Human development

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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

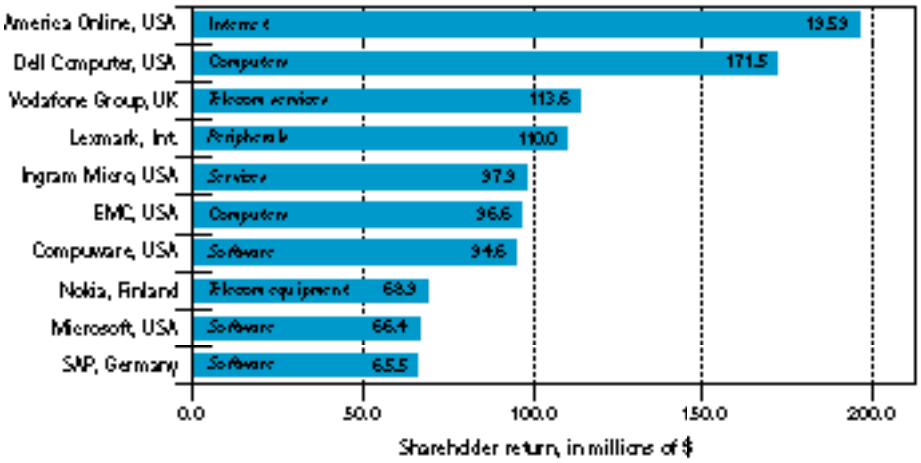
Just like other industrial sectors, ICTs are affected by a great deal of merger activity. The largest transactions of 1998 include the SBC Communications merger with Ameritech for $272,400 million, AT&T with Telecommunications Inc. (TCI) for $48,000 million, Worldcom with MCI Comm for $37,000 million, 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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