakia, Slovenia and the Former Yugoslav Republic of Macedonia) and Eastern European countries which emerged out of the former Soviet Union (Armenia, Azerbaijan, Belarus, Estonia, Georgia, Latvia, Lithuania, the Republic of Moldova, Russia, Ukraine).

All CEE countries are undergoing a process of fundamental political and economic transformation that interacts with changes in social structure and, in many cases with the need to redefine territorial and cultural boundaries. Economic policy has focused on social, economic and labour problems resulting from the crises provoked by the collapse of the old system and the accompanying need to dismantle and/or modernize inefficient and unproductive industries. Consequently, little attention has been paid to promoting forward-looking policies in information and communications technology (ICT) and progress has been slow.

Central and Eastern European countries entered the 1990s with broadcasting and telecommunications infrastructures inherited from the communist era when they were underdeveloped and tightly controlled. Now, however, big changes are underway. The direction and the pace of change differ greatly from country to country, depending on the general political and economic context. In some of the more advanced countries, a dual system of private and public broadcasting is already operating in ways similar to the pattern prevailing in Western Europe. Elsewhere, the state monopoly of broadcasting has been preserved to all intents and purposes, with the old state broadcaster still operating and dominating the scene (see The Development of the Audiovisual Landscape in Central Europe since 1989, p. 386).

Due to the reluctance to privatize state monopolies and liberalize the telecommunications market in Central and Eastern Europe,

> the region's telecommunications industry is still not up to the standard needed in a modern economy in at least two respects. First, teledensity (the number of telephone lines per 100 inhabitants) is too low. Even in the region's best markets, it stands at less than half the level found in Western Europe. Second, the system is not coping with the growing demand for data and information services which define the multimedia age (Why Tortoises Won't Win, 1998, p. 39).

A report prepared in May 1996 for the Central and East European Information Society Forum pointed to the following trend in selected Central European countries:

> Analysis with respect to GDP per capita shows that the proportion of GDP spent on telecommunications equipment is almost a constant at 0.4%. By contrast, spending on information technology (IT) appears to be strongly correlated with gross domestic product (GDP) per capita, rising from 1% for a GDP per capita of 8,000 euros to 2.5% for 23,000 euros. These figures suggest that telecommunications investment is treated as . . . something indispensable, whereas IT expenditure is seen as something optional that is indulged only when funds permit. Company IT spending is often below 1% of revenue compared to much higher figures in the EU, where 6% or more is common (Report of Panel A, 1996, p. 9).

The situation may have changed somewhat since then, but much remains to be done in Central and Eastern European countries for the information society to become a reality.

Central and Eastern European countries represent a wide variety of social and political environments, as well as different levels of economic and technological advancement. Reliable data for some of them are very hard to obtain. The following overview, therefore, cannot claim to be complete. In some cases, data from several sources and for different years have been used to provide as full a description as possible. More detailed information is generally available for Central European countries, and therefore much of the attention will be focused on them.

LEVELS OF ECONOMIC AND HUMAN DEVELOPMENT

Progress in new information and communication technologies is determined to a very large extent by the level of economic and technological development, as well as the size of the market and the purchasing power of the population. Therefore, discussion of ICTs in Central and Eastern Europe would be incomplete without at least a cursory examination of these structural factors.

Table 16.1 shows that CEE countries vary enormously in size of population and levels of human development and economic performance. Conditions for ICT development depend heavily on the service sector. The greater its role in economic activity, the more demand there is for information and communication services and, therefore, for ICT.

It is clear from Table 16.2 that countries with low per capita GDP and gross national product (GNP), where the contribution of the service sector to the GDP is also very low, are not capable of sustaining a high rate of ICT growth. This is confirmed by Table 16.3 which compares the volume of telecommunications investment and revenues among different countries of the region. In low-income countries, the volume is insignificant, indicating that telecommunications are not yet an important part of the economy. There are also clear differences in the level of telecommunications revenue and investment between more and less advanced countries in the other income brackets.

ICT INFRASTRUCTURE

Telecommunications

As noted above, Central and Eastern Europe lags behind Western Europe in terms of telecommunications development. This is clearly evident in

Table 16.1 → Trends in human development and economic growth in CEE countries, 1995

Country	Population in thousands	Human development index + per capita income		National income accounts		Trends in economic performance	
		HDI	GDP per capita ($) 1995	GDP (in thousands of millions of $) 1995	Services as % of GDP 1995	GNP (in thousands of millions of $) 1995	GNP per capita ($) 1995
High human development							
Czech Rep.	10,223	0.884	3,164	45	55	40	3,870
Hungary	9,930	0.857	2,334	44	59	42	4,120
Poland	38,754	0.851	1,701	118	54	108	2,790
Slovakia	5,360	0.875	3,054	17	61	16	2,950
Slovenia	1,920	0.887	na	19	57	16	8,200
Medium human development							
Albania	3,445	0.656	887	2	23	2	670
Armenia	3,645	0.674	587	2	20	3	730
Azerbaijan	7,864	0.623	355	3	41[1]	4	480
Belarus	10,323	0.783	1,712	21	52	21	2,070
Bulgaria	8,387	0.789	2,605	12	53	11	1,330
Croatia	4,494	0.759	na	18	62	16	3,250
Estonia	1,442	0.758	2,530	4	64	6	2,860
Georgia	5,788	0.633	433	2	11	2	440
Latvia	2,448	0.704	1,912	6	60	6	2,270
Lithuania	2,131	0.750	1,683	7	53	7	1,900
Moldova	4,451	0.610	na	3	22	4	920
Romania	22,573	0.767	1,358	36	39	33	1,480
Russia	147,231	0.769	1,988	345	55[1]	332	2,240
The Former Yugoslav Rep. of Macedonia	2,205	0.749	na	2	na	2	860
Ukraine	51,218	0.665	999	80	41	84	1,630

1. Data refer to a year other than the one specified in the column heading.

Source: Human Development Report 1998, UNDP, United Nations Population Division.

Table 16.2 → Telecommunications revenue and investment in CEE countries, 1996

	Telecommunications revenue			Telecommunications investment		
	Total, in millions of $, 1996	Per inhabitant in $, 1996	As % of GDP 1996	Total, in $, 1996	Per inhabitant in $, 1996	As % of GFCF, 1995 (gross fixed capital formation)
Low income countries						
Albania	36.5	9.9	1.3	5.1[2]	1.4	na
Armenia	29.6[1]	7.9	na	2.7[1]	0.7	na
Azerbaijan	43.8	5.8	1.3	1.4	0.2	na
Bosnia	0.4[2]	0.1	na	0.1[2]	na	na
Georgia	7.1[1]	1.3	na	0.9[1]	0.2	na
Lower middle income countries						
Belarus	225.1	22.0	2.0	118.3	11.5	1.5
Bulgaria	79.3	9.4	1.9	23.8	2.8	2.7
Estonia	147.9	100.6	2.9	65.5	44.6	5.0
Latvia	141.3	57.0	2.8	58.0	23.4	na
Lithuania	133.3	35.9	1.8	31.5	8.5	4.0
Moldova	38.0	9.0	1.5	16.0	3.8	8.5
Poland	2,538.4	65.7	1.8	886.2	23.0	4.4
Romania	559.8	24.8	1.2	197.4	8.7	3.0
Russia	5,259.8	35.6	1.0	1.2	na	1.4
Slovak Republic	476.2	88.6	2.1	279.8	52.1	3.7
The Former Yugoslav Rep. of Macedonia	80.5	37.2	2.5	87.0	40.2	na
Ukraine	1,100.8	21.5	15.4	199.5	3.9	2.1
Yugoslavia	413.9	39.1	1.5	99.4	9.4	10.2
Upper middle income countries						
Croatia	592.4	131.6	3.2	246.1	54.7	21.5
Czech Rep.	1,158.8	112.3	2.1	1,063.5	103.1	21.5
Hungary	1,287.2	126.0	1.8	544.4[2]	53.1	6.5
Slovenia	326.3	163.9	1.6	142.2	71.4	2.5

1. Data from 1994.
2. Data from 1995.

Source: World Telecommunication Indicators, ITU,1998.

Table 16.3 → Telecommunications penetration in Western and Central Europe, 1996

	Main lines per 1,000 inhabitants (%)	Mobile subscribers (%)	CATV subscribers HH (%)	% of Digital per main lines
Western Europe	50.9	9.1	27.7	84.6
Central Europe[1]	22.6	1.54	21.2	37.1

1. Based on data for Bulgaria, Czech Rep., Hungary, Poland, Romania.

Source: EITO, 1998.

Table 16.4 → Main telephone lines, residential main lines, mobile telephones and fax machines, 1996

	Main telephone lines per 100 inhabitants	Residential main lines per 100 households	Cellular mobile subscribers				Estimated fax machines (000's)
			Total (000's)	Per 100 inhabitants	% digital	% of total telephone subscribers	
Low income countries							
Albania	1.74	5.8	2.3	0.06	na	3.5	na
Armenia	15.4	62.0	0.3	0.01	na	0.1	0.3
Azerbaijan	8.54	38.3	17.0	0.23	2.9	2.6	2.5
Bosnia	8.98	24.4	1.5	0.04	100	0.5	na
Georgia	10.49	33.5	2.3	0.04	100	0.4	0.5
Lower middle income countries							
Belarus	20.77	43.8	6.5	0.06	na	0.3	8.9
Bulgaria	31.26	65.1	26.6	0.31	47.0	1.0	15.0
Estonia	29.85	55.8	69.5	4.73	50.4	13.7	13.0
Latvia	29.81	66.0	28.5	1.15	64.6	3.7	0.9
Lithuania	26.78	64.7	51.0	1.37	77.2	4.9	5.6
Moldova	14.0	38.6	0.9	0.02	na	0.2	0.6
Poland	16.91	41.5	216.9	0.56	41.1	3.2	55.0
Romania	13.98	38.5	17.0	0.08	na	0.5	20.7
Russia	17.54	40.5	223.0	0.15	na	0.9	63.4
Slovak Rep.	23.19	48.5	28.7	0.53	na	2.2	55.4
The Former Yugoslav Rep. of Macedonia	16.98	59.6	1.1	0.05	100	0.3	2.6
Ukraine	18.09	39.2	30.0	0.06	na	0.3	0.1
Yugoslavia	19.69	54.2	na	na	na	na	14.5
Upper middle income countries							
Croatia	30.86	79.6	64.9	1.44	20.1	4.5	45.3
Czech Rep.	27.31	46.9	200.3	1.94	68.7	6.6	79.5
Hungary	26.06	55.6	473.1	4.63	86.7	15.1	45.0
Slovenia	33.33	90.8	40.0	2.01	na	5.7	17.7

Source: World Telecommunication Indicators, ITU,1998.

Table 16.5 → Key parameters on network development

	Fixed telephone main lines per 100 inhab.	Network digitization (%)	Average waiting time for fixed telephone	Mobile subscriptions (% of population)	% of population covered by mobile radio	Radio paging access (% of population)
Bulgaria	31.93 (1996)	5.5 (1997)	over one year	0.45	NMT, 80; GSM, 100	0.05
Czech Rep.	27 (1996)	n.a.	1.9 years	2.5	Eurotel, 74; Radiomobil, 40; Eurotel Prague, 96	99
Estonia	29.4 (1996)	n.a.	3.8 years (1996)	4 (1996)	EMT, 98; Radiolinja Eesti, 65; Ritabell, 60 (1997)	0.8 (1996)
Hungary	30	n.a.	4 years (1996)	7 (1997)	Westel 9000, 93 (1996)	0.13 (1997)
Latvia	31.2 (1996)	n.a.	2.7 years (1997)	2.7 (1997)	95 (1997)	1.1 (1997)
Lithuania	26.8	n.a.	3.5 years (1996)	1.3	5 (1997)	0.05 (1996)
Poland	17.6 (1997)	39 (1996)	2.9 years (1996)	2.1 (1997)	n.a.	0.14 (1996)
Romania	14	35	4 years	0.186 (1997)	70 (1996)	n.a.
Slovakia	25.88 (1997)	50.76 (1997)	10.2 months	3.75 (1997)	91 (1997)	0.044
Slovenia	36 (1998)	100 of transmission capacity	1 year	6 (1998)	98 (1997)	99 (1997)

Source: Phare Regulatory Observatory for Telecoms, Broadcasting and Posts, Central and Eastern European Country Reports, January 1998-June 1998.

Table 16.3 which compares the situation in the two regions. The five countries of Central Europe taken into account in the table display a relatively high level of telecommunications development, so in real terms the comparison would be even less favourable for the region as a whole.

To take one example, Lithuania is one of many CEE countries where the existing quality of local communications does not satisfy the users' requirements. Therefore, plans call for replacing analogue telephone centres with digital ones – to be completed by 2015 – and for setting up of a telephone subscriber information system, with the gradual introduction of special equipment, such as voice simulation, automatic system control, and communication with other countries' systems. By 2000, existing coin-box telephones will be replaced by card-operated ones; card telephone control and diagnostics centres will be established in all branches of Lithuanian Telecom.

Rapid development of the fibre-optic cable line network is planned. In 1996, a fibre-optic line from Kaunas to Klaipëda via Panevëpys and Diauliai was introduced, with digital 155 Mb/s multiplexing systems. Lithuanian telecommunications will be provided with a second international communication line via Latvia; it will be possible to connect twelve Lithuanian cities by means of a high-capacity transmission system. The same fibre-optic lines will be used for the setting up of a national public data network.

A fuller picture of telephony in CEE countries can be obtained from Tables 16.4 and 16.5.

At the 1996 Central and East European Information Society Forum it was pointed out that penetration targets for fixed telephone lines set for the year 2000 range from 18.9% for Romania to 50.0% for Latvia. To meet those targets, CEE telecommunications would need to install new lines that are at least 50% faster over the next five years. The total investment required in all ten CEE countries together to achieve those targets would be about $20,000 million, or $4,000 million per annum. Those targets are high compared with an annual investment rate of $1,600 million for the four years up to 1995 during which the three International Financial Institutions (IFIs) provided at most $440 million per annum. (Report of Panel A, 1996).

Media equipment

As Table 16.6 shows, radio and television reception is universal in most Central and Eastern European countries, although in some places access even to these basic technologies is not generally available.

Cable and satellite television, as well as video camera recorders (VCRs), display quite high levels of penetration in the Central European countries for which data are available; these are shown in Table 16.7.

Table 16.6 → Access to radio and television in Central and Eastern Europe, 1996

Country	Radios per 1,000 inhab.	Television sets per 1,000 inhab.
High human development		
Czech Rep.	806	534
Hungary	697	438
Poland	518	337
Slovakia	580	486
Slovenia	416	364
Medium human development		
Albania	235	118
Armenia	5	225
Azerbaijan	20	22
Belarus	290	242
Bulgaria	531	390
Croatia	333	267
Estonia	680	408
Georgia	553	470
Latvia	699	485
Lithuania	292	451
Moldova	720	281
Romania	317	231
Russia	344	405
The Former Yugoslav Rep. of Macedonia	184	230
Ukraine	872	230

Source: UNESCO Statistical Yearbook 1998, UNESCO, Paris, 1998.

In some countries, pay television is available and spreading. As with cable, reception of Direct to Home (DTH) satellite television and VCRs, the appearance and development of pay television is determined by the size of the market and living standards (including discretionary purchasing power) prevalent in a particular country. For this reason, pay television can be found mostly in Central European countries. According to data available in Statistical Yearbook 1998 of the European Audiovisual Observatory, in 1997 there were 385,000 pay TV subscribers in the Czech Republic, 225,000 in Hungary, 386,600 in Poland, and 200,000 in Romania.

1998 saw the introduction of digital television in Poland, in the form of two competing satellite bouquets: Wizja TV (owned and operated by @Entertainment, an American company, which is also heavily involved in cable television in Poland) and Cyfra+, operated by Canal+ Polska (a licensed Polish broadcaster involving the French company Canal+), also offering a terrestrial pay TV channel. Canal+ Polska is also a partner in a newly created company Polska Platforma Cyfrowa (Polish Digital Platform), alongside with Polish Television Plc. (the public-service television broadcaster) and most other ranking licensed commercial stations.

Computer equipment and the Internet

As noted above, spending on information technologies in Central and Eastern Europe has grown remarkably over the past few years. However, both the relationship of IT expenditures to GDP and per capita IT spending reveal that expenditures are still much lower than in Western Europe. In 1996, the vast majority of Central and Eastern European countries spent less than 1.9% of GDP annually on information technology (Hungary, 1.89%; Poland, 1.19%; Russia, 0.79%; Slovakia, 1.91%). Only the Czech Republic exhibited spending levels (2.99% of GDP) which matched those of many Western European countries.

Table 16.7 → Television, cable and satellite TV households and VCR penetration (estimates for 1 January 1997)

	Total TV households (000's)	Total households having the possibility to link up to a cable network (000's)	Total households connected to cable (000's)	Satellite Master Antenna TV+Direct-to-home (000's)	Households having the possibility to link up to a cable network/ TV households	Households connected to cable/ TV households	Households connected to cable/ Households having the possibility to link up to a cable network	VCRs (% of TV households, 1996)
Bulgaria	2,820	165	35	100	1.2	1.2	21.2	49
Czech Rep.	4,022	2,400	750	400	59.7	18.6	31.2	–
Estonia	539	–	93	30	–	18		51
Hungary	3,849	–	1,905	500	–	50	–	46
Lithuania	1,438	–	197	40	–	14	–	18
Latvia	921	–	155	10	–	17.0	–	22
Poland	12,146	–	2,766	2,000	–	23	–	60
Romania	4,687	4,000	2,300	300	85.3	49.1	57.5	26
Russia	46,776	11,578	–	150	–	25	–	21
Slovakia	1,850	–	470	150	–	–	–	27
Slovenia	637	–	220	200	–	–	–	55 (1996)

Source: European Audiovisual Observatory, Statistical Yearbook 1998.

Table 16.8 provides a comparison between Western and Central and Eastern Europe in terms of IT hardware sales in 1998.

Spending on hardware, software and services is another important difference between the less and the more advanced countries. The country-level markets of Central and Eastern Europe remain heavily oriented towards personal computers and PC-related technologies. These accounted for the largest percentage of IT hardware spending during the 1996–1997 period. By contrast, in the Czech Republic, personal computers and related hardware represent less than 35% of IT spending, with the remainder being shifted to implementation services, networking applications, development and support. Elsewhere, the low-end office equipment market, local area network (LAN) hardware and the LAN server market have experienced considerable growth over the last several years. However, the computer systems segment (mainframes, servers, workstations) has stagnated in several countries due to reductions in funding for public IT projects.

Despite the overall predominance of hardware sales, software and services represent one of the fastest growing sectors of the IT market. Particularly strong growth is being seen in the market for packaged software, such as PC applications software, enterprise resource planning (ERP) applications, and application tools for database development and management. Demand for basic services such as IT consulting, contract programming and software design is also strong. The regional value of the software and services market reached almost 2,000 million euros in 1997, up more than 13%over the previous year. Most growth in the software and services sector is derived from

Table 16.8 → IT hardware shipments (in units)

	Western Europe	Eastern Europe
Unix servers	129,316	7,641
NT servers	272,100	19,812
Other servers	369,251	67,431
Workstations	210,077	6,040
PCs	19,824,095	2,414,300
LAN cards	15,388,400	1,130,112

Source: EITO 1998.

large-scale projects in banking, financial services, government administration, telecommunications and industry. Local firms play a role of growing importance as system integrators, value-added resellers, software developers and training centres.

Table 16.9 illustrates the volume of the information technology market in selected CEE countries. Differences in spending on particular technologies are not commensurate with the great difference in size and population between Russia and the other four countries. This is as good an indication as any of the directrelationship between economicdevelopment and the successful penetration of information technology.

Table 16.10 shows the penetration of information technology (PCs and Internet access) in Central and Eastern European countries.

USE OF ICT IN THE REGION

New information and telecommunication technologies are gradually being introduced into all spheres of life in Central and Eastern Europe. In Estonia, for example, a national school computerization programme, known as 'Tiger Leap', has been launched. In 1997, 25% of all schools were connected to the Internet. By the year 2000, all the schools are scheduled to be on the Internet. A similar project, School-Net, was inaugurated in 1996 in Hungary, with a view to providing direct access to the Internet for about one thousand schools by 1 September 1998. As a result of this project, schools are being equipped with computer laboratories incorporating 6 to 18 multimedia computers per laboratory. A further

Table 16.9 → IT market value (millions of euros) in selected CEE countries (1999, estimated)

	Czech Rep.		Hungary		Poland		Russia		Slovakia	
	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999
Servers	136	147	89	107	159	178	354	462	51	57
Workstations	15	16	10	11	17	17	23	27	5	6
PCs	328	359	153	160	525	577	1,549	1,824	132	153
PC/workstation add-ons	116	127	85	97	153	166	328	360	40	46
Computer hardware	595	650	337	376	853	939	2,254	2,673	228	262
LAN hardware	75	86	32	37	87	100	143	161	29	34
Other data communications	17	18	15	16	26	28	62	65	3	3
Data communications hardware	92	104	47	52	113	128	205	227	32	37
IT hardware	765	838	441	489	1,057	1,188	2,889	3,301	290	331
Systems software	74	81	50	55	74	84	65	71	25	27
Application software	77	84	62	67	102	112	113	127	23	25
Software products	151	164	112	122	176	195	178	198	48	53
Consulting	91	98	59	63	49	59	35	41	8	10
Implementation	193	227	118	136	200	230	185	215	33	39
Operations management	77	90	40	45	40	45	44	50	8	9
Support services	101	112	63	67	94	100	129	147	13	15
Services	462	526	280	312	382	435	394	454	63	73
Software and services	613	691	392	433	558	630	572	652	110	126
Total IT market	1,377	1,529	832	923	1,633	1,818	3,461	3,953	400	457

Source: EITO, 1998.

Table 16.10 → Internet and PC penetration, 1996

	Internet				Estimated PCs	
	Hosts		Estimated number of users		Total (k) 1996	Per
	Total 1998[1]	Per 10,000 inhabitants, 1996	Total 1996	Per 10,000 inhabitants 1996		100 inhabitants 1996
Low income countries						
Albania	76	0.22	1,000	2.72	na	na
Armenia	482	0.47	3,000	0.09	na	na
Azerbaijan	348	0.04	500	0.66	na	na
Bosnia	348	0.10	500	1.38	na	na
Georgia	655	0.39	2,000	3.70	na	na
Lower middle income countries						
Belarus	648	0.25	735	0.72	na	na
Bulgaria	6,693	3.92	60,000	0.17	250	2.98
Estonia	19,856	54.29	5,000	34.01	10	0.67
Latvia	8,439	23.31	40,000	161.29	20	0.79
Lithuania	8,893	4.67	10,000	26.97	24	0.65
Moldova	370	0.01	200	0.47	11	0.26
Poland	106,663	13.68	480,000	124.23	1,400	3.62
Romania	22,359	3.46	50,000	22.12	120	0.53
Russia	137,178	3.93	600,000	40.61	3,500	2.37
Slovak Republic	14,805	14.77	100,000	186.08	na	na
The Former Yugoslav Rep. of Macedonia	407	0.89	1,500	6.93	na	na
Ukraine	16,278	1.29	50,000	9.79	290	0.56
Yugoslavia	5,416	2.40	20,000	18.91	na	na
Upper middle income countries						
Croatia	4,633 (1996)	10.29	40,000	88.78	100	2.09
Czech Rep.	72,120	39.60	200,000	193.89	700	6.79
Hungary	76,143	29.22	100,000	97.92	450	4.41
Slovenia	18,537	69.35	100,000	502.26	95	4.78

1. Figures for July 1998; source: Network Wizards (www.nw.com)

Source: World Telecommunication Indicators, ITU,1998.

500 primary schools and 34 student hostels were to gain Internet access during the first stage of the project.

In Estonia, computer workplaces installed in national publicadministration authorities (PAAs) were expected to achieve an average of almost 90% by the end of 1997. Some branches were expected to reach 100%. Local area networks (LANs) are rapidly being adopted in Estonian PAAs. In 1993 there were only 15 networks in operation and 23 uninstalled network kits; by the end of 1997 the estimated number of LANs was expected to reach 431. However, the LANs used in these administrations are usually not large. The average number of workstations connected into a public administration LAN is 14.5, including 56 in networks of supporting structures, 17 in ministry networks, 12 in national board networks, 6 in inspectorates and 15 in county government networks. About 30% of these networks – mainly in regional units of governmental agencies – operate without a specialized

server. The rest have 1.6 servers per network, with two servers in central apparatus networks. Only 8% of the servers are minicomputers, while 69.3% of them are equipped with uninterruptible power supplies (UPS).

The number of printers in public administrations totalled 3,393 by the end of 1996, which amounted to 48% of the total number of workplace computers. It was estimated that by the end of 1997, the number of printers would increase to 91.6% of the computer workplaces. Only a few public administrations own a plotter. The number of scanners increased by almost three times in 1996 compared to 1995. PAAs had 667 modems by the end of 1996, due to the explosive growth in the use of Internet and electronic mail.

In Lithuania, due to the limited funding available from the state budget in 1993–1995, only the most important technology projects were selected for investments. These included the integration of computer networks for public institutions, the state register system and geographical information systems, and networks for local authorities and customs. Altogether, 46 institutions were united into the Public Institutions Computer Network (VIKT): the Seimas (Parliament), the Government, the Ministries of Economics, Finance, Communications and Informatics, Foreign Affairs and Internal Affairs, the Customs and Statistics Departments, the Vilnius Municipal Office and similar bodies. They were also provided the opportunity of connecting to the Internet. LITNET, a Lithuanian science network, has been an official member of the Internet since 1994. LITNET allows the multimedia exchange of texts, graphs, signals, static and moving images among subscribers from 173 countries of the world. The network's services are used by 10 universities and academies, 14 research institutes, and about 140 other schools, libraries, public institutions, and healthcare establishments. LITNET consists of over 2,000 computers and the number of users exceeds 10,000 people. There is a co-ordinated effort to develop computerized information systems (IS) that help manage government departments like the Ministry of Internal Affairs (State Border Control IS), the State Control Department, the Ministry of Finance (Tax Administration IS, Treasury IS), and the Ministry of Social Security and Labour (State Social Security Board IS, State Employment Agency IS). An X.25-standard data communication network, Vilniaus DATAPAK, with 240 connection ports, is operated by Lithuanian Telecom. It is used by the Customs IS and the Bank IS.

The examples of Estonia and Lithuania illustrate the increasing use of ICT in Central and Eastern European countries, where they are among the most developed in the region.

RESTRUCTURING AND PRIVATIZING TELECOMMUNICATIONS AND MEDIA SECTORS

Broadcasting monopolies are a thing of the past in Central and Eastern Europe, but political and economic circumstances in individual countries have shaped broadcasting systems differently. In most Central European countries, a dual system of public and private broadcasting is operating at the national and also, in some cases, at the sub-national level. In the Commonwealth of Independent States (CIS), the situation is different. In these countries the private sector is non-existent: there are, in most cases, no independent or commercial stations at the national level, and 'authorities have retained control over important state-owned media. If they have not outlawed independent or opposition altogether . . . they have retained important levers: they may withdraw subsidies, increase the rent of editorial premises, refuse to print or distribute a paper, delay registration, deny a licence or frequency to a broadcaster, increase tariffs, restrict access to information or file libel suits' (Lange, 1997, p. 21).

Economic factors also weigh heavily on growth prospects for the media in most CEE countries. Larger or more buoyant markets attract foreign investors and

generate relatively high volumes of spending on advertising. On the other hand, underdeveloped and stagnant economies are not capable of sustaining extensive media growth: there is neither start-up capital, nor sufficient advertising to finance such activity.

Table 16.11 portrays the situation in selected Central European states resulting from the demonopolization of television at the national level.

Practically everywhere in CEE countries cable television is in private hands, with foreign companies sometimes holding a majority stake.

Progress is also being made, albeit at a slower pace in some countries, towards the liberalization of telecommunications. No doubt this is aided by the fact that many Central European states aspire to membership in the European Union (EU) which requires policies in harmony with those of the EU. In traditional telecommunications services, the market in many cases is still closed, or open only to limited competition. Even where telecommunication companies have been privatized, many of them have been given exclusive long-term licences. Full liberalization will come only when these licences have expired. As far as new services – Global System for Mobile Communication (GSM), Nordic Mobile Telephone System (NMT) 40, Digital Cellular System (DCS) 1800, satellite communications, radio paging, data transmission, Internet service provision – are concerned, the market is open in most cases and they have been launched from the start by private companies, many with significant foreign shareholders.

Bulgaria and Romania have yet to liberalize their telecommunications. Poland has begun a process of privatization of Polish Telecom (TP S.A.) by selling a part of its shares on the stock exchange. A strategic partner is to be chosen in 1999. Several countries have decided to choose international operators as strategic investors by partially privatizing their telephone companies. Several local telephone operators have been licensed. New services are provided by private companies, many with foreign shareholders.

The Estonian government sold 49% of Esti Telefon to a Scandinavian consortium. The private investors have been given management control with a 25-year concession to operate the national network, as well as an exclusivity period of eight years to provide long-distance service.

Hungary at first sold 30% of its national operator MATÁV to a consortium of Deutsche Telecom and Ameritech. MATÁV obtained the right to operate long-distance and international services as well as two-thirds of the local areas with an exclusivity period of eight years for public telephone services. Later, Hungary sold a further 37% of MATÁV's shares to Deutsche Telecom and Ameritech. The government's share holding is now down to 25% so that the foreign consortium has both majority ownership and full management control. The remaining local areas have been sold to several smaller operators under similar conditions. The private investors have management control with an 8-year concession.

Latvia sold a 49% stake of Lettelkom to a consortium led by Finland Telecom and Cable & Wireless, with a 10% equity stake bought by the International Finance Corporation. Lettelcom has a 20-year concession to provide domestic and international telecommunication services.

In Lithuania, the market is theoretically open, but in most areas there is only one operator, Lietuvos Telekomas (LT). It is foreseen that a new telecommunications law will grant LT exclusive right to provide some services until 2003.

The Czech government allowed SPT Telecom A/S to increase its capital by creating new shares which were sold to Tel Source. This consortium, which includes the Dutch telecommunication and postal group (KPN) and Swiss Telecom, owns 34% of SPT and has management control. The arrangement helps finance the company's modernization plans. The company has a monopoly over domestic and international network services until the year 2000, during which time it is required to double the number of tele-

Table 16.11 → State/public and commercial television in Central European countries (main channels)

Company	Channel	Distribution	Technical penetration (%)	Audience 1995 (%)	Revenue
Bulgaria					
BNT	Channel 1 (public)	Terr./cable	99	70	State budget/advertising
BNT	Efir 2 (public)	Terr./cable	89	22	State budget/advertising
Multimex	Nova TV (comm.)	Terr.	20 (Sofia)	n.a.	advertising
Dni Ltd.	7 dni (comm.)	Terr.	12.5 (Sofia)	n.a.	advertising
Czech Republic					
CT	CT-1 (public)	Terr.	98	22.5	Lic. fee/advertising
CT	CT-2 (public)	Terr.	81	3	Lic. fee /advertising
CET 21	Nova TV (comm.)	Terr.	98	70	Advertising
PTV Premiera	Prima TV (comm.)	Terr./sat.	70	2	Advertising
RTV Gemma	Galaxie (comm.)	Sat/cable	n.a.	n.a.	Advertising
Nethold	MultiChoice (comm.)	Sat/cable	n.a.	n.a.	Advertising
Estonia					
Eesti TV	ETV (public)	Terr.	97.5	23	Advertising/State Aid
Kanal Kaks	Kanal 2 (comm.)	Terr.	77.5	15	Advertising
TV1	TV1 (comm.)	Terr.	n.a.	n.a.	Advertising
TV3	TVS-2 (comm.)	Terr.	92	17	Advertising
Hungary					
MTV	MTV 1 (public)	Terr/cable	100	58.4	Lic. fee/advertising
MTV	MTV 2 (public)	Terr/cable	98.5	20.8	Lic. fee/advertising
MTM	MTM (comm.)	n.a.	n.a.	n.a.	Advertising
CLT	RTL-Klub (comm.)	n.a.	n.a.	n.a.	Advertising
Duna TV	Duna TV (public)	Sat/cable	45.3	2.5	Advertising
Budapest Communications	TV3 (comm.)	Sat/cable	40	n.a.	Advertising
Latvia					
Latvijas TV	LTV1 (public)	Terr.	97	23	State budget/advertising
Latvijas TV	LTV2 (public)	Terr.	96	7	State budget/advertising
A/S LNT	LNT (comm.)	Terr.	82	n.a.	Advertising
Baltkom	Baltkom (comm.)	Sat.	100	n.a.	Advertising
Lithuania					
Lietuvos RTV	LTV (public)	Terr.	99	30	State budget/advertising
LNK	LNK TV (comm.)	Terr.	98	27	Advertising
Tele3	Tele3 (comm.)	Terr.	92	20	Advertising
Baltijos TV	Baltijos TV (comm.)	Terr.	90	4	Advertising
Poland					
TVP S.A.	TVP1 (public)	Terr./cable	99	47 [96]	Lic. fee/advertising
TVP S.A.	TVP2 (public)	Terr./cable	98	21 [96]	Lic. fee/advertising
TVP S.A.	TV Polonia (public)	Sat/cable	32	2 [96]	Lic. fee/advertising
Polsat	Polsat (comm.)	Terr./sat.	81	20 [96]	Advertising
ITI Holdings	TVN	Terr./sat.	n.a.	7	Advertising
Polska Korp. Partycypacyjna	Canal+ Polska (comm.)	Terr/Sat./cable	6	n.a.	Pay-TV

Table 16.11 (continued)

Company	Channel	Distribution	Technical penetration (%)	Audience 1995 (%)	Revenue
Romania					
TVR	TVR 1 (public)	Terr./cable	100	73.6	State budget/advertising
TVR	TVR 2 (public)	Terr./cable	50	7.4	State budget/advertising
TVR	TVR Int'l (public)	Sat./cable	n.a.	n.a.	State budget/advertising
Pro TV	PRO TV (comm.)	Terr/cable/sat	45	3.9	Advertising
Amerom/Prima	Amerom (comm.)	Terr/cable/sat	10	n.a.	Advertising
TELE7 abc	TELE7abc (comm.)	Terr/cable/sat	40	1.2	Advertising
Slovakia					
Slovak TV	STV-1 (public)	Terr./cable	99	59	State budget/advertising
Slovak TV	STV-2 (public)	Terr./cable	99	26.6	State budget/advertising
Markiza Slovakia	TV Markiza (comm.)	Terr./cable	82.5	65.2	Advertising
Vasa Televizia	VTV	Sat/cable	53.7	10.2	Advertising
Slovenia					
RTV Slovenia	TVS-1 (public)	Terr/cable/MMDS	95	62	Lic. fee/advertising
RTV Slovenia	TVS-2 (public)	Terr./cable/MMDS	95	19	Lic. fee/advertising
CME/MMTV/Tele 59	POPTV (comm.)	Terr./cable	80	36	Advertising
Kanal A	Kanal A (comm.)	Terr./cable/MMDS	80	9	Advertising
TV3	TV3 (comm.)	Terr./cable	75	2	Advertising

phone lines. Meanwhile, a number of local telephony operators have been licensed, providing competition for SPT.

In Slovakia, liberalization of basic voice telephony services will start in the year 2003, at the latest. Most other areas are theoretically open.

In Slovenia, the public telecommunications network and voice telephony are operated by Telekom Slovenije under monopoly until the end of 2000. Most other areas are open to competition, which is, however, limited by the size of the country.

INTERNATIONAL AND REGIONAL CO-OPERATION AND DEVELOPMENT ASSISTANCE

Central and Eastern European countries which are associated with the European Union have been able to benefit from the Phare Fund. This Fund is available for upgrading the knowledge and practical experience of staff who handle the operational and regulatory aspects of improved telecommunications systems. Other projects have concentrated on facilitating investments, on providing aid for setting up independent telecommunications regulatory authorities and on developing licensing guidelines and expanding services.

Additional funding has been earmarked for restructuring the transport, energy and telecommunications sectors in CEE countries to help them play a larger role in a market economy. For example, assistance has gone towards eliminating bottlenecks at some of the important border crossings and towards developing a more rational and efficient use of resources. The old system's artificially low prices for energy had encouraged inefficient production techniques and high consumption, which in turn led to serious environmental degradation. To address these problems, the European Union has supported the setting up of commercial companies to manage energy production, telecommunications services, privatization of road transport, restructuring of rail companies and the preparation of a regulatory framework for both the telecommunications and transport systems.

Since 1995, the European Commission has organized annual European Union/Central and Eastern European countries (EU/CEEC) Information Society forums whose goal is to integrate candidate CEE countries into European and international efforts towards the Global Information Society. Policies and strategies for implementation have been developed through a series of meetings. In 1996 the second Forum created four panels which dealt with strategy and policy formulation for the Information Society; implementation of demonstrations, pilot projects and other actions; education and training for the Information Society; and the application of information and communications technologies in public administration.

At the same Forum, an Action Plan for Information Society pilot projects in CEE countries was adopted. It was based on the conviction that 'for the CEE countries, the information society is a top priority in order to improve competitiveness and enhance the efficiency of public administration. Even though some important political decisions have yet to be made, and the financial resources available are severely limited, it is still crucial to send positive signals about the information society in order to raise public awareness. For this reason, this set of ideas has been put forward in the form of an action plan. . . . The action plan has identified thirty themes covering the areas where pilot projects will be particularly effective.' (EU-CEEC Forum on the Information Society, Panel on the Implementation of the Action Plan, www.mzt.si/med./peco002.html).

At the third EU/CEEC Information and Society Forum (Brussels, 9-10 October 1997), the European Commission was invited to:

- → Fund the extension of the European Survey on the Information Society to CEECs and, in particular, to identify and analyse regional disparities in terms of basic telecommunications services, information infrastructures and applications.
- → Support the use of Phare funds, in co-operation with International Financial Institutions, to facilitate investment in the information infrastructure.
- → Strengthen and refocus the indicative objectives expressed in national and multi-country PHARE programmes to support the integration of information and communication related technologies into education.
- → Support the provision of the necessary co-funding support to allow partners in CEECs to participate in EU TEN-Telecom projects, and in TEN-34.
- → Establish opportunities for EU funding for Information Society activities and for co-financing CEEC participation in EU Information Society related programmes, like INFO2000 and the Multi-lingual Information Society programme, in order to develop the full scope of the Information Society.
- → Support improvement of intra- and inter-administration communication in the CEECs, and between them and EU administrations, by enabling their participation in appropriate projects for data interchange between administrations (IDA), such as the Système d'information sur les marchés publics (SIMAP), which has the objective of harmonizing legal and payment principles of data exchange regarding public procurement. The electronic posting of public calls for tender should be introduced throughout the CEECs.
- → Continue to provide advice on the alignment of Information Society related legislation in the CEECs with the acquis communautaire, notably the data protection directive (95/46/EC) and on the implementation of such legislation, paying particular attention to the creation in each CEEC of an independent supervisory body in the field of data protection.
- → Draw the attention of the European Parliament

to the advantages to be gained from the establishment of electronic interconnections between the parliaments of the EU, the member states and CEECs.

→ Take action to facilitate the involvement of the CEE and EU business communities in projects by shorter decision making and payment times.

MOVING TOWARDS THE INFORMATION SOCIETY: REGIONAL PROSPECTS

The 'informatization' of Central and Eastern European societies has been both a top-down and a bottom-up process. It began only after 1989 when political and administrative constraints on access to, and use of, information and telecommunication technologies were lifted. Considering these inauspicious beginnings, CEE societies have indeed made great strides in the past decade.

Nevertheless, it is clear that Central and Eastern European countries are only at the beginning of their journey towards the Information Society. In 1996, Panel A, Financing of Infrastructure, of the Central and East European Information Society Forum, concluded that 'in most cases, the governments of CEECs are not organized in such a way as to enable them to monitor the evolution of the "Information Society" as an economic sector [and] specific new responsibilities are needed. To be effective, such responsibilities would have to operate across the boundaries of existing government ministries and other agencies' (Report of Panel A, 1996). Even more importantly, many of those governments have yet to focus fully on the issue of the Information Society, preoccupied as they are with the job of creating a market economy and dismantling the legacy of the centralized economic system. For many, economic underdevelopment and crisis/stagnation have created immediate and pressing challenges which direct attention away from the promise of the Information Society.

Nevertheless, a number of countries have adopted action programmes oriented towards laying the groundwork for the creation of the Information Society. In Hungary, a National Information Infrastructure Development Programme had been operating for more than ten years in 1997. Hungary has established a Governmental Committee on Information and Telecommunication Technology and has developed a 'National Informatics Strategy'.

In Lithuania, the task of the Ministry of Communications and Informatics is to form and to implement the Lithuanian communications and informatics strategy, to organize postal, telecommunications and informatics activities, and to co-ordinate the operation of public telegraph, telephone, data transmission, information, radio and television facilities and networks belonging to enterprises, institutions, organizations and individuals. The Ministry of Communications and Informatics co-ordinates the development of the national data transmission networks and state databases, registers and information systems.

In Estonia, a development plan for Estonian informatics has been adopted. It includes a package of documents describing Estonia's information policy: 'Fundamentals of the Estonian Information Policy', an 'Action Plan' and 'Proposals to the Government of the Republic'. Similar documents developed in the past have had little impact.

The Romanian Government's National Commission for Informatics has adopted a plan which calls for:

→ setting up a national information infrastructure as a backbone for the informatization of central and local public administration (as far as municipalities are concerned);

→ developing a national ICT industry, especially a software industry;

→ creating favourable conditions for large scale use of ICT in industry, trade, agriculture, defence, tourism, health, environmental protection,

education, research and culture, to comply with the European Union regulations.

By the year 2005, the plan calls for extending the information infrastructure to the countryside and for advancing informatics in Romania to the level required for integration into the European information society.

The Polish government has adopted a 'Telecommunications Development Policy' and has before it a number of draft documents concerning ways of moving towards the Information Society.

The third EU/CEEC Information Society Forum (1997) invited CEE governments to ensure that their national Information Society strategy and related action plan contain chapters specifically devoted to such important areas as national budgetary provision, the pro-active role of government, protection of personal data, information security and cryptography, education for the Information Society, promotion of cultural and linguistic diversity and international co-operation in statistics. On the basis of the acquis communautaire in these areas, CEE governments were also invited:

- → to stimulate investment by business by creating an appropriate environment, including further progress in liberalizing telecommunications;
- → to build confidence in electronic commerce between business and consumers and encourage them to adopt electronic commerce and develop digital content by establishing a clear and predictable legal framework;
- → to set up a national advisory body on Information Society strategy;
- → to create a national office to co-ordinate the implementation of the national action plan and contribute to awareness-raising.

The basic nature of these proposals confirms that much work still remains to be done, even in the most advanced CEE countries, in order to move towards the Information Society.

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Chapter 17
Latin America and the Caribbean

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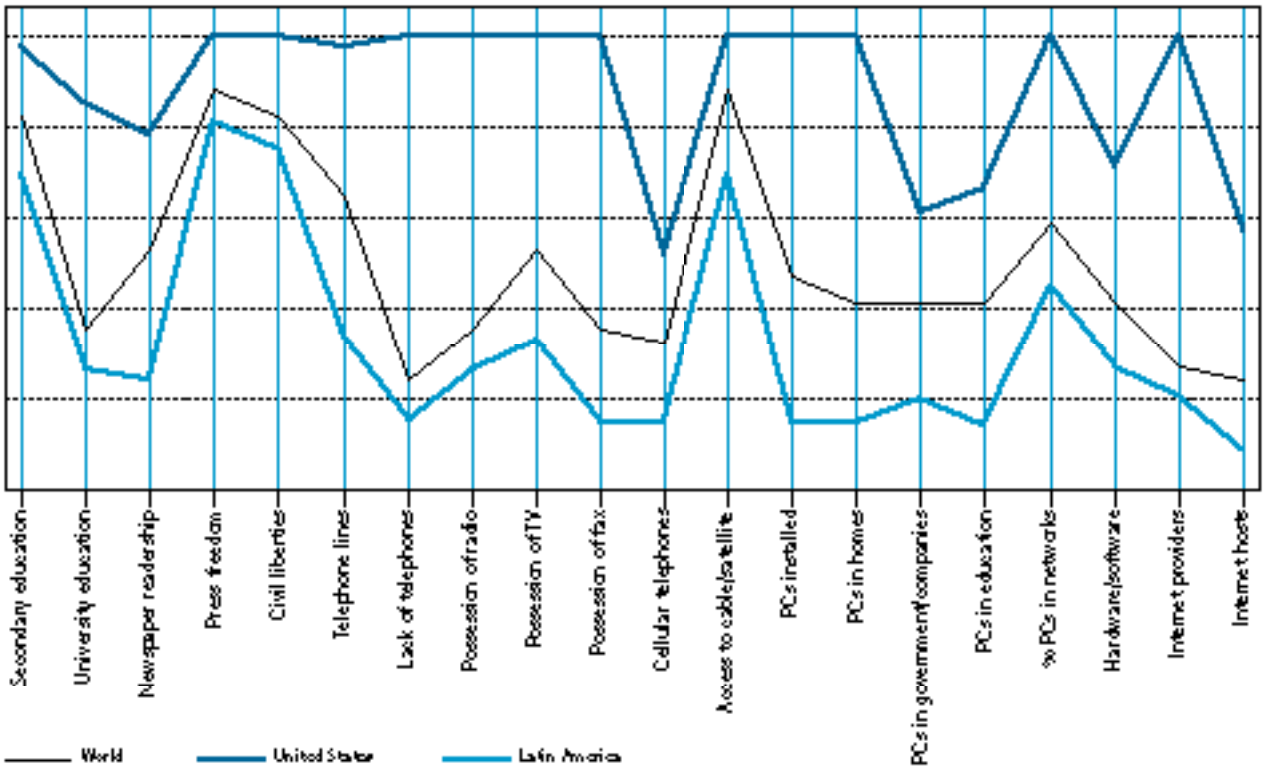
In this regional report, we shall attempt to summarize the most salient aspects of the situation currently existing in Latin America and the Caribbean in the sphere of communication and information. To do this, we shall first deal with the subject of Information Technology (IT), or computing, by looking at the position of the region in a global context with reference to the Information Society Index (ISI), and by describing the investments being made in IT, the markets and market segments that now exist and their distribution. Secondly, we shall describe the situation of information centres and libraries and the networks being set up within Latin America and the Caribbean to link them together, with the support of the Organization of American States (OAS) and the Hemisphere Wide Inter-University Scientific and Technological Information Network (RedHUCyT). Thirdly, we shall consider communications, touching briefly on the situation of mass print media, and referring to the extraordinary growth of telecommunications in the region.

INFORMATION TECHNOLOGIES

The worldwide expansion rate of Information Technologies has been increasing rapidly, and the Latin America and Caribbean region is no exception to this trend, although the regional growth rate is generally below that of the developed countries and of the world as a whole. In the Information Society Index (ISI) designed by International Data Corporation, the region ranks close to the world average for a number of social criteria (freedom of the press, civil liberties and secondary education), for one computing infrastructure criterion (percentage of PCs in networks) and for one information infrastructure criterion (access to cable/satellite). For the remaining factors, it is below the world average, and far below the position of developed countries such as the United States. Figure 17.1 illustrates this.

The position of the ten Latin American countries that are the best situated by comparison with other

Figure 17.1 → Information Society Index (ISI)



Source: International Data Corporation/World Times (Gil, 1998).

countries is shown in Table 17.1. It should be noted that the relative position of these countries improved slightly between 1996 and 1997, rising from 3.92 to 3.9, on average. Venezuela, however, fell from third place to fifth, and from thirty-fourth to thirty-eighth in the world as a whole. The positions of the other countries shifted less. Table 17.2 shows the positions of the ten countries for each of the three types of index, namely, social, information and computing infrastructure.

The IT investments made by Latin American countries correlate quite closely with their ISI rankings, especially in 1997. Figure 17.2 and 17.3 show this correlation. Note that Venezuelan IT investment does not change substantially, as a proportion

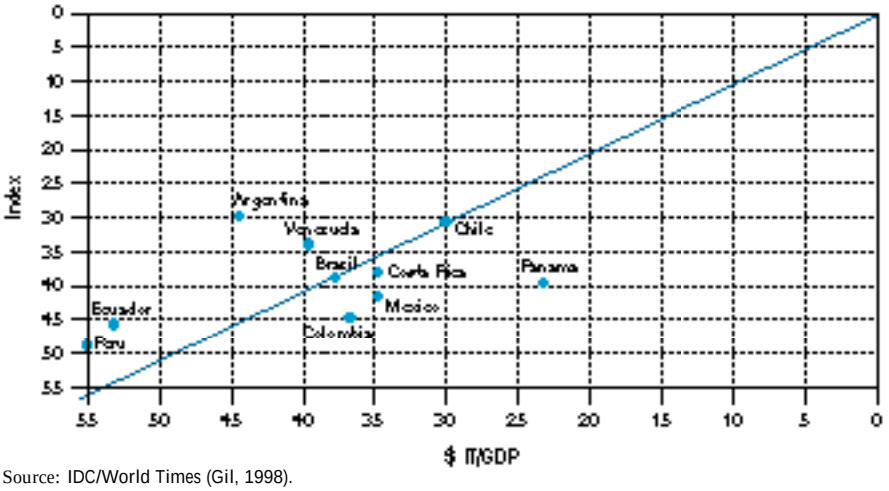
Table 17.1 → Ranking of the top ten Latin American countries in the ISI index

Country position 1996		Country position 1997	
Argentina	30	Argentina	31
Chile	31	Chile	32
Venezuela	34	Brazil	36
Brazil	38	Colombia	38
Costa Rica	39	Venezuela	39
Panama	40	Costa Rica	40
Mexico	41	Mexico	41
Colombia	44	Ecuador	42
Ecuador	46	Panama	43
Peru	49	Peru	48

Table 17.2 → Values of three components of the ISI index

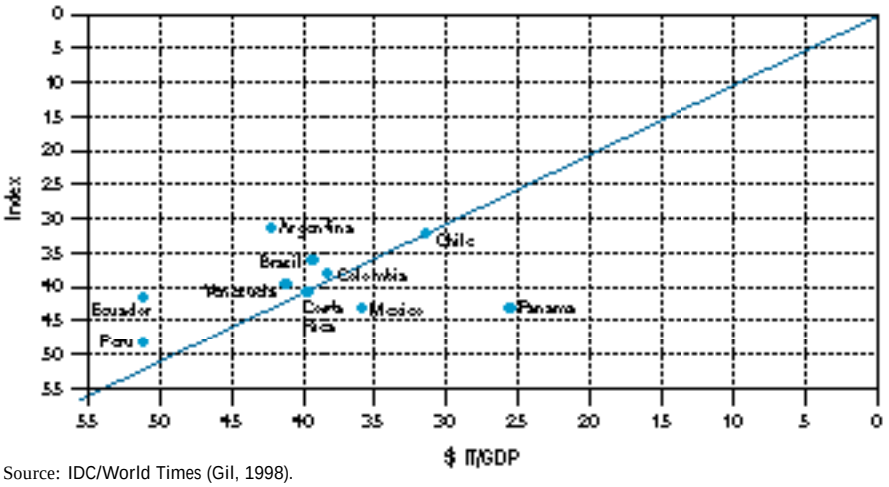
Country	Type of indices					
	Social		Information		Computing	
	96	97	96	97	96	97
Argentina	23	27	30	30	30	37
Chile	24	30	38	38	31	31
Venezuela	35	32	36	37	34	40
Brazil	43	41	37	29	38	35
Costa Rica	26	31	45	42	39	38
Panama	36	36	40	49	40	34
Mexico	44	38	41	36	41	39
Colombia	46	45	46	38	44	29
Ecuador	40	39	39	34	46	42
Peru	41	35	50	48	49	46

Figure 17.2 → ISI versus IT investment, 1996



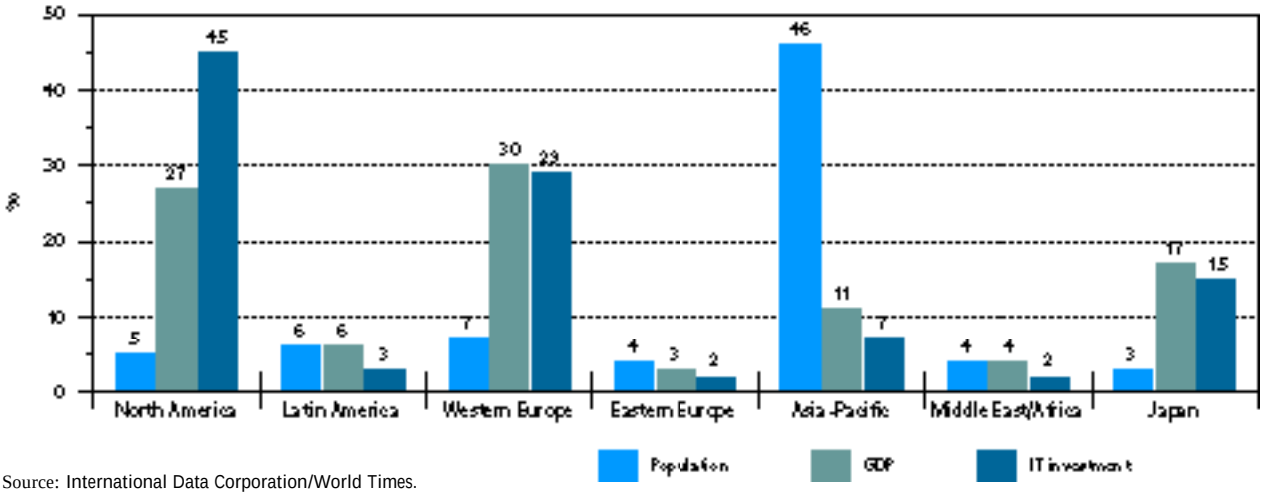
Source: IDC/World Times (Gil, 1998).

Figure 17.3 → ISI versus IT investment, 1997



Source: IDC/World Times (Gil, 1998).

Figure 17.4 → Comparative chart of IT investment, 1997



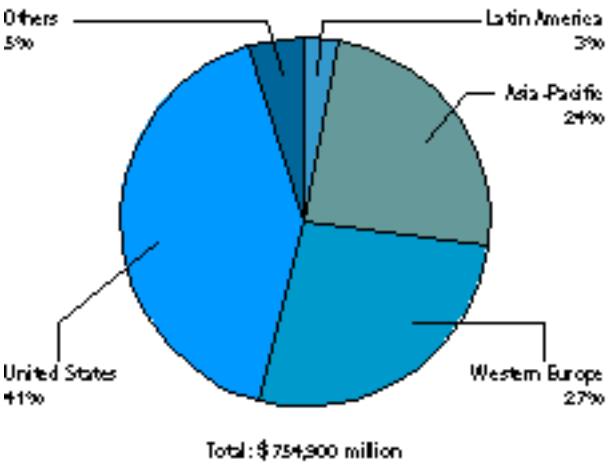
Source: International Data Corporation/World Times.

of GDP, but the country still falls in the world rankings, while in the case of Colombia the opposite occurs. This shows that Venezuelan IT investments were less effective in 1997 than they had been in 1996, while the opposite is true in the case of Colombia. Note, too, the case of Argentina, which ranks first among the Latin American countries in the ISI, even though its level of IT investment is not the highest, being rather around the average. Argentine investment stands at virtually the same level as that of Venezuela, but it is more effective. This would appear to be accounted for mainly by the fact that it has better social infrastructure, as Table 17.2 shows. Panama, meanwhile, would appear to be the least effective in its IT investments.

The Latin American and Caribbean region contains approximately 6% of world population and accounts for 3% of world IT investment, whereas North America, with 5% of the population, accounts for 45% of world IT investment. The relative position of the region in this respect is similar to that of Africa/Middle East. All other regions outstrip Latin America, with the exception of Asia and the Pacific (excluding Japan). Figure 17.4 gives further details.

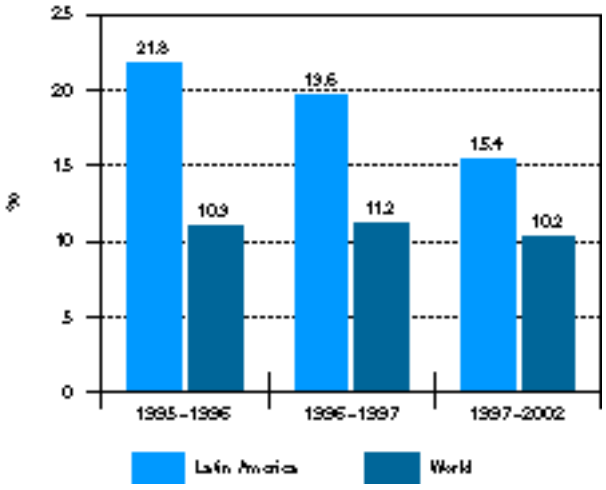
The Latin American IT market represents 3% of the world market (Figure 17.5), but growth in Latin America is above the world average (Figure 17.6), being twice as high in the period 1995–1996, and almost twice as high in 1996–1997. For the period 1997–2002, growth in the Latin American market is forecast to be 51% higher than the world average.

Figure 17.5 → World distribution of the IT market, 1997



Source: IDC Latin America IT Spending Patterns, 1998 (Prothero, 1998).

Figure 17.6 → Growth in the IT market, 1995–2002

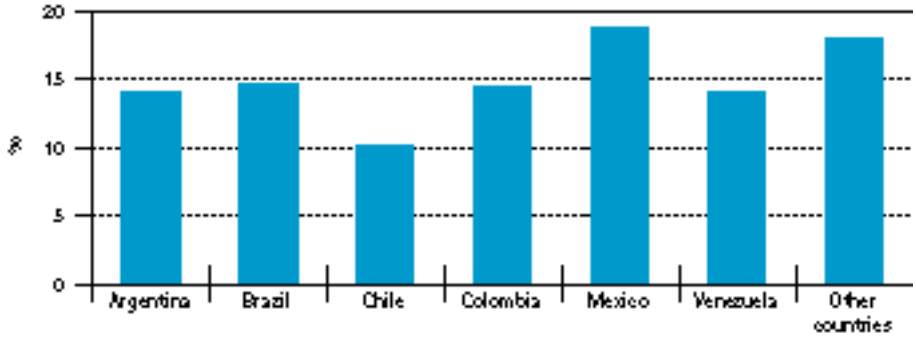


Source: IDC Latin America IT Spending Patterns (Prothero, 1998).

Figure 17.7 shows growth for the period 1997–2002 in a number of countries of the region. The regional market is divided up as shown in Figure 17.8. The market segments are shown in Figure 17.9.

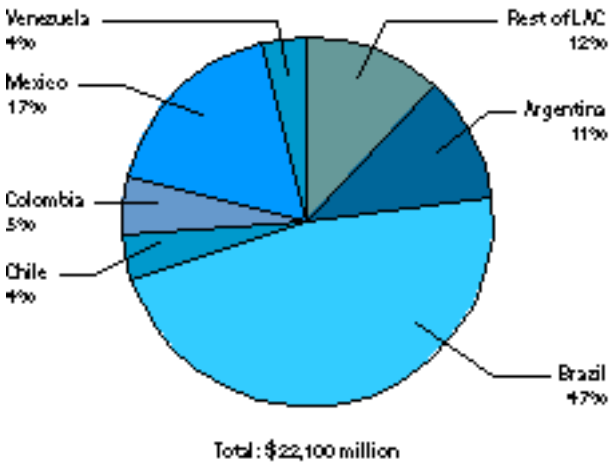
As Figure 17.10 demonstrates, growth in the Latin American software market has become explosive. In three years (1995–1998) it has expanded by some 297%, and by 2002 it is expected to have grown by 303% over the 1998 level. The five most widely used database managers are those produced by Oracle, IBM, SAGA, Informix and Sybase, in that order.

Figure 17.7 → Growth in the IT market by country, 1995–2002



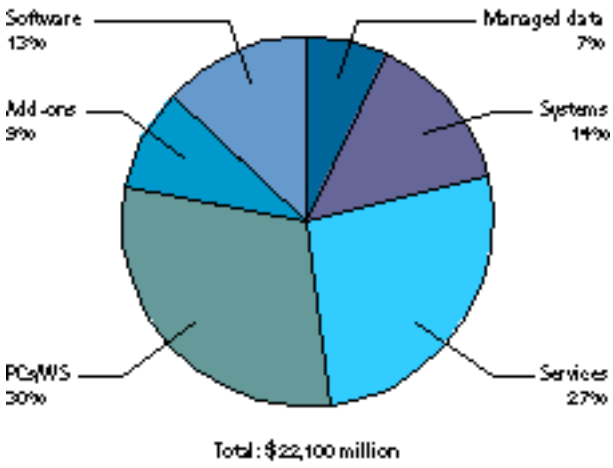
Source: IDC Latin America IT Spending Patterns (Prothero, 1998).

Figure 17.8 → Distribution of the Latin American IT market by country, 1997



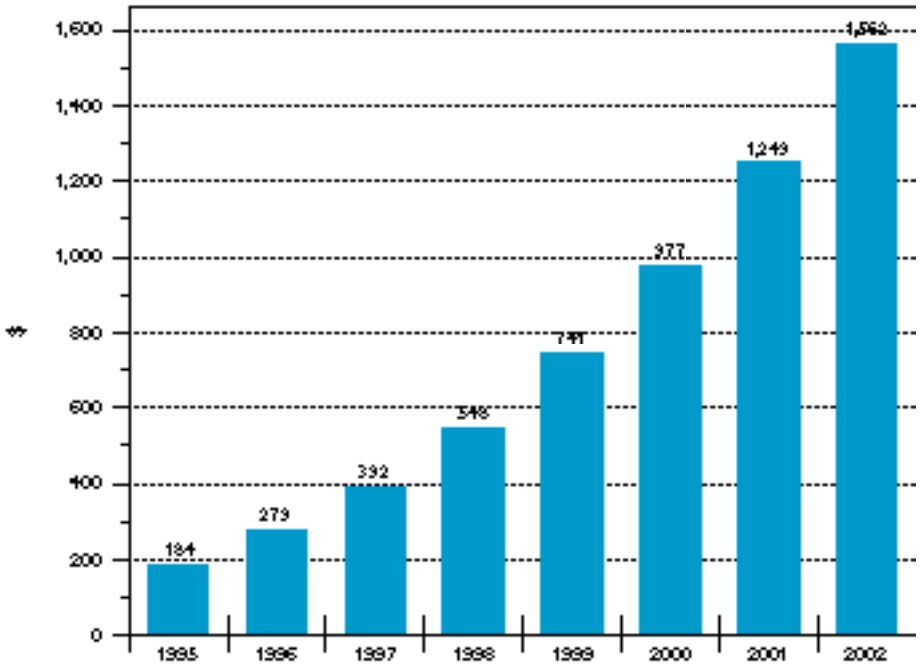
Source: IDC Latin America IT Spending Patterns, 1998 (Prothero, 1998).

Figure 17.9 → IT market segments in Latin America, 1997



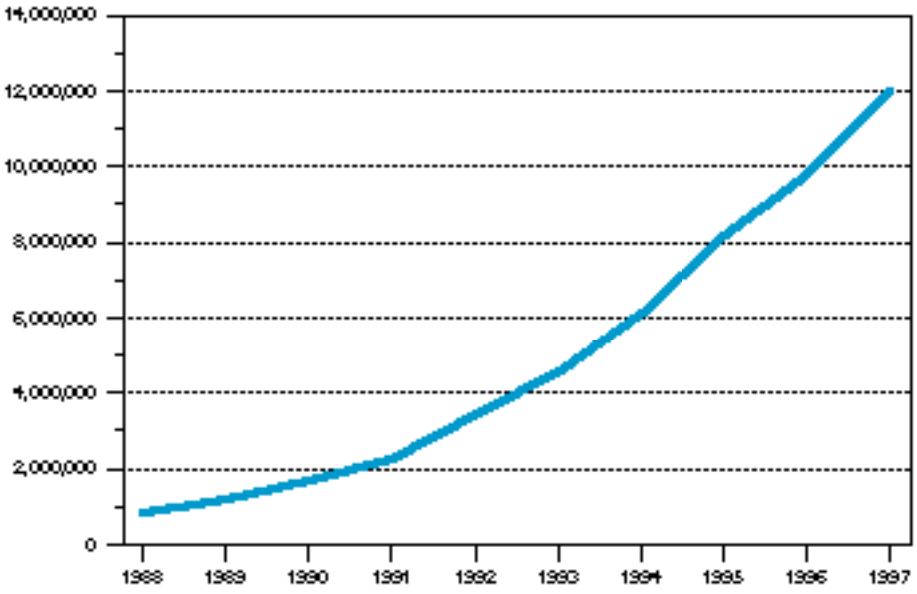
Source: IDC Latin America IT Spending Patterns, 1998 (Prothero, 1998).

Figure 17.10 → Latin American software sales, 1995–2002



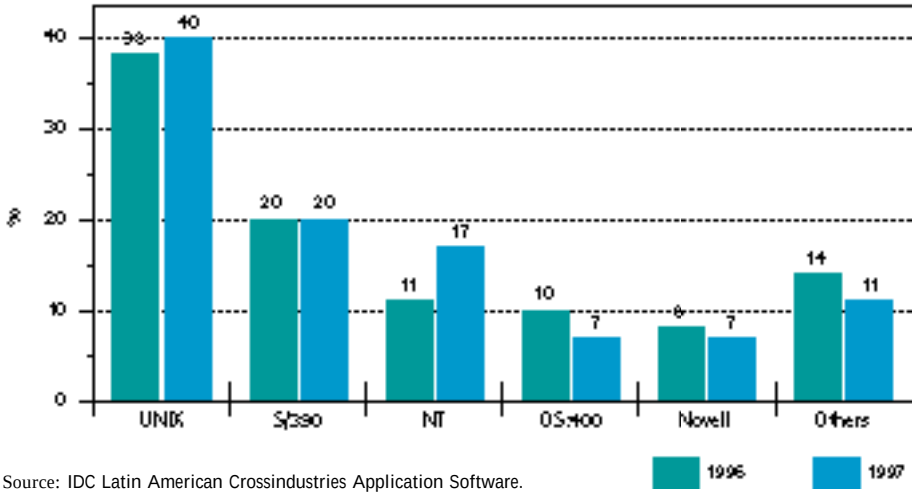
Source: IDC Latin America IT Spending Patterns, 1998 (Prothero, 1998).

Figure 17.11 → PC purchases in Latin American and the Caribbean, 1988–1997



Source: World Communication Indicators.

Figure 17.12 → Distribution of the Latin American market for server operating systems, 1996-1997



Source: IDC Latin American Crossindustries Application Software.

The most widely used tools are supplied by IBM, SAGA, Oracle, Informix and Microsoft, in that order. The applications most in demand are SAP, Datasul, Baan, SSA and JDE, also in that order. Figure 17.11 shows how PC purchases have been growing in the region, and Figure 17.12 shows the distribution of the Latin American market for server operating systems in 1996 and 1997.

INFORMATION AND LIBRARY SERVICES

In general, libraries in Latin America and the Caribbean have sought to adapt to new technological developments, while their efforts have been concentrated on meeting local needs. Traditionally, however, co-operation initiatives, which are a top priority for modern information services, have been few and far between.

Institutions such as the OAS and UNESCO have been supporting the creation of networks between libraries in the region, as a way for these to cater for the growing demand for information services in spite of increasingly tight budgets. As a result, there has been progress in setting up local, national and regional consortia to develop library tools and thereby meet more of the requirements that have been created by the Information Age. Academic and research libraries have been the most successful in entering into co-operation networks and they have received the most international support. It is on the basis of these networks that other libraries will be seeking to create networks among themselves. Consequently, we shall concentrate here on academic and research libraries.

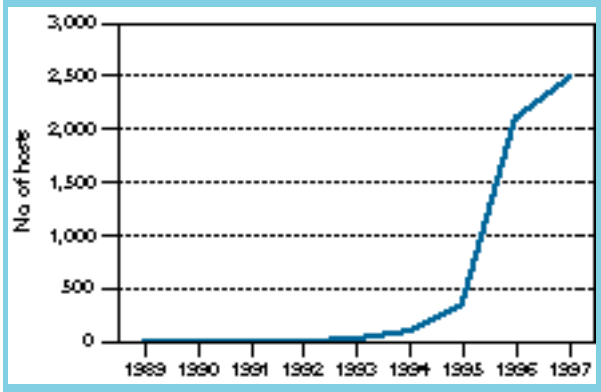
Although the idea of co-operation between libraries was frequently discussed in the 1960s and 1970s, it was a long time before it became a reality in the region, owing to poor telecommunications infrastructure and to restrictions on computer imports in certain countries. These negative factors managed to overwhelm the strong common regional heritage of language, religion and history, which had created a territorial situation probably unique in the world. The following factors have been instrumental in the start of regional co-operation: the recent privatization process in the telecommunications sector and the resulting flow of foreign investment into the region; moves to deregulate the telecommunications industry in certain countries; the technical and political efforts made by libraries to overcome financial and cultural obstacle; and programmes implemented by UNESCO (General Information Programme) and regional institutions, such as ECLAC (Economic Commission for Latin America and the Caribbean) through its CLADES division (Latin American Centre of Economic and Social Documentation) and its Programme of Information Management, which interacts on a permanent

Box 17.1 → The RedHUCyT Project and the telecommunications situation in Central America (excluding Costa Rica)

The Costa Rican National Research Network (CRNet), supported by the RedHUCyT, is the mainstay of the trunk network which will link up the networks of the Central America region. The first connection was made in November 1996: Costa Rica and Nicaragua were interconnected directly by digital link. Since then, the other countries have also been interconnected. RedHUCyT is supporting the process and providing technical consultancy services to El Salvador, Honduras, Nicaragua and Panama. In March 1997, an agreement was signed with the University of Costa Rica to provide technical assistance to other countries in Central America and the Caribbean.

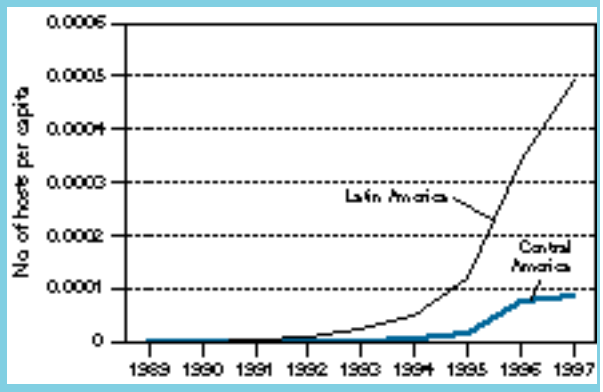
With the process of creating a trunk network thus under way, Internet use has gained momentum, and this has been reflected in the substantial rise in the number of hosts since 1996. Even so, the number of hosts per capita has remained very far below the regional average, and is falling farther behind all the time. Cellular telephony has always been below the regional average, and is likewise dropping ever farther behind. As regards the number of personal computers (PCs) per capita, the gap with the region is very large indeed, although there could be some uncertainty about this as our source does not have data for certain Central American countries.

Internet



Source: World Telecommunication Indicators, ITU, 1998.

Internet



Source: World Telecommunication Indicators, ITU, 1998.

Personal computers

Source: World Telecommunication Indicators, ITU, 1998.

This indicator has not been fully reported for the Central American countries.

Cellular telephony

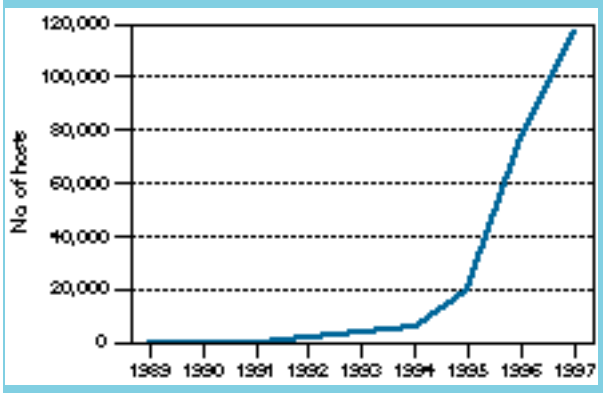
Source: World Telecommunication Indicators, ITU, 1998.

Box 17.2 → The RedHUCyT Project and the telecommunications situation in Brazil

Major contacts and arrangements are currently being made to connect the Universidad Estadual Minas Gerais and other institutions to the Internet with the support of the RedHUCyT project. This network was one of the joint sponsors and organizers of the First Network Forum in Latin America, together with the National Research Council/National Research Network (CNPq/RNP).

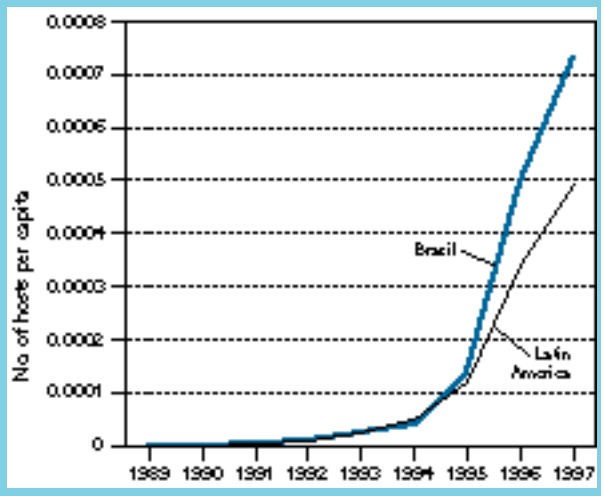
Brazil was formerly below the Latin American region average for personal computers and cellular telephony, but since 1995 it has been slightly above this average, as can be seen from the charts.

Internet



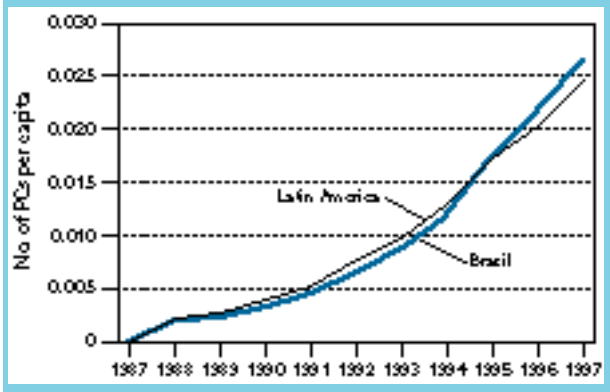
Source: World Telecommunication Indicators, ITU, 1998.

Internet



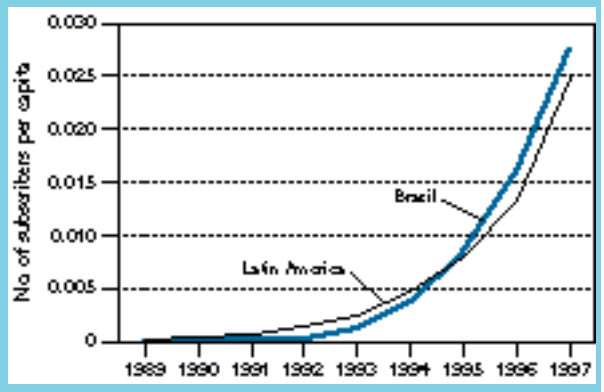
Source: World Telecommunication Indicators, ITU, 1998.

Personal computers



Source: World Telecommunication Indicators, ITU, 1998.

Cellular telephony



Source: World Telecommunication Indicators, ITU, 1998.

basis with more than 180 organizations in 17 countries of Latin America. Thanks to efforts of this kind, a process of co-operation has commenced along the same lines as in the developed countries, although later than these for the reasons given above.

In the process of setting up co-operation mechanisms, a number of information networks have emerged, with many of them relying on the CDS/ISIS software distributed by UNESCO which was prepared especially for developing countries. Among the new fields of operational information there are networks for public administration (CLAD), social sciences (CLACSO), health sciences (BIREME), education (REDUC), planning (INFOPLAN and CARISPLAN), and

co-operation between national information networks and systems (INFOLAC), population research (DOCPAL) and sanitary engineering (REDIDISCA).

Although progress of this kind had already been achieved before the Internet boom of recent years, the extraordinary growth of Internet use is definitely strengthening co-operation among libraries in these countries. Referring to the Internet, Gazitúa (1997) asserts that the technological environment shows that almost all the limitations have been overcome, and the main responsibility for making progress rests with information agents rather than with technologies.

THE INTER-UNIVERSITY NETWORK

With the new opportunities generated by the Internet have come new initiatives to support the creation of Latin American information networks that can provide the basis for greater co-operation among libraries in the region. Of these initiatives, particular mention should be made of the RedHUCyT project (Hemisphere Wide Inter-University Scientific and Technological Information Network), launched by the OAS, which began in 1991. Its main objective is to 'connect Member States to the Internet, forming an electronic network for the exchange of scientific and technological information. The project provides high-tech equipment and technical support, and sponsors technical workshops and seminars in the region to prepare technical projects, improve skills, share technical knowledge and train network managers in the countries' (RedHUCyT, 1998).

The importance of this type of information infrastructure was recognized by the 34 American heads of State at the Summit of the Americas held in Miami in 1994. The Plan of Action signed by them emphasizes the importance of telecommunications and information infrastructure, an entire chapter being devoted to the subject. They state: 'The telecommunications, information technology and broadcasting infrastructure of a country is an essential component of political, economic, social and cultural development. Where information infrastructure is concerned, the development needs of the Americas are immense. The Governments of the Americas propose to meet these needs by undertaking a wide range of actions,' in which it is stated, and highlighted in bold, that Governments 'will urge the main universities, libraries, hospitals and governmental organizations to link up to these networks by taking advantage of the OAS Hemisphere Wide Inter-University Scientific and Technological Information Network' (Summit of the Americas Meeting, 1994).

Again, the RedHUCyT has received the backing of Ministers of Science and Technology who, at their Cartagena Meeting in 1996, undertook that their respective countries would 'Promote active participation by the countries of the region in the construction, design and standardization of the Global Information Infrastructure, and encourage them to link up through regional networks such as RedHUCyT' (Meeting of Ministers of Science and Technology, 1996). In turn, the General Assembly of OAS, meeting in Panama on 3 June 1996, once again stressed the importance of RedHUCyT, with the participants resolving to 'Strengthen regional networks such as the Hemisphere Wide Inter-University Scientific and Technological Information Network (RedHUCyT)' (OAS General Assembly, 1996). As a result of the undertakings and support provided on these various occasions, more and more countries in Latin America and the Caribbean have come to participate in the RedHUCyT, constructing their own national networks and connecting them to others. With this ongoing support and encouragement, the RedHUCyT has been carrying out important activities. During the first stage of the project, the focus was on setting up the basic infrastructure needed to provide academic institutions in the region with access to the Internet. Many of these connections are made via the PAS-1 satellite operated by the Panamerican Corporation of Florida, which provides a direct link-up to the NSF node in Florida

for the following countries: Argentina, Costa Rica, Ecuador, Honduras, Paraguay, Peru and Venezuela. The other countries of the region make the connection through operating companies.

The following objectives were set for the second stage of the RedHUCyT project, here quoted verbatim:

- International expansion of Member States' inter-communication and value added networks: the new and increasingly large applications being introduced into electronic networks require high communication speeds. Immediate action is needed on this, as numerous requests for support have already been received.
- Increase in the number of connections and points of presence available nationally for the electronic networks currently in use in member countries. Although most of the countries in the region have some kind of electronic network connectivity, there is a need to create or expand national backbones so that a greater number of institutions can be interconnected. Likewise, local networks within institutions need to be expanded so that a greater number of final users can be reached.
- Assistance for other non-academic sectors, such as: government agencies, particularly those that have databases of interest to the scientific community, and other sectors such as trade, promotion of democracy, human rights, environment and others (RedHUCyT, 1998).

The progress achieved to date is making it easier to incorporate libraries and information services of the region into global library networks. Their Internet connection currently enables them,for example, to use Compuserve Global Data Communication to connect up to the OCLC (Online Computer Library Center) Network. As the RedHUCyT project advances, increasing use will be made of OCLC services in the future. Now that OCLC is using Internet TCP/IP, replacing the proprietary communication protocols with which it began when it was set up in 1970, it is easier and easier to gain low-cost access to libraries connected to the Internet. Information Services and Libraries in Latin America and the Caribbean will turn this advantage to increasingly good effect. Thus, WorldCat (the OCLC online union catalogue), the Inter-Library Loan System and the FindSearch service, which have yielded such good results in the United States, will be used more and more in the region. According to the OCLC Annual Report for 1996/97, WorldCat contains 1,525,707 records in Spanish and 304,811 in Portuguese. With new opportunities to use OCLC services, access to which is becoming financially viable thanks to the RedHUCyT project and the changeover by OCLC to the TCP/IP protocol, these numbers will rise.

THE MEDIA

The tide of democracy in Latin America and the Caribbean has generated hopes and expectations of greater freedom of expression and an expansion of the press, radio, TV and other mass media. Although the fall of dictatorships and the emergence of governments elected by popular suffrage do not necessarily guarantee adequate press freedom – as is illustrated, for example, by what has been seen in Guatemala, Peru and Venezuela (Buckman, 1996) – they do open the way for a process leading to greater social, political and economic openness, which will gradually foster greater press freedom and freer speech through the media.

Privatization, deregulation and a growing influx of outside capital are acting as catalysts in the process that the tide of democratization made possible and set in train. They are also bringing the countries of the region into the globalization process, which is providing the underpinning for greater expansion of the media and for greater interaction between them and the rest of the world. A good image of this rapid progress towards greater openness to the world may be observed in the juxtaposition of the 150-metre high Entel Tower which dominates the Avenida Bernardo O'Higgins in Santiago, Chile, just two blocks away from the 400-year-old La Moneda Palace. This tower is the voice of the capital; with its satellite and

microwave links, and with its data, video and audio communications network, it connects the capital with the rest of the country and with the world beyond the Andes and the Pacific, the geographical barriers that kept Chile isolated in the past. Something similar is happening, rather slowly perhaps, but steadily, throughout Latin America and the Caribbean.

The rapid development of the mass media in recent years has not diminished the great differences and contrasts found in this sector, and may indeed have increased them. What has come out of this process appears to be an intermixing of the First and Third Worlds. On the one hand, there are the multimedia conglomerates typical of the First World, thriving printed newspapers and magazines, television networks and production companies that export television serials and other material. These large corporations have little reason to envy their northern counterparts. The Industria de Medios Latinoamericana owns two of the world's largest and most profitable television networks. On the other hand, there are newspapers with very low circulation and rural areas that are sometimes served by just a single primitive radio set. Notwithstanding this contrast, the rise of the communications media would appear to be helping small firms that are effective and efficient to grow, while causing less efficient ones to perish or to be absorbed by better-performing ones. Consequently, the trends appear to be very promising; this at least is the opinion of a number of authors who have researched the media situation in Latin America.

Print media in Latin America and the Caribbean do not appear to have grown significantly in the last two decades. In point of fact, growth between 1980 and 1986 stood at 3.81% in the number of daily newspapers, 16% in circulation (number of copies) and –8.35% in the number of copies per head (UNESCO, 1997). If, however, these figures are compared with those for the United States (–12.9%, –8.37% and –21% respectively) and for Canada (–13%, –8.4% and –6.29% respectively), we see that this growth is not as low as it might appear, but rather the contrary, since the tendency in developed countries is towards negative growth, owing to the new alternatives that are continually coming into being and to the increasing penetration of electronic media: radio, TV and the Internet.

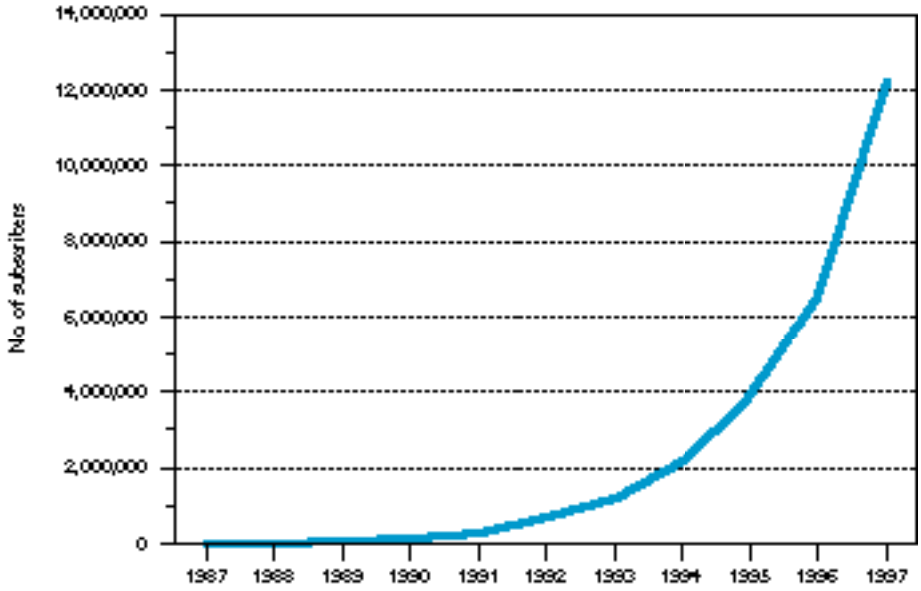
TELECOMMUNICATIONS AND THE INTERNET

The development of Internet telecommunications has been so great that we shall here devote a special section to it.

For the economy of a country or region to mature today, a solid telecommunications infrastructure is not merely desirable, it is absolutely necessary. Nonetheless, the instability of Latin America has meant that the region has failed to attract the amount of domestic or foreign investment needed to consolidate an adequate infrastructure. Some countries, such as Argentina and Chile, have taken firm steps in the right direction; in others, such as Brazil, Colombia, Mexico, Peru and Venezuela significant progress is being made, but prospects are somewhat uncertain and the future is unpredictable enough to discourage the big operating companies from committing greater resources.

However, the great potential of Latin America is attracting more and more attention from operators willing to run the risks involved. Long-term strategies are beginning to take precedence over short-term profits. For example, Robert Meyer, the business development manager for Latin America of BellSouth International, has claimed that 'to be successful here (in Latin America) you need to have patience, and partners that understand the region' (O'Shea, 1996). Arely Castellón, Vice-President and General Manager for the Americas Region of Global One (an alliance between Sprint, Deutsche Telekom and France Télécom), says that 'experts are always talking about the potential of this region (Latin America) and its

Figure 17.13 → Cellular telephony growth in Latin America and the Caribbean, 1987–1997

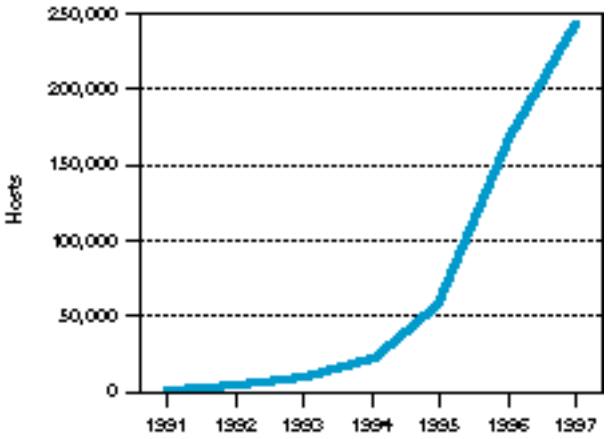


Source: World Telecommunication Indicators, ITU, 1998.

prospects as an emerging market. There is no reason,' he adds, 'to put off the important work we have ahead of us' (O'Shea, 1996).

Two of the main factors driving growth in the telecommunications industry in the world as a whole, and in the Latin America and Caribbean region in particular, are Internet plus mobile computing technologies and wireless communications. These two areas of technology are enjoying the most rapidly accelerating growth in the telecommunications industry. The growth of cellular telephony is remarkable, particularly in developing countries like those of the region, since it is being used as a substitute for traditional telephony, whereas in developed ones it is being used to complement it. The underdevelopment of traditional telephony in developing countries, and the inadequacy of the infrastructure used to provide this service, have led to growth in cellular telephony that is as extraordinary as it is unexpected. As Figure 17.13 illustrates, the growth of cellular telephony has been exponential in Latin America and the Caribbean, being rivalled only by the growth of Internet use, shown in Figure 17.14. In the region, cellular telephony growth actually appears to be the faster of the two.

Figure 17.14 → Growth in the number of Internet hosts in Latin America and the Caribbean, 1991–1997



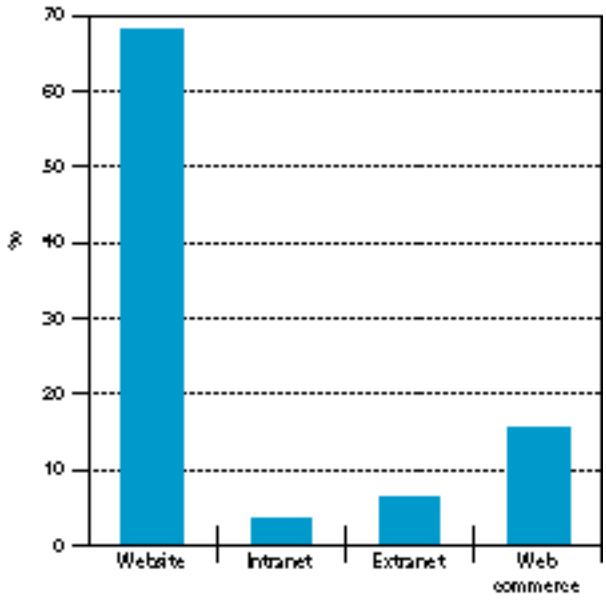
Source: World Telecommunications Indicators, ITU, 1998.

The use of Internet/Intranet/Extranet-related technologies is growing at an extraordinary pace in the region. Corporate spending in this area was $18,000 million in 1997, and in 1998 it increased substantially, according to the 1998 Latin American Corporate Internet Strategy and Adoption Report produced by the International Data Corporation (IDC) (Swafford, 1998). According to this same report, 92% of Latin American firms (out of a sample of 180) have access to the Internet at the corporate level, and 71% reported increased investment in this area for 1998. Of this investment, more than 75% is in personal computer servers, and more than 65% of the companies reported increased investment in network equipment and software. Figure 17.15 shows what kinds of use Internet technologies are being put to in Latin American corporations, most of which stated that setting up Web pages was a very economical way of increasing company visibility and name recognition. Again, they were of the opinion that setting up and using an Intranet increased the productivity of employees and reduced operating costs. Consequently, purchases of PCs, servers, software and network equipment were found in the study to be closely associated with the creation and use of Intranets and Web pages.

Latin American corporations, however, do not yet have significant plans for electronic commerce, although 45% stated that they had electronic commerce applications. Latin American executives gave two main reasons for this, namely: the problem of security, and a perception that electronic commerce is not particularly profitable, at least for the time being.

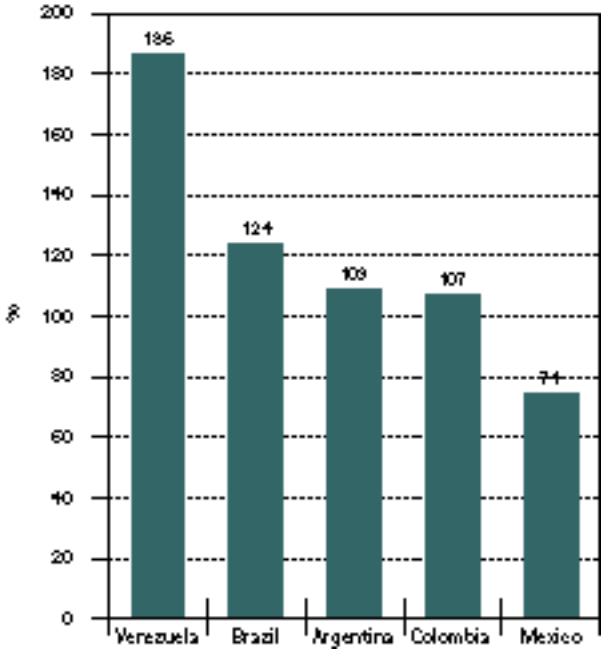
Security is an issue that has attracted a great deal of attention from Latin American corporations, as a result of which major investments are being made in firewalls and other security mechanisms. In fact, 40% stated that they were using firewalls in their Web sites and 23% that they were using them in their Intranets. More than 95% stated that they were using some type of Internet/Intranet security mechanism.

Figure 17.15 → Percentage of companies with Web technology in 1997



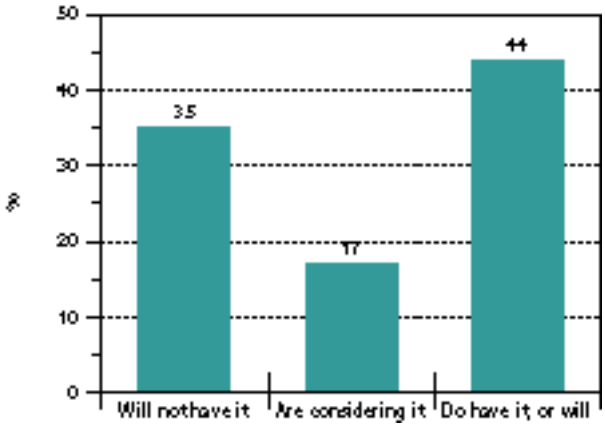
Source: 1998 Latin American Corporate Internet Strategy and Adoption.

Figure 17.16 → Real growth in PCs connected to the Internet, 1996–1997



Source: 1998 Latin American Corporate Internet Strategy and Adoption (Prothero, 1998).

Figure 17.17 → Web commerce in Latin America, 1997



Source: 1998 Latin American Corporate Internet Strategy and Adoption (Prothero, 1998).

Growth in the number of hosts in Latin America and the Caribbean is exponential, as it is in the rest of the world. Figure 17.14 illustrates this growth.

The number of PCs connected to the Internet grew at an incredible rate from 1997 to 1998, as illustrated by the sample of countries in Figure 17.16. As regards Web commerce, Figure 17.17 shows that corporations are somewhat divided on the subject, owing to the problem of security referred to earlier.

THE CARIBBEAN COUNTRIES

Although what has been said so far is equally applicable to Latin America and the Caribbean, except where we have referred explicitly to Latin America alone, we believe it would be useful to make some specific reference to the Caribbean subregion.

As can be seen from the charts in Box 17.3 relating to the Caribbean countries, growth in telecommunications and computing in these countries is below the Latin American average except in the case of cellular telephony, which is roughly in line with the regional average. There would appear to have been a decline in the Caribbean subregion over the last two years, but this is not in fact the case, since the apparent decline indicated by the charts is due to the fact that the source we consulted did not have adequate statistics for those years.

The activities of the 36-member Caribbean Association of National Telecommunication Organizations (CANTO) have been gradually furthering the development of telecommunications and computing in the subregion. The mission of CANTO is to promote and facilitate co-operation and integration in the development of telecommunications in the Caribbean. Its ambition is to become the backbone of the Caribbean family with its focus on human and economic development, through telecommunications. Its aims are to exchange information, know-how and experience in the area of telecommunications; to help generate the inputs needed for orderly growth and for the formulation of appropriate policies; to consider aspects that are of mutual interest to the Caribbean countries; to develop telecommunications links between those countries; and to promote technical and economic co-operation between them. CANTO seeks to achieve these aims by providing technical, financial and administrative advisory services, facilitating human resources training, keeping member organizations informed and awareof developments, carrying out strategic planning, identifying and designing projects of interest and organizing conferences, seminars and exhibitions in the subregion. CANTO held its fifteenth Annual Conference and Trade Exhibition in Aruba from 16 to 20 May 1999.

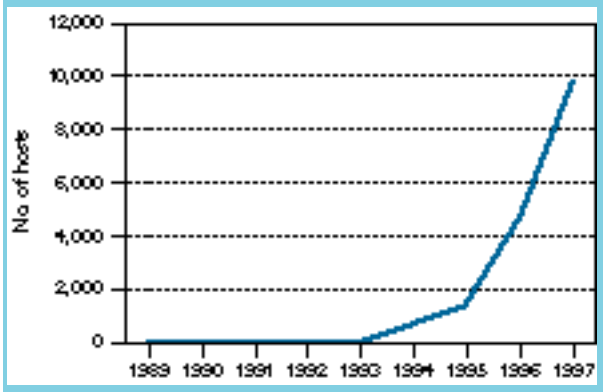
The Organization of Eastern Caribbean States (OECS), whose membership is made up of nine island countries of the Eastern Caribbean, has the objective of making these countries attractive to electronic equipment manufacturers, information processing companies, tourist development companies and agribusiness. To that end they have set up the Eastern Caribbean Investment Promotion Service (ECIPS) which has recently been giving priority to its efforts in the areas of computing and telecommunications. They hope to turn the Caribbean into a major artery in the information superhighway. Their objective is gradually to build up the advantages of the Eastern Caribbean countries so that foreign companies will site their information processing operations there. They

Box 17.3 → The RedHUCyT Project and the telecommunications situation in the Caribbean countries

In 1991, the Caribbean University Network (CUNet) was set up with the support of Puerto Rico, and this has facilitated Internet access for a number of institutions in the Caribbean. Most of the Caribbean countries now have access to the Internet. Connections to the outside are made through telephone companies. RedHUCyT has also helped arrange two important subregional seminars and financed a number of consultancy operations. In a second phase, the OAS is providing significant funding for the purchase of communications equipment, technical assistance and training, to help enable a greater number of academic, scientific and governmental institutions to connect to the Internet.

From the charts it can be seen that, where the Internet is concerned, the Caribbean countries have a growth rate similar to that of Latin America and the Caribbean region as a whole, albeit below the average for the region. In cellular telephony they were slightly above this average until 1996. The apparent decline since then is not a real one, as several Caribbean countries have not reported data. In personal computing, the Caribbean is well below the region; in fact, together with Central America, it has the lowest values for this indicator. A number of Caribbean countries did not provide data in 1996 or 1997, which accounts for the irregular pattern of those years.

Internet



Source: World Telecommunication Indicators, ITU, 1998.

Internet

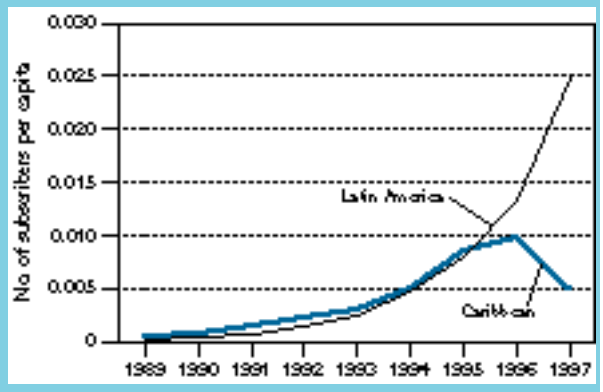
Source: World Telecommunication Indicators, ITU, 1998.

Personal computers

Source: World Telecommunication Indicators, ITU, 1998.

This indicator has not been fully reported for the Caribbean countries.

Cellular telephony



Source: World Telecommunication Indicators, ITU, 1998.

In 1997, this indicator was reported by only some Caribbean countries, whence the apparent decline.

aim to secure these advantages by providing member countries, which are geographically close to North America, with good-quality and reasonably priced telecommunications services, an efficient labour force with a good command of English, tax incentives, a peaceful and stable environment and pro-business governments.

These efforts are beginning to yield some initial returns. The World Bank has given the OECS countries support in building up telecommunications. Amendments to the laws governing this sector of industry have considerably improved pricing. The Cable and Wireless company is implementing major investments and technological improvements in the OECS countries, including the installation of fibre optic networks. Jamaica has just granted a licence to Globalstar Caribbean Ltd. to provide mobile and wireless communication services, both in Jamaica and in the Caribbean generally. AirTouch Satellite Services Inc., a subsidiary of AirTouch Communications, the world's largest wireless communications company, owns all the shares in Globalstar Caribbean Ltd. The wireless communication services of this company are based on 48 Globalstar satellites, which send and receive signals to and from regions that are not covered by terrestrial cellular telephony. Mike Kerr, Vice-President of Globalstar Caribbean Ltd., has stated: 'The licence that has just been granted will ensure Jamaica a crucial role in our strategy of bringing the benefits of Globalstar to the entire Caribbean. We hope to provide high-quality satellite cellular communications coverage to North America and the Caribbean.' In this way, Jamaica has now been incorporated into the globalization process that is under way in telecommunications, and has thereby opened the door for the whole of the Caribbean to take part in this process. This initiative, along with the Jamaican network JAMNet, makes it likely that Jamaica will spearhead the development of the Caribbean countries in the areas of communications, computing and information systems. In the meantime, the OAS is also furthering development, through the RedHUCyT, in every one of the Caribbean countries. Table 17.3 summarizes these measures in the Caribbean countries.

CONCLUSIONS

The privatization process in the telecommunications industry of Latin America and the Caribbean has attracted substantial foreign investment into the area, to take advantage of what is considered to be a potentially large market in the region. In 1998, according to the Financial Times, 29 of the 100 largest companies in Latin America were in the telecommunications sector. In 1997, 24 of the 100 largest were in this sector. The market deregulation and liberalization process which has now been undertaken by some Latin American and Caribbean countries is accelerating the influx of foreign investment and leading-edge technology into those countries. As the other countries of Latin America and the Caribbean undertake this process, their development in the areas of communications, computing and information systems will accelerate still further. If this were to happen, the necessary conditions for the overall development of the region would be on their way to being met. Sufficient conditions would be put in place, in our opinion, if a process of regional integration were initiated, first in the economic sphere, and then in the political and cultural spheres.

Table 17.3 → Hemisphere-wide Inter-University Scientific and Technological Information Network: activities in the Caribbean

Country	RedHUCyT has helped with	Recipients	Achievements	Other aspects
Antigua	Basic equipment and telecommunications software	University of Health and Sciences	Electronic node for mail exchange via dial-up	Future projects to expand the Network are currently being evaluated
Bahamas	Basic equipment, high-capacity router, communications server and communications hardware and software	College of Bahamas	First electronic node and Internet interconnection of the College of Bahamas Network	
Barbados	Communications equipment. Three workstations and funding	University of the West Indies, Barbados Community College	First electronic node. Interconnection to the Internet and expansion of the local network	
Belize	Communications server, computer hardware and software. Sponsorship for the 'Schools Internet Workshop'	University College of Belize	Full Internet connection. Training in telecommunications and computing	The workshop has supported a project to link up a number of colleges
Dominica	Funding, equipment and software	University of the West Indies, Clifton Dupigny Community College, etc.	Interconnection of the networks of several institutions	
Dominican Republic	Equipment, routers, modems, servers, communications and computing software	Pontificia Universidad Católica Madre y Maestra, the Autonomous University of Santo Domingo, the Santo Domingo Institute of Technology, CONES, UNAPEC, etc.	The Dominican Academic and Scientific University Network (RUDAC), which connects universities and other academic and scientific institutions to the Internet	A project to connect up secondary schools is in progress with financing from the Inter-American Council for Integral Development (CIDI) within the RedHUCyT
Grenada	Computer equipment and software	Marryshow Community College, training centres, etc.	Access to electronic mail and interconnection of university and training centres	
Guyana	Communications and computer equipment and software	University of Guyana	First dial-up mail node and expansion for full Internet connection	
Haiti	Negotiations	Government of Haiti	Internet connection	
Jamaica	Telecommunications and computer equipment, including high technology and technical assistance	University of the West Indies, College of Arts, Science and Technology (CAST), etc.	The Jamaican National Network (JAMNet) which connects Jamaica to the Internet via a high-speed satellite link (64Kbps)	
Saint Kitts and Nevis	Communications and computer equipment, and software	Ministry of Education and College for Further Education	Electronic node for Internet access by dial-up telephone line	
Saint Lucia	Funding, equipment and technical assistance	Sir Arthur Lewis Community College and the Institute for Self-Improvement	Expansion of the SALCC local network and interconnection of this to Internet	
Saint Vincent and the Grenadines	Modems, serial cards and communications and computing equipment and software	Ministries of Communications and Works, Education and Planning	Electronic mail exchanged through the server of the Commonwealth of Learning in Vancouver	
Suriname	Communications equipment and software, and assistance	The University of Suriname	Establishment of the first electronic node	
Trinidad and Tobago	Funding, assistance and communications equipment	National Institute of Higher Education, Ministry of Education, etc.	Internet connection	

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Chapter 18
Western Europe and North America

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Deregulation of the telecommunications sector, the emergence of global markets and the convergence of media and developments in telecommunications and information technology have forced countries all over the world to face up to new challenges. It will be less and less easy to separate telecommunications from networked computer-based communications (i.e. the Internet, electronic commerce, Internet-telephony, etc.) and electronic media and content (broadcasting, multimedia, on-line services). The convergence of electronic networks and services is a global phenomenon which transcends national boundaries and increases international competition.

Furthermore, unemployment and its harmful effects on society increase the pressure to seize the new economic opportunities offered by the emerging Information society. These developments represent a political challenge. Experts say that sustainable economic growth and prosperity can be supported by making more efficient use of telecommunications and information technology, by increasing productivity and the development of new products and services. The development potential of new services such as digital television and the Internet offer huge scope for services that are either completely new or designed to complement existing ones. However, the process of technical convergence brought about by digitization and the merging of previously distinct areas should not lead to the assumption that future developments will be dominated solely by technical issues.

Initially we are 'merely' talking in terms of technical potential. The extent to which this potential is realized and utilized in the countries of Western Europe and North America will depend primarily on infrastructural penetration, usage rates with corresponding added value in work and daily life, and last but not least on political initiatives for the emerging information society.

This chapter presents a comparative overview of the following topics:

→ ICT markets and multimedia in Western Europe and North America
→ Basic indicators of specific ICT and multimedia infrastructures
→ Initiatives in Western Europe and North America for the information society

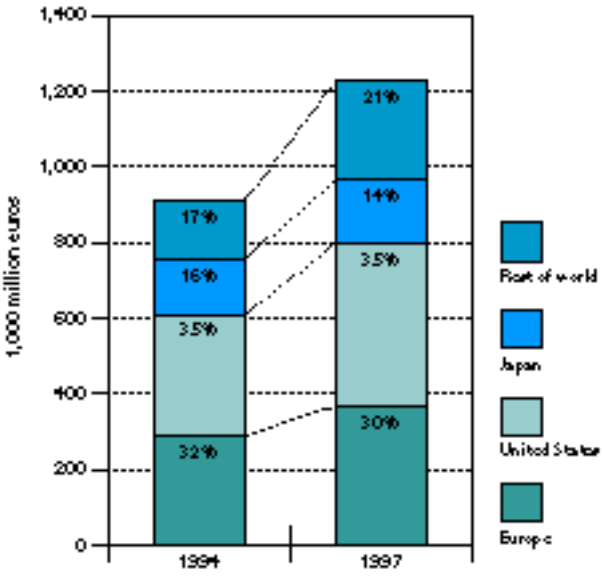
MARKETS FOR ICT AND MULTIMEDIA IN WESTERN EUROPE AND NORTH AMERICA

The worldwide ICT market grew from 910,000 million euros to 1,225,000 million euros between 1994 and 1997, an increase of around 35%. It is evident from Figure 18.1, showing regional market shares for 1997, that the United States occupies the dominant position in this market with a share of 424,000 million euros (approximately 35%). Europe takes second place with 371,000 million euros (30%), followed by Japan with 171,000 million euros (14%). The combined total for all other countries amounted to 259,000 million euros (21%), with growth rates in Asia and Latin America being mainly responsible for the disproportionate increase in this category (European Information Technology Observatory [EITO], 1998).

The increasing economic significance of information technology and telecommunications is also evident from the growing proportion of gross domestic product (GDP) that these markets represent. Table 18.1 and Figure 18.2, showing ICT expenditure as a percentage of gross domestic product since 1993, illustrate the overall increase in the contribution of this sector to the national economies of individual countries. These figures do not include ICT technology used in other products (Prognos AG, 1998).

A comparison of national ICT expenditure in 1997 shows that in the United States, it reached 7.0% of GDP and exceeded 6% in the United Kingdom, Sweden, Switzerland and Ireland. In Western Europe ICT technology averaged a direct proportion of 4.9%

Figure 18.1 → Worldwide ICT market by region, 1994-1997



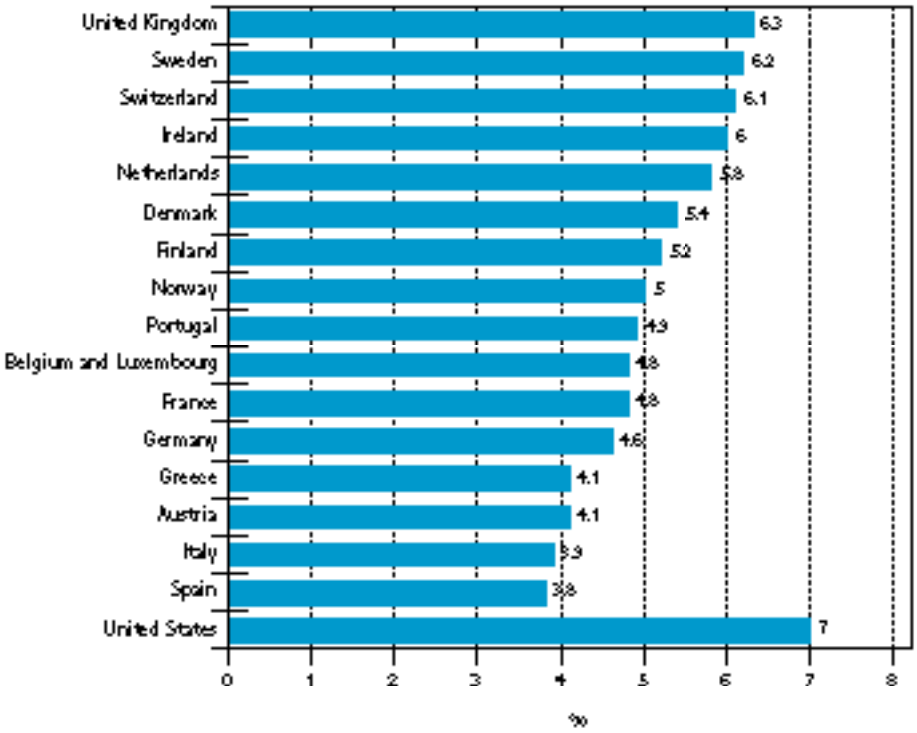
Source: European Information Technology Observatory, 1998.

Table 18.1 → ICT expenditure as a percentage of GDP, 1993–1997

	1993	1994	1995	1996	1997
Germany	4.05	4.14	4.30	4.23	4.33
France	3.91	4.25	4.37	4.53	4.75
United Kingdom	4.77	5.46	5.77	6.09	6.26
Italy	3.48	3.76	3.67	3.70	3.85
USA	6.02	6.13	6.47	6.81	7.02

Source: Prognos, 1998.

Figure 18.2 → Information technology and telecommunications expenditure as a percentage of GDP, 1997

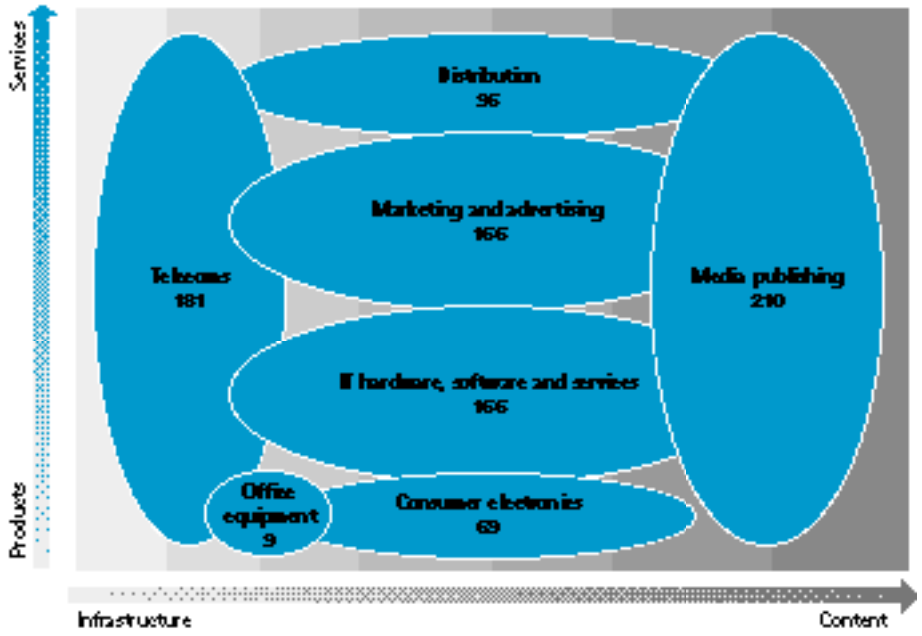


Source: FVVIT/FVK 1998.

of GDP in 1997 (FVIT/FVK, 1998). However, the extraordinary financial significance of information and communications technologies to competitiveness is not only illustrated by the increasing proportion of turnover that this sector represents. More important still is the fact that ICTs are an innovative inter-disciplinary technology for other products (e.g. in the fields of mechanical engineering, equipment manufacturing and automotive engineering) and services (e.g. electronic commerce) and represent a high proportion of the potential added value creation of these markets. At the same time, the extensive digitalization of content, services, networks and terminals is reinforcing the trend towards convergence in the fields of information technology, telecommunications and media (broadcasting, publishing etc.), leading to increased process and product innovation in the value-added chain of the developing multimedia markets.

The ongoing process of convergence in the information technology, telecommunications and media sectors serves to reinforce the increasing significance of multimedia-related markets for overall economic development. In Western Europe, the annual expenditure in these converging fields increased by around 21% between 1993 and 1996 from 743,000 million euros to 897,000 million euros. However, information and communication technologies continue to be the driving force for ongoing growth in the converging sectors. A study carried out by Booz, Allen and Hamilton (Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie, 1998) on multimedia-related ICT markets (content, networks, components and terminals) in the G7 countries reported a total expenditure of around $1,344,000 million for 1996. The growth rates in these markets have been approximately 10.4% each year since 1992, with the content sector (software, games, multimedia, TV/Pay-TV), which is to a large extent dependent on the software and ICT service market, showing the highest growth rate. A regional breakdown of the G7 market as a whole, reveals the dominance of the United States, with a market share of 48.7%, followed by Japan with 25.0%, and Germany with 8.4%. Of the

Figure 18.3 → Expenditure in the converging IT, telecoms and media sectors, in thousands of millions of euros, 1996



Source: European Information Technology Observatory, 1998.

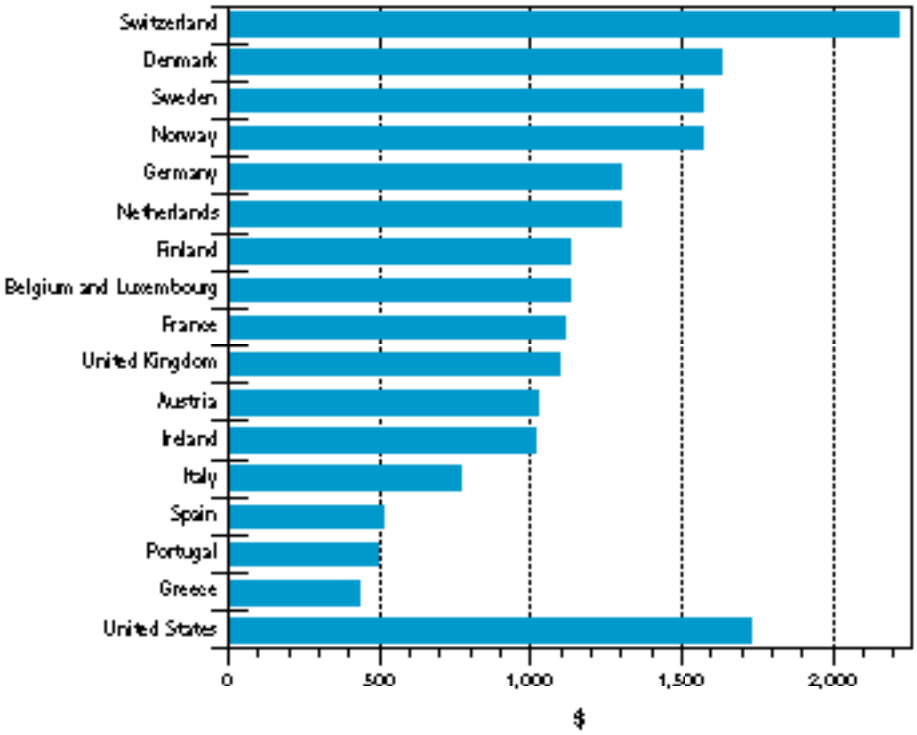
G7 countries, Canada, with just 3%, has the smallest share of the total multimedia-related ICT market.

BASIC INDICATORS OF SPECIFIC ICT AND MULTIMEDIA INFRASTRUCTURES

One of the main factors determining a country's competitiveness, its ability to develop innovative new services and content and provide equal access to the new multimedia-related markets for all, lies in the creation of an ICT infrastructure that allows these new services to be distributed among and used by large sections of the population. From a socio-political point of view, the problem of ensuring equal access to these markets calls for particular vigilance, because the new media, services and content on offer in an emerging information society represent much more than mere commercial products or sources of market information (see also Chapter 3 on this issue). The development of multimedia is in itself a significant cultural issue and serves to express cultural identity. Therefore the extension of technological infrastructures in ICTs and multimedia is one of the main pillars for developing economic and cultural prosperity. However, willingness to invest in information and communications technology – and the financial capacity to do so – varies greatly inside Europe and between Europe and North America.

Figure 18.4 gives a breakdown of per capita expenditure on information technology and telecommunications for individual countries and shows a clear North-South divide in Western Europe. Investment in ICT technology is particularly pronounced in countries that are economically prosperous and already possess a particularly good telecommunications infrastructure, thus serving to further widen the gap between

Figure 18.4 → Expenditure on ICT in $ per inhabitant, 1997



Source: FVIT/FVK 1998, compiled by the EIM.

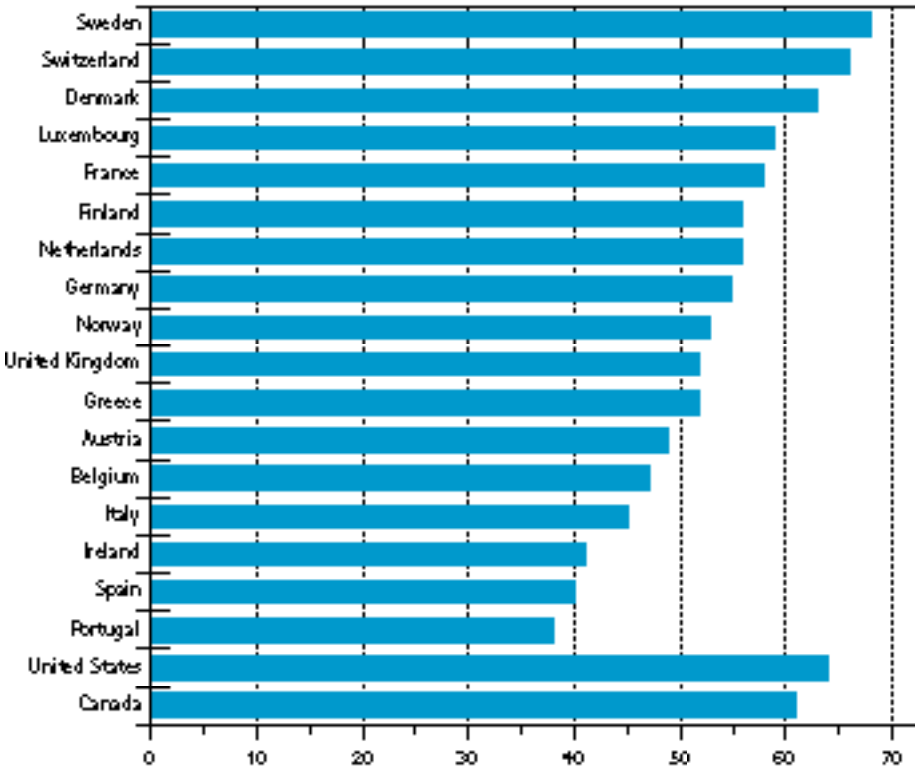
infrastructure levels of northern and southern Europe. Switzerland has by far the highest per capita ICT investment at $2,216, followed by the United States at $1,729 and the Nordic countries of Denmark, Sweden and Norway. The lowest per capita ICT investment is found in Greece, Italy, Portugal and Spain.

Access to electronic information and services can only be provided where the country in question possesses a network infrastructure that allows the user to connect to the various information and communicationsservicesatareasonableprice.Thisinfrastructure includes analogue and digital telephone lines, mobile telephone networks and cable and satellite Television connections.

Unlike in Africa, where there are only 2 main telephone lines for every 100 inhabitants on the average, the widespread availability of telephone lines is almost taken for granted in Western Europe and North America. In addition to individual telephony, a telephone line used in connection with the appropriate hardware provides extra functions and services (telephone answering, fax services), which are increasing in importance for both personal and business use. Furthermore, the combination of a telephone line, a personal computer (PC) and modem is currently the most important gateway to the Internet network, whichisexpandingveryrapidlyallovertheworld.The number of main telephone lines per 100 inhabitants inEuropevariesbetween40(Portugal) and 70 (Sweden). The United States and Canada are again among the leaders, with over 60 lines for every 100 inhabitants.

The push towards the digitization of telephony and the increasing numbers of main digital telephone lines, particularly in Europe, is paving the way for

Figure 18.5 → Main telephone lines per 100 inhabitants in Western Europe and North America, 1997



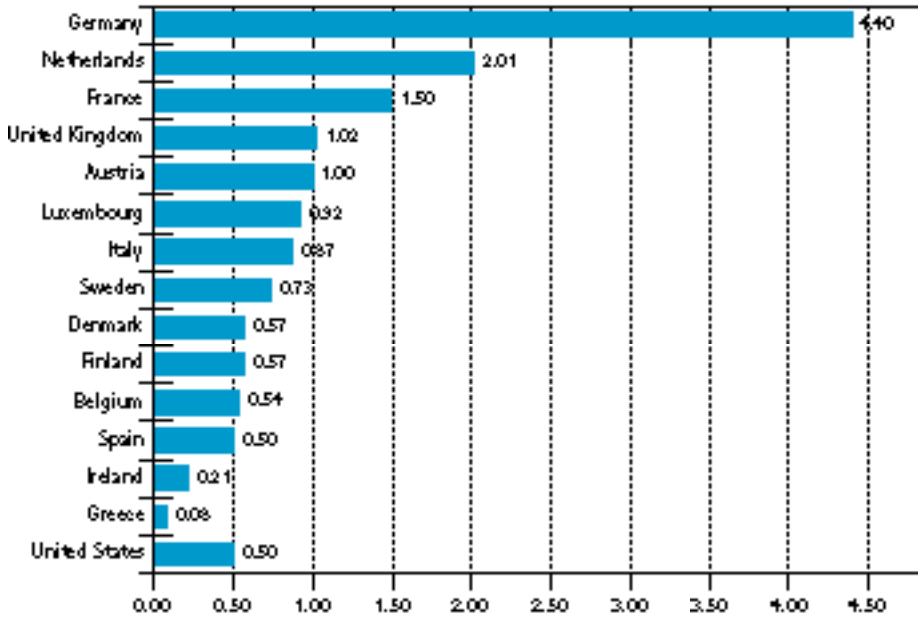
Source: ITU, 1998.

new services, extra functions and improved data transfer speeds (e.g. 2 × 64 kbits/s). Germany is the overall international leader in this field, with 4.4 integrated service digital network (ISDN) lines per 100 inhabitants in 1997. By comparison the United States is a long way behind, with around 0.5 ISDN lines per 100 inhabitants. However, ISDN will face increased competition from other digital transmission technologies in the future, such as Asymmetric Digital Subscriber Line (ADSL), which can multiply the transmission capacity of ISDN (e.g. 2–8 Mbits/s) using the digitized telephone network. The same applies for the multifunctional application of cable and satellite television, which is currently used almost exclusively for the reception of radio and television programmes, but which will also be used for new multimedia services in the near future.

Within Western Europe, cable and satellite penetration stands at almost 100% of television households, particularly in the Benelux countries. Following close behind with over 90% penetration are Denmark, Switzerland and, with a slightly lower penetration, Germany. However, terrestrial television is still of great importance in Europe and in individual countries such as France, Italy, Portugal, Spain and the United Kingdom.

With around 66 million cable television connections in the United States (67.2% of television households) and 8 million connections in Canada (73.2% of television households), North America has

Figure 18.6 → Integrated Service Digital Network (ISDN) lines per 100 inhabitants in Western Europe and the United States, 1997



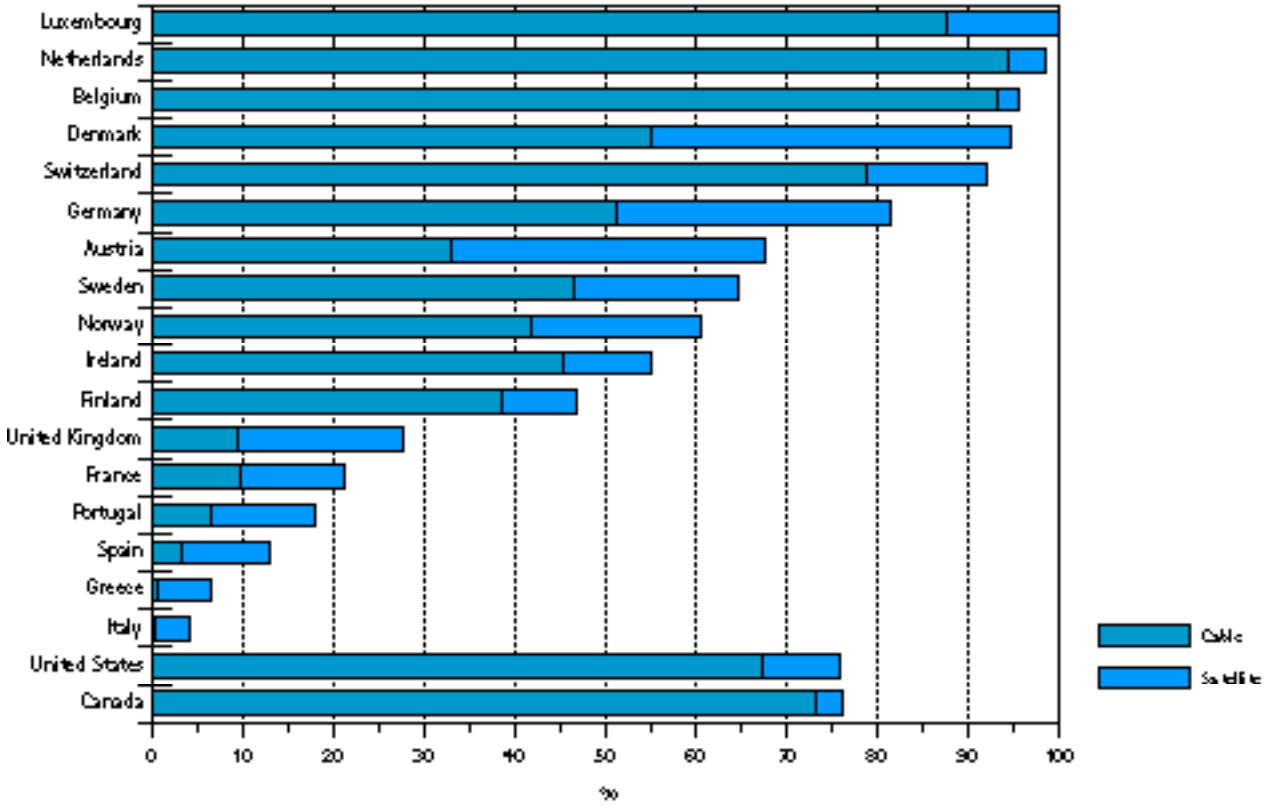
Source: ESIS-IPSO; BA&H; VDMA:ZVEI; data for Finland, Denmark, Belgium, Luxembourg 1996.

a very high level of cable penetration. Its lead in relation to the total figure for Western Europe of 42.5 million cable television households (28.8% of television households) is considerable, despite the fact that individual countries in Europe had a higher cable penetration in 1997 than Canada and the United States. In Western Europe 24.5 million television households received their television and radio programmes via satellite at the end of 1997, representing 16.6% of all television households. Europe is therefore a long way ahead of North America in terms of satellite penetration.

The commercial significance of digital television using broadband transmission via cable and satellite will increase in the future. The interlinking of new television services (Pay-television, Video on Demand, Pay-per-View, thematic channels) with new interactive services (Internet access, Online shopping, e-mail by television, electronic commerce, etc.) is particularly important in opening up new economic opportunities for the multimedia-related ICT industry and the media sector. The decisive advantage of digital transmission systems is that, by using compression techniques, the data quantities to be transmitted can be greatly increased, and the frequencies released in the process can be used for new multimedia services.

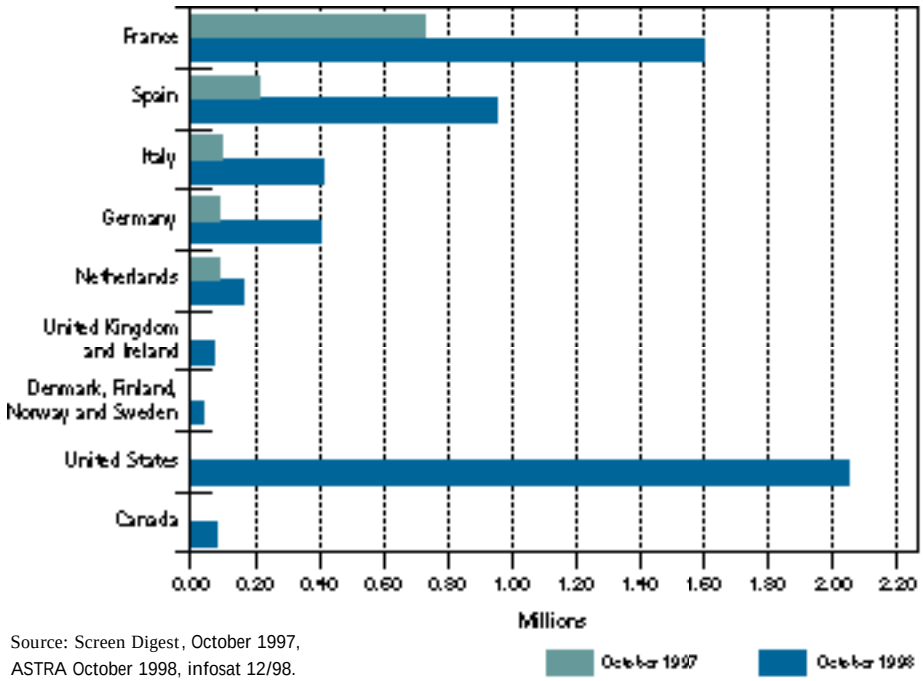
The current trend within the digital market in European countries shows that the countries that have traditionally been pay-television countries, such as France and Spain, have the highest digital television penetration. France, with the digital television providers Canal+ and the Télévision par Satellite consortium, and Spain with the providers Canal Satellite Digital and ViaDigital, are currently the only digital television markets in Europe in which there is any noteworthy level of competition. The most successful

Figure 18.7 → Percentage of cable and satellite penetration in TV households in Western Europe and North America



Source: TV Europe 1998, Screen Digest, May 1998; TBI Yearbook 99.

Figure 18.8 → Digital TV subscribers in Western Europe and North America, in millions, 1997–1998

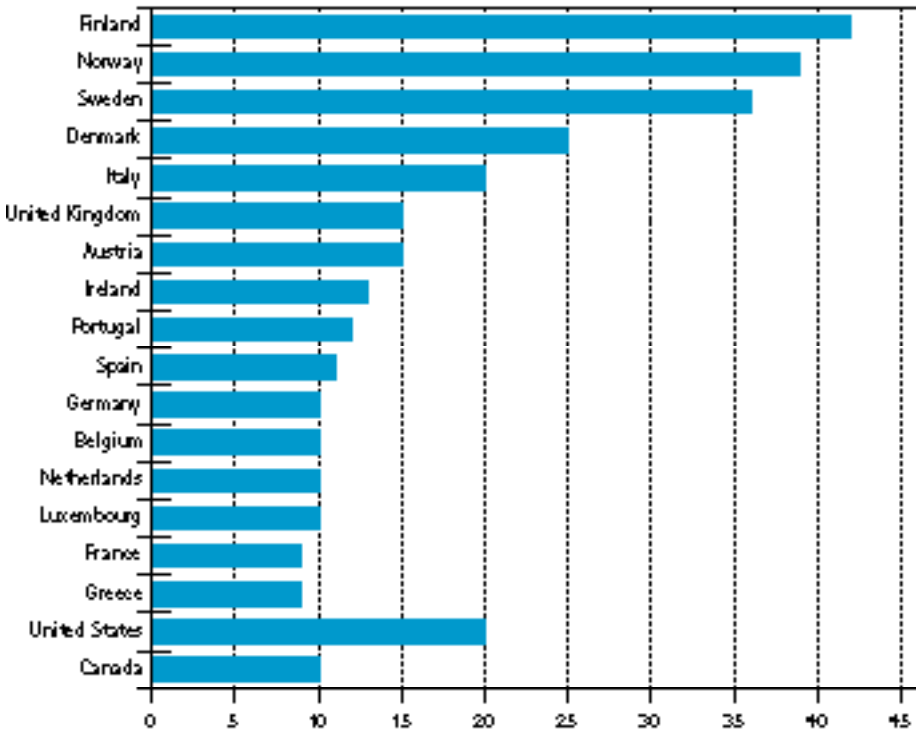


Source: Screen Digest, October 1997, ASTRA October 1998, infosat 12/98.

digital satellite system in the United States is Direct Television with 3.8 million subscribers (Infosat 12/98). Digital television is to be launched over the American cable networks this year after a long experimental phase, with the largest cable network operators such as TCI, Time Warner and Comcast having already ordered several million Set Top Boxes for digital reception. The software company Microsoft has also prepared itself for this development, investing around $1,000 million in the cable network operator Comcast in 1997. This involvement should speed up the development of data and video services available via the Comcast cable network and promote the merging of PCs and televisions , as will the take-over of Web-TV, a company involved in the provision of Internet services and Internet navigation systems via the television set (Konert, 1998). In the Canadian market, two digital satellite systems have been available since the end of 1997, Expressvu, which has 30,000 customers, and Star Choice, with 50,000 subscribers.

The digital mobile telephone sector is one of the few other areas of the telecommunication sector apart from ISDN development in which Western Europe holds an edge over North America in terms of its position in the world market. This applies both to the production of hardware (e.g. Nokia, Siemens, Ericsson), the development of Global System for Mobile Communications standards (GSM) and in terms of the usage figures for mobile telephone subscribers. The Nordic states of Finland, Norway, Sweden and Denmark in particular surged ahead of North America in the number of lines.

Figure 18.9 → Mobile telephone lines per 100 inhabitants in Western Europe and North America, 1997



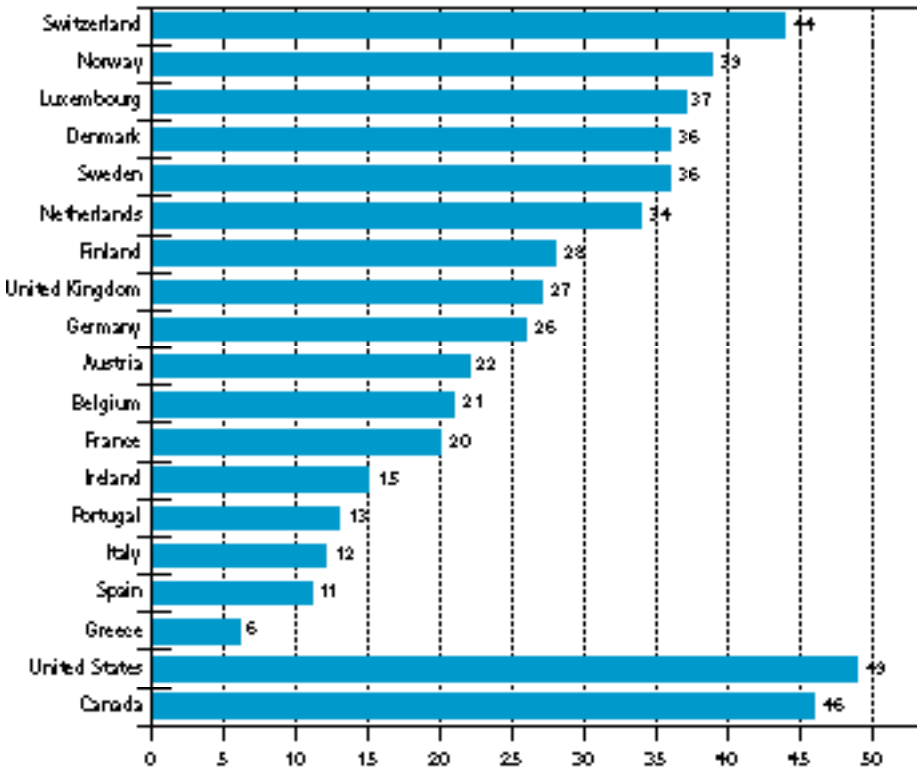
Sources: ESIS-ISPO; Ericsson 1/98; FVIT 1998; data for Denmark, Luxembourg, Canada 1996.

Table 18.2 → Mobile telephone subscribers per 100 inhabitants, 1993–1997

	1993	1994	1995	1996	1997
Germany	2.2	3.1	4.6	6.7	10.6
France	1.0	1.5	2.2	4.2	9.9
Great Britain	3.9	6.7	9.8	12.1	15.1
Italy	2.1	3.9	6.7	11.2	20.4
USA	6.2	9.3	12.8	16.6	20.7

Source: Prognos, 1998.

Figure 18.10 → PCs per 100 inhabitants in Western Europe and North America, 1997



Sources: ESIS-ISPO, EITO, BA&H, Statistics Canada; VDMA:ZVEI; data for Ireland, Portugal, Luxembourg 1996.

Growth rates in the mobile telephone sector from 1993 to 1997 are impressive. The boom is particularly pronounced in those countries that had previously occupied a mid-range position, with the number of subscribers increasing between five- and tenfold in the last four years. Increasing competition, the integration of tariffs with the fixed network and new services will lead to an increase in the number of mobile telephone subscribers. In addition, new digital network developments in the mobile telephone sector such as Universal Mobile Telecommunications Systems (UMTS), which have transmission capacities far in advance of those that can be achieved using ISDN, will promote further growth.

The North-South divide in ICT investment discussed at the beginning of this chapter is highlighted by a comparison of PC equipment in different countries at the end of 1997. Switzerland leads Europe

Table 18.3 → PCs per 100 inhabitants, 1993–1997

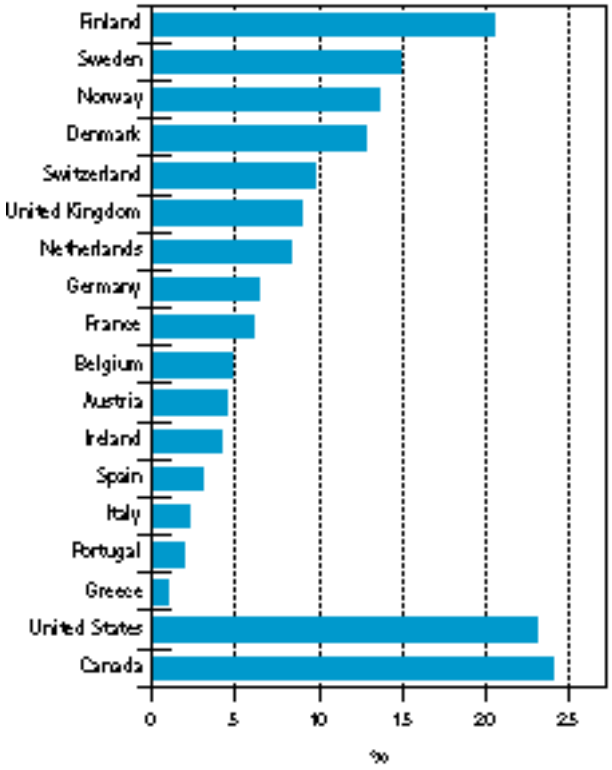
	1993	1994	1995	1996	1997
Germany	13	14	17	24	26
France	10	12	13	18	20
Great Britain	13	15	19	25	27
Italy	6	7	8	10	12
USA	27	30	33	48	49

Source: Prognos, 1998.

with 44 PCs per 100 inhabitants and the Nordic states are also amongst the highest in Europe with more than 35 PCs per 100 inhabitants. In the Southern countries of Europe, on the other hand, only one in ten inhabitants possesses a PC. Penetration is most advanced in North America (United States and Canada), where almost one out of two inhabitants possesses a PC. However, Table 18.3 also highlights the fact that the number of PCs installed in Great Britain, Germany and France – countries where PC ownership is close to the European average – has doubled within just four years. This increasing rate of growth also applies for Italy, although in this country there was a lower initial level of PC ownership. Furthermore, it is evident that a disproportionate level of growth took place in the PC sector from 1994 to 1996 in particular, and lower growth rates (although starting from a higher level) were experienced in 1997.

At the heart of the multimedia-related ICT revolution is the Internet, the most dynamic market of the future from a financial point of view (electronic commerce, Internet telephony, Internet broadcasting, on-line shopping, etc.). According to figures from the Fachverband Informationstechnik (FVIT), around 89 million people used the Internet or online services on a regular basis in 1997 (FVIT/FVK, 1998; see also the Statistical Annex, Section 3). It is extremely difficult to measure the number of Internet users directly, because individual accounts are sometimes used by several people, and figures from Internet Service Providers (ISP) and on-line services cannot be verified with any certainty. For this reason, the data in Figure 18.11 from the Nua Internet Survey for the period between late 1997 and early 1998 should be regarded as approximative. The figure clearly high-

Figure 18.11 → Internet users as percentage of total population, in Western Europe and North America, 1997

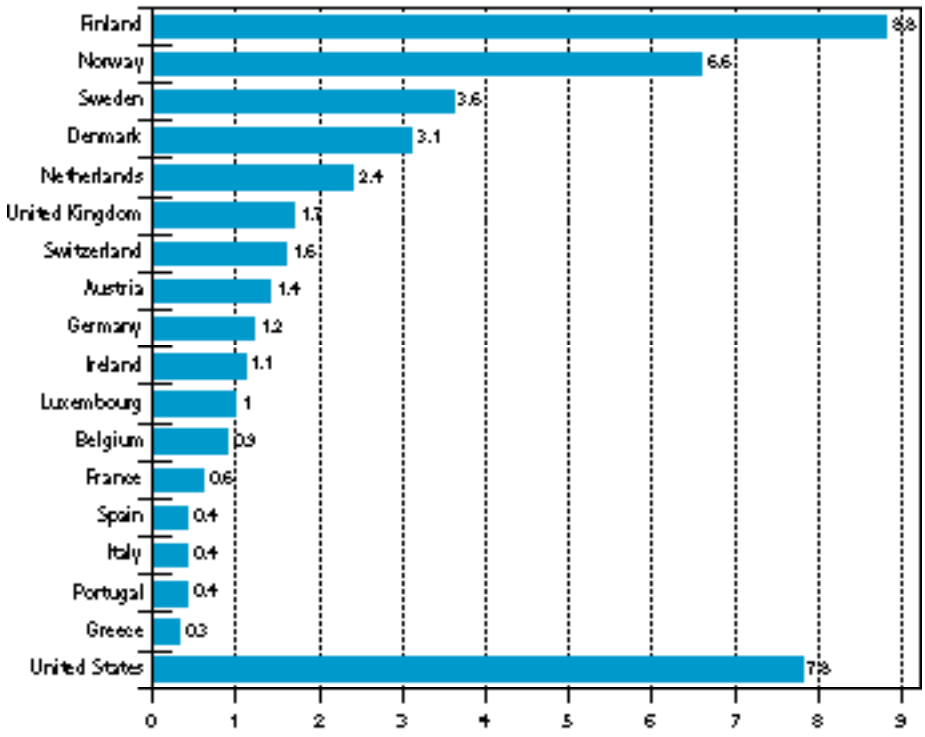


Source: NUA Internet Survey, Statistics Canada (with estimations 1997/1998).

lights the leading role played by North America in the spread of the Internet. In both Canada and the United States almost one in four inhabitants was using the Internet at the beginning of 1998. Within Western Europe a very mixed picture emerged with large variations. In the Nordic countries of Europe (Finland 20.4%, Sweden 14.8%, Norway 13.3%, Denmark 12.8%), Internet use is very advanced, but in the Southern countries (Spain, Italy, Portugal, Greece) at the beginning of the year only around 3% of the population had access to the Internet.

The analysis given in Figure 18.12 of the number of Internet hosts provides an even more meaningful picture of the importance and intensity of Internet use in individual countries. Internet hosts are computers that are permanently connected to the Internet via a fixed Internet Protocol (IP) number and through which access can be gained to the Internet at any time using the IP. Computers that have access to the Internet only at certain times (e.g. using telephones with alternating IP numbers) are not considered here. The percentage distribution of Internet hosts illustrates even more clearly the large lead that the Scandinavian countries have gained over other European countries, with Finland having overtaken even the United States. The great variations within Europe have very different causes. On the one hand, due to their economic weakness, the ability and willingness of Southern European countries to invest is much lower than that of countries with stronger economies and higher incomes. On the other hand, country-specific differences are also in evidence. For example, in France the

Figure 18.12 → Internet hosts per 100 inhabitants in Western Europe and the United States, January 1998



Source: FVIT 1998.

on-line Minitel system, established very early on, has delayed development of the Internet. Cost structures for Internet access (service provider costs and telecommunications costs) are also very varied within Europe and disproportionately high in comparison with North America. The liberalization of the European telecommunications market has been an important factor in causing telecommunications costs to fall within Europe, thus reducing the costs of Internet access. This indicates that the growth rate for Internet use will increase more rapidly in countries where Internet use has previously been at a lower level than in those countries that already have relatively high Internet penetration (Squire, Sanders and Dempsey, 1998).

INITIATIVES OF WESTERN EUROPE AND NORTH AMERICA FOR THE INFORMATION SOCIETY

For most governments, the availability of infrastructures for electronically transferring and accessing information is perceived as essential for the realization of the economic, social and cultural benefits and competitive advantages for the economy. They are therefore willing to support and shape the development of an information infrastructure as was seen in the UNESCO World Information Report 1997, Chapter 21. This section outlines the main policies and initiatives concerned with the development of an information society in Europe and North America.

The concept of a National Information Infrastructure (NII): the United States and the Information Highway

The 1993 NII Agenda for Action emphasized the government-private sector partnership and the leading role of the private sector in the development of the National Information Infrastructure. As stated therein: 'Nonetheless, while the private sector role in NII development will predominate, the government has an essential role to play. In particular, carefully crafted government action can complement and enhance the benefits of these private sector initiatives.' Nine principles and goals have been identified to guide government action:

- → promote private sector investment;
- → extend the 'universal service' concept to ensure that information resources are available to all at affordable prices;
- → act as a catalyst to promote technological innovation and new applications;
- → promote seamless, interactive, user-driven operation of NII;
- → ensure information security and network reliability;
- → improve management of the radio frequency spectrum;
- → protect intellectual property rights;
- → co-ordinate with other levels of government and with other nations;
- → provide access to government information.

The well known metaphor 'Information Superhighway' is very attractive to the American public. From the beginning, the NII initiative emphasized benefits for all Americans and stressed a broad concept of universal service and public access. The administration therefore received strong support from public-interest groups. Furthermore the Information Infrastructure Task Force (IITF), set up to co-ordinate the United States Federal Government's activities, developed at an early stage a specific programme aimed at promoting non-commercial applications for the public and non-profit sectors, called the Telecommunications and Information Infrastructure Assistance Programme (TIIAP), which serves the public interest. In contrast the TELEMATIC application programme in Europe is not limited to the non-profit sector but also supports commercial projects to promote the competitiveness of the European Union (d'Udekem-Gevers, and Lobet-Maris, 1997, p. 199).

The reform of the United States telecommunications law dating back to 1934 took place, when President Clinton signed the Telecommuications Act in February 1996 (technologylaw.com/techlaw/act_index.html). This act primarily preempts state laws that prohibit entry into local telephone services; establishes the conditions for competition for local telephone services; eliminates restrictions that prevent cable and telephone companies from entering each others' business; gives the Federal Communications Commission (FCC) broad authority; requires the FCC to continue to update the definition of universal service, and to provide discounted service to schools and libraries; and makes the transmission of obscene or indecent communications to minors illegal (OECD, 1997, p. 213).

As far as online communication is concerned, legal provisions of the 1996 Telecommunications Act outlaw the transmission of indecent or patently offensive material to minors over PC networks. But the Supreme Court ruled that this Commmunication Decency Act would be unconstitutional as it breaches freedom of speech protected under the First Amendment of the United States Constitution.

In a speech at the International Telecommunications Union (ITU) in 1994, Vice President Gore argued for world wide co-operation to extend the project of the NII to a Global Information Infrastructure (GII) (www.iitf.nist.gov/documents/speeches/032194_gore_giispeech.html). This proposal was later endorsed at a 1995 meeting of ministers from the G7 group of leading industrialized countries. This G7 ministerial conference in Brussels was the first large international conference devoted to the information society, and bringing together political leaders on that subject (Club de Bruxelles, 1997, p. 76). The G7 conference outlined common principles for the world-wide information society and common guidelines for co-operation. The principles outlined were to promote dynamic competition; encourage private investment; define a regulatory framework that can change with the times; ensure open access to networks; guarantee universal supply of and access to services; promote equal opportunity for all citizens; promote diversity of content, including cultural and linguistic diversity; and recognize the need for global co-operation by paying particular attention to the least-developed countries.

This agreement was important as a means of facilitating multinational efforts to co-ordinate the work of global bodies like the World Trade Organisation (WTO), the World Intellectual Property Organization (WIPO) and the International Telecommunication Union (ITU). The GII is regarded as a key element of economic development and industrial policy in many developed countries as it creates opportunities for reaching international markets.

The United States Administration's major programme for supporting research and development related to the NII is the $1,100 million High-Performance Computing and Communications (HPCC) initiative. Since 1993 the scope of the programme has been expanded to include support for the NII applications and technologies. In October 1996, President Clinton announced the Next Generation Internet (NGI) initiative (www.ccic.gov/ngi/) that will support universities and national laboratories with networks that are much faster than today's Internet.

The Canadian Information Highway

In April 1994, Industry Canada's discussion paper The Canadian Information Highway proposed three main objectives for Canadian strategies, which were to create jobs through innovation and investment, reinforce Canadian sovereignty and cultural identity, and ensure universal access at reasonable cost.

To reach these goals and to provide advice and recommendations to the Minister of Industry the Information Highway Advisory Council (IHAC), with representatives from industry, education, research, labour, consumer and public interest groups, was established at the beginning of 1994. In September

1995, the Advisory Council released its final report Connection, Community, Content: The Challenge of the Information Highway, which contains some 300 recommendations for government action. In May 1996, the Government of Canada unveiled its plan for building the Information Highway in a report, which underlined four strategic thrusts with the following policies and initiatives (Minister of Supply and Services Canada, 1996) :

- → building Canada's Information Highway by creating a competitive, consumer-driven policy and regulatory environment that is in accord with the Canadian public interest and that is conducive to innovation and investment by Canadian industry in new services on the Information Highway.
- → growing Canadian content on the Information Highway, thereby strengthening the ongoing national cultural dialogue and creating economic growth and jobs.
- → realizing the economic and social benefits for all Canadians of the Information Highway and allowing them to participate fully in the emerging information society.
- → getting government right by ensuring better services and more affordable, accessible and responsive government and making government a model user and a catalyst for Information Highway development across Canada.

The government also expressed the intention – where market forces fail – to ensure affordable access to essential Information Highway services for all Canadians, regardless of their income or geographic location.

In September, 1997, the IHAC published its second final report of its mandate to encourage continuing action with regard to these commitments (The Information Highway Advisory Council, 1997). The IHAC concentrated on two tasks, namely advancing the public policy agenda by advising the government on outstanding issues and concerns related to the Information Highway, and reporting on Canada's progress in the transition to an information society and a knowledge-based economy. The IHAC emphasized that technology-neutrality must be the central principle of policy and regulation for the Information Highway, so that no obstacles remain to using the best technology for a given application or purpose. Access for all Canadians and Canadian quality content are seen as most important imperatives to ensure Canada's future as a knowledge society.

The government instructed the Canadian Radio-Television and Telecommunication Commission (CRTC) early in 1995 to conduct public hearings on regulatory changes required as a result of the convergence of broadcasting and telecommunications (Raboy, 1996, p. 51). In 1997 the CRTC adopted measures to fully liberalize Canada's telecommunication market by January 1998 and to encourage convergence between telecommunication and broadcasting. New telecommunication entrants were allowed to offer local services in 1998. As regards convergence, cable television operators were immediately allowedtooffer local telecommunication services, while telecommunication companies were entitled to apply for broadcasting licenses to enter the market in 1998. These decisions reflected the policy objectives included in the 1993 Telecommunications Act and the 1991 Broadcasting Act and, last but not least, the priority that the Canadian government has placed on the development of a competitive communications environment. The CRTC is an independent federal agency and is responsible for the supervision and regulation of telecommunications and broadcasting in Canada. The Telecommunication Act gives the CRTC a broad range of powers, including the regulation of telecommunication rates and conditions of service, approval of interconnection agreements, and quality of service standards (Industry Canada, 1997, p. 60).

In Canada, a wide range of social and cultural approaches built upon the Canadian tradition of a mixed public/private system (e.g. broadcasting) to the

NII have emerged during recent years. In order to develop the new information infrastructure, public policy promotes a new hybrid model of communication, which combines the social and cultural objectives of both broadcasting and telecommunications, and provides new regulatory mechanisms (IHAC, 1997).

The European Union's Information Society policy

Since the early 1990s the European Union has recognized the need to act quickly to develop an Information Society in Europe. The pace of globalization is picking up and Europeans fear that they will lose ground to the United States, Japan and the new emerging industrial nations in the Far East and South-East Asia. An analysis of the policies of the European Community reveals a gradual shift taking place in strategy (The European Institute for the Media, 1998, p. 45-51).

In the 1980s, the emphasis was on promoting information technology. Due to its multifunctionality and cross-sector significance, information technology was designated a 'key technology' and computer manufacturing was elevated to a 'key industry sector'. The key role given to information technology was illustrated in particular by the efforts made by the EU to set up the European Strategic Programme for Research and Development in Information Technology (ESPRIT) in 1984 and the increases in budget allocation for this area in subsequent Framework Programmes.

This period was followed by measures aimed at improving the communications infrastructure and accompanied by the deregulation of the telecommunications sector. By creating a comprehensive telecommunications infrastructure the idea was to offer, by simple, cost-effective means, opportunities to companies, authorities and citizens to share multimedia information (in the form of data, text, voice, still and moving images) to a high technical standard and with no constraints of distance. The creation of a European telecommunications infrastructure featuring narrow- and broad-band networks began with the Research and Development in Advanced Communications Technologies (RACE) and continued with its successor, the Advanced Communications Technologies and Services (ACTS). Within the framework of European policy on promoting the information society, increased assistance was given in the early 1990s towards establishing a trans-European network. To help accelerate and finance this expansion of the technical infrastructure, the European community has adopted deregulation and liberalization of the telecommunications sector (network, services, interfaces) as a key pillar of policy with some basic rules: an important precondition in this process is the need to safeguard a universal service and maintain interconnection and interoperability in a manner which ensures open and fair competition. The liberalization of the European telecommunications market was largely completed at the beginning of 1998.

The next step was to place greater emphasis on business matters relating to new services and content in the information society (information as a commodity and factor of production markets). This issue came to the fore, mainly because of the increasing convergence between telecommunications, computing and broadcasting/media sectors. These considerations led among other things to the setting up of the Telematics research programme. The programme placed greater emphasis on demonstration projects (i.e. in the area of transport, education, health and administration) that reflected market needs and provided assistance for products and multimedia applications likely to prove successful in the marketplace. In this context the problems facing small and medium-sized enterprises (SMEs) were given greater attention within the European assistance programmes. The 'information economy' was seen as the key area which will determine future growth and prosperity. The White Paper Growth, Competitiveness

and Employment emphasized a more specific focus on information infrastructures to enhance competitiveness and create jobs (European Commission, 1993). In December 1993, the European Council entrusted a high-level group, later known as the Bangemann group, with drafting a report. The report by the Bangemann group underscored that the private sector should be given a leading role in developing the European Information Society.

In July 1994, the European Commission published a communication entitled Europe's Way to the Information Society: An Action Plan that underlined issues such as the legal and regulatory setting as well as services, applications, content and social and cultural aspects (European Commission, 1994). Since the mid-1990s, new approaches in European information policy, particularly in the area of education and training, pointed to the need to consider the social repercussions of the information society. This change in approach grew from the realization that the upheavals taking place in society and business needed to be underpinned by a social framework. It was also understood that if such a social dimension were to be overlooked, growing problems of acceptance could jeopardize further progress. The High Level Group of Experts on Social and Societal Aspects of the Information Society, set up in April 1995, and the Information Society Forum (ISF) in July 1995 focused more attention on the social aspects of the information society (further information about ISF and HLEG and their publications can be found at the Information Society Project Office at www.ispo.cec.be). However, it can be seen that from the beginning the United States gave more prominence than Europe did to the notion of supporting the non-profit-sector and of improving the ways in which democracy functions and achieving higher levels of political codetermination with the help of online technology. If the notion of 'people first' (European Commission, 1996: COM (96) 389 and European Commission 1997, COM (97) 397) is to receive the widespread support of European citizens, it is absolutely essential that European citizens be involved in the democratic process of achieving equal access and economic and social cohesion in the development of the European information society.

One of the main problems with the European approach of concentrating on individual aspects of the information society one after the other is an inability to anticipate well in advance the cross-sectoral repercussions of the various actions for society, business, law and technology, along with accompanying structural changes. Only with the Green Paper on convergence of December 1997 has the European Commission launched a public discussion regarding a more comprehensive regulatory approach in the field of telecommunications, media and information technology (European Commission, 1997: COM (97) 623).

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Statistical annex

The statistical annex presents a coherent, but limited, set of data related to the development of information and communication technologies throughout the world. The objective is to allow the reader both to have a general view of the main data relevant to the field and to set the chapters of the Report in a general context.

No attempt has been made to collect original data; they have been gathered from various sources, mainly from the UNESCO and ITU Statistical Services, but also from others. The authors selected those which they found most significant which explains the variations from one chapter to another. In order to get a more balanced grasp of the world wide situation and to allowfor interregional comparison,the annex brings together a selected range of data, presented in four sections. Section One covers basic general variables such as population, GNP and so on, then a series of communication and information variables. Section Two concentrates on trade data for communication and information equipment. Section Three provides some typical data related to Internet development and use. The fourth and last section summarizes UNESCO'S operational activities in the fields of communication, information and informatics.

The chapters in Part Three of the Report include a number of tabular and/or graphic presentations of quantitative data, related to the region concerned and the specific subject matters covered. The contents, type of data andthelevelof aggregationvariesfrom chapter to chapter, according to data availability, relevance and focus.

The method used to select the variables to be included in the annex can perhaps best be described as one of 'exclusion'. In a first instance, all quantitative variables from all the chapters in the Report were taken into account. Following this, it was decided that in cases where either data for other regions were not available or data generally were not complete enough to make regional estimates possible, or where regional estimates were not applicable, the variables would not be included in the tables.

In general, lack of data or difficult access to data poses a greater problem for developing than for industrialized countries. National data or even regional data may exist, but the difference in research methods etc., make further comparisons impossible. There are also specific areas where the lack of quantitative data is more generalized, for example in the case of libraries, where data are scarce and cannot be compared at a global level. For some other areas, and in particular those related to the commercial world, such as market shares of communication industry, market forecasts for equipment and services, multimedia industry etc., data are available, but not accessible, due to the high costs of purchase. It should also be noted in these areas that the methods employed and the angle of research obviously differ, depending on the targeted users of the research results, and the more detailed research available on the commercial market may not therefore be altogether relevant to the purposes of this Report.

Signs used:

na	=	not available
–	=	zero, magnitude nil
*	=	not applicable
0 or 0.0	=	less than half the unit used

Sources for Tables A1 to A6:
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International Trade Centre (www.intracen.org), 1998
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eMarketer (www.emarketer.com), 1999.

SECTION ONE. SELECTED GENERAL, COMMUNICATION AND INFORMATION INDICATORS

Table A.1 → Selected general, communication and information indicators

	World	Sub-Saharan Africa	Arab States	Southern Asia	Eastern Asia	South-Eastern Asia and Pacific	Latin America and Caribbean	Eastern Europe and CIS	Industrial countries	Develop-ing countries
General indicators										
Est. midyear population 1996 in millions	5,787.4	604.9	260.4	1,337.7	1,805.7	3,516.6	484.3	343.5	1,228.7	4,538.7
GNP/capita	4,880	518	2,162	426	1,323	617	1,533	2,013	18,158	1,141
Human Development Index, 1995	0.772	0.386	0.636	0.462	0.676	0.683	0.831	0.756	0.911	0.586
Est. adult illiteracy rates, in % of population, 1995	22.6	43.2	43.4	59.8	na	16	13.4	na	1.3	29.6
Tertiary education: enrolment in millions	7.4	0.9	5.6	3.2	na	4.5	7.0	na	18.0	4.3
Postal services										
Domestic services: dispatched letter items/capita,1995	69	6	5	na	na	17	16	31	380	na
International services: dispatched letter items/capita,1995	1.6	1.1	2.6	na	na	0.5	1.1	1.6	6	na
Press										
No. of dailies, 1994	8,896	157	136	2,790	404	3,650	1,199	na	4,088	4,808
Est. circulation/1,000 inh., 1994	96	10	44	27	na	56	44	na	44	286
Newsprint consumption, kg/inhab., 1996	20.9	1.6	2.9	1.9	7.5	6.8	10.7	6.7	78.2	5.2
Libraries										
Est. registered users/1,000 inh., 1995	na	1.7[1]	na	na	41.0[2]	na	na	330.0	na	na
Telecom										
Est. main lines/1,000 inh., 1996	131	14	51	18	61	35	108	169	424	45
Est. subscribers to cellular telephones/1,000 inh., 1996	25.7	2.1	3.7	0.4	8.7	9.0	15.3	3.8	91.7	5.8
Estimated no. fax machines/ 1,000 inh., 1995	na	0.2	1.5	na	0.5	0.3	4.2	1.2	23.2	na
Est. no. of ISDN subscribers/ 1,000 inh., 1996	0.7	na	na	na	na	na	na	na	3.7	0.0
Est. average residential connection charge, in $, 1996	148	96	127	59[3]	na	94	213	187	185	130
Est. average telecom revenues/ capita, in $, 1996	12	15	35	5	8	26	85	40	381	25

Table A.1 (continued)

	World	Sub-Saharan Africa	Arab States	Southern Asia	Eastern Asia	South-Eastern Asia and Pacific	Latin America and Caribbean	Eastern Europe and CIS	Industrial countries	Develop-ing countries
Media										
No of radio receivers/1,000 inh., 1996	364	166	264	88	215	156	384	412	1005	185
No. of television receivers/ 1,000 inh., 1996	228	35	138	55	248	150	223	317	524	145
Computers										
No of PCs/1,000 inh., 1996	43.6	na	5.7	1.2	6.5	8.3	17.5	18.2	156.3	6.5
Internet										
No. of hosts, in thousands, 1996	16,253	104	9	4	135	77	164	246	15,818	435
Estimated no. of users/ 1,000 inh., 1996	4.8	na	0.2	na	0.5	0.6	1.3	2.6	17.9	0.5
Est. no. of people on-line, in millions, 1999	158	1.1[4]	0.8[5]	na	na	26.6	4.6	na	125.1	na

1. Estimate based on 7 countries only.
2. Estimate based on 3 countries only.
3. Figure based on 4 countries only.
4. Includes African Arab States.
5. Refers to the Middle East.

SECTION TWO
TRADE DATA FOR COMMUNICATION AND INFORMATION EQUIPMENT

Table A.2 → Major exporters, radio receivers, 1996

Country	Thousands of $
Malaysia	3,066,783
China	2,396,693
Singapore	1,912,670
Japan	1,518,824
Mexico[1]	1,048,888
USA	648,935
Netherlands	592,666
Portugal	565,220
Germany	562,772
Belgium-Luxembourg	558,476
% of world exports	na

1. 1995 figure.

Table A.3 → Major exporters, television receivers, 1996

Country	Thousands of $
Mexico[1]	2,977,544
Korea, Rep. of	2,206,483
Malaysia	2,084,264
Japan	2,031,575
UK	1,864,290
Singapore	1,797,088
Thailand[1]	954,137
France	899,549
Germany	865,764
Spain	830,139
% of world exports	na

1. 1995 figure.

Table A.4 → Major exporters, printed matter, 1996

Country	Thousands of $
USA	4,345,792
Germany	3,781,272
UK	3,439,176
France	1,904,873
Italy	1,591,815
Belgium-Luxembourg	1,028,209
Canada	895,138
Spain	891,119
Netherlands	884,483
Hong Kong	618,662
% of world exports	64

Table A.5 → Major exporters, computer equipment, 1996

Country	Thousands of $
Singapore	23,104,560
USA	21,384,912
Japan	15,848,706
UK	11,931,943
Netherlands	9,764,368
Germany	6,901,486
France	6,496,893
Ireland	6,177,021
Korea, Rep. of	4,706,853
Malaysia	4,112,737
% of world exports	87.2

Table A.6 → Major exporters, telecommunication equipment, 1996

Country	Thousands of $
USA	17,693,776
Japan	14,940,588
Germany	9,062,230
UK	8,552,028
Sweden	8,356,232
Singapore	6,166,107
France	5,081,477
China	4,687,631
Korea, Rep. of	4,403,608
Canada	3,980,770
% of world exports	76.9

SECTION THREE
INTERNET

Some definitions

Host: An Internet host is a computer connected to the Internet that can both access and be accessed, i.e. deliver information.

Internet: The Internet is a global network of networks enabling computers of all kinds to directly and transparently communicate and share services throughout much of the world (see Chapter 11). Because the Internet is an enormously valuable enabling device for so many people and organizations, it also constitutes a shared global resource of information, knowledge, and means of collaboration, and co-operation among countless diverse communities (Internet Society [www.isoc.org]).

Subscriber: Someone who is paying for dial-up or leased line access to the Internet.

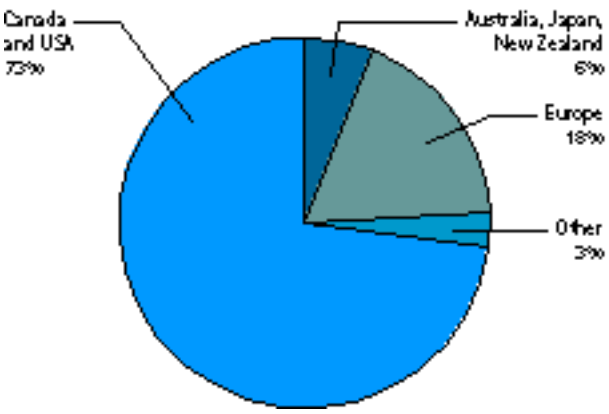
User: This is an indicator in which the lack of definition limits usefulness. A user could be someone who has used Internet once, someone who has used the Internet at least once during a certain period, or someone who uses it every day.

Who is connected to Internet?

Geographically

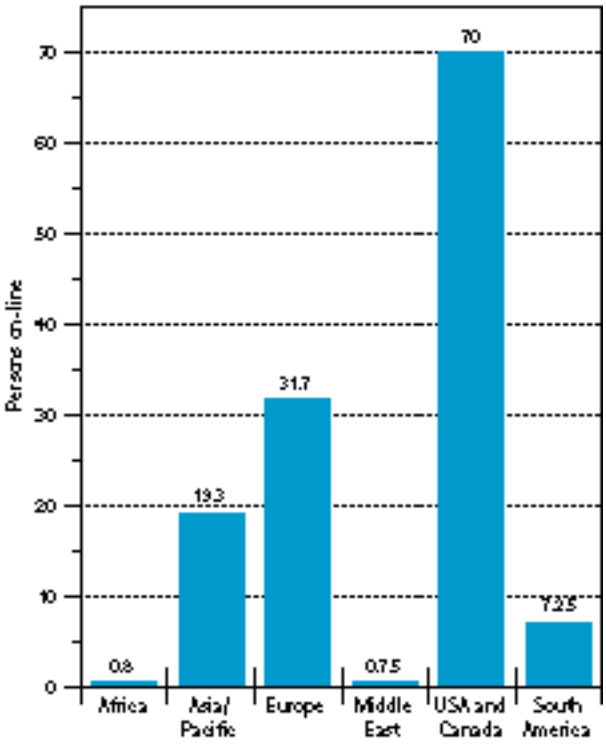
In global terms, which means asking which countries are connected, the answer is simple: almost all countries. According to the ITU (Dec. 1998) only three countries did not have any access, locally or otherwise, to the Internet: Democratic People's Republic of Korea, Iraq and Tokelau, the two former by choice and the latter due to its size. This does not mean, however, that access possibilities are equal. There are great disparities between high- and low-income regions.

Figure A.1 → Distribution of Internet hosts, July 1998



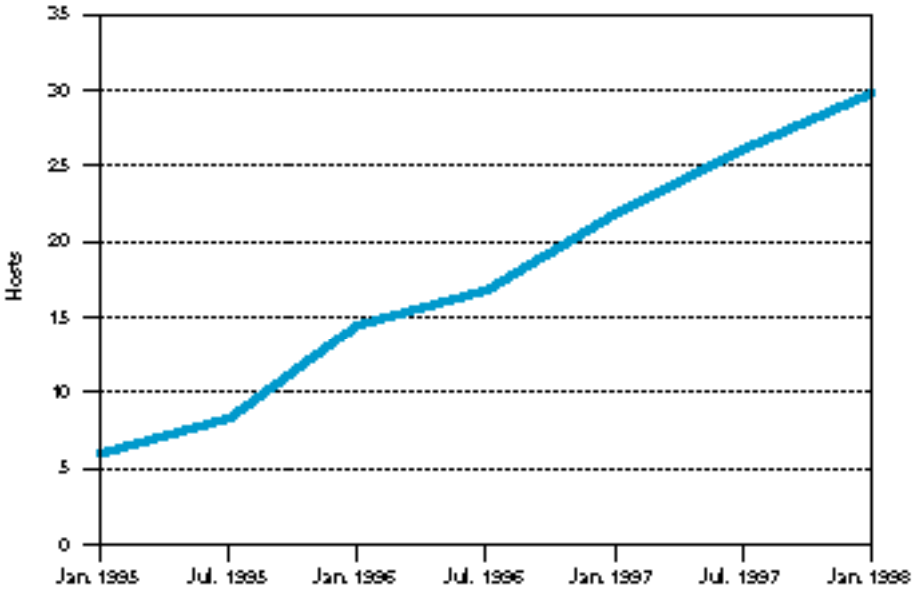
Source: Adapted from RIPE (www.ripe.net).

Figure A.2 → Estimated number of persons on-line, in millions, August 1998



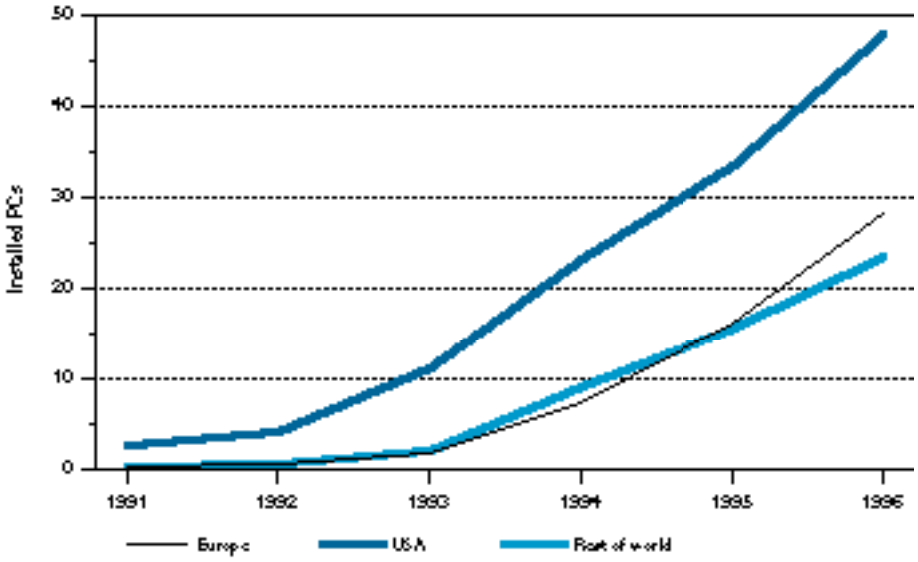
Source: Various; compiled by Nua Internet Surveys, 1998.

Figure A.3 → Estimated number of hosts, in millions, 1995–1998



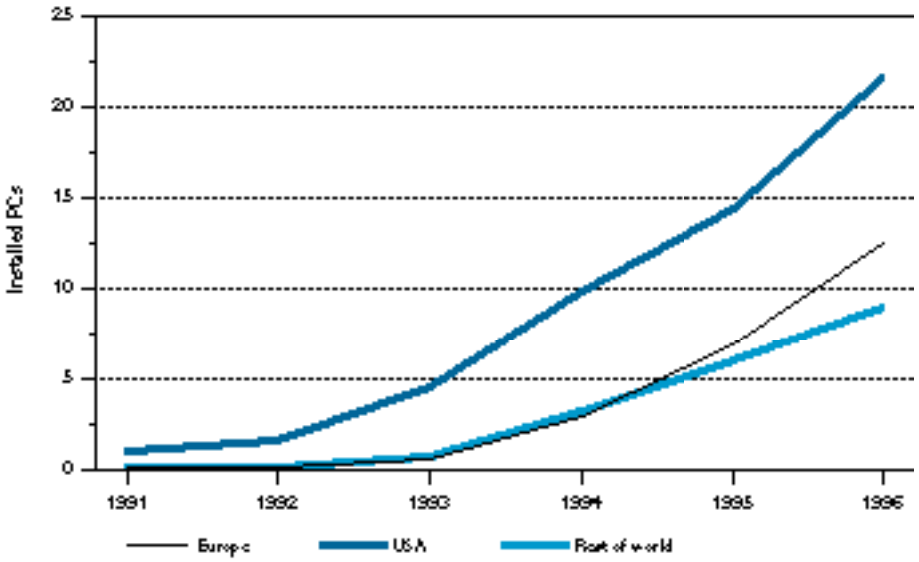
Source: Network Wizards (www.nw.com).

Figure A.4 → Total number of installed PCs, home and professional, in millions, 1991–1996



Source: GkF, Inteco/BIPE Conseil.

Figure A.5 → Total number of installed home PCs, in millions, 1991–1996

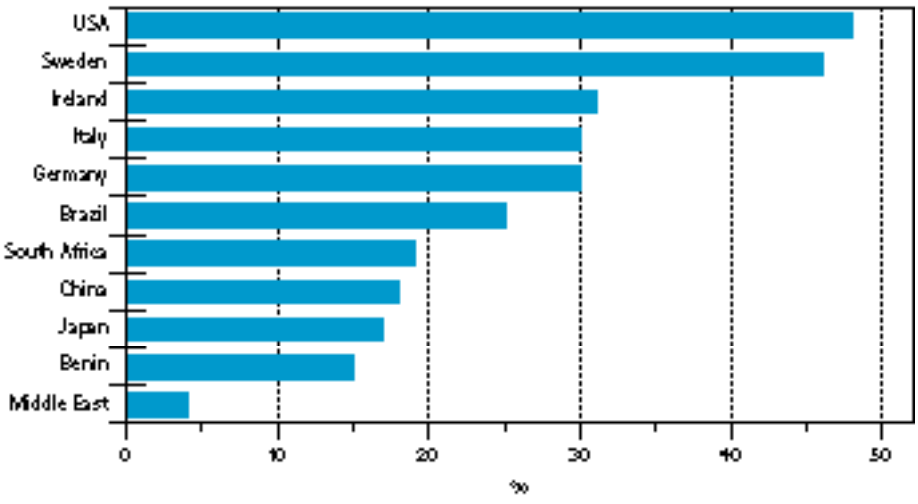


Source: GkF, Inteco/BIPE Conseil.

Gender differences in Internet use

Internet use is largely male dominated, but to a varying degree from country to country. According to the ITU, 'Women have a number of disadvantages compared to men that inhibit their accessibility of the Internet. Multiple demands as both homemakers and workers gives women less time to both access and acquire the experience and knowledge for successfully using Internet.' Furthermore, girls make up only a small percentage of students in computer science classes. Girls are significantly more likely than boys to enroll in clerical and data-entry classes, while boys are more likely to enroll in advanced computer science and graphics courses. Girls use computers less often outside of school, with the result that boys enter the classroom with more prior experience of computers than girls (American Association of University Women (AAUW), 1998).

Figure A.6 → Estimated percentage of female Internet users for selected countries, 1998



Source: Compiled from various sources (available at www.nua.ie/surveys/index.cgi).

Internet access tariffs

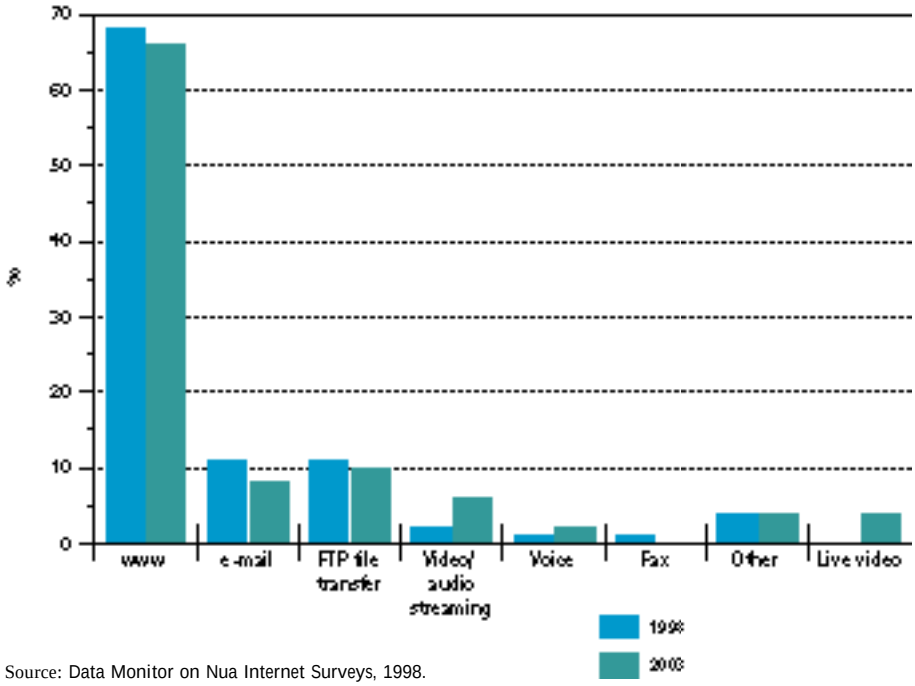
Nationally and internationally the pricing of Internet access differs a great deal. There are options of full Internet access at variable prices and fixed prices, prices for only local Internet access and for only e-mail, etc. Table A.7 presents some examples of prices in selected countries including a monthly dial-up charge of 20 hours of Internet use, local telephone charge and Internet Service Provider (ISP) charge (including VAT).

Table A.7 → Internet access tariffs

Country	Total cost in $
Argentina	41.30
Australia	28.90
Belgium	42.70
Canada	12.30
France	42.40
Germany	51.20
Greece	28.70
Hong Kong	22.90
Hungary	44.20
India	12.80
Indonesia	14.40
Ireland	35.30
Israel	49.80
Italy	36.90
Japan	55.60
Korea	26.40
Luxembourg	78.30
Malaysia	8.40
Mexico	27.20
Netherlands	42.10
New Zealand	18.70
Norway	43.80
Philippines	30.50
Poland	40.00
Portugal	28.90
Russia	20.00
Singapore	20.50
South Africa	25.60
Spain	38.40
Sweden	38.60
Switzerland	32.10
Taiwan-China	28.30
Thailand	58.20
Turkey	33.90
UK	48.60
USA	20.00
Venezuela	66.90

Source: ITU, Internet Diffusion Trends, 1998.

Figure A.7 → Estimated percentage distribution of traffic on the Internet, 1998, and forecast for 2003



Source: Data Monitor on Nua Internet Surveys, 1998.

Internet traffic

Of the traffic over the Internet, the traffic on the World Wide Web (WWW) is by far the largest. The diagram below shows the estimated traffic in 1998 by type of service and a forecast for the year 2003.

Purchasing on the Internet

Use of the Internet, and primarily the WWW, as a market place, is steadily evolving. According to Nielsen Media Research, around 26% of the Net users in Canada and USA have purchased something via Internet. During 1998 the products most sold where the following:

Product	Estimated % of Net users who purchased
Books	7.1
Hardware	5.6
Software	5.1
Travel	3.6
Clothing	3.5

According to this survey the gender distribution of purchasers were 71% male and 29% female.

Purchasing for the Internet: Worldwide Market Forecast

Table A.8 shows estimates for products and services that are purchased primarily to enable access to information and applications through the Internet or a corporate intranet, not for general use. (CAGR stands for Compound Annual Growth Rate.)

Table A.8 → Worldwide Internet and intranet products and services, 1996 and 2000, in millions of $

Product/Service	1996	2000	1996/2000 CAGR (%)
Internet access	3,149	11,300	37.6
Personal computers	5,511	16,200	30.9
Network computers	706	15,440	116.3
Servers	2,247	13,150	55.5
Network equipment	3,500	10,300	31.0
Software	916	12,221	91.1
Services	2,477	13,770	53.6
Total	18,506	92,381	49.5

Source: International Data Corporation, 1997 (www.idcresearch.com/f/idcf.htm).

Selected variables by country

Table A.9 → African Internet density, 1998: African countries ranked by number of people per Internet user

Country	Full ISPs	E-mail	Total ISPs	Users	International bandwith (Kb/s)	International IP provider	ISP monopoly	Population (millions)	Population/ ISP user	Users/Int. Bandwith (#/Kb/s)
South Africa	70	5	75	600,000	30,000	ISP+PTO	No	39	65	20
Namibia	5	1	6	2,000	256	ISP	No	1.7	850	8
Djibouti	1	0	1	400	128	PTO	Yes	0.43	1,075	3
Swaziland	2	1	3	900	128	ISP	No	0.97	1,078	7
Mauritius	1	5	6	1,000	256	PTO	Yes	1.1	1,100	4
Zimbabwe	7	57	12	10,000	2,000	PTO	No	11.1	1,110	5
Eq. Guinea	1	0	1	200	64	PTO	Yes	0.42	2,100	3
Tunisia	2	2	4	3,500	512	ATC	No	8.9	2,543	7
Boswana	3	3	6	500	512	PTO	na	1.4	2,800	1
Gabon	2	0	2	400	128	PTO	No	1.2	3,000	3
Egypt	25	3	28	20,000	2,000	RITSEC	No	60.7	3,035	10
Benin	5	1	6	1,750	64	PTO	Yes	5.5	3,143	27
Senegal	6	3	9	2,500	1,000	PTO	No	9	3,600	3
Ghana	3	6	9	4,500	512	ISP	No	17.8	3,956	9
Zambia	2	1	3	2,000	128	ISP+PTO	No	9.5	4,750	16
Morocco	15	2	17	6,000	2,000	PTO	No	29.2	4,867	3
Mozambique	5	1	6	3,500	256	ISP+PTO	No	18.4	5,257	14
Guinea Bissau	1	0	1	200	64	PTO	na	1.1	5,500	3
Kenya	8	8	16	5,000	2,000	ISP	No	29.1	5,820	3
Gambia	1	3	4	150	64	PTO	No	0.99	6,600	2
Angola	2	3	5	1,500	128	PTO	No	10.1	6,733	12
Cameroon	1	3	4	2,000	128	PTO	Yes	13.5	6,750	16
Uganda	2	2	4	2,000	256	ISP	No	20.4	10,200	8
Tanzania	10	4	14	2,500	2,000	Datel, SITA, Wilken	No	28.7	11,480	1
Eritrea	0	4	4	300	28.8	ISP	na	3.7	12,333	10
Togo	1	1	2	300	128	ISP	No	4.4	14,667	2
Ivory Coast	1	2	3	1,000	128	ISP	No	14.8	14,800	8
Burkina Faso	1	2	3	700	64	PTO	Yes	10.4	14,857	11
Central African Republic	1	0	1	200	64	PTO	Yes	3.2	16,000	3
Madagascar	3	2	5	700	128	PTO	No	13.9	19,857	5
Lesotho	0	1	1	100	9.6	ISP	No	2	20,000	10
Ethiopia	1	3	4	3,000	256	PTO	Yes	60.8	20,267	12

Table A.9 (continued)

Country	Full ISPs	E-mail	Total ISPs	Users	International bandwith (Kb/s)	International IP provider	ISP monopoly	Population (millions)	Population/ ISP user	Users/Int. Bandwith (#/Kb/s)
Guinea	4	1	5	300	128	PTO	No	6.6	22,000	2
Mauritania	1	1	2	100	128	PTO	No	2.3	23,000	1
Mali	2	3	5	400	128	PTO	No	9.4	23,500	3
Malawi	1	2	3	400	128	ISP	No	9.7	24,250	3
Niger	1	1	2	200	64	PTO	Yes	8.9	44,500	3
Algeria	1	2	3	500	64	CERIST	Yes	28.5	57,000	8
Burundi	1	0	1	75	19.2	ISP	na	6.3	84,000	4
Rwanda	1	0	1	100	128	PTO	Yes	8.6	86,000	1
Sierra Leone	0	1	1	50	9.6	PTO soon	na	4.8	96,000	5
Sudan	1	0	1	300	64	ISP	na	30	100,000	5
Nigeria	2	4	6	1,000	128	ISP, PTO soon	No	101.2	101,200	8
Tchad	1	2	3	50	64	PTO	Yes	5.6	112,000	1
Congo-Kinshasa	1	0	1	100	9.6	ISP	No	44	440,000	10
Comoros	0	0	0	0	0	–	–	0.5	0	0
Liberia	0	0	0	0	0	–	–	3	0	0
Libya	0	0	0	0	0	–	–	5.2	0	0
Somalia	0	0	0	0	0	–	–	6.8	0	0

Source: Sangonet (wn.apc.org), 1998.

Table A.10 → Estimated number of hosts by top-level domain name

Domain code	Full name	Hosts	= All hosts	— Duplicate names	Level 2 domains	Level 3 domains
	TOTAL	43,229,694	49,426,417	6,196,723	1,305,147	14,898,729
com	Commercial	12,140,747	15,479,017	3,338,270	868,016	5,993,551
net	Networks	8,856,687	9,383,201	526,514	64,423	2,926,036
edu	Educational	5,022,815	5,228,251	205,436	3,600	1,678,553
jp	Japan	1,687,534	1,718,935	31,401	97	38,979
us	United States	1,562,391	1,642,418	80,027	75	3,118
mil	US Military	1,510,440	1,653,661	143,221	71	125,582
uk	United Kingdom	1,423,804	1,692,305	268,501	42	38,340
de	Germany	1,316,893	1,375,114	58,221	77,016	398,631
ca	Canada	1,119,172	1,584,273	465,101	5,048	259,457
au	Australia	792,351	858,380	66,029	39	25,678
org	Organizations	744,285	844,410	100,125	78,094	621,029
gov	Government	651,200	749,278	98,078	433	248,230
nl	Netherlands	564,129	576,161	12,032	19,964	293,278
fi	Finland	546,244	558,913	12,669	7,477	352,875
fr	France	488,043	571,220	83,177	8,834	252,090
se	Sweden	431,809	444,751	12,942	7,981	176,907
it	Italy	338,822	370,629	31,807	14,899	185,599
no	Norway	318,631	326,305	7,674	6,232	188,934
tw	Taiwan, China	308,676	320,327	11,651	23	4,306
dk	Denmark	279,790	293,778	13,988	9,386	119,290
es	Spain	264,245	270,352	6,107	3,843	139,691
ch	Switzerland	224,350	232,139	7,789	14,108	200,483
br	Brazil	215,086	224,916	9,830	378	25,908
kr	Korea, Republic	186,414	195,782	9,368	31	4,034
be	Belgium	165,873	255,739	89,866	3,659	40,081
ru	Russian Federation	147,352	155,246	7,894	4,465	80,108
za	South Africa	144,445	219,420	74,975	30	11,676
at	Austria	143,153	212,049	68,896	4,285	38,075
nz	New Zealand	137,247	142,952	5,705	17	4,507
mx	Mexico	112,620	120,967	8,347	122	8,999
pl	Poland	108,588	116,946	8,358	1,158	15,635
il	Israel	97,765	103,068	5,303	12	2,818
unknown	Unknown	96,914	238,862	141,948	71,308	67,341
hu	Hungary	83,530	87,263	3,733	1555	35,356
hk	Hong Kong	82,773	84,008	1,235	12	10,958
cz	Czech Republic	73,770	79,597	5,827	5,735	41,994
sg	Singapore	67,060	112,570	45,510	12	2,044
ar	Argentina	66,454	68,978	2,524	24	3,545
ie	Ireland	54,872	55,867	995	1,712	32,931
gr	Greece	51,541	54,026	2,485	2,399	20,524
pt	Portugal	49,731	51,210	1,479	2,225	27,650

Table A.10 (continued)

Domain code	Full name	Hosts	=	All hosts	—	Duplicate names	Level 2 domains	Level 3 domains
arpa	Mistakes	47,974		52,839		4,865	2	96
my	Malaysia	47,852		48,290		438	21	3,009
tr	Turkey	32,496		33,303		807	13	1,840
cl	Chile	30,103		31,083		980	1,053	9,429
ee	Estonia	21,969		23,068		1,099	1,172	14,898
is	Iceland	21,894		22,417		523	1,369	18,569
th	Thailand	20,527		20,951		424	9	1,083
su	Soviet Union	19,475		20,280		805	64	2,174
sk	Slovakia	17,953		18,638		685	1,082	12,858
ae	United Arab Emirates	17,904		18,292		388	7	211
si	Slovenia	17,836		18,309		473	864	9,097
cn	China	17,255		17,628		373	39	567
ro	Romania	16,659		24,266		7,607	843	12,216
co	Colombia	16,200		16,322		122	32	606
ua	Ukraine	15,652		19,149		3,497	48	1,539
id	Indonesia	15,448		16,223		775	11	680
uy	Uruguay	15,394		16,823		1,429	6	267
in	India	13,253		14,027		774	10	208
lv	Latvia	10,345		10,777		432	658	6,970
lt	Lithuania	10,147		10,338		191	440	8,141
ph	Philippines	9,204		9,677		473	7	283
ve	Venezuela	7,912		8,189		277	26	1,309
bg	Bulgaria	7,425		8,375		950	257	3,297
hr	Croatia (local name: Hrvatska)	6,884		6,973		89	549	5,795
yu	Yugoslavia	6,753		7,026		273	21	2,314
lu	Luxembourg	6,502		16,821		10,319	345	5,921
kw	Kuwait	6,231		6,546		315	7	5,061
do	Dominican Republic	4,825		4,851		26	19	239
pe	Peru	4,794		5,118		324	9	776
cy	Cyprus	3,902		3,937		35	6	280
nu	Niue	3,461		3,600		139	2,234	2,262
cr	Costa Rica	3,261		3,357		96	12	273
pk	Pakistan	3,096		3,524		428	8	407
na	Namibia	2,654		2,768		114	8	59
lb	Lebanon	2,358		2,604		246	6	57
tt	Trinidad and Tobago	1,944		1,994		50	9	116
eg	Egypt	1,908		18,538		16,630	7	191
kg	Kyrgyzstan	1,907		1,915		8	16	1,785
to	Tonga	1,871		1,928		57	1,113	1,339
gl	Greenland	1,741		1,750		9	50	826
pr	Puerto Rico	1,571		1,576		5	5	118
ec	Ecuador	1,548		1,566		18	14	478

Table A.10 (continued)

Domain code	Full name	Hosts	=	All hosts	—	Duplicate names	Level 2 domains	Level 3 domains
kz	Kazakhstan	1,480		1,495		15	111	1,302
bm	Bermuda	1,449		1,468		19	87	1,387
bn	Brunei Darussalam	1,195		1,200		5	5	1,174
py	Paraguay	1,147		1,157		10	6	134
zw	Zimbabwe	1,031		1,056		25	5	190
mt	Malta	966		976		10	11	54
gt	Guatemala	913		926		13	6	151
int	International Organizations	898		64,027		63,129	30	110
sv	El Salvador	815		820		5	5	64
cc	Cocos (Keeling) Islands	789		820		31	669	432
cx	Christmas Island	763		787		24	598	454
pa	Panama	742		760		18	12	43
by	Belarus	718		738		20	18	343
ni	Nicaragua	715		723		8	8	82
ge	Georgia	692		718		26	13	464
ke	Kenya	686		694		8	5	95
om	Oman	664		667		3	16	21
bw	Botswana	658		675		17	39	559
bo	Bolivia	626		632		6	8	99
fo	Faroe Islands	621		630		9	112	586
bh	Bahrain	577		579		2	3	5
mu	Mauritius	575		577		2	2	575
ma	Morocco	548		583		35	7	427
lk	Sri Lanka	539		547		8	30	211
ad	Andorra	517		520		3	34	512
mk	Macedonia, The FYR	515		518		3	5	85
md	Moldova, Republic of	501		836		335	46	461
bs	Bahamas	481		485		4	2	481
vi	Virgin Islands (US)	414		450		36	64	356
ng	Nigeria	410		412		2	4	15
am	Armenia	385		408		23	71	342
ba	Bosnia and Herzegovina	378		379		1	4	4
jo	Jordan	370		374		4	6	32
ky	Cayman Islands	348		363		15	12	49
li	Liechtenstein	331		339		8	111	113
jm	Jamaica	322		327		5	6	38
sa	Saudi Arabia	319		321		2	7	28
gi	Gibraltar	316		318		2	33	315
zm	Zambia	303		308		5	14	281
pf	French Polynesia	281		282		1	27	270
sz	Swaziland	278		304		26	9	56
tm	Turkmenistan	263		270		7	160	188

Table A.10 (continued)

Domain code	Full name	Hosts	=	All hosts	—	Duplicate names	Level 2 domains	Level 3 domains
bz	Belize	252		254		2	6	12
mc	Monaco	246		251		5	51	246
ir	Iran (Islamic Republic of)	244		247		3	5	25
ci	Côte d'Ivoire	237		239		2	17	71
uz	Uzbekistan	236		243		7	54	118
sm	San Marino	236		240		4	40	236
ai	Anguilla	233		264		31	111	63
fj	Fiji	214		217		3	5	56
sn	Senegal	194		194		0	16	193
gh	Ghana	192		194		2	1	7
bf	Burkina Faso	176		178		2	3	176
ag	Antigua and Barbuda	175		179		4	60	139
fm	Micronesia, Federated States of	170		171		1	165	15
az	Azerbaijan	163		164		1	6	14
gp	Guadeloupe	159		160		1	88	158
np	Nepal	153		156		3	3	6
dm	Dominica	148		148		0	8	146
mo	Macau	142		143		1	4	31
mz	Mozambique	141		141		0	13	111
tz	Tanzania, United Republic of	129		131		2	5	25
pg	Papua New Guinea	118		120		2	4	9
st	Sao Tome and Principe	115		124		9	85	85
ug	Uganda	113		114		1	7	30
nc	New Caledonia	113		113		0	58	93
gf	French Guiana	113		114		1	1	113
tg	Togo	110		112		2	3	68
mv	Maldives	109		109		0	3	6
gu	Guam	108		111		3	6	60
al	Albania	102		107		5	5	76
hn	Honduras	99		102		3	20	86
im	Isle of Man	98		99		1	6	23
aw	Aruba	88		88		0	4	88
cu	Cuba	80		100		20	16	70
vu	Vanuatu	78		78		0	8	25
tc	Turks and Caicos Islands	78		78		0	53	77
et	Ethiopia	78		78		0	3	3
tj	Tajikistan	74		83		9	43	43
hm	Heard and McDonald Islands	72		73		1	34	47
gy	Guyana	69		70		1	3	4
tn	Tunisia	67		69		2	11	67
mg	Madagascar	61		62		1	12	61
kh	Cambodia	60		61		1	3	13

Table A.10 (continued)

Domain code	Full name	Hosts	=	All hosts	—	Duplicate names	Level 2 domains	Level 3 domains
ac	Ascension Island	60		61		1	43	44
as	American Samoa	57		59		2	43	33
nf	Norfolk Island	55		56		1	11	25
aq	Antarctica	53		54		1	1	53
io	British Indian Ocean Territory	46		47		1	2	46
ck	Cook Islands	46		46		0	3	7
bb	Barbados	44		72		28	9	31
gb	Kingdom United	40		40		0	1	1
je	Jersey	39		44		5	5	14
mq	Martinique	38		40		2	21	37
sh	St. Helena	36		36		0	31	26
bt	Bhutan	36		37		1	6	35
vn	Viet Nam	34		34		0	8	27
ms	Montserrat	25		25		0	15	17
lc	Saint Lucia	23		23		0	5	23
dz	Algeria	23		25		2	2	22
vg	Virgin Islands (British)	22		22		0	9	18
ye	Yemen	20		20		0	9	16
sb	Solomon Islands	20		20		0	1	6
mn	Mongolia	20		20		0	18	6
ls	Lesotho	19		19		0	3	18
gg	Guernsey	19		19		0	10	18
ne	Niger	18		19		1	14	16
mr	Mauritania	15		16		1	7	15
mp	Northern Mariana Islands	15		15		0	10	9
gw	Guinea-Bissau	15		15		0	5	12
sl	Sierra Leone	13		13		0	1	13
qa	Qatar	13		13		0	5	8
tf	French Southern Territories	12		12		0	6	7
bj	Benin	12		12		0	2	12
va	Vatican City State (Holy See)	11		12		1	5	9
cd	Congo (Democratic Republic)	11		12		1	7	9
an	Netherlands Antilles	10		10		0	7	7
km	Comoros	9		9		0	3	8
sc	Seychelles	7		8		1	3	4
gs	South Georgia and the South Sandwich Islands	7		7		0	4	5
kn	Saint Kitts and Nevis	5		5		0	4	3
ly	Libyan Arab Jamahiriya	4		5		1	4	4
pn	Pitcairn	3		3		0	1	3
gd	Grenada	3		3		0	3	3
cm	Cameroon	3		3		0	3	2
tp	East Timor	2		2		0	2	1

Table A.10 (continued)

Domain code	Full name	Hosts	=	All hosts	—	Duplicate names	Level 2 domains	Level 3 domains
mh	Marshall Islands	2		2		0	1	2
ws	Samoa	1		1		0	1	0
um	United States Minor Outlying Islands	1		1		0	1	0
tv	Tuvalu	1		1		0	1	1
sy	Syrian Arab Republic	1		1		0	1	0
re	Reunion	1		1		0	1	1
pw	Palau	1		2		1	1	1
mw	Malawi	1		1		0	1	1
mm	Myanmar	1		1		0	1	0
ml	Mali	1		1		0	1	1
lr	Liberia	1		1		0	1	0
cv	Cape Verde	1		1		0	1	0
cg	Congo (Republic)	1		1		0	1	0
af	Afghanistan	1		1		0	1	1
zr	Zaire	0		0		0	0	0
yt	Mayotte	0		0		0	0	0
wf	Wallis and Futuna Islands	0		0		0	0	0
vc	Saint Vincent and the Grenadines	0		0		0	0	0
tk	Tokelau	0		0		0	0	0
td	Chad	0		0		0	0	0
sr	Suriname	0		0		0	0	0
so	Somalia	0		0		0	0	0
sj	Svalbard and Jan Mayen Islands	0		0		0	0	0
sd	Sudan	0		0		0	0	0
rw	Rwanda	0		0		0	0	0
pm	St. Pierre andMiquelon	0		0		0	0	0
nr	Nauru	0		0		0	0	0
la	Lao People's Democratic Republic	0		0		0	0	0
ki	Kiribati	0		0		0	0	0
iq	Iraq	0		0		0	0	0
ht	Haiti	0		0		0	0	0
gq	Equatorial Guinea	0		0		0	0	0
gn	Guinea	0		0		0	0	0
gm	Gambia	0		0		0	0	0
ga	Gabon	0		0		0	0	0
fk	Falkland Islands (Malvinas)	0		0		0	0	0
er	Eritrea	0		0		0	0	0
dj	Djibouti	0		0		0	0	0
cf	Central African Republic	0		0		0	0	0
bv	Bouvet Island	0		0		0	0	0
bi	Burundi	0		0		0	0	0
ao	Angola	0		0		0	0	0

Source: Network Wizards (www.nw.com).

SECTION 4
UNESCO'S OPERATIONAL PROJECTS IN THE FIELDS OF COMMUNICATION, INFORMATION AND INFORMATICS, 1998

In November 1989, as the Berlin Wall began to fall, UNESCO's General Conference adopted a New Communication Strategy aimed at responding to the needs of emerging democracies and those of developing countries. This strategy has three objectives:

- → to encourage the free flow of information, at international as well as national levels;
- → to promote its wider and better balanced dissemination, without any obstacle to the freedom of expression, and
- → to strengthen communication capacities in the developing countries in order to increase their participation in the communication process.

At a time when the media and specialized information are tending to move closer together because the technologies through which they are conveyed are now often much the same, the principle of 'free flow' of information should be widened to cover all forms of information that contribute to the progress of societies and their democratic functioning.

The United Nations General Assembly's adoption in November 1996 of a resolution underscoring the key role of communication for development – as an instrument of dialogue between citizens and the authorities – and encouraging planners and decision-makers at all levels to include a 'communication' element in development programmes and projects, should give new impetus to the Organization's work in this field, since UNESCO is the only organization in the United Nations system with specific responsibility for the free flow of information and the development of the means of communication. The resolution reaffirmed the importance, to that end, of resource mobilization – including financial co-operation – and called upon the international community and the organizations of the United Nations system to assist developing countries in capacity-building in this field.

Through its intergovernmental programmes (IPDC, PGI and IIP), international and regional networks and professional organizations, UNESCO rallies international technical co-operation to support the development of communication, information and informatics at the national, subregional and regional levels.

Through its 254 extrabudgetary projects, implemented by the Communication, Information and Informatics sector and its Regional Advisers, UNESCO is developing partnerships with public and private multilateral and bilateral funding agencies to implement projects and programmes in priority fields such as governance and the media; support for independent and pluralistic media; improving infrastructures (media, libraries, archives, information services and computer networks); strategies and policies to develop the new technologies; training specialists in communication, information and informatics. These activities will concern the developing countries as a priority, in particular the least developed countries and the Africa region, and also countries in transition.

As lead agency for two components of the United Nations System-Wide Special Initiative on Africa – Informatics in the service of development and Communication for peace-building – UNESCO will contribute in close co-ordination with the United Nations Economic Commission for Africa (ECA), UNDP, the International Telecommunication Union (ITU) and others in mobilizing the resources needed to implement them.

In 1998, a total of 254 projects were being implemented in the Communication, Information and Informatics Sector at Headquarters and Fields offices. The overall budget, which includes projects recently completed, those close to completion as well as those

that are on-going, amounts to $40.8 million. Almost 50% of the funding concerns activities in Africa, and the remainder is shared among other developing regions. In the field of Communication, which takes an overall share of 82%, the larger providers are the Intergovernmental Programme for the Development of Communication and the United Nations Development Programme. The share of the fields of Information and Informatics is much smaller, 17.8%, with funding coming mainly from the Intergovernmental Informatics Programme and the UNDP.

Source: UNESCO. Sector of Communication, Information and Informatics. On-going Extrabudgetary Projects. Paris, UNESCO, 1998 (www.unesco.org/webworld/projects/statistics.html).

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Acronyms and abbreviations used in the text

A&E	Arts and Entertainment
AAAS	American Association for the Advancement of Science
AAUW	American Association of University Women
ABB	Asea Brown Boveri
ABC	American Broadcasting Corporation
ACCT	Agence de Coopération Culturelle et Technique
ACP	African, Caribbean and Pacific Countries
ADP	Accelerated Development Programme
ADSL	Asymmetric Digital Subscriber Line
AFRINIC	African Regional Register for Internet Addresses
AISI	African Information Society Initiative
AMIC	Asian Media Information and Communication Center
ANI	African Network Initiative
AOL	American Online
APDIP	Asia Pacific Development Information Programme
APEC	Asia Pacific Economic Cooperation
APIA	Asia Pacific Internet Association
APNG	Asia Pacific Networking Group
APPLe	Asia Pacific Network Information Center for Asian Policy and Legal Group
APRICOT	Asia Pacific Regional Internet Conference on Operational Technologies
ARABSAT	Arab Satellite Communications Organization
ARPANET	Advanced Research Project Agency Network
ASEAN	Association of South-East Asian Nations
AT&T	American Telephone and Telegraph Company
ATM	Asynchronous Transfer Mode
AUPELF	Association des Universités Partiellement ou Entièrement de Langue Française
AVU	African Virtual University
BBC	British Broadcasting Corporation
BCE	Bell Canada Enterprises
BEON	Bristol Education Online Network
BIEF	Banque Internationale d'Information sur les États Francophones
BT	British Telecom
BTTB	Bangladesh Telephone and Telegraph Board
CAL	Computer-assisted learning
CAM	Computer-aided manufacturing
CANTO	Caribbean Association of National Telecommunication Organizations
CAT	Communications Authority of Thailand
CBS	Columbia Broadcasting System
CD	Compact Disk
CD-I	Compact Disk–Interactive
CD-ROM	Compact Disk–Read Only Memory
CDS/ISIS	Information Retrieval Software distributed by UNESCO
CE	Consumer Electronics
CEE	Central and Eastern Europe
CEEC	Central and Eastern European Countries

CERT	Computer Emergency Response Team
CIDI	Consejo Interamericano para el Desarrollo Integral
CIFFAD	Carrefour International Francophone de Formation à Distance
CIS	Commonwealth of Independent States
CIX	Commercial Internet Exchange
CLADES	Centro Latinoaméricano de Documentación Económica y Social
CLT	Compagnie Luxembourgeoise de Télédiffusion
CMC	Computer-Mediated Conferencing
CNN	Cable News Network
CNPq/RNP	NationalResearch Council/National Research Network
COMESA	Common Market for Eastern and Southern Africa
COMSATS	Commission on Science and Technology for sustainable Development in the South
CORBA	Common Object Request Broker Architecture
CRNet	Costa Rican National Research Network
CSILE	Computer-Supported Intentional Learning Environments
CUNet	Caribbean University Network
DANIDA	Danish International Development Agency
DARPA	Defense Advanced Research Project Agency
DBS	Direct Broadcasting Satellite
DCS	Digital Cellular System
DFG	Deutsche Forschungsgemeinschaft
DNS	Domain Name Server
DOE	Department of Education
DOI	Digital Object Identifier
DoT	Department of Telecommunications (India)
DSC	Digital Service Corporation
DSL	Digital Subscriber Lines xDSL refers to different types of DSL technology such as ADSL (Asymmetric Digital Subscriber Line), HDSL (High data rate DSL) or VDSL (Very high data rate DSL)
DSS	Decision Support System
DSTV	Digital Satellite Television
DTHTV	Direct-to-home Television
DVD	Digital Versatile Disk
DVD-ROM	Digital Versatile Disk–Read Only Memory
D-COM	Distributed Component Object Model
ECIPS	Eastern Caribbean Investment Promotion Service
ECO	Electronic Commerce Forum (German Internet Service Provider Association)
ECOWAS	The Economic Community of West African States
EDI	Electronic Data Interchange
EIM	The European Institute for the Media
EITO	European Information Technology Observatory
EPG	Electronic Programme Guide
ERNET	Education Research Network
ERP	Enterprise Resources Planning
ERTU	Egyptian Radio and Television Union
ESPN	Entertainment and Sports Programming Network
ESPRIT	European Programme for Research and Development in Information Technologies
EU	European Union
FCC	Federal Communication Commission (USA)
FLAG	Fibre-optic Link Around the Globe
FR	Frame Relay
FTP	File Transfer Protocol
FTP	Financing and Promoting Technology
FVIT	Fachverband Informationstechnik
FYR	Former Yugoslavia Republic
GARNET	Ghana Academic and Research Network
GATE	Global Alliance for Transnational Education
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GE	General Electric
GIAS	Gateway Internet Access Service
GII	Global Information Infrastructure
GIS	Geographical Information System
GNP	Gross National Product
GSM	Global System for Mobile Communications
GT	Ghana Telecom
GTE	General Telephone and Electronic Corporation
GUI	Graphical User Interfaces
HBO	Home Box Office
HDI	Human Index Income
HDTV	High Definition Television
HFC	Hybrid Fibre-coaxial
HPCC	High Performance Computing and Communications
HSD	High Speed Data
HTML	Hypertext Markup Language
IAL	Intel Architecture Lab
IANA	Internet Assigned Numbers Authority
IBM	International Business Machines
ICANN	The Internet Corporation for Assigned Names and Numbers
ICL	International Computers Limited
ICRA	Internet Content Rating Alliance
ICSU	International Council of Scientific Unions
ICT	Information and Communication Technologies
IDA	Interchange between administrations
IDC	International Data Corporation
IDRC	International Development Research Centre
IDSC	Information and Decision Support Center
IETF	Internet Engineering Task Force
IFEX	International Freedom of Expression Exchange Network
IFIP	International Federation for Information Processing
IFJ	International Federation of Journalists
IFLA	International Federation of Library Associations and Institutions
IIA	Internet Initiative for Africa

IITE	Institute for Information Technologies in Education
IITF	Information Infrastructure Task Force
IMP	Interface Message Processors
IMS	Instructional Management System
INIST	Institut National de l'Information Scientifique et Technique
IOP	Internet Operators Group
IP	Internet Protocol
IPR	Intellectual Property Rights
IPS	Inter Press Service
ISDN	Integrated Services Digital Network
ISI	Information Society Index
ISO	International Standard Organization
ISP	Internet Service Provider
ITU	International Telecommunication Union
I-TV	Interactive Television
IWF	Internet Watch Foundation
IWGCR	International Working Group on Content Rating
KII	Korea Information Infrastructure
KPN	Dutch telecommunication and postal group
LAMP	Literacy and Awareness Publication
LAN	Local Area Network
LEO	Low Earth Orbit Satellite
LITNET	Lithuanian Science Network
LMDS	Local Multi-point Distribution System
LWF	Learning Without Frontiers
MAI	Multilateral Agreement on Investment
MAN	Metropolitan Area Networks
MARC	Machine Readable Cataloguing
MBC	Middle East Broadcasting Centre
MCI	Microwave Communications
MDS	Multi-point Distribution System
MEASAT	Malaysian East Asian Satellite
MEO	Medium Earth Orbit Satellite
MEON	Merseyside Education Online Network
MGM	Metro-Goldwyn-Mayer
MIS	Management Information System
MISA	Media Institute of Southern Africa
MITI	Ministry of Telecommunications and Information Technology (Mauritius)
MOO	Multi-User Object Oriented Domain
MOTC	Ministry of Transport and Telecommunications (Ghana)
MPEG	Moving Pictures Expert Group
MPTC	Ministry of Posts and Telecommunications of Cambodia
MSC	Multimedia Super Corridor
MSNBC	Microsoft National Broadcasting Corporation
MTA	Mauritius Telecommunications Authority
MTV	Music Television
MUD	Multi-User Domain
MUSH	Multi-User Shared Hallucinations
NACESTID	National Center for Scientific and Technological Information and Documentation (Vietnam)
NBC	National Broadcasting Company
NC	Network Computer
NCA	National Communication Authority (Ghana)
NCB	National Computing Board (Mauritius)
NCS	Network Computer System
NEC	Nippon Electric Company
NESLI	National Electronic Site Licencing Initiative
NETS	National Educational Technology Standards
NGfL	National Grid for Learning
NGI	Next Generation Internet
NGO	Non-Governmental Organizations
NII	National Information Infrastructure
NITSP	National Information Technology Strategic Plan (Mauritius)
NMT	Nordic Mobile Telephone System
NSF	National Science Foundation
NSFNET	National Science Foundation Network
NTA	Nepal Telecommunication Authority
NTC	Nepal Telecommunication Corporation
NTT	Nippon Telegraph and Telephone
OAS	Organization of American States
OAU	Organization for African Unity
OCLC	Online Computer Library Center
OECD	Organization for Economic Co-operation and Development
OECS	Organization of Eastern Caribbean States
OPAC	Online Public Access Catalogs
OROM	Optical Read-Only Memory
ORSTOM	Office de la Recherche Scientifique des Territoires d'Outre-mer
PAAs	Public Administration Authorities
PAN	Pan Asia Networking
PANA	Panafrican News Agency
PC	Personal Computer
PCO	Public Call Offices
PDA	Personal Digital Assistant
PDN	Public Data Network
PGI	General Information Programme
PHNET	Philippines Internet Network
PICS	Platform for Internet Content Selection
PICTA	Partnership for Information and Communication Technologies in Africa
PITAC	President's Information Technology Advisory Committee
PNG	Papua New Guinea
POP	Point of Presence
PSLI	Pilot Site Licence Initiative
PSTN	Public Service Telephone Network
PTO	Public Telecommunication Operators
PURL	Persistent User Requirement Languages

RDBM	Relational Data Base Management
RedHUCyT	Hemisphere Wide Inter-University Scientific and Technological Information Network
REFER	Réseau Électronique Francophone pour l'Enseignement supérieur et la Recherche
RISC	Reduced Instruction Set Computer
RP-SARNET	Philippine Science Academic and Research Network
RSAC	Recreational Software Advisory Council
RSACI	Regional Software Advisory Council labelling scheme for the Internet
RTP	Radiodifusão Portuguesa
SABA	South African Broadcasters Association
SA-BLS	Southern Africa – Botswana, Lesotho and Swaziland
SADC	Southern African Development Corporation
SAPAG	Systems Applications and Products in Data Processing
SBA	Singapore Broadcasting Authority
SBS	Satellite Business System
SGML	Standard Generalized Markup Language
SHD	Super High Definition Image System
SIL	Summer Institute of Linguistics
SIMAP	Système d'Information sur les Marchés Publics
SITA	Société Internationale de Télécommunication Aéronautique
SML	Standard Markup Language
SONET	Synchronous Optical Networks
SQL	Structured Query Language
SSA	Sub-Saharan Africa
STARS	Student Technology AdvisoRS
TAC	Telecommunication Advisory Council (Mauritius)
TCI	Telecommunications Inc.
TCP	Transmission Control Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
TEI	Text Encoding Initiative
TF1	Télévision Francaise 1
TIIAP	Telecommunications and Information Infrastructure Assistance Programme
TOT	Telephone Organization of Thailand
TP S.A.	Polish Telecom
TRIP	Trade Related Aspects of Intellectual Property Rights
TT&T	Thai Telephone and Telecomunication
TTC	Teacher Training Centre
TV	Television
UDEAC	Central African Customs and Economic Union/Union Douanière des États d'Afrique Centrale
UMTS	Universal Mobile Telecommunication System
UN	United Nations
UNAL	UNESCO Network of Associated Libraries
UNCSTD	United Nations Commission on Science and Technology for Development
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational Scientific and Cultural Organization
UPNG	University of Papua New Guinea
UPU	Universal Postal Union
UREF	Université des Réseaux d'Expression Française
URL	Uniform Resource Locator
URN	Uniform Resource Name
USAID	United States Agency for International Development
VAN	Value Added Networks
VCR	Video Camera Recorder
VDC	Vietnam Data Communications
VHS	Virtual High School
VIKT	Public Institutions Computer Network (Lithuania)
VNPT	Viet Nam Posts and Telecommunications
VoD	Video on Demand
VOIP	Voice over Data and IP Telephony
VR	Virtual Reality
VRML	Virtual Reality Modeling Language
VSAT	Very Small Aperture Terminal
VSNL	Videsh Sanchar Nigam Limited
W3C	World Wide Web Consortium
WAN	Wide Area Networks
WANAD	West African News Media and Development Centre
WCT	WIPO Copyright Treaty
WGU	West Governors University
WHO	World Health Organization
WIPO	World Intellectual Property Organization
WPPT	WIPO Performances and Phonograms Treaty
WTO	World Trade Organization
WWW	World Wide Web
xDSL	see DSL
XML	Extensible Markup Language
YLE	Finnish Broadcasting Company