TOWARDS A NEW INFORMATION AND COMMUNICATION TECHNOLOGIES STRATEGY FOR AFRICAN LEAST DEVELOPED COUNTRIES

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Acronyms

AEC	African Economic Commission
DOT Force	Digital Opportunity Task Force
GDP	Gross domestic product
HCR	High Commissariat for Refugees
ICT	Information and communication technology
IP	Internet Protocol
ISP	Internet service provider
LDC	Least developed country
POP	Point of Presence
PTO	Public telecommunication operator
UNCTAD	United Nations Conference on Trade and Development
UNECA	United Nations Economic commission for Africa
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UN ICT	United Nation ICT Task Force
WEF	World Economic Forum
VSAT	Very small aperture terminal
WTO	World Trade Organization

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The context

As many countries move forward in the information and communication society era, the serious problems which affect the least developed countries (LDC) need to be addressed. Some 600 million world inhabitants belong to this category; they are distributed over 49 countries, of which 34 are in Africa. As yet, they do not benefit from the socio-economic advantages pertaining to information and communication technologies (ICT).

The persisting problems faced by these countries include: a low human capital qualification level, lack of telecommunication infrastructure, an inadequate regulatory and judicial framework, institutional weakness, lack of strict maintenance, and insufficient investment capital, resources, management and technological innovations.

A number of current programmes and action plans aim at addressing these issues. Some progress has been achieved, but a large number of countries have not yet attained the objectives.

The third LDC United Nations Conference (Brussels, May 2001) adopted a plan of action whose scope is to achieve, by the year 2015, a reduction by half of the proportion of people living in extreme/absolute poverty and suffering from starvation, and to promote LDCs' sustainable development. This programme takes into consideration the advantage/benefit in assisting LDCs in having access to ICTs and to acquire the required material infrastructures, together with the capabilities indispensable to reduce the digital divide.

In its 56/183 Resolution, the General Assembly observes that it is "urgent to utilise the potential of knowledge and technology in order to achieve the objectives of the Millennium Declaration and to find efficient and innovative means to put this potential in the service of the development for all". The UN Millennium Summit defined a set of goals to be achieved to protect the vulnerable communities, such as the LDCs, small island developing states and landlocked countries. In this context , the World Summit on the Information Society (WSIS), which will be held in 2003 and 2005, can help to focus world attention on these problems.

This study is carried out within the preparation of WSIS. Stemming from the analysis of the main impediments, it is an attempt to identify a strategy and the mechanisms to be implemented in order to provide assistance to these countries so that they become less isolated and take advantage of information new technology advancement, and thus participate in global exchanges.

In order to reduce the digital divide, countries should play a central part by making their ICT needs known.

There is, today, a certain consensus on the strategic objectives to pursue, including:

- The implementation of a progressive organisational and regulatory platform;
- Human resources improvement;
- Information resources ("info-structure") improvement;
- Technological resources improvement;

- ICT application in all the sectors which promote economic and social development, including education and health care.

Tangible and measurable results are expected for LDCs, hence the necessity of a specific approach from which hasty transposition of solutions developed in industrialised countries should be excluded; the adoption of measures enabling LDCs to develop their institutional and human capacities, the establishment of a technical assistance programme/plan for technology transfer and the development of an adapted and relevant technology.

The strategy obviously emphasizes investment for the development of human capital. Furthermore, the necessity of investment in education is associated with the necessity to implement physical telecommunication infrastructures. The potential advantages resulting from the progression of ICTs may be reflected in an acceleration of economic and social development, and a better inclusion of isolated populations, especially in rural areas. Thus, while offering a large number of economic development opportunities, ICTs are, in addition, associated to a risk of exclusion for those economies which fail to adapt.

The actions to be implemented require different actors, including: government, private sector, international bilateral and multilateral partnership, non-governmental organisations and the media.
The implementation of the strategy requires a follow-up framework based on the definition of objectives and indicators follow-up allowing periodic assessment both of actions undertaken and results.

I. Introduction

The new economic order and the market economy are characterized by globalization which leads countries whatever their development level, to open to competition and to various transactions, thus creating an area paramount for the utilization of the information and communication technologies (ICT). Access to information, and therefore to knowledge acquisition, is viewed as crucial for the development process. In this respect, special attention should presently be paid to technology for it creates opportunities for the advancement of health care and nutrition, for the broadening of knowledge, the stimulation of economic growth, and it also provides individuals with the means to participate in the life of the community.

Some consider technology as a result of development, and the digital divide as an inevitable consequence of income differences. Admittedly, the people have a greater access to the benefits of technological progress as their incomes increase, but a number of techniques also represent tools for human development which enable the population to improve its income and its life expectancy, to enjoy better health and living standards, and to be more innovative. Like education, technology represents a means for the poor to surmount their condition. It therefore represents a tool for growth and development and is not only an outcome of them.

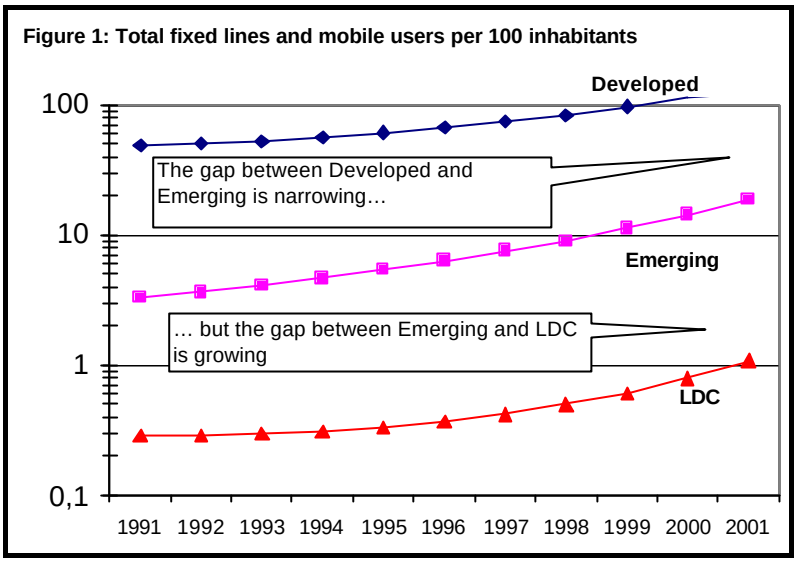
The United Nations Millennium Declaration signatories' *leitmotiv* "[to undertake] among other things, to ensure that the advantages of the new technologies, and in particular ICT, should be granted to all", should be viewed in this context. Access to information, and to knowledge acquisition, is viewed as crucial for the development process. On one hand it involves the existence of adequate ICT networks and services, on the other hand, the capability to use these tools in order to design applications useful to the whole of society. However, both these tools and the capacity to use them are unequally distributed"[(1)].

The Millennium Declaration acknowledges the specific problems faced by the vulnerable communities such as LDCs, the small developing insular states and landlocked countries. It also acknowledges the necessity to enable these countries to fully participate in the world economy. The vulnerable communities are, even to a larger extent than the others, dependent on ICTs because of their isolation.

Indeed, in spite of considerable progress achieved in recent years, access to ICTs, namely to the fixed and mobile telephone, the Internet and to radio-broadcasting, remains unequally distributed. The double-speed development is particularly felt in Africa, the continent which contains 39 out of 49 least developed countries in the world. According to the International Telecommunications Union (ITU) 1991 estimates, total telephone penetration (fixed plus mobile telephony) represented 49 per cent in the developed countries, against 3.3 per cent in the emerging countries, and only 0.3 per cent in the least developed countries.

Ten years later, these figures increased to 121 per cent, 18.7 per cent and 1.1 per cent, respectively. The ratio between developed countries and emerging countries decreased by more than half, declining from 15/1 to 6/1. Conversely, the gap between emerging countries and LDC widened, the ratio changing from 12/1 to 17/1. The situation is even more serious with respect to the Internet (3 accesses per 1000 inhabitants in LDCs), and discrepancies affect not only access to but also quality of access to internet (SeeWorld Telecommunication Development Report, ITU 2002).

[(1)] Kofi A.Annan: The Millenium Declaration, Millennium Report of the Secretary General of the United Nation (UN 2000),Link:http://www.un.org/millennium/sg/report/



Source : World Telecommunication Development Report, ITU 2002.

In its 56/183 Resolution, the General Assembly observes that it is "urgent to utilise the potential of knowledge and technology in order to achieve the objectives of the Millennium Declaration and to find efficient and innovative means to put this potential in the service of the development for all".

In the present context of the globalisation of the economy and exchanges, industrial countries enter, albeit with some hiccups, a new area essentially based on information and knowledge. The issue of the way for developing countries, and more particularly the least developed countries, to find their place in such a context, considering their lack of communication means should therefore be addressed. In an increasingly non-physical new economy, the development challenge is thus reflected, at least to a certain extent, in the capacity of the different actors to share and organise the circulation of the "global" information.

The large-scale diffusion of the new ICTs in developing countries appears as an unavoidable challenge to be met. Should "the digital divide" which can currently be observed persist, developing countries could become even more isolated from economic circuits, and extremely marginalized, and their take-off opportunity once more heavily at stake.

This situation entails, once more, that the issue of the means to be implemented and the mechanisms to be promoted in order to help these countries to become less isolated and benefit from the progress in the new information technologies, and to integrate them in the global exchanges be addressed. The necessity to bring in the relevant support so as to enable these countries to benefit from economic globalisation is largely recognised and established. According to this stance, the debate can take place at the level of the analysis of the fundamental constraints, the determination of the potential for the improvement of institutional and human capabilities, taking into account existing mechanisms, and finally the definition of an appropriate strategy based on specific national, regional and international needs.

II. The situation of LDCs and the inhibiting factors

The LDCs are defined as low income countries whose growth has been hampered for a long time, in particular by a low level of human resources development, and/or serious structural problems. These countries are included in a list established by the United Nations General Assembly, which is revised on a three-year basis.

Box 1: Criteria and indications used in determining the list of LDCs

1. Per capita GDP
Three-year average, converted at each year's official exchange rate.
Threshold for graduation: above US$1,035.

2. Augmented Physical Quality of Life Index (APQLI)
Calculated as a simple average of four component indices based on the following indicators:

a) Health: child mortality rate (under age 5)
b) Nutrition: per capita daily calorie intake as a percentage of daily requirement
c) Education: combined primary and secondary school enrolment ratio
d) Education: adult literacy rate

Threshold for graduation: greater than 68

3. Economic Vulnerability Index (EVI)
Calculated as a simple average of five component indices based on the following indicators:

a) Share of manufacturing and non-government services in GDP
b) UNCTAD's merchandise export concentration index
c) An indicator of instability of agricultural production
d) An indicator of instability of exports of goods and services
e) Population size (in logarithm)

Threshold for graduation: less than 31

4. Supplementary (qualitative) considerations:
If any of the three criteria (per capita income, quality of life, vulnerability) is near its graduation threshold, a vulnerability profile of the country is called for to enable the Committee for Development Policy members to make a sound judgment on graduation out of the list of LDCs.

Source :UNCTAD-LDC-2002 Report

There are currently 49 LDCs in the world, of which 34 are to be found in Africa, with a population of 427 million, living, according to the United Nations, on less than one dollar a day.

Box 2: List of Africa LDCs and indicators

	Basic Indicators						*Internet Penetration*	*Cellular subscribers*
	Total Population	*GDP per capita (USD)*		*Main telephone lines per 100 inhabitants*			*Users per 10'000 inhabitants*	*Per 100 inhabitants*
	2001	*2000*		*1990*	*2001*		*2001*	*2001*
Angola	13'528'000	684.77	(99)	0.76	0.59		44.35	0.64
Benin	6'446'000	368.60		0.32	0.85	(00)	24.60	0.91
Burkina Faso	12'220'000	186.74		0.18	0.45	(00)	8.38	0.51
Burundi	6'860'000	119.58		0.15	0.30	(00)	4.48	0.24
Cape- Verde	437'000	1'355.88	(99)	2.41	14.27		-	7.21
Central Afr. Rep.	3'782'000	311.69	(99)	0.17	0.26	(00)	4.15	0.14
Chad	8'135'000	181.92		0.07	0.14		3.92	0.25
Comoros	727'000	-		0.75	1.22		34.39	-
Dem.Rep.Congo	52'522'000	-		0.09	0.04		0.10	0.29
Djibouti	643'000	-		1.10	1.54		51.32	0.47
Equatorial Guinea	470'000	1'290.23	(97)	0.37	1.35	00	11.32	-
Eritrea	3'815'000	191.08	(99)	-	0.84		786.37	-
Gambia	1'337'000	-		0.67	2.62		134.63	2.62
Ethiopia	64'460'000	106.04	(98)	0.26	0.48		3.88	0.04
Guinea	8'020'000	-		0.20	0.32		106.73	0.69
Guinea-Bissau	1'227'000	238.20	(97)	0.62	0.93	(00)	24.97	-
Lesotho	2'160'000	417.54		0.72	1.03	(00)	18.58	1.00
Liberia	3'108'000	-		0.36	0.21	(00)	1.59	-
Madagascar	16'437'000	243.24		0.25	0.36		21.29	0.90
Malawi	11'572'000	151.61		0.31	0.47		17.28	0.48
Mali	11'678'000	225.02		0.13	0.35	(00)	16.74	0.09
Mauritania	2'747'000	368.44	(99)	0.29	0.72	(00)	18.87	0.27
Mozambique	20'190'000	209.27	(99)	0.34	0.44	(00)	15.24	0.26
Niger	11'227'000	171.27	(98)	0.12	0.19	(00)	4.66	0.04
Rwanda	7'949'000	236.33		0.17	0.23	(00)	6.47	0.67
S. Tomé & Principe	150'000	-		1.92	3.10	(00)	436.48	-
Senegal	9'662'000	512.12	(99)	0.60	2.45		103.50	4.04
Sierra Leone	4'870'000	131.01		0.32	0.47		14.37	0.55
Somalia	10'050'000	-		0.17	0.15	(00)	0.21	-
Sudan	31'809'000	364.24	(97)	0.25	1.42		17.61	0.33
Tanzania	35'965'000	257.05		0.29	0.49	(00)	32.75	0.51
Togo	4'657'000	282.15		0.30	0.92	(00)	216.03	1.08
Uganda	22'525'923	249.61		0.17	0.28		26.64	1.43
Zambia	10'649'000	462.64	(97)	0.88	0.80	(00)	19.19	0.95

Source: www.itu.int/ITU-D/ldc/indicators.html

Most analysts consider that LDCs' situation has worsened, which has resulted in a limited growth of the telecommunication sector. According to the ITU estimates, teledensity is 0.59 per cent, against 10 per cent in developing countries ; there is less than one Internet user per thousand people in these countries.

In fact, the 49 LDCs share the same characteristics and they face the same types of constraints but they differ in terms of economic and geographical potential. The problems are on one hand technical, linked to the telecommunications services obsolescence and under-equipment, on the other hand political, with geographical discrepancies resulting from political choices implemented in general by centralising States which promoted a more or less exclusive concentration of telecommunication services in the capital cities. However, the future information society assumes a universal and equal access to all the populations in a country.
The main obstacles and bottlenecks should be looked for in the following fields: infrastructure status, the financial and institutional capabilities, and the level and qualification of human capital, cultural differences, etc.

1. Infrastructure status

While it is true that encouraging trends have emerged for some years, the discrepancy between development levels in Africa, and more particularly in the least developed countries, and levels attained in the rest of the world has widened in the field of ICTs more than for more classical criteria used for measuring development. The fact is that african population in its large majority has never made a telephone call, or in terms of quality of communication, because of existing networks obsolescence or saturation.

Irregular power supply, if any, a common feature to the whole of the landscape represents a major hindrance to an intensification in the use of ICTs, especially out of the large towns. Many countries' power distribution networks are very limited and penetration in rural areas has just been initiated. Long power cuts are more or less the norm, even in such capital cities as Accra or Dar es Salam. Further, most tax regimes continue to consider ICT products, almost exclusively imported, as luxury goods, which makes their purchase price even more expensive, thus preventing most people from buying them.

Under these conditions, it is not surprising that radio-broadcasting still remains the most widely used mass communication means, and the ownership of a radio set is much more common than any other electronic device. It is also worth observing that many people listen to or watch the same TV set at the same time. According to the 2001 UNESCO Report the existing radio transmission networks reach more than 60 per cent of the sub-Saharan African population, while television coverage is essentially limited to the larger towns.

However, it can be said that most LDCs are experiencing an expansion and a modernisation of their telecommunication networks, which is reflected in an annual increase of the number of main lines of around 10 per cent. In addition, a large part of the telecommunication network is analogue and a large number of sectors operate to capacity saturation or they are not very reliable, especially during the rainy seasons. Moreover, 50 per cent of the available lines are concentrated in the capital cities, where only 10 per cent of the population live. Compared to the rest of the world, it appears that the region avails of by far the least developed infrastructure.

The existing telephone networks status varies greatly depending on the countries. Some, like Botswana and Rwanda, which have made telecommunications one of their priorities, are installing digital switches with optical fibre links between towns together with the most up to date cell and mobile telephone technology. At the other extreme, countries such as Madagascar and Uganda have analogue telephone systems which, in general, are not very reliable and poor national links between urban centres.

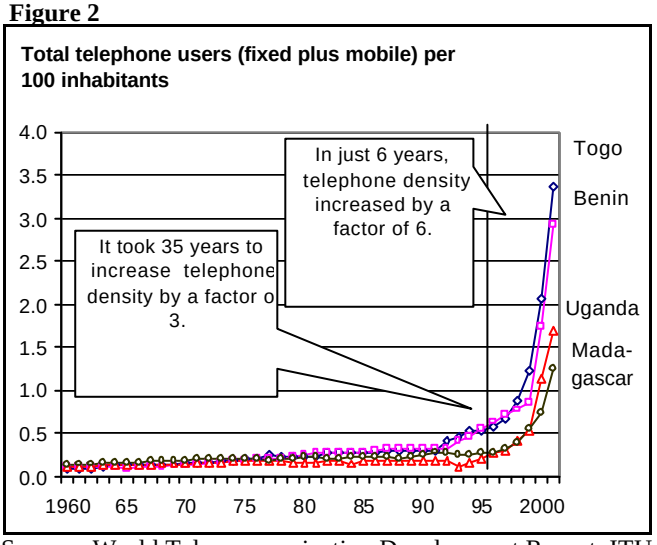
Thus, in terms of main lines capacity, the change which took place in the 90s shows considerable discrepancies from one country to another, since in some countries capacity decreased while in other countries it increased 300 per cent. The countries whose capacity stagnated are obviously those in which the political and economic situation have experienced serious problems in the past decade such as Liberia, Rwanda, Congo, Angola etc. Conversely, neither are countries where the situation experienced the greater improvement characteristic of an average situation; in general, growth took place in small countries where networks development cost is much lower, such as in Cape Verde.

At the sub-regional level, Sahel and Central African countries, such as Mali, Niger and the Democratic Republic of Congo, have less than two telephone lines per 100 inhabitants.

With the advent of the mobile telephone, access to telecommunications increased considerably. Uganda enshrines the example of the mobile telephone revolution in LDCs. This east African country granted in 1998 a licence to a second national operator (MTN Uganda), whose priority was access to prepaid mobile telephones. Microwave network installation is rapid and, in a country where the majority of the population cannot afford a subscription, prepayment makes telecommunications more easily affordable to many. The results were spectacular. Uganda's overall teledensity increased fourfold, from 0.41 telephone subscriber per 100 inhabitants in 1998 to 1.72 in 2001. In slightly more than one year, MTN became the most important operator in the country.

The company has since actively undertaken to expand the network to the rural areas. More than 50 per cent of the population and about 80 towns are currently covered by the cell phone. An increasing number of LDCs are now implementing the Uganda project.

Figure 2



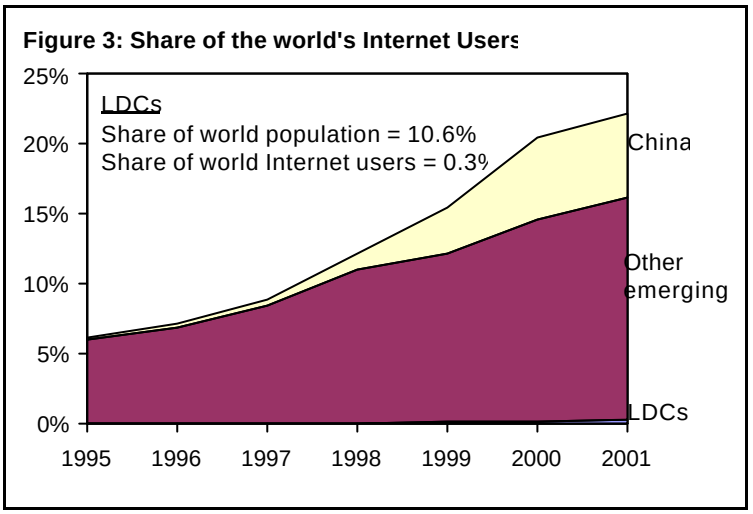
Source : World Telecommunication Development Report, ITU 2002.

The Internet is still a privilege in the least developed countries, where two out of a thousand inhabitants use it. This ratio, which is clearly less than the average of other developing countries (one out of twenty) is well below certain developed countries, where one out of four inhabitants has access to the Internet (see figure 1).

This discrepancy is not only due to LDCs' extreme poverty, but to geophysical factors too. The Internet requires excellent quality and very fast connections, and the corresponding infrastructures. But, in the

major part of these countries, especially landlocked territories and remote islands, there are very few national and international links. These countries are not yet equipped with optical fibre links, and satellite links are limited and very expensive. Furthermore, internal telecommunication infrastructures are, generally speaking, concentrated in a few of the larger towns, while they are seriously insufficient in rural areas. As a remedy to this situation, certain countries have made the decision to supply access to the Internet via local call over the whole of their territory through the use of a determined zone code. Some countries (Angola, Botswana, Ghana, Namibia, Tanzania) have POP servers in some of their secondary towns.

In addition, demand for the various services offered on the Internet is not expected to increase until a wider penetration of computers and data processing material takes place in the region.



Source : World Telecommunication Development Report, ITU 2002.

2. Financial resources and institutional capability

An additional characteristic of LDCs' situation is the difficulty in bearing the cost of the use of communication technologies. Indeed, the proportion of the population that can afford to pay the price of a telephone is much lower than in other countries. Human poverty and institutional fragility deepen the gap between technologies adapted to the incomes and capabilities of rich and poor countries alike.

Furthermore, revenue generated from international calls, especially incoming calls represents more than half the telecommunications revenue, while it also represents a source of foreign currency (except Lesotho) [See Case Studies: Uganda (2000), Lesotho, Mauritania, ITU, (1998)]. Thus, in the context of changes within the international telecommunication environment, including the distribution of revenue from joint international services, a change in the international calls tariff system will have significant implications on LDCs which rely heavily on international payments in order to guarantee the financial solidity and durability of their infrastructure development plans (Box 6).

Box 3: Case Studies: Impact on LDCs of the change in the international telecommunication environment

The case of Uganda

Like other LDCs, Uganda is heavily dependant upon revenues from international telecommunications However; the level of dependency is relatively low compared with that of other countries. Indeed, the overall level of revenue from international markets was just over 10per cent of Uganda Telecommunication Limited (UTL) (Telecom operator) revenues. There are some reasons why UTL gains so little from international services: (1) UTL's overall inefficiency in collecting and retaining revenues, (2) much traffic goes unrecorded; billing inefficiencies, (3) UTL is a net payer to many developed countries.
The lack of revenue gained from international services is one reason why UTL has been unable to expand its network at a faster rate.

The case of Lesotho

Lesotho occupies a rather exceptional position with respect to international traffic; Lesotho is a net creditor in accounts settlement, and outgoing traffic is greater than incoming traffic. A large part of international calls transit via South Africa, and they are not included in the international call statistics.
The main difficulties for LTC are the lack of investment and insufficient funds. Overall, Lesotho experienced a negative lines development, which results in a low telephone density.

The case of Mauritania

Mauritania Telecom revenues are relatively less dependent on international calls modes of payment. Nevertheless, as a country with a low international calls reception rate, and thanks to the transit agreements, the analysis shows that asymmetrical tariff is more adequate and it can generate more revenues that the basic no change scenario.

Source: ITU Case studies at : www.itu.int/casestudies

Furthermore, the weakness of institutions may not only slow down the diffusion, but also the creation of specific products in developing countries. In this respect, the main obstacles to the implementation of national information and communication services are listed below: (1) lack of adequate standards for homologation of materials prototypes; (2) difficulties in obtaining authorisations to have access to international telecommunication companies; (3) lack of an appropriate legal framework for the creation of companies or value-added services suppliers' associations; (4) lack of support services, computer training, information strategies planning; (5) difficulties in obtaining the required funding; (6) delay in the provisions relative to intellectual property rights; (7) restrictions on freedom of speech; (8) lack of satisfactory management and coordination mechanisms at the national, regional and subregional levels; (9) lack of awareness of the importance of the implementation of the information and telecommunication infrastructure.

Thus, in a study carried out UNCTAD (see Report on Trade and Development, 2001), on electronic commerce development in ten LDCs, the most important obstacles mentioned by companies wishing to start electronic commerce in LDCs are of a regulatory character: foreign exchange control,

telecommunications monopoly, restrictive commercial practices, miscellaneous prohibitions with respect to encryption, Internet telephony, and the possibility to use their own access portal, and so on.

3. Human capital level and qualification

While we are moving from the era of fixed telephony to the era of ICTs, the requirements for human resources development are exponentially multiplying, in terms of both users and specialists. While the use of a fixed telephone does not require any prior training, handling a mobile phone is already more complex; Furthermore, the poor level of technological knowledge in LDCs should also be taken into consideration. Certainly, the Internet provides access to the whole of global information, but one needs to be able to read and write in order to use a complex system and retrieve what one is looking for.

LDCs are not only the countries where per capita income is the lowest, but where the illiteracy rate is the highest, the enrolment rate in primary education is the lowest, and the educational divide between girls and boys the widest. (Report on LDCs, UNCTAD, 2002).

Although an improvement of competence has been achieved in the last twenty years in certain deprived countries, some countries do not avail of the adequate capacities as yet. This shortcoming makes them incapable of adapting the technologies available in the world at large to their needs, and *a fortiori* to extend the use of ICTs and define their own programmes in order to meet their needs.

Policies and instruments have been implemented in most countries in order to promote human resources development. In the education and training sector varying levels were achieved in different countries. Indeed, in certain countries the efforts have resulted in human resources development in IT both in the formal academic system and in training institutions while in some other countries the performance levels remain poor.

In addition, policy implementation faces difficulties, which are generally associated with hardware and software acquisition and shortage of a qualified workforce.

4. The cultural dimension

The debate on ICTs content bears a great significance in this regard. The risk of cultural colonisation by nations producing most of the cultural goods on information highways is real, and exposes ICTs to being rejected by developing societies. The greatest handicap, which represents an inhibiting factor is the fact that, gradually, a certain "cyber-culture" is settling on the network with a specific behaviour, and with particular standards and languages.

III. International awareness closing the digital divide

Since the 1995 G7 Information Society Conference expressed its concern in respect of the digital divide dividing industrial countries from developing countries, and launched an appeal for "a shared vision of human empowerment", issues related to the digital divide have become an international priority.

During the Okinawa Summit in July 2000, the G8 prepared the Okinawa Chart on the Global Information Society and created the Digital Opportunity Task Force (DOT Force). The DOT Force

designed a plan, "Digital Opportunities for all: Surmounting the Challenge", presented during the G8 Summit in Genoa in July 2001.

On the occasion of its Millennium Session, the United Nations General Assembly paid specific attention to ICTs, and a United Nations working group on ICTs was created, as a practical step, in order to reinforce the United Nations system role and leadership, and to develop effective partnership with the private sector, civil society and other relevant parties.

The ECOSOC session in July 2001 took up the theme of ICTs, with special emphasis on knowledge networks.

The financing implemented by the international cooperation in ICTs clearly shows the importance given by the international community to this sector. The following represent projects with the greatest potential:

- The United Nations System Special Initiative for Africa, under the aegis of the Secretary General, within which information and communication technologies represent one of the main components of a programme, called "Information Technology for Development", which benefits from the support of various UN partners. (www.unicttaskforce.org).

- The USAID/Leland (United States Agency for International Development) Initiative, which provides assistance for the development of Internet connectivity in twenty African countries in return for agreements to liberalise the market to third-party Internet services providers and on adopting policies allowing for an unrestricted flow of information. Within the same programme, new initiatives announced by Vice-President Al Gore include a programme entitled "One million PCs for Africa, a thousand schools and one hundred universities connected".

- The ITU LDC special programme, whose aim consists in the reform of the telecommunication sector and the increase of telecommunication services penetration rate in these countries in order to guarantee universal access to these services. (See Figure 5).
  Among the United Nations agencies, the International Telecommunication Union (ITU), plays a key role in telecommunication development and the dissemination and exchange of information, in particular through its Telecommunication Development Bureau (www.itu.int/ITU-D/ldc) and the Strategy and Policy Unit (http://www.itu.int/osg/spu).

- The World Bank, which offers assistance in the telecommunications field and ICT development. These initiatives include, in particular, the African Virtual University (AVU), Economic Toolkit and Workshops for Internet Connectivity in Africa, the Rural Telecommunication Field Trial.

- IRDC's Acacia programme which develops projects ICTs to the development the use of ICTs in communities in Africa,(www.idrc.ca/acacia/studies/ir-gap/s.htm).

- The United Nations Conference on Trade and Development (UNCTAD) Trade Point Initiative which emphasises the commercial aspect, (www.gtpnet-e.com).
  UNCTAD has made Africa the priority region for the next two years (2002-2003). A financial commitment of 30 million Euros was obtained from the European Union for networks regional development for the improvement of local trade in Africa.

- UNESCO gives a high priority to initiatives in informatics and telematics in Africa through support to the Regional Informatics Network for Africa (RINAF).

In addition, UNESCO implemented the Creating Learning Networks for African Teachers project designed to help teacher training familiarise themselves with ICTs and their application in teaching, and to connect them to the Internet. The project, already operational in Zimbabwe, has been initiated in Senegal, and will be, in principle, extended to other African countries. (www.unesco.org/webworld).

- In recent years, UNDP has launched several initiative and partnership agreements with the private sector and some foundations. The 2001 Human Development Report stresses the role of the new technologies in development. (www.undp.org/hdr2001).

- The UNDP Bureau/Centre for Africa gave its agreement for the creation of 6 million dollar fund in order to finance internet connectivity upgrading in Africa within a project called "Internet Initiative for Africa" (IIA). Countries that are currently involved include Angola, Burkina Faso, Cape Verde, Gambia, Mauritania, Namibia, Nigeria, the Democratic Republic of Congo, Sao Tome-et-Principe, Swaziland, C had and Togo.

- The UNDP Sustainable Development Programme for the Creation of Networks (SNDP) includes ten operational nodes in Africa (Angola, Benin, Cameroon, Malawi, Morocco, Mozambique, Chad, Togo, and Tunisia). National projects implemented within SNDP are funded for a two or three year period, and should, in principle, provide starting capital to launch a sustainable operation, either through remunerated services or incorporation to the State budget. (www.undp.org/comm/).

- The United Nations Programme for the Environment (UNPE) Mercury Project which utilises the VSAT (Very Small Aperture Terminal) technology for the implementation of an information exchange network on the environment in Africa. The UNPE cooperates with the ITU to study the possibility of using the network standby pass-band for other functions. (www.uneca.org)

- Catalysing Access to ICT's in Africa (CATIA), initiated by the U.K. Department for International Development. CATIA has several objectives including support for key organizations influencing regulatory policy in the telecommunications and Internet sectors and CATIA will also encourage private/public partnership activities that facilitate low cost Internet access opportunities across Africa.

In addition, UNESCO implemented the Creating Learning Networks for Africa Teachers project designed to help teacher training familiarize with ICTs and their application in teaching, and to connect them to the Internet. The project, already operational in Zimbabwe, has been initiated in Senegal, and will be, in principle, extended to other African countries.

Box 4: ITU's Special Programme for LDCs

Since 1973, ITU has significantly assisted LDCs. Currently, the 49 LDCs receive a technical assistance in various fields in order to accelerate the pace of development in their telecommunications, which, in turn, will entail socio-economic development in these countries.

In conformity with the Buenos Aires Action Plan, and subsequently the Valetta Action Plan, crucial priorities include the introduction of new technologies, the reform and re-structuring of the telecommunications sector, rural telecommunications development, human resources development, and telecommunications networks extension funding through partnership.

The main objective of these special actions towards LDCs is closing the digital gap between the poorest 49 countries and the rest of the world. In practical terms, the programme aims to increase average teledensity up to five main lines per 100 inhabitants, and connections to the Internet to 10 users per 100 inhabitants by 2010.

The strategy will consist in focusing on a small number of countries, starting with those with the least means, and gradually covering the others.
In 2002, the following African countries have been selected for specific assistance: Djibouti, Malawi, Central African Republic, Mali, and Zambia.

A special assistance is equally brought to LDCs, which have just emerged from war, internal troubles or natural disasters, such as Somalia, Rwanda, Burundi, Liberia and East Timor. The aim of the assistance is to consolidate their political and regulatory frameworks in the telecommunication sector and to improve access to rural areas to services by encouraging private investment.

Source: www.itu.int/ITU-D

- The various activities of the Francophony Inter-governmental Agency and other international bodies, which assist French-speaking economies, mostly located in Africa, in ICTs. The AFRINET project which was launched recently provides Web servers and related media at the ministerial level in Benin, Burkina Faso, Cameroon, Ivory Coast, Madagascar, Mali, Mauritius, Mauritania and Senegal. (www.francophonie.org)

- Some private sector forums have also introduced the ICT theme. For example, the World Economic Forum (FEM) which launched, in April 2000, a global digital initiative to make the digital divide an opportunity for growth and which adopted an action plan in October 2001. Priority has been given to actions oriented to the adoption of e-strategies by governments, human resources development and initiatives from companies.

- The role of civil societies is becoming more and more visible, with an increasing number of initiatives on site.

IV. Challenges and needs

As the results of various experiments reveal, the diffusion of new communication technologies in the least advanced countries is not a fallacy. Certainly, the Internet will never replace the need for good roads, but this tool can limit the harmful effects of the shortage in key infrastructures such as transport, health care, education and logistics.

Within a development strategy, the ICT objective consists in allowing LDCs to benefit from these technologies in order to achieve the objectives of their collectivity/community in social, economic, educational and health care development. Some priority problems delay LDCs development including health and education; ICTs represent some of the possibilities for their resolution.

1. The challenge: ICTs for development

In its 56/183 Resolution[1], the General Assembly states that it is urgent to utilize knowledge and technology potential in order to implement the objectives of the Millenium Declaration and find efficient and novel means to put this potential in the service of development for all.
The main challenge is linked to the danger of creating a two-speed society in which only one part of the population has access to the new technologies, and is able to use them with ease, and enjoy the advantages they procure. There is then a risk of a rejection of the new information culture and its tools. Hence, the preparation of LDCs for the advent of the information society is a priority task. Teaching, training and awareness building will necessarily play a central part.

The opportunities offered by the global information and communication revolution to developing countries are considerable if adequate policies are correctly implemented. Indeed, the advantages of the new ICTs are no longer limited to the communication and information sectors; they now represent general use technologies, penetrating all fields and sectors, for instance:

a) In the field of education: ICT use has potential promise for drastic cost reduction and for an improvement of training and education quality. Education and training should be considered as a priority for the promotion of equal opportunity for participation in and benefit from the information Society. ICT integration in the curriculum and in teachers' education and training should be reinforced as teachers are knowledge multipliers in ICT use. Technological skills acquisition in all levels of education, especially the broadening of knowledge in informatics, is essential for attracting investment, and sustains entrepreneurship, which are both crucial for economic development.

b) In the field of health care, ICTs will play an important part in the alleviation of certain problems, which can be achieved by improving access to health care services in rural areas, by extending public education campaigns in order to promote sanitary behaviour, through the transfer of diagnoses information to the specialized centres, by reinforcing information for decision making, promoting information exchange between researchers and students, and valorizing public health establishments.

c) In business, where exchanges are hindered by poor transport and communication networks and lack of information, ICTs will allow business companies to become more competitive thanks to

[1] The text of the Millenium Declaration is available at : http//www.un.org/millennium/declaration/ares552e.htm

updated and adequate commercial information. Indeed, ICTs boost the establishment of links between chambers of commerce, commercial companies, and commercial associations and firms, so as to help small and medium-sized firms and develop regional and international exchanges, and further reduce the cost of business transactions.

d) Food security: for example, ICTs are a way of receiving drought alarms on time, enabling the timing of the planting of crops to be modified, thereby reducing the risk of famine.

e) Women and development: ICTs provide access to information and indicators which help in identifying problems. They provide equitable information opportunities for women, together with access to technology and technical education.

f) Culture: the new opportunities are numerous, including saving the cultural heritage on electronic media, supporting it with documents and carrying out its diffusion, and the original production of local contents.

g) Development of governmental services, as well as electronic registration of marital status and tax forms, for example.

2. The needs

In order to reduce the digital divide, countries concerned should play a central part by making their ICT needs known. However, while information is a necessary source for alleviating poverty, information alone is by no means sufficient. Equally or even more important are such factors as competence, production technologies, the requirement of results, and other societal sources. The African countries' ICT needs listed in the New Partnership for Development in Africa (NEPAD) represent a significant reference point. The various studies carried out agree on the notion that the building an information and communication sector requires the utilisation and development of the following elements as supporting factors prior to the implementation of an ICT policy: (1) a legal and institutional framework, (2) human resources, (3) technological infrastructures, and (4) information resources.

a) The legal and institutional framework

This requires the following conditions:

- More flexible regulations in order to promote competition and the reduction in cost of telephone and Internet subscriptions;
- Exemption or reduction of the tax regime in order to stimulate the informatics and telecommunication sectors;
- Reinforcement of legislation, in particular with respect to the promotion of e-commerce and the protection of intellectual property;
- Support of the universal access programme through legal assistance in the field of ICTs.
- Price structure revision and reform.

b) Human resources

LDC social and economic development is, to a large extent, determined by the size and quality of the employed population – its human and intellectual capital - education, training, and the valorisation of human resources will represent milestones for the new information society. Furthermore, on one hand human resources development requires novel attitudes from decision-makers and new skills among both the executives and the labour force, i.e. the capacity to adapt, adopt and utilise the new technologies and master change, and, on the other hand, the creation of new labour markets in which the technical competence and knowledge acquired could be used. It is in fact necessary to ensure:

- The training of decision-makers, who should be aware of the necessity of an equitable access to technology;
- The training of computer technicians and electronics engineers;
- The training of telecommunications and computer engineers;
- Training in new Internet skills: cyber-archivists, website designers, web designers, profilers, etc.
- Basic training in the use of the Internet and information management for all categories of development professionals;
- Improvement of the rate of elimination of illiteracy.

c) The technological infrastructures

No information and communication system can operate efficiently without reliable inexpensive and abundant technological means, in the form of computers, software and all the elements of a telecommunications infrastructure allowing data and information processing.

Not only will it be necessary to modernise and develop the infrastructure and the telecommunications material and logical network at the national level, especially in rural and remote areas, but also to improve interconnection at the regional level and include international transit centres for access to international telecommunications networks.

The basic needs are as follows:

- The extension of the telephone network to the whole of the country, possibly using fundamental plans of this country;
- The increase of the number of inter-city lines and extension of the telephone network to rural areas;
- The development of telecentres in suburban and rural areas;
- The growth of access providers in rural and suburban areas;
- The increase of the pass band transmission rate for the Internet and the multiplication of Internet nodes (especially in hinterlands);
- Internet access line development;
- Production of adapted data-processing software.

d) Information resources: "the info-structure"

It is generally assumed that the poor are solely beneficiaries of information and knowledge technology. It is obvious that this is not the case. Deprived communities produce their own information and knowledge. Thus, ICTs may play a positive part by allowing the wider diffusion of indigenous information and knowledge.

But information gathering is not an end in itself; it should also be processed and routed to the end-user without delay. The challenges of information highways are first and foremost technological. The nations with the know-how and performing infrastructures for information processing and distribution are undeniably those well ahead of the others. Information highways represent an opportunity for LDCs, and can help compensate for lower levels of technological and economic development. The sectors in the best position to draw a maximum of benefit, and very rapidly, are education, scientific and technical research, medicine, tourism, the valorisation of the cultural heritage and trade and industry. The rural world, which represents 85 per cent of the population in LDCs, should not be excluded from this process, hence the importance of developing community information systems allowing the codification of all of the information required for the rural sector development by:

- designing interfaces for information access by an illiterate population;
- making such information as civil status data, economic statistics linked to the agricultural sector, handicraft, fishing and cultivation available.

The implementation of polyvalent community telecentres (TCP) by ITU with the cooperation of several partners (UNESCO, UNDP, HCR, WTO, private organizations) benefiting a group of LDCs is impressive. (see http://www.itu.int/ITU-D-Rural).

In Senegal, according to the telecentres managers union, the some 10,000 operational telecentres in the country generate an annual turnover of circa 50 million Euros, an activity which, in addition, contributes to the creation of a large number of jobs (about 15,000) particularly for young people.
The least developed countries which benefited from ITU pilot projects executed or currently implemented, are listed below: Benin, Burkina Faso, Cape Verde, Mali, Uganda, the United Republic of Tanzania, Nepal, Bhutan, Malawi.

It is obvious that these projects are exposed to problems which reveal the significance of needs, in particular: power supply and other problems related to infrastructure. Access to the Internet is confronted to the problem of analogue obsolescence. It is particularly the case of Sengerema TCP, in Tanzania. The definition of a relevant and useful content for the local community is not an easy task.
Hardware and software maintenance is poor. A low literacy rate and limited computer knowledge, and services which are too costly.

V. A strategy for closing the digital divide

In the light of the analysis of ICTs in the least developed countries and of the identification of the potential needs, it clearly appears that the constraints hindering the development of information and communication of a society are closely linked to the economic and social context and to the different factors belonging to the transfer of technology. Thus, the actual issue to be addressed by a strategy for the promotion of ICTs is that of determining in what way such communication tools as the Internet or the telephone, radio and television can contribute to the local development of communities, thereby

creating the conditions of a sustainable development in each of these countries and in the regions which surround them.

In this respect, the 2001-2010 Action Programme for LDCs of the third LDC United Nations Conference (Brussels 2001) invited partners to pay special attention to LDCs' needs, and recommended some steps in favour of these countries. Partners to implement concrete measures, especially in the field of ICTs, base this partnership on LDCs and the reciprocal commitments for development.

The programme of action comprises four quantifiable objectives in respect of the upgrading of the telecommunications physical infrastructures, as follows:

- LDCs communication networks development, including the post and telecommunications services,
- Improvement of access of the poor to the services both in urban and rural areas ;
- A 50 per cent increase of the teaching of informatics in higher education establishments and universities by 2015, and a 25 per cent increase in primary and secondary education;
- Increase of average telephone density to five main lines per 100 habitants and increase of 10 per cent in the proportion of persons connected to the Internet by 2010.

Also, against this background, the Istanbul Action Plan adopted during the last Telecommunications Development World Conference (held in March 2002) set out a special programme, aiming at improving access of the world poorest countries to information and communication technologies.

In order to achieve the objective of increasing telephone density, the programme proposes a new mechanism which adopts a two-year procedure to increase the number of assistance beneficiaries from six to twelve countries for a two-year period, for a more sustained follow-up of the measures taken. The priority aspects of this programme are:

- The development of rural telecommunications in order to ensure easy access to telecommunications services in the rural areas in which the major part of the population of LDCs live;
- Infrastructures development and the adoption of new technologies and new services according to the countries needs and priorities;
- Restructuring of this sector in order to facilitate liberalisation and competition and, possibly the privatisation of the sector;
- Human resources development and management;
- Funding and the coordination between the funding partners for an optimal use of the potential resources.

Nevertheless, if such strategic objectives as those recommended by all the partners are to be achieved, it is appropriate to define the fields where constructive partnerships between the different actors, the public and the private sectors can be implemented at the international, regional and national levels. Reconciling a number of often-divergent priorities involves the implementation of a national action plan based on the priorities and particular features of each country, the follow-up of performance indicators, and the promotion of an adequate financing mechanism. A great number of countries have defined their policy in this respect, such as Benin, Burkina Faso, Cape Verde, Gambia, Mauritania, etc. (UNECA, May 2002, http://www.uneca.org/). The process should now be generalised and its implementation encouraged. Given the significance of the issue of the strategy funding, the part of the international community is fundamental.

Furthermore, cooperation, links and partnership between the countries concerned should be developed, which would enable them to collectively draw the benefits of the experience accumulated in respect of programme implementation, and would stimulate development in miscellaneous information and communication fields on the regional level.
There is, today, a certain consensus on the strategic objectives to pursue, including:

- The implementation of a progressive organizational and regulatory platform;
- Human resources improvement;
- Information resources ("info-structure") improvement;
- Technological resources improvement;
- Application of the ICT in all sectors in support of economic and social development.

1. Implementation of a progressive organisational and regulatory platform

The actions to be implemented require different actors, including government, private sector, non-governmental organisations and the media.

Experiments the world over have showed that the rapid diffusion of ICTs in a country is closely linked to the level government support. The government's role is, first and foremost, to present a vision for the future, a strategy and an environment favourable to the implementation of a national information and communication infrastructure, and to ensure that all sectors are benefiting from it. Its mission should consist in:

- Elaboration of national plans for the adoption of informatics and new communication technologies by government or public bodies, and follow-up on their implementation;
- Promotion of the use of the new information and communication technologies in the civil service in order to improve public services productivity and stimulate information and communication industries;
- Significant support to public establishments, such as higher education bodies and research institutions;
- Creating a framework and procedures for the participation of all sectors in the implementation of a national information and communication infrastructure, the coordination and harmonisation of different actors' efforts, including the private sector, non-governmental organisations and the media.
- Establishing relationships with other countries, international organisations and regional bodies, for coordinated and harmonious development at both the regional and the international levels;
- Designing the legal framework and the required regulations to resolve the problems related to costs of telecommunications and accessibility, universal service objectives, intellectual property, respect for privacy, free circulation of information and the convergence of radio and television broadcasting with telecommunications;

In this respect, governments' principal tasks are listed below (although this list is not exhaustive)

- Telecommunications: the issue is to facilitate the liberalisation of national telecommunications and radio and TV broadcasting public services. In this respect, legislation should be defined and incentive measures for the private sector's collaboration in the implementation of this infrastructure should be offered, and an independent and strong regulatory body in charge of the

regulation of partnerships between the public sector and the private sector and, particularly, international participation, should be established.

- Intellectual Property: LDCs require a legal framework which can take into balanced consideration intellectual property as an international obligation and the necessity to meet the basic intellectual needs of the poor. Governments should pass and implement copyright legislation and increase public awareness of intellectual property rights. They should also simultaneously forecast and design palliatives in respect of the negative impact of such laws on society.

- Respect for privacy: laws for the protection of private persons against any breach of their privacy that could be caused by the new technologies should be adopted.

- Free circulation of information: formulation and application of laws and regulations for the protection of the freedom of speech, which represents a guarantee for easy access to information and services.

- Facilitate equal access for women to the new information technologies.

The private sector has a significant part to play:
In this respect, the private sector can make a contribution, by using the appropriate mechanisms, for instance:

- Contribution to the creation of an adequate legal framework;
- Promotion of expansion of commercial activities in this field;
- Action at the level of the market so as to multiply the number of potential consumers by providing better quality and more diversified information services;
- Contribute in the creation of polyvalent telecentres;
- Finance experts to assist governments in the identification of needs for ICTs.

Role of non-governmental organizations (NGO)
The part of NGOs is that of a catalyst, while ensuring coordination with the government and the private sector. Hence, their part consists in making the needs of the poor and rural communities known, and in contributing in the development of their capacities so as to benefit from the services offered.

- Consumers' associations should voice their concerns and the needs of the public at large in order to define priorities.

- Workers' associations, which submit the workers' concerns to employers and to the government, and also support equal opportunities for women.

Role of intergovernmental organisations and bilateral assistance :

Some experiences are already initiated in certain countries. It is appropriate to focus the efforts on the targeted and concrete projects such as the improvement of the infrastructure and the development of applications. In this context, coordination between the different development partners could be useful for the mobilisation of the resources and to support a synergy.

Several projects are edifying examples of effective coordination between partners such as resources of online formation (iTrain-online) , technologies monitoring (ScanICT) and the use of the e-mail, the radio and the telephone (WAVE, WorldTalk) (see http://www.dotforce.org/).

Newspapers, radio and television offer an easy, accessible and low-cost means of transmission of information . The media have access to a large part of existing information sources, and broadcast on sufficiently wide bands to reach the actors and the various social strata, especially in poor and remote areas. Therefore, they have a part to play in information and awareness-building campaigns, which could be financed by the private sector.

2. Human resources valorisation

The above recommendations require that decision-makers, the private sector, the public at large, as well as students and the young in general, be well-prepared for the information society era. It will be crucial to pursue the strategy through the integration of ICT elements in existing projects.

1. Information programme for the actors

This aims to develop in the private and public sector decision-makers informed decision-makers, allowing them to improve their knowledge of the value of the use of information, national and international information resources, research methods and direct information retrieval on the Internet network or on other international information networks, the electronic mail and "knowledge bases" networks, potential social, economic and cultural effects of the new information and communication systems and the necessity for training in order to adapt structures and work methods in order to benefit from electronic media and spaces.

2. Teaching programme for schools and universities

The objective is the introduction of the new ICT in schools and universities. This programme aims at designing technological training/learning programmes required in various fields, adapting existing programmes to the countries' needs and conditions and instructors' and students' training in the use of software. Emphasis will be on gender balance and on the young people and promoting distance learning in the regions with insufficient coverage.

3. Professional training programme for specialized technicians and skilled workers

This programme's aim is to improve skilled technicians and workers in all professional sectors, such as health care, industry, tourism, transport, etc.., in using the new tools and techniques within their field of specialisation, in order to enable them to improve their performance in work. Special attention should be paid to information and telecommunications specialists.

The programme designed for information specialists should emphasise the training of telecommunications and networks technical services specialists, computer systems specialists as well as information services suppliers.

The programme should include the following activities:

- Implementation of the required infrastructure, especially "centres of excellence" in ICT, training centres, laboratories, and required facilities with respect to communication and networks services;
- Designing technological learning programmes at different levels of education;
- Technicians' and specialists' training in ICT.

The government's role should be supported by development cooperation, resulting in the implementation of institutional and regulatory frameworks in order to stimulate a proper use of ICTs in the educational sector. The role of NGOs may range from the articulation of needs which may be increasingly marginalized by technological progress, to the assessment of the population's real information needs, including the supply of relevant data at local level. The private sector can both provide the technical infrastructure and promote the creation of content by means of innovative ideas.

3. Information resources valorisation ("info-structure")

The following activities should be carried out:

1. Establishment of national information resources

The objective of this programme consists in the creation of national data and information sources, covering all economic sectors. It should include: (1) the creation of local and sector-based databases taking into account national priorities; (2) the creation of mechanisms for continuous data collection, updating and processing; (3) national databases and national information resources updating.

2. Creation of value-added information services

The objective of this programme consists in the creation of value-added information services absolutely necessary to make information available to the public sector and increase the comparative advantages of the private sector. It should include :(1) interconnection with the Internet network and the participation of LDCs in the network informational content; (2) creation of value-added information services in key fields of the economy, such as commerce, employment, tourist services, legislation, etc.

3. Creation of electronic libraries

Books and periodicals would be made available to schools, universities and research centres, through electronics to create direct national electronic libraries and provide direct access to international resources. In this respect, the following should be undertaken: (1) automation of national libraries and make them accessible en direct; (2) creation of devices allowing information exchange between libraries already existing in ministries, municipalities, universities and schools.

4. Technological resources valorisation

There cannot be an information and communication system operating efficiently without reliable, low-cost and abundantly available technological means, such as computers, software and all the elements of a telecommunications infrastructure allowing data and information processing. Neither is it about building a new communication infrastructure starting from scratch, rather it is about gradually extending the existing communication capacity so as to meet traffic increase.

Thus, LDCs are recommended to develop both access to telecommunications networks and services and to the global information infrastructure, in particular for the population in rural and isolated areas. In this regard the following should be implemented:

- Use of affordable radio and satellite communication systems, especially in rural and remote areas;
- Installation of networks with a reliable access to the global information infrastructure, especially to the Internet network;
- Installation of low-cost, simple, using flexible, modular and network models;
- Choice of equipment, software and applications according to the training and maintenance needs taking into account durability and ease of use;
- Installation of access systems in public premises (kiosks and telecommunications local centres) and mobile or easily transportable systems to bring the infrastructure close to mass information;
- Provision of printers to allow users to print the results of their queries or commercial transactions;
- Utilisation of radio and data broadcasting systems in order to broadcast information at an affordable cost in the regions deprived of the necessary telecommunication infrastructure;

In order to develop and modernise existing communication services, the following will be required:

1. Develop and modernise the national telecommunications infrastructures

The objective is to modernise the material communication infrastructure in countries that do not have the required installations; (see: www.itu.int/ipd)

- Extension of the geographical coverage of the material infrastructure and addition of new capacities and services;
- Introduction of new technologies in order to meet current demand considering the particular conditions of each country;
- Creation of basic network services, such as electronic mail, file transfer protocol (FTP), the World Wide Web, etc., in each country.

2. Interconnection at the regional level

This consists in the creation of national data communication hubs, in order to improve the regional and continental connections; the adoption of regional plans in order to develop the telecommunications network; and installation of direct links easy to obtain between countries; the creation of interconnections necessary between the telephone and data networks in the region; the creation of international transit centres and gateways between national networks and the rest of the world (see D. Akst and M. Jensen, June 2001).

3. *Integrated rural development*

This involves the creation of rural telecommunication centres, kiosks, mobile computer services and telecommunications in selected locations with the assistance of international funding bodies. In this regard, women and their concerns in ICT - through such projects as the radio-electric IP network implemented in order to make cyber-commerce more affordable (e.g. Project for the Entrepreneurs Association in Cameroon).

5. Finance

The most important difficulty is the lack of investment and insufficient funding. In order to progress, it is possible to envisage a certain number of responses at both the commercial and general policy levels. On the commercial level it is necessary to respond to the internal requirements of the countries, especially through the growth of the penetration rate in rural areas, international traffic growth, and increase of revenue and improvement of the tax system.

At the level of general policy, privatisation of the telecommunication sector and the arrival of strategic investors is bound to respond to the concerns related to the funding necessary for the development of the sector. However, any development effort should be accompanied by support for good governance and a reinforcement of institutions. Amongst other recommendations, the mobilisation of an external sources of funding and the liberalisation of services other than the central ones, such as the Internet and other value-added services, data services and international simple resale services (ISR), can stimulate international competition and boost revenues for operators.

A telecommunication development plan requires revenue increases. Among the recommendations generally made, increases in communication tariffs are usually favoured. As for price restructuring, the issue is to determine whether financing of universal service is indispensable in order that rural and

remote areas benefit from a sufficient coverage should be addressed, both from a policy and financing viewpoint. Nevertheless, there are many reasons why tariff increases should be limited, the most important one being the social cost which would result from an increase of communications tariffs.

In order to respond to LDCs' financial difficulties, the international community, in particular intergovernmental organizations and bilateral partnerships, should take a serious commitment and mobilize the resources required for the implementation of practical actions. The provision of financial and technical assistance within the reinforcement of ICT capacities is, in this regard, essential.

Conclusion

The connection of the least developed countries to information highways certainly represents a difficult problem. Determining ICTs' potential in low–income economies is a challenge - considering that the large majority of the populations may not benefit from this potential. In the context of the overwhelming problems of hunger, water shortage and physical threats, this challenge is considered as a diversion from the most basic development needs.

The insufficiency of information industry policy, especially with respect to the extension of basic infrastructure, at the current penetration rates in the rural areas, to isolated initiatives, can be incompatible in respect of licenses, tariff and interconnection agreements, which hampers an efficient and cost-effective infrastructure development in the long run. Moreover, the objectives associated with specific reform initiatives, whether privatization or liberalization may also suffer from the lack of explicit links between these initiatives and the wider government objectives with respect to the information industry.

It is obvious that the approach adopted by the developed countries in order to establish their information highways cannot be the same as those to be implemented by LDCs, not only because of cost but of adaptation to demand. A specific approach, and gradual connection based on the existing infrastructure seems to be a more realistic alternative. Hence, the implementation of efficient regional cooperation procedures for a dynamic policy of exchange of experiences, resources sharing and common initiatives, may constitute a motor for national or regional initiatives.

The issue which needs to be addressed, is whether the joint effort of all parties can stimulate growing and sustainable development and basic and advanced applications in order to improve living conditions among these populations.

Appendices : Strategy follow-up framework

Strategic Objective 1: **Implementation of an Institutional Framework**

Intermediate Objectives	Activities	Participants	Follow-up Indicators
1.Elaboration of a national plan 2. Promoting ICTs in the civil service (national and local level) 3.Institutional support to public establishments (University and research centres) 4. Implementation of a coordination and harmonisation mechanism between the different actors in the promotion of ICTs. 5. Implementation of a mechanism for regional coordination. 6. Implementation of a legal and institutional framework.	1.Telecommunications - Elaboration of a legal framework for telecom liberalisation. - Determination of priorities to be included in the action plan. 2. Intellectual property • Elaboration of a legal framework, copyright legislation • communication and awareness-building strategy re. intellectual property 3. Privacy legislation. 4.Legislation for the free circulation of information. 5.Actions for women's equal access to ICTs. 6. Development of commercial activities in the field of ICTs. 7. Marketing strategy in order to increase the number of users. 8. Awareness-building and information campaign.	The Government The private sector contributes in the creation of the appropriate legal framework through a participation in the definition of priorities and implementation of mechanisms. NGOs playing a part in the definition of needs, and assistance to populations with access problems. The private sector and government The private sector, the media, NGOs The media, NGOs.	1.Elaboration regulatory texts: Telecommunications Code; - Post code - Press code - regulation of electronic exchanges and business. 2. Organisation of the sector : - installation and operation of telecommunications networks - provision of basic telecommunications - provision of telecommunications services - provision of broadcasting services - creation of value-added telecommunications services, internet services - operation of telecommunications publics centres 3. Implementation of an awareness-building and communication strategy

Strategic Objective 2 : Human Resources Valorisation

Intermediate Objectives	Activities	Participants	Follow-up Indicators
1. Information and training Programme des participants	1.Implementation of an awareness-building programme and training of civil servants, decision-makers.	Government, private sector , NGOS and development partners IGO and bilateral assistance	1. Training programme for decision-makers 2. Creation of a college of communications : - Training engineers and executives, managers in the telecommunications field. - Training programmes for qualification. - Further education and training for the first job. - creation of a technological communications institute.
	2. Implementation of the required infrastructures (training centres, creation of excellency centres …)		
2. Teaching programme for schools and universities.	3. Technological learning curricula design.	Government, private sector , NGOS and partners de development (bilateral assistance)	- Telecommunications studies and research centre. - Information, training and documentation centres. - Introduction of the new technologies in school curricula.
	4. Trainers and teachers training.		
3.Vocational training programme.	5. Training of information technologies technicians and specialists	Government, private sector , NGOS and partners de development	- Provision of Equipment and learning aids to schools.
4. production of local contents: media, education culture	6. Training in the operation of modern networks management systems.		

Strategic Objective 3: Information Resources Valorisation

Intermediate Objectives	Activities	Participants	Follow-up Indicators
1.Constitution of national information resources.	1.Creation of local and sector-based databases according to priorities. 2. Designing data collection and updating mechanisms. 3. National data and information resources updating.	Relevant services and development partners.	Creation of Centre of excellence
2. Setting up value-added information services.	1. Interconnection with the Internet network. 2. Definition of a relevant content. 3. Set up a value-added information service in the following fields: business, employment, tourism, legislation.		- Provision of internet services - Implementation of a virtual commercial agency, offering on-line services.
3. Setting up electronic libraries.	1.Setting up electronic libraries. 2. Designing an information exchange mechanism between libraries in different services.		Creation of a virtual library.

Strategic objective 4: **Technological Resources Valorisation**

Intermediate objectives	Activities	Participants	Follow-up indicators
1. Telecommunications infrastructures development and modernisation.	1 Development of the communication sector.	Government, private sector and development partners.	I. 1. Postal network extension. II. creation of an express mail service. 2. International mail sorting centre.
	2. Broadcasting development.		II.1. radio coverage increased to 100%. 2. TV coverage increased to 100%.
	3. Telecommunications development.		III.1 Telephone density: 5 lines per 100 inhabitants in 2005 1. Digital cell mobile telephone network. 2. increase the number of subscribers to the fixed and mobile telephone. 3. public phone services. 4. international telecommunications network. 5. Rural telephone network. 6. Internet network covering the whole of the country 7. extension of telecommunications centres versatile in isolated areas. 8. Increase the number of beneficiaries.
2. Interconnection at the regional level	1. Extension of geographical coverage.		
3. Development rural integrated	1.Installation of radio and satellite communication systems, 2.Installation of simple interfaces for the illiterate. 3.Installation of mobile systems. 4. Supply printing material.		

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