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## TABLE OF CONTENTS

	<u>Paragraph</u>	<u>Page</u>
<b>Table of Contents</b>		2
<b>Economic Commission for Africa</b>	1-25	3
<b>Economic Commission for Europe</b>	26-82	6
<b>Economic Commission for Latin America and the Caribbean</b>	83	18
<b>Economic and Social Commission for Asia and the Pacific</b>	84-93	18
<b>Economic and Social Commission for Western Asia</b>	94-169	21
<b>Food and Agriculture Organization</b>	170-198	33
<b>International Civil Aviation Organization</b>	199-209	37
<b>International Labour Organization</b>	210-226	39
<b>International Maritime Organization</b>	227-242	43
<b>International Telecommunication Union</b>	243-265	45
<b>Office for Outer Space Affairs</b>	266-280	48
<b>Annex I</b>		51
<b>Annex II</b>		54
<b>United Nations Centre for Human Settlements (Habitat)</b>	281-299	55
<b>United Nations Conference on Trade and Development</b>	300-316	59
<b>United Nations Development Programme</b>	317-363	62
<b>United Nations Educational, Scientific and Cultural Organization</b>	364-482	69
<b>United Nations Environmental Programme</b>	483-495	89
<b>Universal Postal Union</b>	496-517	92
<b>World Bank</b>	518-563	95
<b>Annex</b>		100
<b>World Food Programme</b>	564-573	102
<b>World Health Organization</b>	574-587	104
<b>World Intellectual Property Organization</b>	588-597	107

## ECONOMIC COMMISSION FOR AFRICA

### Definition and Introduction

1. Democratization is a process through which the establishment of democratic systems, principles and values are instituted in society for greater participation of people in the processes of political, economic, social and cultural governance. Popular participation, freedom of expression, the rule of law, respect for economic, socio-cultural, political and human rights are just some of the hallmarks of such a process. It is also an emerging structural process in many African countries, which needs to be understood and nurtured in the interest of strengthening intrinsic democratic culture. To a great extent, democratizing access to the information society is dependent on the degree of democratic culture that exists in societies in which citizens become full participants in the decision-making, development, application and evaluation of the deployment of ICTs. Where possible, the process also entails building and developing a citizenry empowered to fully utilize ICTs for basic human development, especially within the current context of the information revolution.
2. The combination of old and new information and communication technologies of broadcasting, telecommunications, the Internet, CD-ROM, satellite and cable are creating a plethora of applications that promote interactive learning. Characteristically, the availability of information is making the application of participatory communications ever more possible for target beneficiaries.
3. African countries risk further marginalization if they fail to embrace the new technologies to transform their economies; the digital divide threatens to be a devastating one. Without immediate action by African countries, the divide will increase at a devastating rate. African countries have to learn from experiences of others. Democratizing access allows the greatest good for the greatest number of people (not just elite). There are critical minimum conditions for general access to information, good governance and democracy.

### The issues

4. Information debate in Africa is widely discussed except the concept of the fundamental human right to communicate and to have access to information. It is essential to see how to guarantee this right and in the context of wider human rights debate. As peoples rights to communicate are enhanced so to will the innovations and strategies of African content and so to will the African citizen feel they have a sense of ownership to African information society. The process of democratization is in its infancy. Procedures need to be put in place to ensure public participation in systems of governance. To what extent are communities interests at the heart of national restructuring processes?
5. Language and content. The multi-lingual, multi-cultural setting in Africa adds to the complexity of democratizing access to the information society and remains to this day a rather daunting challenge. The seven million documents on the Internet are predominantly shaped by Western countries at the forefront of the technologies. As a result, linguistic differences still represent substantial barriers to communication and knowledge/information sharing. Also, content development is at the heart of the complex issue of language and culture with regards to democratizing access to the information society and is an area that needs urgent attention if as many people as possible are to become stakeholders.

6. Human resource development is key to access. But Human resource development and education for whom and for what. Is access limited to the elite? There are enormous challenges such as a high illiteracy rate. In African countries ICTs are not well developed and computer networks are installed in capitals only. Training is the key to preparing each and every sector and class for the full deployment of ICTs. It is by building and developing a critical mass of people that a participatory approach to the information society can emerge.

#### Policy issue

7. Does the political will exist at the highest level in African countries? Governments need to have ICT policies and need to adopt National Information and Communication (NICI) strategies and plans in order to make full use of ICTs as the engine of growth and development in Africa.

#### Analysis

8. Today, African societies have achieved significant measures of political, economic and social reforms and attempts at economic liberalization, democratic governance and the opening up of communications (press, broadcasting and telecommunications) all signify such changes. The restructuring of telecommunications and the opening up of the airwaves has stimulated unprecedented growth, ushering a rare culture of communications through cellular telephony, public payphones and the emergence of private/independent broadcasting stations in many cities and towns of the continent. However, there is need for government commitment, visions and visionaries to drive the process. There is a relationship between the actors who are involved in the process and the beneficiaries of the information society initiatives. Access involves know how and utilization of the instruments in the social development context. The fundament of the African Information Society is the development and consolidation of National Information and Communication Infrastructure policies and plans, which will be a cornerstone of Africa's response to the challenges of globalization. It is the national level which provides the platform for making strategic choices as to the most appropriate modalities for decisions.

9. The challenges facing African countries in achieving a culture of democratized access to the information society goes beyond passing legislation or introducing a new policy but includes how participatory communication could become an inherent aspect of cultural identities in every society. Consequently, the questions that need to be answered are access for whom, for what, at what costs, where and how? Therefore, the continuum of participatory governance should begin by the policy maker asking the right questions and involving different actors with different skills and expertise to respond to the changing needs and contexts in African societies. However, in discussing democratizing access to the information society, focus will inevitably be on the grassroots and/or rural communities in relation to improving their standard of living.

#### Action oriented recommendations

10. The advent of the information society is speeding up emerging forms of participatory communications and is precipitating a two-way communication based on exchange of ideas and information to improve the lives of people in various communities. In particular, the potential role of the Internet (and electronic communication such as e-mail) as a democratic tool could go a long way in empowering communities. That is why the following recommendations will be geared towards ways and means of empowering communities by enabling generalized access and promoting content development and usage

## Information access via telecentres

11. Democratizing access and reaching the community level, the disenfranchised groups, rural population, youth and women will only be possible by developing integrated multipurpose community information centers known as “Telecentres” where users can have access with minimal cost to any ICT, knowledge, communication and learning facilities which are dispensed under one roof. Consequently, a telecentre is likely to be a modern library and documentation centre, a radio and television station, telephone and fax bureau, provide local bulletins, WWW navigation and document searches on demand, e-mail accounts for communities and individuals, video libraries for entertainment and education, health and nutrition training, photocopy, word processing and other computing facilities and a post office.

12. The telecentre is increasingly representing the vehicle for democratizing access to the information society for the urban low-income and rural communities. The telecentre concept is being promoted for open and flexible learning. Implementation of AISI has led to creation of telecentres and cybercafes in almost all African countries.

## Agriculture and Food Security

13. Many of Africa’s agricultural and rural development problems have been related to misguided, weak institutions and a lack of well-trained human resources. According to FAO, a critical factor in meeting the challenge of ensuring food security in Africa is human resource development through knowledge building and information sharing, of which communication technologies are central to the process. Consequently, a decisive role can be played by communication technologies in promoting human capacity development for food security in Africa.

14. Agriculture Ministries need to identify ways of developing expertise in digital databases and networks for providing information to researchers, extension officers, etc. In addition extension officers should be trained to repackage information for farmers in local languages.

## Health

15. One of the visible advantages of the information era is that ICT projects in Africa have paid attention to the needs of health researchers and professionals who require access to up-to-date research and reference material. Technologies such as satellites and lately the Internet have also afforded health workers rapid information exchange, conferencing, distance learning, as well as access to urgent advice and diagnostic assistance.

16. Ministries of Health could identify ways of introducing or upgrading communication facilities for health care institutions and consider using low-cost methods such as e-mail, radio stations or radiocommunication which can save lives, reduce isolation and enable doctors to make better, more informed decisions. They could also carry out research on ICT production and usage in the areas of community health care and combating HIV/AIDS.

## Education

17. To respond to the challenges and crisis facing education and learning in Africa, there is a need to stimulate change and create learning environments that are more meaningful and responsive to the localised and specific needs of learners. Teachers and learners, could obtain material whenever required, through the use of radio, television, video, film and newer

technologies, which could transform the education sector in many ways and enable people to develop new skills in education and learning.

18. Education ministries should develop policies to strengthen the use of ICTs in the education sector in teaching and learning, strengthening delivery of learning materials as well as commissioning education software in these areas. Also efforts are needed to reduce Africa's dependence on imported training materials that do not meet the local needs. Specific efforts should be made to provide practical information sources and to close the resource gap by making resources electronically available, especially for schools, universities and research centres. Also educational programmes for teacher training and distance learning should be established.

#### Governance

19. Poor networks and infrastructure exacerbate the difficulties of communication between citizens and governments in many parts of the world. Therefore, ICTs as tools for governance can make a difference to how citizens access government information and government services and enhance participation in the governance process.

20. At a time when many governments are decentralizing their local government operations ICTs could further strengthen these efforts to enable citizens – especially those in rural and remote areas break through the feeling of isolation. Local government authorities could enhance citizen participation through ICTs.

21. African governments should invest in a research and development (R & D) especially in the design of applications relevant to local conditions for enhancing both national and local government services.

#### E-commerce

22. ICTs are creating new markets and reinforcing old ones for goods and services, offering enormous trading potential for entrepreneurs in using new technologies to communicate and earn extra income as well as to trade with the outside world .

23. African governments should devise ways and means for facilitating electronic commerce by developing adequate policies, building required networks, promoting local content, and developing human resources.

#### Women

24. Women's organizations in collaboration with international partners have committed themselves to strengthening ICT-skills base among organizations. Increasingly, women's organizations are keen to use ICTs to promote their acquisition of knowledge and the interaction between different groups in society (such as decision-makers, government officials and other development actors) to facilitate rapid and equitable socio-economic development. However, there is still a shortage in the skill base of women.

25. ICT Gender dimension should be incorporated into every aspect of development in society, including networking technology development and IT usage.

## ECONOMIC COMMISSION FOR EUROPE

### Selected issues

#### Introduction

26. Rapid progress and expansion of **information and communication technology (ICT)** has been the hallmark of human civilization development in the last decade of the twentieth century. It has dramatically changed ways of doing business, profoundly affected economic and social life, and rendered the established concepts of national independence and sovereignty largely obsolete. ICT development has also been one of the most important driving forces behind the process of globalization. Wide-ranging impact of ICT is sometimes compared to that of the industrial revolution of XIXth century.

27. The purpose of the paper is to give a brief overview of **the implications of ICT for economic and social development** in the countries of the ECE region and suggest appropriate policy responses. It is demonstrated that ICT can stimulate economic growth through several channels: adding new products, allowing for efficiency gains through production process innovations, introducing new management and marketing techniques, and spatially integrating economic activities. On the other side, rapid diffusion of ICT may also lead to some negative developments, including disturbances to tax collection, new forms of crimes, risks of social and cultural clashes and increased vulnerability to external shocks. However, both benefits and costs are difficult to measure with some precision, as statistical evidence remains scarce.

28. One of the most important aspects of ICT development is its impact on the existing economic disparities between and within countries in the ECE region. ICT development and applications have been concentrated chiefly in developed countries of Western Europe and North America, particularly in high-tech and knowledge-intensive sectors. By contrast, in most countries with economies in transition, ICT development and use have generally lagged behind (though there are some important exceptions). This pattern implies that economic and social benefits from ICT application and use may accrue mostly to higher-income countries and social groups. That would indicate that ICT revolution involves a risk of a **“digital divide”** and may contribute to growing economic inequalities between and within individual countries of the ECE region.

29. The paper argues that specific **policy actions** both at national and regional levels are needed to prevent the “digital divide”, to contain possible negative effects of ICT, and to help the less advanced countries to benefit fully from the ICT revolution. These actions would include measures aimed at expanding “digital” connectivity across societies and upgrading skills and knowledge levels of less advanced countries and social groups. They would also include regulatory measures to increase security and efficiency of ICT applications, in particular Internet-based businesses. An idea of national ICT programmes is advanced. The UN system should play a role in elaborating and disseminating standards on ICT applications and uses, helping less advanced countries in the catching up process. In Europe, the ECE is well placed to be instrumental in raising public awareness to the significance of balanced ICT development and providing technical assistance to countries with economies in transition in their efforts to develop national strategies of ICT development and use.

#### ICT: opportunities and challenges

30. As every major technological advance, **the ICT revolution** opens new vast opportunities but also poses challenges and risks. It is a chance but not a gift. Those who fail to seize the new

opportunities risk falling behind. The industrial revolution of the first half of XIXth century offers a good lesson: the United Kingdom and the United States managed to make good use of its outcomes to accelerate their economic development, leaving behind some rival countries such as Spain or Turkey. Is the present ICT revolution as important as the industrial revolution? Experts differ, but many say that it may be so because of the nature of technological progress it involves, the speed of the progress and its wide impact across all sectors.

31. Implications of ICT development and use are only partly recognized and identified. No doubt, ICT can produce **important economic and social benefits**. New technologies help to improve economic efficiency and open up new business opportunities, facilitate diffusion of technical progress and new ideas, and establish direct “real-time” links between people and enterprises across different countries and regions. They stimulate scientific progress, open new possibilities for education and accumulation of knowledge, and enrich human choices. ICT is also at the heart of the “new economy” paradigm that attempts to explain the recent astonishing economic growth performance in the United States mainly through productivity gains arising from the rapid and universal development and diffusion of ICT. Symptoms of the “new economy” are also increasingly seen in Europe.

32. At the same time, rapid ICT development can also pose some **risks**. Rapid development of electronic means of information transmission, including satellite TV, telecommunication and communication through the Internet allows western mass and commercial culture to penetrate local communities around the world (MacLuhan’s “global village”). This “imposed cultural homogeneity” may adversely affect social cohesion of local communities, undermining traditional values and changing the established behaviour patterns. Explosive growth of electronic commerce as well as sales and advertising through the Internet may seriously distort consumption patterns. Regulatory framework for electronic commerce in most countries is still in *statu nascendi* and does not assure sufficient protection of consumer rights and security of transactions. It is also vulnerable to technical failures, new forms of crime and sabotage. Recent attacks on the Internet have seriously undermined confidence and trust in electronic business.

33. Also, there are risks that benefits from ICT development and applications **do not spread equally and universally**. Available statistics for the ECE region show that ICT intensity (the ratio of spending on ICT to GDP) is closely and positively correlated with the level of general education and the level of GDP per capita. This suggests that the economic and social benefits tend to accrue mostly to those who are already rich and better educated, which may lead to further widening disparities between individual countries and social groups. The resulting risk of a “digital divide” can further complicate efforts aimed at closing the gap between the rich and the poor countries in the ECE region.

34. In **Europe**, this challenge has acquired an important regional dimension, arising from the rapidly expanding interrelations between the more affluent and ICT-advanced countries of Western Europe on the one side, and less advanced countries with economies in transition being at varying stages of reforms on the other side. Catching up with the west European income and wealth levels is an important goal for the acceding countries and a component of the EU enlargement strategy. It is also essential to ensure a balanced development of ICT in the region as a whole so that the other countries with economies in transition are not left behind.

35. The wide variety of not yet fully grasped implications of ICT require much more attention and effort to better understand and control the new phenomena. It is important to better know the nature of new technologies and their impact on economic activities and social life. To make sure that ICT contributes to economic and social development and to be able to prevent possible

negative implications has now emerged as an important and urgent task for governments, business and community leaders, and international organizations. Well-conceived and effectively enforced **policies and regulatory measures** are necessary at national and ECE region-wide levels in order to maximize the positive impact of ICT on economic and human development.

36. To design sensible policies and to establish an effective, transparent and business-friendly regulatory framework for ICT both globally and in Europe, is not an easy task. Problems start with the very **definition of ICT**. The term is rather broad and imprecise, encompassing new products (e.g. computers, mobile phones), new types of services (e.g. satellite transmission, data processing and storing, Internet information), and new techniques of production, management, organization and marketing (computer-guided processes, production networking, Internet sales and advertising). In fact, ICT is a complex and multi-dimensional concept that includes technical, commercial, economic, financial, legal, social and psychological aspects. An effective policy approach to promote and regulate ICT development has to take into consideration this multi-faceted nature of ICT.

### **ICT and globalization**

37. **Globalization** has become a fashionable code word to describe a plethora of new tendencies that have emerged in the world economy in the last two decades of the twentieth century and have established strong and multiple links between individual economies and societies, thereby reducing economic and psychological distances between them. In its essence, globalization means dramatically increased international interdependence and an urgent need for much more international cooperation, both on a global and regional level.

38. Links between ICT and globalization are frequently emphasized. Indeed, **ICT is a vehicle of globalization**. It reduces the cost and increases the speed of communication and thus allows for faster and cheaper transactions, as well as for decentralization and more efficient spatial distribution of many manufacturing activities within increasingly integrated production networks covering many countries. Establishing direct and rapid communication links, ICT reduces economic distance, saves time needed for coordination of business activities and lowers transaction costs. Through electronic means, ICT links together financial markets across countries and continents. In Europe, application of electronic documentation and reporting in customs procedures helps to remove many technical barriers to international trade. Through its impact on the speed and scope of commercial transactions, ICT enhances globalization and internationalization. In fact, ICT is a powerful factor working in favour of economic integration in the ECE region and worldwide.

39. **The relationships between ICT and globalization** work in both directions. Globalization, being also an outcome of specific national policies and liberalisation of international trade and investment within multilateral policy arrangements (GATT/WTO) establishes an enabling environment for ICT development. Increasingly open borders encourage trade and foreign direct and portfolio investment; this in turn requires more efficient techniques of management, coordination, supervision and control. Urbanization works in favour of uniformization of consumption patterns, which expands markets and justifies broader ICT applications.

40. But **globalization is not yet truly global**; in fact it is more regional than global. Benefits from expansion of trade, FDI, international production networks and financial flows seem to mostly favour those countries that have been able to sufficiently develop their institutional and physical infrastructure and pursue policies that have created attractive environment for FDI and ICT development. In the ECE region, there is a clear regional concentration of ICT production

and use in Western Europe and North America. For instance, in 1998 the OECD countries accounted for more than 80% of world ICT production, 92% of world information technology production and 94% of world software production. By contrast, large regions in south-east Europe and the CIS do not participate, for various reasons, in the gains produced by the process of globalization and ICT-based integration in the world economy (though they may painfully feel some of its adverse consequences, such as currency crises or fluctuations of commodity prices). These reasons need to be identified and specific policies designed and implemented in order to allow more countries to gain from ICT development and catch up with the more advanced countries.

## **ICT and economic growth**

41. The impact of ICT on **economic growth** works through three main channels, reflecting and building on its multi-dimensional nature. First, it expands total output directly through adding new goods and services – such as computers, other digital equipment, magnetic card machines and applications, fax machines and mobile phones, satellite TV, new financial services. In those sectors, new job opportunities have been created at a rapid rate. Second, it increases productivity through innovations in the existing production processes, such as the use of computer-guided robots, application of new software, electronic commerce, or wireless communications. In this context, ICT can be thought of as a new factor of production which, together with labour, physical capital, human capital and land, contributes to growing total factor productivity (TFP), though this contribution is still very difficult to measure. Third, ICT applications improve overall efficiency through innovations going beyond the production process proper; these include new methods of management, sales, organization and marketing, such as cross-border production networking, “outsourcing”, or advertising and sales through the Internet.

42. Production of ICT **goods and services** has been expanding rapidly in the last decade. There is no systematic statistics for the ECE region, but partial data indicate that the share of ICT goods in GDP increased in most countries of the region by 0.5-2 percentage points between 1993 and 1997. Out of three main categories of ICT goods – computer equipment, electronics and communication equipment – this is the latter that has shown highest growth rates. OECD statistics show that trade in communication equipment increased by 267% between 1990 and 1997, compared with 160% growth for electronics and 120% growth for computers. Even faster has been the expansion of certain ICT-based services, such as data communication, Web-based and e-business services, software, systems design and integration, consulting, education, etc.

43. This rapid growth of output has been associated with large **imbalances in the consumers' structure**. The use of ICT equipment use has been concentrated in higher income segments of the market, mostly among wealthy individual and institutional consumers and investors. There are several obvious reasons for this unequal distribution. First, there is a price barrier. ICT products such as computers, mobile phones, fax and Xerox machines, computer software are still relatively expensive, at least by individual income standards; at the same time these goods are not considered as necessities. This is even more obvious for the new financial services (e.g. electronic banking) that are addressed mainly to higher income groups of customers. Second, the professional use of ICT-based products is naturally concentrated in high-skills professions and high-tech sectors (banking, media, electronics, telecommunication) where incomes generated are generally higher. Third, the use of ICT-based products increases with the level of education and knowledge, which typically also depends positively on the income levels.

44. ICT-based production **process innovations** have been driven by increasing competitive pressures on markets for high-tech products and services. Broader application of computers and

digital communication systems helps to improve labour productivity and quality of products. Firm-level productivity data reveal that information technology has a positive impact on marginal output (although the actual effect depends also on other factors such as organizational change). Recent studies have shown that growth in computer equipment in the US economy in 1992-1996 contributed between 0.32 and 0.60 of a percentage point to overall output growth. In countries such as the US, the UK and Canada, the contribution of ICT capital to output growth accounted for over one-half of total growth contribution of fixed capital during 1990-1996.

45. ICT-driven process innovations inevitably affect **employment levels and structure**. High manpower costs, difficulties with effective labour management and the growing need for standardization have all encouraged investments in new, labour-saving and technically foolproof technologies. This trend has put pressure on labour markets in the ECE region, increasing lay-offs of manufacturing manpower in some sectors and/or putting a cap on wage increases. There seems to be a degree of substitution between production factors in industry in favour of ICT and to the detriment of labour. While it is rather evident that the economy-wide net balance of ICT impact on the employment levels should be positive, it also seems clear that sectoral distribution of employment gains and losses is likely to favour the better educated and younger manpower (as was probably the case with every big technical innovation). For instance, employment in the “Internet economy” in the USA increased from 1.6 mln to 2.3 mln between the first quarter of 1998 and the first quarter of 1999.

46. In the area of **organization of production activities**, ICT allows for removing traditional spatial barriers in production and opens up practically unlimited possibilities for geographical decentralization of a production process. It allows for establishing production networks spreading across national and regional borders, with different production phases located in separate places offering best economic and business conditions but still functionally integrated through ICT (“componentization”). This process is typically associated with increased inflows of FDI. An important implication of this tendency is that it enhances the role of small and medium enterprises (SME) as they obtain more opportunities to get integrated through “outsourcing” and subcontracting into activities of large corporations. Cost-minimizing, ICT-based spatial decentralization of production is not only clearly efficiency-improving, but may have also other positive effects such as e.g. alleviation of urban congestion, or less environmental pollution through reduced transport requirements.

47. One important and promising sequel to the rapid ICT development in this area is the tendency to shift some highly sophisticated ICT-based activities to low-cost countries. In the past, many infotech companies from West Europe and North America subcontracted increasingly large parts of their software application services to countries like Ireland or Israel. This **pattern of subcontracting** can spread very quickly to countries with economies in transition of Eastern Europe, where education levels are relatively high and basic communication infrastructure is in place. Cross-border outsourcing and subcontracting has already been evident in more advanced countries (such as Hungary, the Czech Republic or Estonia). It looks as if what Alvin Toffler wrote almost twenty years ago may indeed come true: “The new mode of production makes possible a return to cottage industry on a new, higher electronic basis, and with a new emphasis on the house as the centre of society”.

48. Similar efficiency effects can be expected to emerge in **services**. In trade, shifting sales from traditional retail networks to electronic networks, such as the Internet, allows consumers to save time they spend on searching for goods, while producers and distributors economise on stocks and on costs of maintaining necessary commercial space. Banking, insurance, publishing, health care, entertainment and tourism are the service sectors that are most information intensive and are

likely to expand rapidly under the Internet. Similarly, business-to-business (“B2B”) transactions through electronic “hubs” can be effected faster and more efficiently. Electronic stock exchanges for various goods and commodities are already becoming a reality. Electronic markets are generally more transparent and competitive: information on prices and technical characteristics of products and companies is more easily available.

49. The Internet has become the main vehicle for many ICT applications. However, to build up **Internet infrastructure** is costly and requires significant capital investment and advanced technologies that may be beyond poorer countries’ capabilities. The Internet itself is still vulnerable to technical failures and open to sabotage. In its present technical form it is also more and more difficult to access rapidly and at low cost. Moreover, given the lack of efficient regulation in the area of electronic commerce, consumers’ interests are not always sufficiently protected. Responsibilities and obligations of sellers and Internet service providers are not well established and monitoring of commercial practices may not be always possible. Also, electronic payments systems do not guarantee full security and privacy of individual transactions, and risks of fraud are imminent.

50. Rapid development of ICT-based financial services has dramatically increased international capital mobility. This allows for better allocation of financial resources in the whole ECE region, but may also lead to foreign exchange rate instability and currency crises. The “tides” of **international financial capital** that take place instantaneously through electronic means are driven by largely subjective perceptions by investors of differentials in the national risk-adjusted rates of return on assets. The massive flows may be particularly destabilizing for small open countries with economies in transition, leading to very wide fluctuations in nominal and real exchange rates and, consequently, inflicting considerable damage on the real sector. Full liberalization of capital transactions may not therefore be recommended in countries with economies in transition with weak and underdeveloped financial systems and without efficient regulatory framework. But at the same time rapid development of ICT offers new possibilities of efficient supervision and control in the financial sector, including close monitoring of foreign exchange exposure of commercial banks.

51. Probably the greatest potential for efficiency gains and accelerated economic growth is in wider and deeper **applications of ICT across-the-board** in the economy and society. As put by one expert, ICT is not an exogenous source of impact on work processes, but “the fabric in which such activities are woven”. All economic sectors can be expected to gain from ICT development, not only those directly producing ICT; even though most technologically advanced sectors will probably gain much more than traditional sectors. Moreover, ICT applications promise large gains in other, non-economic sectors such as education, health care and public administration.

52. Probably the largest potential for exploiting new opportunities exists in mass education, including primary and secondary schools as well as vocational training. Computer literacy and broad access to the Internet open practically unlimited education possibilities for all. True, some minimum level of knowledge is always required to effectively exploit those possibilities, but on the other hand access to the Internet is itself knowledge-stimulating and enhancing self-education. ICT and the Internet make in fact possible a shift from industrial and post-industrial societies to a **knowledge-based society**.

### **ICT and economic inequalities: the risk of a “digital divide”**

53. By its very nature, ICT applications **are not universally and equally spread**. Across the ECE region, ICT intensity seems to be dependent primarily on factors such as the level of

development and specific national policies. Available statistics show that ICT intensity (proportion of ICT expenditures to GDP) is generally greater in countries where the level of economic development is higher, as measured by GDP per capita. This means that developed ECE member countries spend generally a higher share of its GDP on ICT than do less developed countries and countries with economies in transition. This implies that the more developed countries can also gain proportionately more. At the sectoral level, the ICT intensity seems to depend on factors such as technology, human capital and demand potential. The higher is the technological level in a given sector and the higher is the demand growth, the larger and more intensive are applications of ICT.

54. This pattern, however, may imply an unequal distribution of gains from ICT, both across countries and across sectors. The main benefits are likely to accrue mostly to main users, including high-tech and knowledge-intensive sectors, such as sophisticated manufacturing, financial and medical services, media and entertainment, electronic commerce, research and development. Given the generally higher share of those sectors in developed countries' economies, this implies that the gains may be absolutely and relatively higher in developed countries and, to a lesser extent, in the more advanced transition economies. Systematic evidence is still scarce, but the unprecedented economic growth in the United States over last ten years may be one indication that intensive ICT uses can indeed translate into higher productivity and growth. If this tendency is confirmed, it might turn out that ICT developments tend to benefit the rich in the first place, making them relatively and absolutely richer and further widening the distance between them and the poor. This raises the risk of a **“digital divide”** in the ECE region and worldwide.

55. On the other hand, there are also instances where ICT applications seem to narrow, rather than widen, the existing inequalities. By opening up more opportunities for small and medium size enterprises (SME) and self-employed through outsourcing and subcontracting and by lowering barriers to entry in many industries, ICT may contribute to a **more balanced distribution of growth effects** across the whole economy. Similarly, allowing for more spatial dispersion of production activities (deglomeration), ICT may facilitate economic development of many rural and backward areas.

56. Supply-side statistics on ICT show high concentration of ICT production in developed countries (see above para. 15). Demand-side statistics on ICT uses are still scarce and fragmentary. But available data on Internet users and Internet trade, or FDI-based international production networks seem to support the hypothesis on the concentration of ICT-generated gains in countries, sectors and social groups with **higher levels of incomes and education**. Data on Internet hosts and Internet users confirm positive correlation between the Internet use intensity and per capita incomes. The number of Internet users in EU member countries is generally higher, relative to total population, than in countries with economies in transition, although there are some important exceptions (e.g. Estonia and Slovenia have much more Internet users, relative to total population, than Germany, Belgium or Ireland).

57. The disparities are also clearly evident among the European **countries with economies in transition**. ICT production and application, including especially Internet installation and uses, is much better developed in the most advanced countries with economies in transition, such as Hungary, the Czech Republic, Slovenia and Slovakia. Estonia is the unquestioned regional leader and stands out as a special case (see below para. 53). While this again confirms that income levels are important, there are also other factors that help to explain the inter-country differences. Among those other factors, two appear to be of particular importance: FDI inflows and national policies. By contrast, differences in the education levels across the transition region are generally

small and seem to be less important in explaining the disparities in ICT developments among individual countries with economies in transition.

58. As argued earlier, the more advanced countries with economies in transition have attracted much **higher FDI inflows** than other countries, especially in ICT-intensive sectors such as telecommunication and banking. Available data suggest that there is positive correlation between Internet intensity and FDI intensity. Acquisitions of domestic enterprises by foreign companies under national privatisation programmes allowed for their rapid modernisation, including wider applications of ICT. This has had a direct and sizeable positive impact on overall productivity. By contrast, in countries with economies in transition with little FDI inflows (CIS, the Balkans) not only is ICT intensity much lower but also the consumption pattern of ICT applications appears to be different (it seems more biased toward direct consumer uses such as satellite TV or computer games, and has less direct impact on productivity and growth).

59. Apart from FDI and incomes differentials, another important reason for the considerable disparities among countries with economies in transition are simply different **policy priorities** followed by national governments. For instance, while countries such as Estonia or Hungary have followed an explicit policy of rapid Internet development, most of CIS countries have not yet considered ICT to be an important priority, or failed to translate this priority into concrete policy actions. These differences are, *inter alia*, reflected in varying degrees of ICT applications in public sector institutions: schools, government agencies, hospitals and clinics, libraries, museums, etc. Partial statistics on the number of websites and Internet access offered by these institutions suggest again that the more advanced countries are already much better equipped with ICT, especially in sectors such as higher and secondary education, national ministries and local governments.

60. Differences in national policies with respect to ICT development can also be discerned from international **comparisons of prices for Internet access** in the ECE region. These prices consist of two components – a charge for Internet access provided by an Internet service providing company (ISP) plus a telephone dial-up charge. Prices for dial-up access to the Internet are generally fixed by national telecommunication companies but in most ECE countries the pricing practices are controlled by the state. Again, statistics are scarce and not fully comparable, but available data suggest a clear correlation between Internet intensity and access prices i.e. countries with low access cost have generally higher Internet intensity. One particularly worrying observation is that the access charges in the countries with economies in transition are much higher than in more developed OECD countries.

### **ICT and economic and social risks**

61. Unequal distribution of gains from ICT may contribute to further widening of the existing **economic disparities**. This may pose serious threats to social and political stability within individual countries and region-wide. In Europe, failure by some less advanced countries with economies in transition to increase productivity through wider ICT applications would slow down or even reverse the process of catching up by those countries with the income and wealth levels of more developed countries.

62. Accelerated ICT development and especially Internet applications are likely to have an important **impact on tax revenues** of individual governments. The Internet has the potential for increasing tax competition across the ECE region, as customers would shift their purchases to countries where indirect taxes are lower. Effective tax collection may become more difficult because of anonymity of buyers and also because of specific regulations that forbid in some

countries to tax Internet sales (e.g. Internet Tax Freedom Act of 1998 in the USA). Similarly, the main commercial activities of many companies may be relocated to various “tax havens”. This may lead to wide changes in the level of tax revenues and temptations to engage in various “beggar-thy-neighbour - type” policies by individual governments. As a result of these practices, the national tax systems can be damaged so badly that governments would be unable to meet the legitimate demands of their citizens for public services.

63. ICT and globalization have made individual national economies much more dependent on each other and on global trends. Traditional concepts of **sovereignty and independence** need to be revised. Political elites need to learn how to adjust their political programmes and attitudes to the new situation. A key policy challenge is how to benefit from increased openness while at the same time reduce and control the risks, including susceptibility financial crises and backlash of nationalist and isolationist sentiments.

64. Internet, satellite TV, digital communication have made possible universal dissemination of **ideas, values and behaviour patterns** that have mostly originated in rich countries and reflect essentially the Western culture. Generally, the form and content of electronically transmitted information is neither controlled nor restricted. The “cultural invasion” may lead to conflicts with traditional values that are at roots of local communities in less advanced countries, e.g. in the Balkans and in the CIS. This may result in accelerated and sometimes violent disintegration of those communities, entailing a number of social tensions and pathologies, such as xenophobia, criminality, street violence, religious fundamentalism, drug abuse.

65. Rapid development of ICT in trade, banking and public services has opened up ample possibilities for **new forms of crimes**: fraud, falsified magnetic cards, electronic theft, illegal data copying and use, breach of confidentiality with respect to personal information and banking data, virus infections and sabotage (“cyber-crimes”). The recent cyber-attack on the portals of several largest Internet companies in the US is a clear indication that the Internet is still a very vulnerable and imperfect means of business communication.

### **The need for policy actions**

66. The opportunities and challenges involved in ICT development call for policy and regulatory **actions** aimed at ensuring that all potential of ICT can best serve human development objectives. ICT development and use should be made more universal across countries, especially in less developed countries and countries with economies in transition. The **three fundamental constraints** in those countries include: a) the lack of ICT equipment (computers, computer networks, communication equipment, telecommunication infrastructure and software), b) the insufficient level of knowledge and skills needed to operate, use and benefit from ICT, and c) the lack of appropriate policy and regulatory framework to enhance and support ICT application while preventing negative effects. Paragraphs 42 to 50 suggest a set of policy directions with a view to overcoming these constraints and thereby maximizing the opportunities offered by ICT.

67. Limited availability of ICT equipment, including Internet infrastructure, is primarily a reflection of a general scarcity of capital resources in less developed countries. In this sense, it is a part of a more general problem of elaborating and implementing a **long-term development strategy** required for sustained rapid and balanced economic growth. A fundamental part of such a strategy would be to establish a supportive **institutional and policy environment** for business activities. The institutional and regulatory aspects of a successful development strategy have been recently re-emphasized by the UN Secretary-General in his Millennium Report.

68. ICT development and use should be made more universal within individual countries, especially where large disparities exist between regions and individual social groups. The **target groups** would be school students, local and rural communities, unemployed as well as small and medium enterprises. Community “hubs” for Internet access should be sponsored by government (in schools, libraries, local cultural centres).

69. One strategic objective of a national government policy should thus be to develop **mass education and training** with the aim to build a knowledge-based society. Only such a society can be expected to prosper in the long run through sustained economic growth generated by knowledge- and skill-induced productivity gains. The skills necessary to develop and efficiently use ICT should be acquired continuously throughout the whole life period of professionally active workers and employees. School programmes should include more courses on computer uses and Internet applications at all levels, starting with elementary schools up to universities. Access to training and re-training programmes on uses of computers and Internet applications should be offered free of charge to students, workers and employees, with costs of such programmes preferably refunded by the state. Special training programmes should be offered to SMEs, local government officials, school teachers and unemployed persons.

70. An important area of ICT applications is **public administration and national and local government** agencies. Establishing direct communication with citizens via the Internet, governments can increase the quality of public services, raise accountability and transparency of government decisions, provide better information on their activities and obtain valuable feedback reactions from the citizens. Many public services can also be offered faster and better through the Internet. Developing e-government can also help to reduce burdensome bureaucracy and fight with undesirable phenomena such as corruption.

71. An important pre-condition for rapid diffusion of ICT and Internet applications is well developed **telecommunication infrastructure**. Another strategic objective for national governments would therefore be to expand connectivity through a series of measures that would combine efforts by public and private actors to develop broadband and inexpensive access to the Internet. The gap in both traditional and mobile telecommunication between developed countries and the countries with economies in transition is still substantial. Recent rapid expansion of mobile telecommunication gives the less advanced countries a chance to leapfrog the traditional fixed-line telecommunication systems.

72. It is more and more recognized that **Internet access** should be offered at subsidized prices or free of charge, especially to the target groups (students, SMEs, local communities), if educational, cultural and productivity gains are to be maximised. This conflicts with the predominantly private ownership and operation of the existing Internet infrastructure. While ICT development and Internet applications have so far been private-sector driven, they are increasingly perceived as public goods. A solution should be sought in a balanced public-private partnership and broader and much more active involvement of public authorities, including information campaigns, financial incentives and direct subsidies.

73. Rapid expansion of ICT applications calls for a coherent **regulatory framework** to minimise risks of social conflicts and pathologies, and to ensure that ICT use contributes to productive and human development objectives. The required regulations would cover in the first place the rules on trade through the Internet. These would include rights and obligations of parties in e-contracts, protection of consumer rights in electronically processed trade transactions, protection of private banking and personal data, information content, protection of intellectual property rights in electronic commerce, effective supervision and control of Internet use. At the same

time, the adopted regulatory framework cannot be excessively restrictive and should not inhibit market competition and further innovations. Close collaboration with representatives of business community is strongly desired in this area.

74. An important task for governments in the ECE region would be to elaborate and enforce a system of **statistical data collection** on ICT, especially in areas such as electronic commerce including trade via Internet. Without systematic and reliable statistics it would be extremely difficult to monitor, measure and analyse ICT developments, and to recommend appropriate policy measures. In this area, uniform standards of reporting should be developed and applied across the ECE region.

75. One possible policy initiative for the countries with economies in transition would be to adopt **national ICT development programmes** aimed at stimulating ICT development and diffusion, and informing the society about opportunities and risks related to ICT. ICT use and application should be strongly encouraged, especially in schools and small and medium enterprises, through fiscal and regulatory measures (tax breaks, preferential depreciation rates, tax allowances and/or direct financing support measures for ICT development and use). Development of national information networks should actively be encouraged and supported. Governments should also accelerate liberalization of national markets for telecommunication services. Inexpensive, fast and universal access to the Internet should be one of policy priorities.

76. For European countries with economies in transition, **the case of Ireland** appears to be of special significance. The Irish Government's strategy of encouraging FDI has attracted a large number of international software companies. In 1997, seven out of the world's top ten software firms (including Microsoft, Oracle and Novell) had production facilities in Ireland. In result, by 1998 Ireland has become the second largest world exporter of packaged software, with the total amount of revenues generated by the software sector exceeding USD 7.4 bn and the export value of USD 6.6 bn in 1998. The key factor behind this success was a combination of good macroeconomic policies, liberal business-friendly microeconomic policies, and availability of high-skilled, dedicated manpower.

77. Another example to follow is that of **Estonia**. Within only few years, the country has become the absolute leader in Internet intensity in eastern Europe. A political consensus has been reached among major political parties in the country to spend each year 0.2% of GDP on developing Internet access, in particular in primary and secondary schools. This well-focused policy has become a national priority. The national ICT programme, called "The Tiger Leap" ("Tiiger hytte"), has been launched in early 1990s with the aim to finance purchases of necessary computer equipment and developing Internet infrastructure in schools and other educational institutions. In May 2000, more than 70% of Estonian schools had direct access to the Internet.

78. The national policy should be buttressed by appropriately structured **international assistance**, with special programmes targeted on ICT applications and training in areas such as financial services, banking, customs, local computer networks, access to and use of the Internet, etc. Similarly, foreign assistance to countries with economies in transition could focus on sharing best practices and experiences of more advanced countries in the area of telecommunication policies or electronic commerce regulations. The existing restrictions on trade in ICT equipment should be reviewed and liberalised.

## **The role of ECE**

79. Over the years, the ECE has accumulated considerable expertise in many ICT-related areas. Among many important projects implemented under its auspices, two deserve special attention. The first is **UN/CEFACT** - an initiative to facilitate business processes through recommendations aimed at applying information technologies in business activities and reducing procedural, legal and physical constraints to them. The second is the **Internet Enterprise Development Project** initiated in 1998 and focused on exploring the central issues in electronic commerce and Internet-based enterprise development.

80. Building upon the experience from these and other activities, **ECE** as a regional organization, with its Euro-Atlantic membership and focus on countries with economies in transition, can be the forum for discussing region-wide initiatives to address various aspects of ICT development. Bringing together national governments, business leaders, media, representatives of consumer groups and international organizations, ECE could act as a platform for sharing good policy practices and experiences between more developed and less developed member countries and raise public awareness of opportunities and risks connected with ICT.

81. The ECE could adopt a long-term approach by strengthening the ICT dimension in all its areas of work, in particular trade, statistics and transport. This would include ICT-related activities for all countries of the region (particularly in the field of standards setting) as well as ICT capacity-building activities targeted at economies in transition. The possibility of a long-term programme of activities along these lines could be examined by the Commission in the light of the views and directions emerging from the high-level segment of ECOSOC.

82. Such a programme should be part of a collective action and standardized approach in this area, through synergies with other regional and subregional initiatives such as the "Europe - An Information for All" initiative of the EU and through coordination with other concerned international organizations, in particular WTO, WIPO and ITU.

## **ECONOMIC COMMISSION FOR LATIN AMERICA AND THE CARIBBEAN**

83. Although ECLAC Work Programme does not include activities directly related to ICT, the Commission has carried out several activities within its SubProgramme of Work on Productive, technological and entrepreneurial development aimed at strengthening the technological dimension of production activities, to increase competitiveness, to overcome bottlenecks in key production markets, and to stimulate entrepreneurial development in Latin America and the Caribbean. Particular attention has been given to the areas of technological innovation, technical and international competitiveness in which ICT play a key role. ECLAC has drawn on the results of its work in these areas to prepare a paper to be presented at the regional meeting preparatory for the year 2000 High-level Segment of ECOSOC.

## **ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC**

### **ESCAP activities in information technology**

84. Deliberations on IT issues by the Commission and its subsidiary bodies The general guidelines for ESCAP activities in the field of IT are contained in its medium-term plan. However, in order to keep pace with the rapid development in IT, the main thrust of the

activities is regularly adjusted in accordance with the recommendations and decisions of the Commission and its subsidiary bodies which continuously review different issues relevant to information technology. In 1999, the main theme of the Commission deliberations was “Asia and the Pacific into the Twenty-first Century: Information Technology, Globalization, Economic Security and Development”. Facilitation of trade using IT was discussed by the fifty-sixth session of the Commission held in June 2000 within its main theme entitled “Development through globalization and partnership in the twenty-first century: an Asia-Pacific perspective for integrating developing countries and economies in transition into the international trading system on a fair and equitable basis”. Different aspects of the application and impact of IT such as investment facilitation using IT, IT and competitiveness of industries, application of IT in statistics, IT and infrastructure development, space technology etc. were also discussed under other items of the agenda of the Commission session. Furthermore, subsidiary bodies of the Commission, particularly, the Committee on Regional Economic Cooperation and its Steering Group, the Committee on Statistics, the Committee on Environment and Natural Resources Development and the Committee on Transport, Communications, Tourism and Infrastructure Development also routinely deliberate on issues relevant to the application of IT in their respective areas.

#### Research and analysis in IT

85. The secretariat undertakes analytical research and studies of the recent trends in the development and application of IT at the international and regional levels and their impact on social and economic development of regional countries. This research is undertaken for the preparation of documentation for the Commission and its subsidiary bodies as well as for expert group meetings, training courses and seminars. The results of some of these analyses are summarized in ESCAP publications, such as Part two of the Economic and Social Survey of Asia and the Pacific, 1999 devoted to IT, Globalization, economic security and development; the Semi-annual Government Computerization Newsletter; Inter-Networking through Electronic Commerce to Facilitate Intra-Regional Trade in Asia; Integrated Assessment and Development of Mineral Resources in Greater Mekong Subregion and North East Asia through Application of Geographic Information Systems etc.

#### Data base and information networking

86. In order to widely disseminate the results of the research and analyses and facilitate the exchange of experiences in IT and other areas among regional countries, ESCAP Divisions maintain their web pages where their major publications are posted and have created or are in the process of creating databases in major areas of their activities. Furthermore, the Asian and Pacific Centre for Transfer of Technology (APCTT) which is an ESCAP regional institution maintains data base on technology particularly suitable to SMEs, including IT. ESCAP and its regional institutions have also established or are in the process of establishing different information networks such as the Trade and Investment Information Network (TISNET), the International Network for Transfer of Environmentally Sound Technology for Asia, the Regional Maritime Information Network, the geology-related Geographic Information Systems (GIS) etc.

87. As a first experience, ESCAP is currently organizing a virtual conference on integrating environmental consideration into economic policy-making processes. This is an interactive, live, continuously updated, computer and web-based training programme for government officials which can be used on an individual basis or in training sessions. However, the establishment of data bases and information networks is constrained by the lack of resources and expertise in the

secretariat. There is particular need for training of staff in this area including through sharing experiences available in different Divisions.

#### Awareness creation and capability building in IT

88. The secretariat organizes regional and national seminars, workshops and training courses in different fields relevant to IT such as space application technology, E-commerce, the use of IT in the public and private sector, trade, mineral resources assessment, transport and infrastructure development and HRD for IT. The objectives of these activities are to increase awareness, capability building and promotion of regional cooperation in IT.

#### Consultancy services in the field relevant to IT

89. At the request of Governments, ESCAP has responded with advisory services in areas relevant to IT including E-commerce, space technology application and development, different aspects of IT application in transport and the development of government statistical information systems and the efficient use of IT.

#### Space Application Technology

90. A wide range of space-related information technology activities have been initiated under the Regional Space Applications Programme for Sustainable Development (RESAP) of ESCAP. A three-tier regional cooperative network was established, consisting of the Intergovernmental Consultative Committee, four regional working groups in the main fields of space applications, i.e. remote sensing, GIS and satellite-based positioning, satellite communication, meteorological satellite and natural hazards monitoring, and space science and technology; and the Regional Information Service and Education and Training Network.

91. A strategy and action plan covering the period 2000-2005 was adopted by the Second Ministerial Conference on Space Applications for Sustainable Development in New Delhi in November 1999. Major activities of the plan include, *inter alia*, the establishment of a spatial information network for sound decision-making. The creation of an operational Earth space information network and spatial data infrastructure is being considered. A Minimum Common Programme to realize the priority goals of the Strategy and Action Plan through the use of space-related technology integrated with other information technology, is being developed to address the minimum essential requirements of countries in the region.

#### Promotion of Transfer of Information Technology

92. In order to increase understanding of issues related to transfer of IT, the First WTO/ESCAP Trade Policy Course on the WTO and the Multilateral Training System held in May 2000, *inter alia*, included the TRIPs agreement and the Ministerial Declaration on Trade in Information Technology Products. The need for qualified human resources for transfer, adaptation and use of IT is expected to be addressed at the Regional Seminar in Management of Human Resources Development for Information Technology to be held in Seoul in September 2000. Based on its data base and information network, APCTT, an ESCAP regional institution is facilitating more than 270 technology transfer negotiations per month. Over 750 business meetings of prospective technology seekers were arranged in 1999. Although APCTT does not specifically deal with IT, it is estimated that over 10 per cent of technology transfer negotiations facilitated by APCTT were in the field of electronics.

### Inter-agency cooperation

93. The information collected and the analyses undertaken in ESCAP have been used for the preparation of contributions to the Secretary General's Report prepared pursuant to the General Assembly resolutions on "The role of the United Nations in promoting development in the context of globalization and interdependence" as well as to the Report on IT for ECOSOC. Furthermore, in order to integrate the regional dimension into the high-level policy debate of ECOSOC, ESCAP in cooperation with the Government of India, held a Regional Round Table on IT and Development in June 2000. The Report of the meeting has been issued as addendum to the Secretary-General's report.

### **ECONOMIC AND SOCIAL COMMISSION FOR WESTERN ASIA**

94. This report is prepared in response to the request from the Department of Economic and Social Affairs (DESA) for contributions to the report being prepared by the Secretary General in response to the General Assembly resolution 54/231 on "the role of the United Nations in promoting development in the context of globalization and interdependence," with special emphasis on the transfer of information and communication technologies (ICTs) to the developing countries to facilitate socioeconomic development.

95. The present report adopts the stand that making effective use of novel ICT capabilities in national development is contingent upon integrating such capabilities within a national system of innovation. In other words, acquiring the capacity for passively using modern ICTs, in the absence of capabilities for creating innovative inputs for the national economy, is insufficient by itself, for achieving the full range of benefits inherent in ICTs. This is a crucial notion with considerable policy and strategic implications.

96. Furthermore, in view of specific cultural attributes and language similarities in the ESCWA member countries, issues concerning policy coherence complementarity and coordination in matters relating to regional ICT capacity building are addressed with reference to the need for user-friendly interfacing and Arabization.

97. The report is prepared, in accordance with the terms of reference outlined in the DESA request, with emphasis on action-oriented recommendations aimed at promoting the role of the United Nations system in the transfer of information and communication technology to developing countries. Focused and well-defined initiatives, at the sectoral, national and regional levels, would constitute suitable vehicles for such action. A special section describes the main features of these initiatives.

98. Furthermore, considering the promise held by ICTs in promoting development efforts and the enormous benefits of international cooperation and coordination of efforts aimed at assisting developing countries in ICT capacity building, this report includes a proposal for convening a global meeting on ICTs and development under the auspices of the United Nations in 2001. This meeting would provide a suitable venue for debating issues of crucial importance for maximizing ICT contributions to worldwide growth, socioeconomic development and narrowing the digital divide.

99. The report is based in part on material presented and proposals made at the Expert Panel convened by ESCWA during May 2000, on the theme of “Information Technology and Development Priorities; Competing in a Knowledge-Based Global Economy.” Around thirty experts took part in this Panel the majority from ESCWA member countries with contributions on the status of ICTs in respective settings. Experts from the International Telecommunications Union (ITU), the World Health Organization (WHO), the United Nations Education, Science and Culture Organization (UNESCO) also took part. Additionally, independent international consultants from France and the United States made substantive contributions on the economics of information technology (IT), e-governance and electronic privacy.

100. Recommendations and suggestions put forward by the experts were intended to provide advice to concerned parties, including organizations of the United Nations system, regarding future action aimed at ICT capacity building in the ESCWA member countries. Many of these recommendations are paraphrased below:

### **Role of the United Nations in promoting information and communication technologies (ICTs) for socioeconomic development**

#### ICT infrastructures

101. Information and communication technology (ICT) infrastructures and measures aimed at implementing ICTs in building national innovative capacity take on added importance in today's interconnected and highly competitive knowledge-based global economy.

102. A review of the status of ICT infrastructures in the ESCWA member countries reveals several inadequacies. Indicators of modern ICT dissemination generally fall below world averages, indeed they are exceeded by developing country averages in a majority of cases.

103. The United Nations system could play an important role in efforts by its member countries aimed at infrastructure building, rational technology transfer and competent national systems of innovation. The following priorities stand out in this connection:

- development and implementation of novel modalities including incentives for investment in infrastructure building through private sector participation;

- harmonization of legal and regulatory instruments in order to facilitate the transfer and dissemination of modern ICTs;

- providing assistance to member countries in the design of national innovation policies in which the ICT capacity building is dealt with as a principal priority;

- training of technical and managerial human resources in ICT transfer negotiations under new conditions created by enhanced competitiveness and regimes governing intellectual property rights and international trade agreements;<sup>1</sup>

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<sup>1</sup> In particular, the Trade related Intellectual Property Rights (TRIPS) and WTO rules and the General Agreement on Tariffs and Trade in Services (GATTS)

104. Capabilities for concrete intervention within these domains are already in place in a number of United Nations specialized agencies, regional Commissions, etc. They will, naturally, need to be further coordinated extended, refined and continually updated.

105. Dynamic survey and research activity will be required to arrive at an improved and timely understanding of many of the issues involved and to develop optimal ICT implementation and dissemination modalities. In all of these respects, the United Nations system could provide considerable expertise for harmonization of methodologies and establishing links to the donor community within the framework of specific initiative. See section VI below.

#### ICTs and innovation capacity building

#### ICTs and national systems of innovation

106. Immense possibilities are offered by ICTs in terms of interconnectivity --hence proper functioning-- of national systems of innovation (NSIs). At the same time effective NSIs will provide essential frameworks allowing societies to reap the full benefits of modern ICTs. This symbiotic relationship should be exploited to the full in actions aimed at enhancing ICT contributions to socioeconomic development.

107. In designing national innovation systems based firmly upon modern ICT capabilities the ESCWA member countries, as well as most developing countries around the world, will need to pay special attention to securing several essential prerequisites, including:

- appropriate technology transfer modalities;
- adequate dissemination and adaptation of a range of new technologies in addition to mainstream ICTs;
- effective research and development capabilities;
- enhancing public awareness of the crucial importance of innovative activity in competitiveness;
- improved legislative and regulatory frameworks allowing higher information/knowledge flows and more effective innovative activities.

108. With such objectives in mind, it would be essential for the United Nations system to foster the creation of novel institutional forms in support of national innovation capabilities including virtual, as well as actual, centres/networks of expertise and excellence specifically designed to study obstacles to widespread ICT dissemination and development. Regional particularities will favor collective regional approaches in which the Regional Commissions could play a leading part.

#### Technology transfer

109. ICT technology transfer, adaptation and dissemination constitute core tasks in achieving higher productivity and competitiveness in the global market place. In the ESCWA member countries, ICT infrastructure building is carried out almost exclusively by government institutions focusing on adequate functioning of transferred technologies with little if any accent on ICT adaptation, dissemination and development using local S and T capabilities. This, clearly, leads to poor results in terms of sustained ICT capacity building.

110. Unlike similar activities in the past, building modern ICT infrastructures in the developing countries, essentially through technology transfer, will have to be firmly based on participatory approaches. Alliances between a variety of institutional forms, including government departments, local and international enterprises, technology holders and research organizations, even NGOs concerned with ICT infrastructure building will play an invaluable role. The following issues and needs should be taken into account and reflected in new initiatives aimed at national technology transfer:

- bringing ICT infrastructures within reach of the general population through a variety of means including provision of access systems in public places and providing low-cost dissemination of information in areas with inadequate ICT infrastructure;
- prioritizing ICT infrastructure building activities in accordance with the requirements of specific application areas, such as e-commerce, e-governance, tele-medicine, etc.;
- introducing, adapting and disseminating new technologies such as terrestrial wireless and satellite communication systems in order to allow reliable access to the global information infrastructures;
- adopting unmetered telephone dial-up fees with the same local or metropolitan area code;
- ensuring broadband services in their various forms and providing bandwidth-on-demand facilities for low cost multimedia applications.

#### R and D activity on ICTs

111. That proper utilization and effective dissemination of ICTs will inevitably require sustained R and D efforts is evident from the experiences of developing as well as developed countries. Effective R and D capabilities are doubly important in situations where language difficulties and illiteracy complicate access to ICT devices, limiting their utility for large swathes of developing country populations.

112. The ESCWA member countries avail themselves only sparingly of opportunities for international R and D cooperation through relevant programmes initiated, for example, by the European Union, in comparison to other countries, including other Arab countries of North Africa, for example.

113. In general, greater attention should be awarded to:

- supplementing R and D expenditure with particular emphasis on ICTs and related fields of applied science and technology;
- training of human resources devoted to R and D;
- improving incentives and regulatory instruments that catalyze the commercialization of R and D results, including strict application of intellectual property rights.

114. The United Nations system should provide support to national and regional research efforts aimed at tackling the above issues. Technical advice on research policy formulation is the most obvious direction. Effective support could also be provided through fostering global R and D networks with dynamic agenda coordinated by competent United Nations organizations. The United Nations University along with ITU and concerned entities in the Regional Commissions could play an important role in the formulation of such agenda and in coordinating focused R and D activities with the above objectives in mind.

115. A key issue in all of the above is to secure contributions, in terms of financial resources, equipment and expertise, from the international, regional and national enterprises to pre-competitive research activity aimed at ICT dissemination.

#### National policies, legislative and regulatory issues, and standards for ICT capacity building

116. Future ICT capacity building at the national level will need to take the above issues into account as future policy agenda are formulated in support of national innovative capacity building. The principal goals of such policies should be to:

provide member countries with improved competitiveness in the knowledge-based global economy;  
support their own moves towards creating knowledge-based societies.

117. Policy makers will need to steer optimal trajectories that maximize benefits and avoid negative outcomes. Achieving greater synchrony between national innovation capacity building and promoting ICTs as tools of socioeconomic development should be an important source of guidance in policy formulation.

#### Sectoral vs. national ICT policies and action plans

118. Efforts aimed at the formulation of cross-cutting national ICT policies addressing overall socioeconomic development goals should take into account targets set by explicit sectoral development policies, in addition to policies designed to promote national innovation capabilities, in general.

119. In view of the accelerating pace of ICT development, there is need for national ICT policies to adopt iterative and gradual approaches within short-, medium- and long-term horizons. In the short term, ICT capacity building measures should target objectives such as, establishing and complementing essential institutional arrangements, urgent human resource development programmes and the acquisition of specific ICT capabilities in selected priority sectors/segments and ICT application areas, e.g. distance education, remote healthcare, e-commerce, etc. Goals for the longer term should include instituting change in public attitudes and revolutionizing educational systems.

120. Naturally, action plans based on the above policies will need to be formulated with clear targets and set time frames. The fact that many national institutions charged with drafting ICT policies and plans are still in their infancy indicates the need for assistance by concerned organizations of the United Nations system in developing dynamic policy and planning models.

#### Legislation and regulatory instruments

121. Legislative measures more conducive to effective ICT capacity building are urgently needed in the ESCWA member countries, as well as many developing countries around the world. In particular, attention is drawn to the need for accelerating deregulation of the telecommunication sector in the ESCWA member countries with a view to promoting

competition and providing a wider range of services at lower costs. Other legislative and regulatory issues that may be underlined here concern the formulation of:

- laws to regulate transactions over the Internet, including commercial exchange, with particular attention to consumer protection and fraud prevention;
- national privacy acts based on the universal declaration of human rights in a manner that maintains balance between citizens' privacy, the secrecy of commercial transactions and unimpeded flow of information for the public good;
- intellectual property rights laws and corresponding regulations for their enforcement.

122. Assistance by the United Nations system will be essential in arriving at uniform legislative and regulatory frameworks within acceptable time periods.

#### Standardization

123. Adopting national and regional standards that conform with international ones and allow facile up-grading in the future to accommodate technological change is an essential requirement for sustainable ICT capacity. In particular, adoption of standard international procedures for encryption and digital signatures will also facilitate and ensure the security of web-based transactions.

124. Dissemination and effective enforcement of quality standards for ICT devices, software products as well as related services and maintenance practices is a task of immense importance for ensuring competitive ICT capabilities.

125. The United Nations system should play a much more prominent role in the negotiation and adoption of international ICT standards. Clearly, this will necessitate close interaction and cooperation with firms and institutions engaged in technology development and adaptation, an area of activity not often addressed by the United Nations system.

#### Resources for ICT capacity building

##### ICT human resources

126. The future of ICTs in the ESCWA member countries is highly dependent upon output from higher education, technical and vocational training institutions. Recent reviews of the state of these institutions offer grounds for some hope as well as causes for concern.

127. Statistics on ESCWA university output reveal that larger numbers of young people are completing their university education. Another positive trend, is that many more women now graduate with university degrees in the ESCWA member countries than at any time in the past. This is a general tendency extending over all ESCWA member countries including the Gulf ESCWA countries.

128. Improving human resource development efforts requires sustained efforts on several fronts. More immediate objectives include modernization of educational curricula, in general and the introduction of modern instruction and training modalities based on more recent ICT

advances, e.g. distance learning, and computer aided instruction. Developing viable methodologies for gaining access to inexpensive equipment as well as the Internet should go a long way towards securing improved human resources for future ICT capacity building.

129. The fact that many of these developments constitute excellent opportunities for private enterprise should be highlighted in projects designed by the United Nations system and other concerned organizations to further ICT contributions to socioeconomic development. With this in mind, action oriented measures that might be adopted by organizations of the United Nations system should include assistance to member countries in setting up ICT incubators and pilot facilities to promote effective capacity building with special reference to human resource development on the basis of modern ICTs.

#### Funding of ICT capacity building

130. On a more general level, the issue of securing adequate and sustained flow of financial resources for national ICT capacity building is a task in which governments, national, regional and international investment institutions and donor organizations will need to place at the top of their priorities. This will be especially important in the initial stages, preceding maturity of ICT enterprises and specific applications. The following modalities for achieving sustained funding of ICT development are underlined:

- creating conditions supportive of bids by national, regional and international capital markets to provide venture capital and investment funds for launching ICT companies;
- provision of incentives and regulatory schemes that support and enhance efforts by the private sector in human resource development as well as infrastructure and institution building;
- increasing government spending on R and D and higher education aimed at mastering and adapting priority ICTs;
- encouraging innovation and entrepreneurship through national and regional competitions with financial recognition;
- introducing measures that enhance regulatory transparency and confidence in relevant institutions with a view to gaining long-term investor commitment.

131. The role of the United Nations system in all of the above will need to focus on:

- advice on designing adequate policy measures by national institutions;
- formulation of novel measures for adoption by parties concerned with a view to ensuring adequate resource flows, effective monitoring and linkages with end-user sectors;
- coordination of activities aimed at fund raising in a manner ensuring resource savings and results of as wide an applicability as possible.

132. Many of these issues will need to be addressed through special initiatives such as those described in section VI.

#### Special ICT applications

133. Modern applications of ICTs in a number of essentially service and trade sectors can directly impact socioeconomic development. They deserve special attention in designing new

roles for the United Nations system in the knowledge-based global future. Distance education, remote healthcare, e-commerce, e-governance and online democracy are particularly worthy of special attention as they remain in need of wide ranging coordination, standardization and intrinsic technical developments.

134. Both challenges and opportunities reside in this domain. Among the principal issues that will need to be addressed are proprietary rights and possibilities for continuous development of software and hardware systems associated with these ICT applications as well as rendering these systems accessible to impoverished populations in the developing, and, incidentally, the developed, countries. Issues in need of close consideration include the opportunities inherent in these applications for:

- creating new employment;
- engendering positive changes in existing employment patterns;
- improving gender equality;
- offering MEs new business horizons.

135. Surveys and in-depth studies concerning technical and socioeconomic aspects of ICT applications in distance education, remote healthcare, e-commerce, e-governance are needed as a first step. Pilot projects addressing a variety of environments and application domains are also needed as a prelude to formulating strategies for long term action by the United Nations system. Such pilot projects will need to be incorporated in national, regional and international initiatives launched by organizations of the United Nations system in cooperation with concerned parties in governments, NGOs and enterprises.

### **Overview of new roles and special initiatives by the United Nations system in ICT capacity building**

136. Organizations and specialized agencies in the United Nations system can, and should play a major role in promoting ICTs at the global, regional and national levels. Indeed, facilitating socioeconomic development through implementation of ICTs, stands little chance of proceeding equitably without direct, active and long-term involvement of institutions such as those of the United Nations system.

137. Policy making, harmonization of standards and coordination of infrastructure building constitute three important aspects for which the organizations of the United Nations system are particularly suited.

138. New modalities will also be needed, however, for which many organizations of the United Nations system are not yet suited, or in which these organizations have amassed only limited experience, as yet. The nature of these modalities and how they may best be introduced and honed are issues that require intense deliberation in the immediate future. Several aspects of the new terrain are, nevertheless, self-evident. To start with, making effective use of ICTs requires integration of policies and action modalities at the international, regional and national levels. Partnering with private enterprise with a view to developing specific ICT products and services is another important aspect. The need to directly empower small and medium enterprises (SMEs), is yet another important feature. Greater reliance and more effective use of modern ICTs in the everyday transactions, including those of the United Nations system, is an essential feature.

139. Promoting dissemination and development of specific ICT applications closely linked to major socioeconomic development objectives, including e-commerce, distance learning, tele-medicine, and e-governance comprise an important set of objectives meriting close attention on the part of the United Nations system. It is felt that this may be an area of choice for collaboration between the United Nations system and international enterprises with multiple objectives, including producing concrete results, creating new linkages and experimenting with fresh cooperation modalities.

140. An important consideration in this respect is that making use of ICT applications in the developing countries requires a modicum of ICT capacity. Assisting the member countries in building basic ICT capabilities, therefore, constitutes a foremost priority. The auto-catalytic role played by well-designed, albeit basic, ICT capabilities should contribute to the creation of a virtuous cycle of development provided adequate infrastructural and innovation policy requirements are put in place.

141. In order to achieve worthwhile objectives within the limited time frame set by accelerating technological changes, and the special tasks that need to be addressed considering the special requirements of the ESCWA member countries, focus has to be maintained on promoting interagency cooperation and coordination with a view to national and regional ICT capacity building. With this objective in mind efforts should be aimed at harmonization of work programmes at the earliest possible dates. A number of United Nations organizations will be engaged in the formulation of their medium-term plans for the years 2002-2005. It is proposed that ICT capacity building be among themes singled out for special emphasis by all United Nations Organizations.

142. In addition to a common vision and a set of well-defined objectives, clearly stated in the mid-term plan it will also be essential for concerned United Nations organizations to catalyze, and take part in, the launching and implementation of national, regional and international initiatives aimed at:

- enhancing ICT capacity in the member countries;
- mustering support and providing continuous monitoring and guidance for such initiatives;
- strengthening international collaboration in ICT development and dissemination as a tool for sustainable socioeconomic development.

143. The need for such initiatives to promote ICT capacity building is strongly felt in almost all ESCWA member countries. The United Nations system has manifest advantages in the design and implementation of such initiatives.

#### International initiatives

144. Initiatives at the international scale should be aimed at resolving a multitude of problems facing the dissemination and effective utilization of ICTs in the global economy, including security, privacy, costs, taxation systems, etc.

145. Novel approaches are needed in the design of international ICT initiatives. Participation by international enterprises as stakeholders and actors in technology development in the design and implementation of such initiatives should be ensured along with UN organizations, donor agencies and NGOs. Participation by ICT enterprises in such schemes should be used as an opportunity for diminishing inequities and extracting maximum benefits from novel ICTs and from expertise tacitly embodied in these enterprises.

146. With this in mind, it is considered timely to convene an international conference devoted to deliberating global ICT capacity building, and development priorities in the twenty first century.

147. The conference should be held under the auspices of the United Nations in collaboration with other international and regional organizations, international business, NGOs and other bodies concerned with ICT capacity building and socioeconomic development. It should be designed along the lines adopted in other international conferences convened during the past decade on issues including women, the environment, population issues, etc. The opportunity of the upcoming Millenium Assembly could be a suitable juncture for conducting preparations for this conference.

148. One of the valuable outcomes of such a conference would be to create an opportunity for the international community, as a whole, to take stock of ICT developments and ponder future prospects. It would also provide countries, particularly developing ones, with an opportunity for reassessing their ICT infrastructures, revisiting, indeed drafting fresh national ICT policies and coming up with national plans of action for debate, harmonization, fund raising etc., at the conference.

149. Contributing to efforts by developing countries to join the knowledge-based global economy should be high on the agenda of this conference. Thus, the conference could be designed to tackle obstacles facing access to modern ICTs, by the developing countries, in particular, and might also pave the way towards the creation of international and regional consortia aimed at ICT infrastructure building and ICT dissemination in the developing countries. Other issues for debate at the conference should include:

- current trends in the emerging global knowledge-based economy in relation to ICTs and their applications;

- ICT needs of developing countries and obstacles to their dissemination in these countries; implications of worldwide dissemination of special ICT-based services such as distance education/learning and remote healthcare services.

- the design of modalities for facilitating ICT capacity building in the developing countries and integrating their economies into the global economy;

- equitable terms for technology transfer, particularly in ICT-related applications of priority concern for accelerating socioeconomic development.

150. This conference would constitute an opportunity for requesting that member countries formulate coherent and comprehensive national ICT policies. Lack of such policies appear to be at the heart of conflicting measures and considerable resource waste. Experiences provided by previous global conferences show that such initiatives can galvanize direct action at the national level. National policies formulated by the member countries prior to the conference should be

required to address strategy and resource issues as well as optimal technology transfer modalities for adoption in building national ICT capabilities.

151. From the point of view of the United Nations organizations as well as other international and regional bodies the proposed conference should constitute a valuable opportunity for coordinating plans and arriving at a workable division of labor among concerned actors.

152. This conference should pave the way for the creation of specialized bodies with well-defined mandates for following-up and monitoring ICT developments. Adopting modern ICTs in the activities of such bodies should allow them to operate in harmony as an integrated virtual entity incorporating inputs and resources from a variety of organizations from within as well as outside the United Nations system.

#### Regional initiatives

153. Special initiatives are also needed to capitalize on regional similarities and complementarities in ICT capacity building. Initiatives undertaken at the regional level are especially important to ensure connectivity and harmony as well as conserve resources.

154. In the ESCWA member countries, in particular, economic, social, cultural and linguistic similarities between the ESCWA member countries and other Arab countries in their vicinity, provide solid basis for fertile cooperation and coordination between international and regional organizations concerned with ICT capacity building in the Arab countries as a whole.

155. Regional Commissions of the United Nations can play an especially important role in ICT capacity building. This role takes on especial importance in areas where language issues are particularly important, as is the case in the ESCWA member countries and their neighboring Arab countries.

156. In cooperation with the United Nations specialized agencies and donor organizations, it is possible for the Regional Commissions to implement programmes and help launch initiatives with well-defined objectives with a view to:

- facilitating infrastructure building;
- promoting research and development with accent on Arabization;
- accelerating transfer of technology and dissemination of ICT applications aimed at socioeconomic development;
- setting up recurrent human resource development activities,
- conducting studies and meetings aimed at policy making and harmonization of regulatory practices;
- fostering direct investigations aimed at uncovering implications of widespread ICTs applications for socioeconomic structures and future development;
- improving modalities for effective technology transfer and technology alliance aimed at ICT capacity building.

157. Concerning the latter point in particular, a good deal will be gained by all concerned through negotiations with technology holders concerning special terms for technology transfer in areas of particular importance for socioeconomic development.

158. Should the idea of a global conference on ICT capacity building be taken up, the Regional Commissions would need to play an important role in conducting preparatory regional meetings to secure maximum benefits. They would also have to be entrusted with a good deal of follow-up activities aimed at “regionalizing” the outcome of the global meeting.

159. Other roles of the Regional Commissions in assisting ICT capacity building would encompass high-level training in negotiation skills, assisting, together with other concerned international and regional organizations in setting up regional centres of excellence as well as technology parks and incubators.

#### National ICT capacity building initiatives

160. In view of rapid advances in ICTs and the need to reorganize and budget in preparation for intensive and urgent action it would be advisable to launch, also within 2001, national initiatives aimed at ICT capacity building with the formulation of national and sectoral ICT

161. policies as a first priority.

162. In addition to the formulation of national and sectoral policies and action plans derived from them, the above national initiatives would also need to include activities aimed at:

- gathering information on the status and modes of utilization of ICTs and their applications and modalities for securing continuous updating of such information;
- research on socioeconomic aspects of the implementation and dissemination of ICTs and their applications;
- developing criteria for priority setting in allocation of resources and engaging in cooperative activities in the process of ICT capacity building;
- devising mechanisms for providing ICT enterprises with support, at least in, initial stages of operation;
- setting up and complementing national information networks;
- encouraging and rewarding applied ICT research (software and hardware);
- fostering cooperative activity with the private and public sectors in support of ICT capacity building;
- providing support for SMEs active in ICT development, transfer, adaptation and dissemination;
- encouraging software and hardware industries through establishing incubators and technology parks.

163. Action plans based on the above-mentioned sectoral and national ICT policies will need to be worked out, with set goals, provisional budgets and numerical human resource development targets, definite time frames as well as explicit modalities to ensure their execution within acceptable time horizons.

164. Governments would need to play a leading role in launching, providing support for, and monitoring progress, of these initiatives. However, since many aspects of such initiatives will involve enterprises and civil society a participatory approach in the design and running of the national initiatives will be an optimal choice.

165. Organizations of the United Nations system could provide expertise and facilitate exchange of information on the design and implementation of such initiatives.

#### Concluding remarks

166. Despite prevailing inadequacies concerning ICTs in the ESCWA member countries, a number of recent and on-going developments may be cited that promise considerable hope for the future. Greater awareness is in evidence of the importance of devoting focused policy attention and dedicating higher levels of resources to ICT capacity building.

167. The formulation of comprehensive national ICT policies is an important prerequisite for launching well-defined initiatives aimed at linking ICT capacity building efforts to the socioeconomic development needs and for eliciting full participation by partners including private sector enterprises and civil society institutions. Ultimately, it is at the level of national innovation policies and in the direction of closer integration of such policies with relevant socioeconomic development plans that a satisfactory future may be assured for effective ICT capacity building, and hence sustainable development, in the ESCWA member countries.

168. Alliances with international technology holders/developers, specifically aimed at setting up ICT research and production facilities in the member countries with emphasis on promoting specific ICT applications in education, healthcare, commerce, etc., are candidate for further investigation as a suitable modality for enhancing ICT technology transfer and dissemination.

169. Ultimately, selected entities within the United Nations system will need to operate at, or very close to, the hub of activities aimed at ICT development, continuously conducting technology monitoring, assessment and forecasting tasks. This is considered essential for promoting the contribution of ICTs towards socioeconomic development and creating conducive policy frameworks, legislative and regulatory instruments, etc. Lasting impact will obviously be contingent upon formulation of a fresh vision, new strategic initiatives, commitment of much higher resource levels, adoption of new organizational modalities and commensurate monitoring criteria.

## **FOOD AND AGRICULTURE ORGANIZATION**

170. Focussing on the role of the UN System in the transfer of information and communication technology to developing countries, the role of FAO is particularly aimed at the collection, analysis/interpretation and dissemination of information on agriculture, fisheries, forestry, economics etc.

171. In this context, a portion of the FAO contribution to the "report" could focus on the strategic use of IT/IM in the fulfilment of its mandate, in general, and more specifically on the

*connectivity, capacity* and *content* (i.e. Access to Knowledge) aspects mentioned in the "Digital Divide" issue area.

172. In particular, our comments, experience and contribution can be summarized and articulated through the following topics:

- (a) Knowledge Management: a Technical Strategy to Information Management
- (b) Development of related applications: The FAO experience in Participatory and Virtual Networks
- (c) The benefits of "globalization"
- (d) Limited infrastructure in developing countries

### **Definition of Issues/Problems**

173. Given that: (a) there is a wide difference in the *capacity* to access information within Countries and between Countries ; (b) there are still great differences in the levels and availability of *connectivity*, even if there is a general recognition that the bandwidth situation in developing countries is changing rapidly; (c) the *capacity* both in terms of human and equipment resources also differs within and between Countries and it often is spread in different geographical regions;

174. Then: One of the roles that Information Technology should play in the context of a "Knowledge-based global economy" scenario would be to maximize the collection and dissemination of *content*, making it easily adaptable to suit the different levels of automation at an effective cost, while providing bandwidth effective collaborative and community building tools to promote the sharing of knowledge and resources.

### **Brief Analysis**

#### **(a) Knowledge Management: a Technical Strategy to Information Management**

175. During the last decade there has been a consistently growing tendency of producing large quantities of information in electronic format.

176. Simultaneously, due to the parallel growth of international network communication technology, an increasing number of applications/tools aimed at the electronic dissemination, publishing, retrieval and access of information have and are continuously becoming available.

177. Nevertheless the ability to store information in an electronic format combined with the available 'broadcasting' technology, has not always been used to its fullest advantage since it mostly had been limited to address a specific purpose such as printing or publishing with a specific tool/application and for a specific purpose.

178. Therefore a flexible and scalable methodology for Information Management is of vital importance in order to broaden the use of information and to be able to capitalize on the electronically produced data efforts ( production, update, validation checks etc.). In summary information has to become visible, accessible and re-usable in order to be able to distribute, publish and retrieve it with the most appropriate/cost effective tool or mix of tools.

179. Similarly, the process of developing applications, or selecting tools, to be used for capacity building, analysis and decision making activities, must take into consideration the wide

variety of IT realities (i.e. both in terms of bandwidth and platforms such as Linux which is widely used in developing countries).

180. Investing in the synergy between different applications/tools, that are based on a flexible, scalable and portable architecture, is also of vital importance in order to be able to select the most appropriate combination of functionalities while also being able to adapt it and make it available to the one or more technological infrastructure as they are available.

(b) Development of related applications: The FAO experience in Participatory and Virtual Networks

181. **CDS an example of a Participatory Network.** Conceptually, the Community Directory Server (CDS) is a mixture of a Portal and a Knowledge-base Management System. A better definition may, in fact, be a Decentralized Web-site Information management system (DWI), that is a framework that provides a full set of web-based functionality geared to support the administration, organization, indexing, cross-referencing, uploading and retrieval aspects of information sharing/publishing activities in a decentralized and participatory world-wide network.

182. The system is being developed in a modular fashion and relies on a full Java-based architecture, that makes possible to maximize both its scalability and portability aspects. The system permits to "implement" the whole infrastructure from a centrally manage on-line environment to a completely decentralized, locally managed and off-line scenario, that can run on virtually any operating system supporting Java. The system functionality is also modular and based on an architecture that will make it possible to plug additional features into the system, exploiting and re-using modules developed for other systems.

183. Due to the flexibility, scaleability and portability characteristics of the system, including bandwidth awareness (and thus the possibility to use the system off-line), it can be implemented in a variety of fashions. In particular, and in order to address the phased and progressive growth of a Web-site complexity in terms of information, participation and community building, the system can be tailored to offer a smooth migration path from a fully centralized to a fully decentralized scenario.

184. **Virtual Network: the FAO 3D World experience.** Another pilot that has been undertaken by the Organization in the areas of community building and distance learning, has been based on an interactive 3D technology whereby participants from different parts of the world could "virtually" meet and dynamically interact.

185. In this context, the objective was to investigate the upcoming 3D technology and to experiment the integration between the 3D environment, Text, Graphics and Audio/Visual material over the Web. It was found that the combination of these elements may offer a very effective way to use IT to promote distance collaboration and learning.

186. It is important to notice that despite the graphical 3D look and feel this is a technology that is extremely efficient in terms of bandwidth utilization, up to the point that it is actually lighter than an average size web-page.

(c) The benefits of "globalization"

187. As the use of IT becomes more widespread and scalable, and the global connectivity improves, being able to exchange information and benefit from the use of low-bandwidth tools to

promote "virtual" networks and laboratories will drastically increase the ability to share information, resources and ultimately knowledge.

(d) Limited Infrastructure in Developing Countries

188. In many such countries - but not all - the density of telephone lines ("teledensity") is less than 0.1% of that in developed countries; and the supply of electricity is similarly constrained both in terms of total capacity in megawatts and also in terms of reticulation. Similarly, the number of computers in many countries is small and concentrated in the country's capital and also in the commercial centre, if different.

189. The value of Information Systems (whether towards developmental goals or any other objective) does not come from the infrastructure any more than the value of a building comes from its foundations, but without the infrastructure there can be no value, just as without the foundations there can be no building.

190. Some widely-dispersed developed countries have exactly the same problem when one moves outside the urban centres - the best example is Australia, whose area exceeds that of the continental USA but whose population is much less than that of California; and exceeds Europe, but whose population is one-third that of Italy. Therefore for a generation research in many fields has concentrated on distance-shrinking technologies.

191. The scarcity of trained IT and Comms people in developing countries is exacerbated by the fact that they are highly mobile. When developed countries have an IT and Comms skills shortage, one common resort is to facilitate immigration from other countries - many skilled persons have emigrated from developing countries to the United States in this way over the last 3 years, for instance, as well as others from other developed countries.

192. Although linguistic diversity of content is a goal, it should be recognised at the infrastructure level that such a goal conflicts with the primary goal of just having more and wider infrastructure. (For instance, most operating systems are translated into only 20 or so languages, and the experience has been that this process often results in worse products than the original.)

## **Recommendations**

193. The problem of insufficient use of information systems in a country must be considered in a holistic way, with attention given not just to the information systems but to the entire problem including wide-spread availability of electricity, either by reticulation or by local generation, possibly in the latter case by non-traditional means e.g. solar, small-scale hydro, wind. Energy consumption of computer systems is modest by comparison with most applications except lighting and radio/television.

194. Emphasis should be given to information transport methods which do not rely upon wide-spread terrestrial cables. The investment to lay and maintain them is greater than that required for terrestrial wireless systems or satellite-relay systems, and they are far more vulnerable to damage by natural disaster or by civil unrest. This especially applies to Small Island States, say in the Pacific, where the amount of traffic offering does not justify any sort of cable due to minute populations, but the demand for facilities is as advanced as anywhere else. The performance of wireless systems is now compatible with use of advanced information systems. The objective is to minimise the capital required to be invested in infrastructure so that it can as far as possible be focussed on application level information systems and resources. One counter-intuitive corollary

of this is that leap-frogging to the most recent infrastructure technologies is more able to achieve this goal than to invest in 'traditional' IT and Communications infrastructure.

195. Experience from developed-but-dispersed countries should be harnessed through directed research contracts and co-operative projects making best use of such countries' competitive advantages. ITU should be mandated to have a strong developmental as well as a normative role, and maybe should have its subject coverage expanded to include also computing usage as well as telecommunications as such.

196. The United Nations (and indeed national governments) must recognise that their influence and resources are very limited by comparison with market forces, and should attempt to influence the market by policy settings (e.g. taxation rates, tariffs) rather than by large-scale direct investment. This is particularly so in such a fast-moving technical environment whose pace is generally not compatible with the pace of government decision-making processes in any country.

197. A primary goal in a service sector must be to have enough trained people so that shortages of skills do not remain a limiting factor. Therefore, the UN agencies could focus efforts on distance-learning centres relevant to their respective competencies - in the case of FAO for instance, the mission of FAO is defined to include information dissemination about agriculture in the broadest sense of the word "agriculture" but could perhaps also be re-defined to include a broader sense of the term "information dissemination" - we do conduct literacy courses so that rural people can read our books, we could conduct computer courses so that rural people could read our website.

198. Goals about preservation of linguistic diversity must be applied in a way which recognises their importance at content level but which does not conflict with other more-pressing goals at infrastructure level.

## **INTERNATIONAL CIVIL AVIATION ORGANIZATION**

199. The challenges of turning data into information services was addressed several years ago at ICAO so that good use of such information could be made in business and management processes. Beyond providing information technology systems, focus was put on delivering information for better decisions and actions by the civil aviation world community.

200. ICAO entered the age of on-line availability of its information in 1995, initially on a modest basis and primarily to provide public information. Since that time, the Web presence has grown in importance, wealth and searching tools. ICAO Regional Offices have their individual Web sites to organize reports, schedules and timetables for meetings, working papers, etc. The introduction of electronic commerce will be effected in the coming months.

201. In parallel with the above, the development of an internal, structured repository, with appropriate access techniques and analysis tools, was undertaken. This database was populated with the working papers (in various ICAO working languages) for the governing bodies and bulky technical documents, such as the Annexes to the Convention on International Civil Aviation, manuals, circulars, documents of regional nature.

202. ICAO Web sites are now considered a strategic information resource, which keeps its documents expeditiously updated, since one of the benefits is to reach the ICAO

environment in no time, instead of using the conventional communication media. Any Web user worldwide can have access to ICAO sites to locate information of interest to the aviation community.

203. ICAO has undertaken a re-organization of its Web sites to open them, through secured access, to the civil aviation community in the Contracting States and the National Delegations. This is called the ICAO-Net, a sort of Extranet accessible by a limited audience. Material available will be as follows (not limited to): hyper-linked working papers, State Letters, press links including the specialized aviation press, differences reported by States to the implementation of Standards and Recommended Practices (SARPs), etc.

204. Ad hoc restricted Web sites may be available for Air Navigation Commission panels, technical groups in the air transport field, etc. On-line databases such as the Accident/Incident Data report, air traffic analyses, will be available in the future.

205. Since its inception, ICAO has been open to civil society, to industry and to private international organizations dealing with civil aviation. The relationship with non-governmental organizations has increased over the years and ICAO will improve, whenever possible, the contacts with civil society as a means of helping it fulfill its mandate of establishing international standards.

206. An unprecedented and successful level of international cooperation, requiring extensive and global commitments in technological, financial and human resource terms, was achieved for handling the year 2000 (Y2K) date change problem affecting the global air transport industry. Contracting States, the Airport Council International (ACI), the International Air Transport Association (IATA), different aviation agencies and the industry collaborated with ICAO on the Y2K programme which culminated in a seamless and uneventful millennium changeover. In order to monitor the changeover, a Global Coordination Unit was activated with the participation of ACI, the Federal Aviation Administration (FAA), IATA and the Société internationale de télécommunications aéronautiques (SITA), through the collection, collation and analysis of information supplied by the Contracting States on a real-time basis. Some of the benefits gained from the overall Y2K programme were that all types of aviation systems and infrastructure, including air traffic control, airlines and airports world-wide, were thoroughly reviewed and tested.

207. Through its Technical Co-operation Programme, ICAO has had a long experience in providing advice and assistance in the development of projects, and acts as an executing agency for projects across the spectrum of air transport aiming at improving economic efficiency and operational safety. ICAO is now in the process of formulating a global Technical Co-operation project to provide developing countries with computer equipment and software. The objective of this project is to enable developing countries to access ICAO's database and retrieve information that is of interest to them. Some donor countries have already expressed interest in funding this project. Moreover, ICAO's Technical Co-operation Bureau (TCB) is engaged in the implementation of its Information Technology Master Plan. An important component of this plan is to introduce an "Internet" that puts on line the TCB staff at HQ, ICAO's Regional Offices and ICAO's Large Scale Technical Co-operation Projects.

208. As regards funding by outside sources, ICAO has identified specific programmes or specific projects, which could be financed by extra budgetary resources, for example, for the implementation of a safety oversight programme that will identify deficiencies in meeting the ICAO world-wide SARPs and offer assistance in rectifying those deficiencies, or for the

facilitation of the provision of assistance to States with regards to the technical, financial, managerial, legal and cooperative aspects of the global implementation of the future air navigation system known as Communications, Navigation and Surveillance/Air Traffic Management (CNS/ATM) using satellite information and communication technologies. These are some examples of international cooperation in the context of global economy where the IT component is underlying the efficient delivery of projects. Safety-related issues are a global issue, as human beings travel all over the world across political borders.

209. IT has become a core strategic issue in the aviation industry; with its presence on the Internet and the advent of global telecommunication networks, ICAO is continuously trying to improve the flow of information concerning regulations and practices which ensure the safe and orderly development of international civil aviation throughout the world, and hence to narrow the information gap that exists between the developed countries and the developing countries.

## INTERNATIONAL LABOUR ORGANIZATION

### Information technology and development: impact on the world of work

#### *Knowledge-based global economy: employment and development challenges*

210. The 1990s witnessed an increasing globalization of the world economy, highlighted by the liberalization of trade and financial flows as well as growing interdependence between countries. This process which has brought with it opportunities for trade expansion and consequent economic growth in nation states also poses serious ***challenges to the attainment of employment and labour market objectives and targets***. This is particularly the case for those countries which have so far not been able to benefit from the gains of globalization due mainly to lack of international competitiveness.

211. In tandem with globalization, rapid advancement in information and communication technologies (ICTs), has resulted in an increasingly ***networked global economy***. This is leading to a fundamental transformation of the ***world of work***, with the notion of a “job” having an entirely new meaning in terms of form and content. In this “***new economy***”, globalization and technological advancement are interlinked. New information technologies, by reducing the cost and speed of communication, have played a major role in “globalizing” production and financial markets. In turn, globalization, by intensifying competition has spurred technological diffusion and adoption of new forms of work organization. Knowledge and information have become significant factors in production and services, and are increasingly providing the cutting edge in successfully competing in the global economy.

212. From a development perspective, the new ***knowledge-based global economy*** offers opportunities for new and faster growth patterns at the country level, based on new products, new forms of employment opportunities and livelihoods – especially if expectations of decline in the cost of ICTs are realized. The impact of the new technology on employment is already visible in terms of changes in the international division of labour and in the structure and functioning of the domestic labour market, reflecting increased international competition in products between countries and intense economic competition at the micro level among firms in relation to costs and productivity. The benefits from the new technology in terms of job creation and wealth generation are, however, likely to be skewed and unevenly distributed ***between*** countries as well as ***within*** countries, mainly because of differential access to knowledge and to information and communication technologies.

213. This reality has given rise to manifestations of the “*digital divide*”, characterized by the difference between those countries, regions, sectors or socio-economic groups which have capabilities and resources to access ICTs, and those who do not have such access. The “digital divide”, as a development concept, therefore brings into focus the notion of unequal and inequitable patterns of development linked to access to opportunities and endowment to knowledge and information.

214. Unlike other technological changes, the rapid development and diffusion of ICTs affects all economic sectors, organizational and work structures; this calls for a fundamental rethinking of the character of work and employment and the basis of production and their impact on the overall development process. Whereas in the past, financial capital (alongside raw materials, human strength or machines) was the main basis for production and generation of wealth, in the new economy knowledge will have a more important role in the development process. The basic development agenda will be defined in terms of human resource development and the development of communication infrastructure. Emphasis in human resource development would shift from an individual career-oriented skill development to a more communicative and cognitive learning process involving a large number of persons simultaneously or a community.

215. Hence, in the future, the key to poverty eradication may be found in new development models directly linked to the ascendancy of knowledge and information technologies, rather than the mere transfer of financial capital. The critical factor may no longer be costs but the empowerment of men and women to apply their creative potential and ability to the utilization of these new technologies. If this can be achieved, poor developing countries could enhance the value of their human resources endowment and leapfrog one or more stages of the development gap that today separates them from the developed world.

### **Information technology and the world of work**

216. Looking at information technology as a means of enhancing development, and focusing in particular on impact of IT on work and employment, the following changes and trends are significant for formulation of a policy and strategic framework:

217. ***Nature of work:*** Work will become more flexible and adaptable to production structures and work arrangements that are less regulated, more geographically dispersed and diversified. This in turn will require workers who are multi-skilled, mobile and amenable to continuous training and life-long knowledge-oriented learning, in response to demand shifts in highly competitive product markets. Employers will be inclined to reorganize work around decentralized management, customized products and work differentiation, in order to remain competitive. There will be an increasing tendency to sub-contract tasks; move production and jobs abroad; employ part-time and temporary workers for specific tasks, with workers moving between firms and types of work as jobs are redefined.

218. ***Job creation and employment promotion:*** Competition in product markets and flexibility in the labour market will combine to define access to new job opportunities more in terms of “*employability*” based on acquisition of “IT knowledge portfolio” and multi-skills, and less in terms of particular long-term jobs held on the basis of studying and working or physical skills. However, this type of *flexibility* could lead to increasing *employment insecurity*, if it is not accompanied by *adaptability* to modernise work organization and exploit new opportunities for job creation. Job creation in the new economy could therefore have a high social cost in terms

of insecurity, uncertainty and stress, with most workers having to pay much more attention to keeping their jobs simply because of the threats of losing them.

219. **Job quality and working conditions:** An effective IT for development strategy should not only include opportunities to stimulate economic growth and productivity to support the creation of new economic activities and jobs. The consequences of ICT for employment should include **job quality**, covering issues such as terms of contract; wages; training; and health and safety of new opportunities for work as well as the impact of change on the quality of existing jobs. This implies opportunities to improve access to learning and knowledge including information on safety and health; opportunities to improve and expand social protection and basic services; and opportunities to improve quality of people's lives at work and in leisure. The responsibility for increasing the impact of IT on job quality should be shared one, requiring action by governments and their social partners including employers' and workers' organizations. The impact of the combination of globalization and technological advancement on the world of work could produce work arrangements and working conditions that are not socially congenial; less secure; and even less safe, than earlier styles of production organization. For example, flexibility could lead to an increase in the number of hours worked in order to earn more, rather than earning more for less hours, in less skilled IT jobs. There are also known health risks associated with sedentary-type IT jobs and long hours facing a computer monitor. IT-based work organization can also take its toll on quality of life in terms of stress, and lack of family life and leisure.

220. **Skill development:** Workers and job seekers will need to equip themselves with new kinds of knowledge and information networking for job searches and upward mobility. ICT will play a key role in brokering and placement of jobs and job-seekers. There will be a need for more flexible and continuous learning at various stages of working life or as one moves through different kinds of work. ICT itself is opening new opportunities for education and training at lower costs, through such methods as distance learning and multi-media training systems which are more closely linked to the production process; this in effect narrows the gap between learning and the world of work. Developing countries in particular would need to invest in computer literacy as part of their education and training systems; encourage the development of related analytical and creative skills; and create conditions and institutional arrangements that support life-long learning and employability, in order to reap the employment and productivity benefits from IT and communication infrastructure.

221. **Equal access and gender equality in employment:** Although significant changes had taken place since the 1970s in **gender** relations underlying work, with masses of women entering the labour market albeit in lower-paid jobs, the predominance of information and knowledge-based work opportunities (as compared to physical skills) in a flexible labour market situation is creating more employment opportunities for women on equal footing with men. IT is also providing more opportunities for women to work from home. As labour market becomes more flexible, more married women are incorporated into productive wage employment and men are expected to become more flexible in their choice of work, thereby reducing gender discrimination in employment. Nevertheless, the issue of equality of access to wage work and equal pay for women and men still needs to be addressed in many countries.

222. To the extent that IT-based work involves skills that are less motor and more brain-intensive, it is better suited for many groups of **disabled** persons who are usually denied traditional employment based on human strength, rigid hours and fixed geographical locations. Furthermore, access to life-long learning opportunities should help to improve the employability of the **long-term unemployed** and **older workers** in the labour market.

223. ***Labour-management relations:*** Given that the impact of ICT on the world of work will profoundly change the way enterprises and production are organized as well as employment patterns of the workforce, it is likely to have significant implications for traditional labour-management relations. While current ***industrial relations*** practices reflect traditional industrial and organizational structures, with hierarchical chains of command and narrow divisions of tasks, etc., the impact of ICT is resulting in more flexible and adaptable work arrangements and multi-skilled workers. In addition, we are likely to see the emergence of flatter, cross-sectoral, networked-based and virtual organizations and alliances between producers. All of these will render current occupational classifications and boundaries ambiguous or irrelevant to the realities of the new economy and complementary work arrangements and production structures. Organizations of workers and employers will have to reconsider and redefine their role and strategies for addressing issues of wages, working conditions, career policies, training and social protection. New forms of social dialogue, such as the promotion of voluntary initiatives, incorporation of gender issues and involvement of transnational corporations as dialogue partners, will be necessary. Furthermore, ***international labour standards***, particularly those on home work and discrimination, but including also those on freedom of association and collective bargaining, would need to be emphasized and applied in a sector in which many independent and contract workers may be unprotected by existing legislation.

***Policy challenge and action: Role of the ILO***

224. ***Creating decent and productive jobs:*** The key challenge from an ILO standpoint is to ensure that ICT creates new opportunities for women and men to obtain decent and productive work in conditions of freedom, equity, security and human dignity. As costs of ICTs fall, new opportunities will open up for developing countries to harness the new technology to support their development objectives and goals. This will require at the aggregate level coherent and comprehensive ICT strategies to stimulate economic growth and productivity and create new economic activities and jobs. In view of increasing globalization of the world economy, such strategies will necessary have to be consistent with the goals of economic liberalization and market reform, but tailored to specific needs and conditions of individual countries. Coordinated action, involving the shared responsibility of governments, the private sector, and the social partners, will be required at the firm, industry and national levels if countries are to avail themselves of the opportunities offered by ICT to stimulate growth, create jobs and improve quality of employment and people's livelihoods.

225. ***Strengthening social dialogue and labour market institutions:*** The role of the ILO (as an integral part of the UN system), with its unique tripartite structure, could be crucial in terms of strengthening ***social dialogue*** (involving government and representatives of business and labour) and ***labour market institutions*** (in both public and private sectors) to facilitate the adoption and diffusion of ICT as part of the development process. In this regard, the ILO has already organized an international tripartite meeting on the impact of information technologies on employment and working conditions in the media and entertainment industries (Geneva, February 2000) and plans to examine the situation in other key sectors. The next edition of the ILO's "World Employment Report (due in early 2001) will focus on ICT and employment, and a virtual conference designed to obtain views on the subject has been launched on the web site [www.virtualwer.org](http://www.virtualwer.org).

226. ***Promoting international partnerships and technical cooperation:*** The ILO can be instrumental, particularly in developing countries and countries in transition, in promoting partnerships among governments, the private sector, specialized learning and research institutions and international agencies to make use of IT to:

provide and disperse knowledge and information on occupational safety and health;  
harness and share experience and know-how on training and improved methods of  
productivity and work organization; and  
mobilize internationally available resources for the promotion of IT for development and  
job creation.

## **INTERNATIONAL MARITIME ORGANIZATION**

227. Shipping is an international industry. Without a global regulatory regime, shipping, which accounts for over 90% of the transport of international trade, could not function as effectively and efficiently as it does today since it would be governed by disparate, even conflicting, regulations. The IMO rules and standards, therefore, provide its Member States and the industry with a single regulatory framework, which is accepted by them, and covers numerous subjects falling under the main categories of navigation safety, marine environment protection, development of maritime legislation and facilitation of international maritime traffic.

228. Global maritime standards have been continuously strengthened as a result of preventive regulation, technological developments and increased public pressure, all of which seek to improve the safety of life and goods at sea, and the prevention and control of marine pollution caused by ships, and the efficiency of navigation.

229. Many of IMO's Member States, in particular, the developing countries, do not yet have the administrative, legal scientific and technical capability to give full and complete effect to IMO's instruments. Some have suffered high rates of ship casualties with consequent loss of lives and cargoes. Many of their ships are being detained and arrested for non-compliance with international standards, and their coasts and marine environments are under constant threat of pollution with, in some cases, devastating results for their growing fishery and tourism industries.

### **IMO presence in Africa**

230. In the seventies and eighties, there was a significant tonnage of African shipping fleet e.g. Black Star Line and Nigerian Shipping Line had each over forty deep sea-going ships that participated in the global shipping trade. It was not long before a decline of the African merchant fleet sets in. Without a national fleet, it has become almost impossible to secure training on board ships for cadets in the African maritime academies. Due to the decline in donor funding, most of the academies in Africa including the regional ones in Accra and Abidjan are being run down with outdated training equipment. The number of maritime professionals retiring in Africa, pilots, harbour masters, marine engineers, is more than trained young people entering the maritime industry. It will not be long before some of the Port Authorities in Africa, which are currently self sufficient with trained local maritime personnel, will have to bring in expatriate pilots and/or harbour masters.

231. The last ten years has witnessed the public sector in Africa divesting itself from the transport sector, which includes telecommunications in many countries, following various calls for liberalization, commercialization and globalization of the African economies. In some countries which have privatised the transport services, the telecommunications sector has moved from Government control to private companies under foreign control with the majority of shares coming under the ownership and management of multinationals.

232. To ensure global implementation of IMO Conventions, a pilot scheme to establish an IMO regional presence in Africa was launched with funding from the Technical Co-operation Fund and donor support. This would argue the case for the funding of development assistance to the maritime sector at national or regional level. An inventory of national or regional skills, drawing for example, on the graduates of the World Maritime University and the International Maritime Law Institute was also developed with a view to develop an infrastructure for the transfer of information on maritime technology. .

### **Integrated Technical Co-operation Programme (ITCP)**

233. IMO has an Integrated Technical Co-operation Programme (ITCP), the sole purpose of which is to build up human and institutional capacities, nationally, regionally, and globally, for uniform and effective compliance with IMO instruments. In this context, while national interventions continue to be important elements of the ITCP, it is clear that the regional and inter-country dimension has a particularly crucial impact for IMO, given the objective of securing uniform implementation of global maritime rules and standards.

234. The ITCP activities carried out in the last few years included, among others, the following:

- establishing and upgrading maritime administrations to enhance flag State implementation of international rules and standards;

- developing and updating national maritime legislation and regional maritime codes to enable uniform and effective implementation of IMO Conventions;

- establishing and strengthening regional mechanisms on port state control (PSC), including establishment of information system under regional mechanisms, in order to enhance safety inspections and adopt a uniform standard both for PSC inspections and for actions taken against ships found with defects;

- developing national land regional oil spill contingency plan to strengthen co-operation in response to oil spill incidents;

- exploring integrated approach to deal with all sources of marine pollution;

- strengthening and developing international trade by improved efficiency and reduced cost in the maritime transport sector through facilitation of international maritime traffic.

235. All these activities have contributed to the global efforts of the United Nations System to promote policy coherence, complementarity and co-ordination.

### **Development of an extranet**

236. The traditional system of circulating information on IMO activities to administrations has some weaknesses, which may be particularly severe for developing countries with very bureaucratic administrations. Important documents sent to designated focal points (e.g. in ministries) are often not forwarded to the proper sections where the information is needed.

237. As most developing countries now have access to the Internet, the IMO Secretariat was recently instructed to make certain databases available on the extranet to its Member States. This will make it possible for the operational services to access relevant information on their own directly from IMO. If requested, the Organization would favourably consider developing technical co-operation projects to provide further assistance in this regard.

## **Port State Control, STCW and Search and Rescue activities**

238. The establishment, with the assistance of IMO, of a quasi global network of port State control agreements requires participating countries to set-up an information centre adequately equipped with computers and to be able to access modern information and communication media.

239. The implementation of the revised International Standards of Training, Certification and Watchkeeping Convention (STCW) will require developing countries, in particular those which supply seafarers to foreign flag ships, to use information and communication technology for the verification of certificates as required by the revised Convention.

240. Chapter IV of the Safety of Life at Sea Convention (SOLAS) was revised in 1988 to introduce the Global Maritime Distress and Safety System (GMDSS). The new technology, which relies on terrestrial and satellite communication techniques, is used to support maritime search and rescue operations. With the full implementation of the GMDSS, all maritime communications and maritime search and rescue activities are now based on the new system. Since the adoption of the 1979 Search and Rescue Convention (SAR), IMO has carried out a series of seminars/workshops and conferences in different parts of the world to assist its Member Governments to effectively implement the provisions of the Convention, including the GMDSS, which is an integral part of modern search and rescue.

241. To support these processes, IMO has developed and introduced three facilities - notably:

- a. a web site through which the public image of the Organization is projected, including a comprehensive view of its global mandate;
- b. an electronic system which facilitates the retrieval of IMO documents for use by Member States and the public at large; and
- c. brochures produced regularly focusing on major developments in the work of the Organization.

242. The foregoing information encompasses the general principles of transfer of information in the maritime area.

## **INTERNATIONAL TELECOMMUNICATION UNION**

### **Objective**

243. The purpose of this note is to provide a background reference guide to work conducted by the International Telecommunication Union (ITU) which is relevant to the report of the Panel of Experts preparing for the ECOSOC High-Level Segment. It looks at two specific issues—the role of IT in the rise of the new economy and the so-called “digital divide”—in some detail. Beyond that, the report provides an index to a much greater information resource which is available for consultation including pointers to some country-level data which may be useful to the group in its work.

### **Information Technology and the “new economy”**

244. One of the problems which seem to have beset the ECOSOC initiative is that “information technology” is an elusive concept. It can be defined very narrowly (for instance,

covering only computer technology) or very broadly (encompassing also communications technology and perhaps even broadcasting). In the context of ECOSOC's work, probably the key factor is the coming together of computer technology with communications technology in the form of the Internet. It is the development of the Internet which is one of the factors driving to emergence of the so-called "new economy".

245. In North America, the phrase "new economy" has become a rallying cry for those who see the world entering a new age of higher productivity, lower inflation and prolonged economic growth, built around the Internet. However, it may be more accurate to talk of a "new networked economy". The basic components of the new economy have been with us for a long time: Computers have been around since the late 1940s and those computers have been linked into local area networks since the 1970s. But it is only really within the last decade that we have seen those individual islands of connectivity joined together, via the Internet. It is this "networking" of the wider economy which is giving rise to optimism about longer-term economic prospects.

246. The theory behind the "new economy" is that, within human history, there are short periods of intense technological change which tend to occur every 50-60 years or so and which provide a platform for the development of new industrial sectors. The development of the telegram and the associated rise of the railways provided one such technology push in the 1840s. The development of telephone and electrical networks provided a second push in the late 1800s. In the period around the middle of the last century, there was a further period of intense technological activity, associated, for instance, with the development of computer technology and plastics. Now, at the start of a new century, we are seeing a further technological revolution which is being driven primarily by developments in the Internet and in genetics.

247. As an indication of the rise of the "new economy", it is instructive to consider the long-term evolution of the key technologies of telephone, mobilephone and Internet communications. While it will take the telephone network some 130 or so years to reach one billion subscribers worldwide, the mobile network will get there in just 20 years while the World Wide Web may achieve the same mark in just 15 years. The significance of this is that it shows how the development of the new economy is accelerating.

248. A second illustration of the rising significance of the Internet lies in the fact that it is a key enabling technology. In the United States, for instance, the IT sector, broadly defined, contributes only around 8 per cent of gross domestic product (GDP), but it has contributed around one third of the recent growth in GDP. The increasing significance of IT is also reflected in the fact that many of the world's leading firms, by market capitalisation, have a strong stake in the IT sector, and especially mobile communications and the Internet.

### **The digital divide**

249. One of the points on which the ECOSOC high-level segment is expected to focus is the so-called "digital divide". It should be remembered that the "digital divide" is, to a large extent, a new name for an old concept, namely that access to information technology is not equally distributed. In the 1980s, it was conventional to talk about the "missing link" (the subject of a 1984 ITU report) and in the early 1990s this became the "telecommunications development gap" (the subject of the 1994 ITU World Telecommunication Development Report). By the late 1990s, the vogue term was "information haves and have-nots" and now "digital divide" is favoured.

250. To some extent, the digital divide is the inevitable outcome of uneven economic growth. There is, for instance, a close relationship between the gross domestic product per capita of a

country and its penetration rate of fixed-line telephones (teledensity). However, this relationship is not so strong for mobilephones, suggesting that it may be possible for a country to “leapfrog” ahead with mobile in a way which is not possible with fixed-line telephones. It is certainly the case that a growing number of developing countries, including Cambodia, Uganda, Rwanda, Paraguay and Venezuela already have more mobilephones than fixed-line telephones. In these countries, it might be expected that mobile rather than fixed-line will be the primary platform for Internet access in the future. The hope is that, with so-called “Third generation” (3G) mobilephones, which will offer much higher bandwidths than even today’s standard fixed-line connections (up to 2 Mbit/s for a stationary or pedestrian connection and 384 kbit/s for a fast-moving one), a rapid rollout of high-speed Internet connections might be possible.

251. A crucial difference is that, for fixed-line networks, it has usually been a state-owned network operator that must make the necessary investment, and this has often been associated with long waiting lists. With a mobile network, the infrastructure investment is normally undertaken by a private company and more of the initial start-up costs are borne by the subscriber, thus eradicating the requirement for a waiting list.

252. However, there are signs that the take-up of the Internet may not be subject to the same acceleration in developing countries which has marked the mobile and latterly fixed-line networks. In the Americas region, for instance, the share of the South of the hemisphere has raced ahead in recent years, expanding from 10 per cent to 29 per cent between 1996 and 2000 for mobile subscribers. But for Internet users, the South’s share has hardly budged, increasing only to 2.7 per cent. There are many absurd statistics that could be quoted to show the extent of the digital divide as it relates to the Internet:

253. There are, for instance, more Internet host computers in Estonia than in the whole of sub-Saharan Africa (excluding South Africa); the market capitalisation of Cisco, the leading Internet hardware company, exceeds the gross annual domestic product of India; there is greater Internet connectivity in the city of Geneva than the whole of Latin America and the Caribbean.

254. However, what these statistics illustrate more than anything is the fact that the Internet is right at the start of its product life-cycle and that continuing growth is likely to occur in the years to come. It therefore becomes imperative that the developing countries are not left further behind by a lack of investment or a failure to recognise the significance of the shift from traditional voice-based telecommunication networks to the Internet. One key indicator is regional IP bandwidth. More than 98 per cent of global IP bandwidth, at the inter-regional level, connects to and from North America. The level of bandwidth available *between* the regions of the South is minimal. Furthermore, whereas on the international telephone network, there are sizeable cash transfers from North to South under the accounting rate system (around US\$7 billion per year in the mid 1990s), on the Internet, these flows are reversed with the developing countries making payments to US carriers for connectivity and traffic exchange. Thus the prospects are that the narrowing of the “digital divide” may proceed much more slowly than the narrowing of the gap in the penetration of telephone lines or mobilephones.

## Resources Guide

255. The **fixed-line telecommunications industry** is documented in a number of ITU publications. The specific theme of Universal Access was explored in the 1998 edition of the “World Telecommunication Development Report”, available from the ITU website at: [http://www.itu.int/ti/publications/WTDR\\_98/index.htm](http://www.itu.int/ti/publications/WTDR_98/index.htm).

256. The **mobile communications** industry was the topic of the ITU's 1999 World Telecommunication Development report, available from the ITU website at: [http://www.itu.int/ti/publications/wtdr\\_99/wtdr99.htm](http://www.itu.int/ti/publications/wtdr_99/wtdr99.htm).
257. The **Internet** is the subject of several ITU reports, notably the 1999 edition of "Challenges to the Network: Internet for Development", available from the ITU website at: [http://www.itu.int/ti/publications/INET\\_99/index.htm](http://www.itu.int/ti/publications/INET_99/index.htm).
258. The globalisation of world's communication networks, and the development of international **trade in telecommunications** is elaborated in the "Direction of Traffic" series of reports, written jointly by ITU and TeleGeography Inc. The 1999 edition is available from the website at: <http://www.itu.int/ti/publications/DOT99/index.htm>.
259. The issue of telecommunication reform, especially the establishment of independent regulatory agencies, is examined in the ITU's report on "Trends in telecommunication reform", available at: <http://www7.itu.int/treg/publications/Trends-en.asp>.
260. The ITU has also undertaken **regional** reports covering:  
 The Americas at: <http://www.itu.int/ti/publications/americas/2000/index.htm>.  
 Africa at: <http://www.itu.int/ti/publications/africa98/index.htm>.  
 Asia-Pacific at: [http://www.itu.int/ti/publications/asia\\_97/index.htm](http://www.itu.int/ti/publications/asia_97/index.htm).  
 Arab States at: <http://www.itu.int/ti/publications/arabstates/index.htm>  
 Least Developed Countries at: <http://www.itu.int/ti/publications/lde95/index.htm>.
261. A database of telecommunication indicators is available in published form (statistical yearbook) at: <http://www.itu.int/ti/publications/YB2000/index.htm> and as a computer-readable database at: <http://www.itu.int/ti/publications/world/world.htm>.
262. A general overview of the industry, Telecoms at a glance, is available free of charge on the ITU website at: <http://www.itu.int/ti/industryoverview/index.htm>.
263. Specifically, [http://www.itu.int/ti/industryoverview/at\\_glance/basic98.pdf](http://www.itu.int/ti/industryoverview/at_glance/basic98.pdf) contains figures for fixed telephone main lines and teledensity.
264. [http://www.itu.int/ti/industryoverview/at\\_glance/cellular98.pdf](http://www.itu.int/ti/industryoverview/at_glance/cellular98.pdf) contains statistics for cellular mobile subscribers, by country and by region, worldwide.
265. [http://www.itu.int/ti/industryoverview/at\\_glance/Internet98.pdf](http://www.itu.int/ti/industryoverview/at_glance/Internet98.pdf) contains data showing the estimated number of Internet host computers and personal computers worldwide.

## OFFICE FOR OUTER SPACE AFFAIRS

### INTRODUCTION

266. Space technology is part of information technology. Without the capabilities of satellite technology to collect data and transmit essential information for timely actions, the information revolution that has emerged in the past decade would not have taken place. Satellite communications have enabled the transfer of voice, text, graphics and complex information over large distances within extremely short times, shrinking the distances between people around the world.

267. For protecting the environment and managing land and ocean resources, satellite remote sensing offers lower-cost data acquisition with faster speed and higher frequency coverage compared to airborne and ground surveys. Remote sensing and communication satellites can also play a vital role in disaster management activities, collecting and disseminating critical information on the devastated area for emergency relief operations. Navigation and positioning satellite systems that can determine the location of static and mobile objects anywhere on Earth with a precision of a few centimetres will be essential for land, sea and air traffic. The capability of those satellite systems to relay signals from transmitters activated in distress situations to ground stations made it possible to determine the geographical location of the transmitters and provide immediate assistance to persons in distress, saving thousands of lives.

268. Satellite communications systems have technical and economical advantages over terrestrial infrastructure in terms of mobility (mobile users cannot be connected to the fibre network directly), flexibility (terrestrial infrastructure is extremely expensive to restructure), cost-effectiveness in rural and remote connections (it is not cost-effective to deploy high-capacity fibre networks in areas with low-density traffic and difficult topography), and wide-area services.

269. Providing tools to manage natural resources, space technology offers solutions to those developing countries which depend on agricultural activities for their income and are caught in a downward spiral of poverty and environmental degradation, being forced to deplete resources to survive and then further impoverished by the degradation of the environment. In rural and remote areas, satellite communications can be essential, enabling access to educational and health services. Through these services, space technology offers solutions to those developing countries which have a limited skilled labour force, thus, lacking any chance to be competitive in today's knowledge-based industry.

270. While space technology can help developing countries leap-frog the development process, the rapid development in satellite applications could also lead to widening gaps between industrialized and developing countries. International cooperation would need to be strengthened to develop capacities of developing countries to benefit from the use of satellite communications and to develop their information infrastructure with the use of space technology.

#### Actions Taken At The Inter-Agency And Inter-Governmental Levels

271. Various organizations within the United Nations system have been carrying out educational and training activities and pilot projects to improve satellite-based communications and Earth observation for socio-economic development particularly in developing countries (see Annex II). Those space activities are coordinated by the Inter-Agency Meeting on Outer Space Activities, which meets once a year to plan future endeavours and to explore possibilities of carrying out ongoing and planned activities through joint inter-agency efforts. The Office for Outer Space Affairs serves as the secretariat of the Inter-Agency Meeting.

272. At its session held in February 2000, the Inter-Agency Meeting took further steps to enhance coordination of activities with the use of advanced information technologies. The Inter-Agency Meeting agreed to make consolidated information on space-related work of the United Nations system available via the Internet. A calendar of space-related events in the United Nations system, including educational and training activities for developing countries, will be made available on the web site of the Office for Outer Space Affairs and at the mirror sites of other interested organizations. The Inter-Agency Meeting also agreed to establish a working group to use web-conferencing on a trial basis to increase the efficiency of the work of the Inter-Agency Meeting.

273. At the intergovernmental level, the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space, known as UNISPACE III, identified specific actions which should be taken to address global challenges with the use of space science and technology and applications. In "The Space Millennium: Vienna Declaration on Space and Human Development", UNISPACE III identified the actions which address information needs such as: i) improving the management of the Earth's natural resources by, among others, increasing access to, and the affordability of, satellite images; ii) improving public health services; iii) promoting literacy and enhancing rural education by improving and coordinating educational programmes and satellite-related infrastructure; iv) improving the efficiency and security of transport, search and rescue, geodesy and other activities by promoting the enhancement of, universal access to and compatibility of, space-based navigation and positioning systems; and v) improving knowledge-sharing by promoting universal access to space-based communication services.

274. The General Assembly, in its resolution 54/68, endorsed the Vienna Declaration and called upon all concerned to implement the recommendations of UNISPACE III. In the coming years, it is anticipated that Member States, space agencies, organizations within the United Nations system, space-related intergovernmental and non-governmental organizations together with space-related industry will carry out those actions reflected in the Vienna Declaration, and, in the process, will improve information technologies that will contribute to economic and social development.

275. At its session held in February 2000, the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space made important progress to complement the work of the Inter-Agency Meeting on Outer Space Activities. The Subcommittee agreed to consider during the period from 2001 to 2003 "means and mechanisms for strengthening inter-agency coordination and increasing the use of space applications and services within the United Nations system". The Subcommittee aims to identify additional areas where organizations of the United Nations system could use space applications to increase the effectiveness and efficiency in carrying out their operational activities. The improvement of universal access to basic communication and information services would be one of those areas where the Subcommittee could identify the effective use of space applications.

276. UNISPACE III also recommended that consideration should be given to the possible contribution of the Committee on the Peaceful Uses of Outer Space to the preparations for the World Summit on the Information Society, the feasibility of which is being studied by ITU, with a view to including space-related matters on the agenda of the Summit.

#### Projects Being Undertaken Or Planned

277. The Administrative Committee on Coordination (ACC), in April 1997, agreed to undertake, through coordinated action at the country level, pilot projects in the broad areas as indicated in the appendix to its statement on universal access to basic communication and information services, in order to demonstrate the ability of the United Nations system to bridge the information gap (see para. 24, A/52/354). The use of space technology would be critical for the effective and efficient implementation of some of those projects, such as interactive long-distance education and learning, telemedicine and environmental protection and management.

278. In addition to those areas identified by the ACC, the information gap could also be bridged by conducting pilot projects in the areas including: i) disaster prevention, warning, mitigation and relief management, ii) search and rescue operations; and iii) control of infectious diseases. Space

technology plays a crucial role, and its effectiveness has already been proven, in these areas where the timely availability of critical information saves many lives of people in developing countries.

279. There are already several projects being planned or suggested with the use of space technology in those areas where consideration is being given to implementing inter-agency projects. The United Nations Industrial Development Organization (UNIDO), in cooperation with the Office for Outer Space Affairs, is developing a pilot project on utilizing distance learning to build and strengthen the capacity for investment and technology promotion in developing countries. The Office also plans to organize a workshop on multimedia satellite applications in Kuala Lumpur, Malaysia, in 2000, to be followed by the implementation of a pilot project in the region. At the first annual industry symposium held during this year's session of the Scientific and Technical Subcommittee in February under the theme "Interactive Multimedia Satellite Applications: Implications for the Twenty-First Century", a speaker from the Russian Federation proposed that the United Nations should enhance its role in the development of space multimedia communication systems and that the Committee on the Peaceful Uses of Outer Space, in this connection, should increase its role in the creation of programme contents. These projects could be considered for possible inter-agency projects to enhance universal access to basic communication and information services.

280. Some member States are already proceeding to implement pilot projects with the use of communication satellites to enhance public services, such as education, to reduce information gaps. Countries in Asia, including Japan, Indonesia and Thailand, are cooperating in the Asian Internet Interconnection Initiatives (AI3), a project which will provide access to the Internet where the terrestrial telecommunications infrastructure is not feasible and will use a satellite network to share educational and research information among Asian countries. In Europe, the European Space Agency multimedia programme currently covers fourteen application projects in the fields of distance education, telemedicine, intranet and e-commerce. One of such projects, called the Espresso for Schools, dealt with the integration and pilot operations of a satellite-based platform delivering multimedia learning content to fifty primary schools in the United Kingdom. The project proved that satellite communications can be an effective and affordable way of helping teachers improve educational standards in the classroom. Espresso is currently being launched as a commercial service in the United Kingdom. The concept could be readily adapted and exported to other countries, and through inter-agency cooperation, it may be implemented in developing countries.

## ANNEX I

### **Issues to be considered with respect to the role of information technology in the context of a knowledge-based global economy**

*Q1 What are the characteristics and structural features of the new knowledge-based society and economy and what are their implications and the possibilities they open for developing countries?*

A1 The new knowledge-based society and economy reward those who have faster access to critical information, such as the availability of resources and goods and changing political, economic and social environment affecting the market. Globalization prevails in the knowledge-based economy. In order to stay in the market, a country would need to have skilled labour force. It would be crucial to invest in education to keep its people abreast with rapid developments in science and technology as well as economy and finance. Developing countries

without adequate resources to manufacture goods could gain profits from the global market by participating in the service industry if they have skilled labour and qualified professionals.

*Q2 What are the elements necessary, in terms of skills, organization and infrastructure, for developing countries and societies to utilize and benefit from modern Information Technology? How can the UN system best contribute to the efforts of developing countries to foster such an environment?*

A2 In order to utilize and benefit from modern Information Technology, developing countries would need to invest both in the formal education and training of their people as well as in the upgrading and updating their skills. Training in the use of modern information technology should be integrated into the compulsory education from the early stage and should also be available for adults at low cost. The UN system can increase the number of education and training activities for people from developing countries.

*Q3 How could the goal of access and connectivity as well as education and training for all be achieved, especially in developing countries?*

A3 The establishment of tele-education networks in developing countries could contribute to achieving the goal of access and connectivity as well as education and training for all.

*Q4 How can cultural and linguistic diversity be pursued in cyberspace and how can the knowledge and perspective, especially of women and of marginalized groups of society such as indigenous groups, be included in the substantive content of the information highway?*

A4 Ministries and agencies of the governments responsible for education and/or culture should be encouraged to develop web sites containing information on the culture of their countries and including links to the web sites of relevant NGOs. Through an appropriate intergovernmental body, such as UNESCO, a network linking those web sites could be established and maintained. In order to ensure the participation of women and marginalized groups of society in the substantive content of the information highways, the governments should provide training for those people, and they could be encouraged to develop their cultural web sites in consultations with them.

*Q5 How can the experience and know-how of those developing countries that have made considerable strides in the area of information technology be harnessed for other developing countries, and how can beneficial linkages to other sectors of the economy within these countries be ensured?*

A5 The experience and know-how of developing countries would be particularly valuable to other developing countries, as their circumstances and resources would be more similar than those of industrialized countries. This experience and know-how could be shared through the organization of expert meetings and training activities, which could be a coordinated effort by the United Nations system. In the area of satellite applications, the regional Centres for Space Science and Technology Education, which are being established in all economic regions and being hosted by developing countries, will play an important role in harnessing the experience and know-how. This example could be considered for other areas of information technology.

*Q6 How can explicit linkages be elaborated between an IT development strategy and poverty eradication efforts?*

A6 While some linkages would be not too explicit, an IT development could enhance poverty eradication efforts through the following methods:

- i) Establishment of tele-education network, which would contribute to eradicating illiteracy;
- ii) Increase in the availability and affordability of satellite data and images for land and ocean resources management, which would contribute to promoting sustainable development and the protection of the environment;
- iii) Establishment of disaster management systems, which would contribute to minimizing adverse impacts of natural disasters, contributing to development of stable economy.

*Q7 How can the potential of IT for accelerating development and averting marginalization of developing countries be tapped given the existing distribution of knowledge-power?*

A7 In order to accelerate development and avert marginalization of developing countries, the United Nations system could assist developing countries in disseminating information on their economic, social and cultural activities which could be promoted or supported by the private sector of industrialized countries.

*Q8 How can trends in reduced resource and energy intensity associated with these new technologies be maximized for environmental benefits?*

A8 The information on the reduced resource and energy intensity associated with these new information technologies should be made widely available to the policy makers, with cost figures to indicate the savings to be achieved by the use of such technologies compared with conventional methods. Appropriate intergovernmental bodies dealing with the protection of the environment, or international funding institutions with focus on the protection of the environment, could be encouraged to provide funding for developing countries to introduce those new technologies.

*Q9 How can IT best be used for the prevention and mitigation of natural and man-made disasters or emergencies?*

A9 Space technologies can play important roles in early warning and management of the effects of disasters. As natural disasters often destroy or severely disrupt terrestrial telecommunication networks, remote sensing and communication satellites can play a vital role in supporting or making possible disaster relief operations, including the collection and dissemination of information on the devastated area and the provision of back-up communications. Data from meteorological and Earth observation satellites provide essential information for hazard mapping, risk assessment, early warning and disaster relief and rehabilitation. Navigation and positioning satellite systems can relay signals from transmitters activated in distress situations to ground stations and make it possible to determine the geographical location of the transmitters and provide immediate assistance to persons in distress, saving thousands of lives.

*Q10 What innovative approaches to resource mobilization can be devised and what incentives could be provided to attract private sector investment in the IT sector, including infrastructure, in the developing countries?*

A10 Pilot projects to establish IT facilities could be undertaken by the governments in partnership with universities and industry. Such projects could be partially funded by the

participating companies, but substantive cost of the implementation of the projects would be covered by the governments. The established facilities could then be operated by the participating companies with some government subsidies, or with preferential tax treatments for a limited period of time, until such time as there is reasonable expectation for commercial profits.

*Q11 How can the United Nations system further develop well-coordinated responses to the compelling new challenge of bridging the "digital divide"?*

A11 Consideration could be given to establishing a task force within the UN system to monitor the latest developments in the information technology and their impacts on economy and society, particularly in developing countries. Those participating organizations in the task force could hold virtual meetings, as frequently as required, using web-conferencing, to develop system-wide strategies for actions, when necessary.

## ANNEX II

### **Activities of the organizations within the United Nations system to improve satellite-based communications**

ITU conducts extensive activities, including training educational activities, technical advisory services and implementation or pilot projects, dissemination of publications and organization of international meetings, such as the World Radiocommunication Conference and the World Telecommunication Development Conference.

In carrying out its education and training activities as well as pilot projects relating to satellite communications, ECA emphasized the importance of the African Information Society Initiative (AISII), utilizing information and information technology to build competitiveness of African economies and society as well as policy reforms to provide supportive environment.

As for the use of satellites for the development of rural and remote areas, ESCAP has organized training and educational activities, while ECA has disseminated relevant publications. As for distance education, UNESCO, in cooperation with ITU, has implemented a pilot project to support primary teachers in developing countries and has been establishing a satellite-based network in selected countries. ESCAP has also conducted a study project with special focus on satellite-based education.

The establishment of satellite-based information networks for various purposes has been pursued by the Office for Outer Space Affairs, through its Cooperative Information Network linking Africa (COPINE), whose objective is to enhance information exchange in Africa; UNEP, through its Mercure project, UNEPnet and INFOTERRA (Global Environmental Information Exchange Network), to enhance various aspects of environmental information management; and by UNESCO, through its African Network for Integration and Development (RAPIDE), to ensure the strong presence of Africa on the Internet.

Many organizations consider it essential to ensure the availability of scientific data on various aspects of the Earth in order to enhance the planning and execution of socio-economic development activities. The Office for Outer Space Affairs, ESCAP, UNEP, FAO, UNESCO and WMO contribute to the development of the Integrated Global Observation Strategy, which would allow organizations involved in the collection of data to extend their contribution, assisting user groups and decision makers, in particular those from developing countries, and providing

enhanced scientific understanding at the national, regional and international levels. Many bodies of the United Nations system, including ESCAP, ECLAC, ECA, ESCWA, the Commission on Sustainable Development, UNEP UNITAR, FAO, UNESCO and WMO contribute to the monitoring and protection of the environment. Some of them have extensive programmes to collect and disseminate information on the status of the environment. The environment information systems of UNEP include Global Resource Information Database (GRID) centres, Environmental and Natural Resource Information Networks (ENRIN), Environmental Information Systems (EIS) and INFOTERRA. FAO is also active in collecting and disseminating environmental information particularly for Africa through such systems as the African Real-Time Environmental Monitoring Information System (ARTEMIS), the Regional Environmental Information Management Project (REIMP) for central Africa, and the Digital Land Cover Database for Africa (AFRICOVER).

## **UNITED NATIONS CENTRE FOR HUMAN SETTLEMENTS (HABITAT)**

### **Summary**

Habitat's contribution focuses on the role of information and communications technologies in support of sustainable human settlements development. Following the proposed outline for the Secretary General's report, it first discusses the challenge of the "digital divide" from a human settlements perspective. It then describes Habitat's actions to address the issues of connectivity, capacity and content, based on the operational and normative experience of the Sustainable Cities Programme, the Disaster Management Programme, the Community Development Programme, the Global Urban Observatory, and the Best Practices Programme. Finally, it makes a series of recommendations based on Habitat's experience.

### **KNOWLEDGE-BASED ECONOMY AND DEVELOPMENT**

281. The "digital divide," referring to the differential access to information technology within and between countries, is part of an older problem, that of the "information divide" – unequal access to information. For reasons such as income, education, geography, gender and ethnicity, different people have historically enjoyed differing degrees of access to information. Current levels of access to technologies such as email and the Internet simply reflect the socio-economic realities within and between countries. The new media, however, will either exacerbate poverty and social exclusion or reduce their negative consequences.

282. At the city level, the same realities are evident: richer municipalities are well-connected, while poorer ones are not. Habitat argues that municipal governments warrant targeted interventions to bring them on-line. Humanity has entered the "urban millennium;" for the first time more than half of the world's population lives in cities. Moreover, it is increasingly recognized that the solutions to many of the world's challenges must be found at the local level. Finally, cities generally represent the level of government closest to the people and there is a compelling argument emerging that the new information and communication technologies (ICTs) will play a powerful role in enhancing the quality of local governance through improved transparency, accountability and participation.

283. Finally, a word of caution. The debate over the digital divide must always be informed by the recognition that information and communications technologies are a tool. UNCHS

(Habitat)'s experience is that like money, technology is not a panacea. Improved governance and management is the key. The new media must serve people's efforts to implement their own development objectives. Technology must support a participatory process to help people collect basic information, define priorities for action, implement specific actions and monitor the results and learn from their experience. Only then will the technology contribute to realising sustainable human development.

## ROLE OF THE UNITED NATIONS

284. As the "digital divide" is fundamentally a question of access, the role of the United Nations is to promote more equitable connectivity, capacity and content. Where access to modern ICT's is not possible, the United Nations must support alternative means to facilitate the exchange of information and knowledge between our clients.

### **Connectivity**

285. Habitat facilitates connectivity to hardware and software as part of its overall development agenda through two principal strategies: donor procurement and public-private partnerships with software developers. The Sustainable Cities Programme, for example, builds into the budget of every city demonstration project it undertakes, resources for computer hardware and software. This equipment, however, is designed to support the city's environmental planning and management issues and connects the city to the global sustainable cities network as well as other networks. In another example, the Community Development Programme partnered with a non-governmental organisation in Central America to facilitate the provision of computers to a network of municipalities and community-based organisations in seven countries. The Sustainable Cities Programme (SCP), the Global Urban Observatory (GUO) and the Best Practices Programme (BLP) have established partnerships with the private sector to provide software free or at subsidized costs to programme partners. For the SCP and the GUO, the partnership involves the provision of geographic information system (GIS) software. For the GUO and the BLP, Intranet software connects their respective networks of partner institutions around the world to a common Intranet platform that is used to facilitate networking, joint preparation of working documents and sharing of working tools and methods.

286. As one of two United Nations agencies headquartered in the developing world, however, Habitat is all too aware of the poor levels of access to the new ICTs. As a result, effort must be made to bring people together using more traditional means such as print, radio, and meetings. This point was made by a coalition of 133 developing countries in May 1999 when they called upon the Secretary General to ensure that the United Nations keep radio and other traditional media as a means of disseminating information rather than relying exclusively on the Internet. Accordingly, Habitat's information unit collaborates with private sector partners such as the British Broadcasting Corporation (BBC), Africa Journal, CNN and WE-TV to provide radio and television programming, particularly to support the dissemination of human settlements "best practices." In addition, the print medium remains a central part of Habitat's outreach strategy.

### **Capacity**

287. As stated above, access to modern ICTs should be purpose-driven. Following are some examples of how Habitat is using ICTs to support the development objectives of its clients.

288. The Sustainable Cities Programme is developing an Environmental Management Information System (EMIS), a tool for collecting, organising and applying information relevant to

urban development and the environment. It is designed to assist in clarifying issues, formulating strategies, implementing action plans, monitoring progress and updating changes. The system combines Environmental Planning and Management (EPM) concerns and issues with a carefully structured management information system, using mapping and geographical information systems (GIS) as essential components for presentation, analysis and modeling. To date, Accra, Chennai, Dar es Salaam, Ibadan, Ismailia, Shenyang, Wuhan, and Zanzibar have developed locally relevant mapping standards and GIS applications to prepare up-to-date and reliable maps for environmental management purposes, drawing on academic, research and government institution resources.

289. In a priority application of electronic technology to monitoring urban conditions and trends, The Global Urban Observatory is developing, testing and distributing the UrbanDataLink, an inexpensive, easy-to-use package of software for local collection, verification, management, evaluation, presentation and comparison of policy-oriented urban indicators data. This tool will permit cities to enter data on the international indicators – and on their own indicators – and to analyse these data over time, or in comparison with other similar cities throughout the world, in database or in map format. Future versions of the UrbanDataLink will include a meta-directory to help compile distributed local data sets into “virtual” national, regional and global policy-oriented databases.

290. The Community Development Programme developed SISCOM, an Internet-based networking system that served to connect, at its peak, over 1,000 municipalities and 1,500 community based organisations in Latin America. The software facilitated the development of national and regional human settlements plans and to design specific projects for implementation. Representatives of Government, municipalities and community-based organisations can access the plans, responsible individuals, donors, resource people from any city or country in the network.

291. Habitat’s Disaster Management Programme is currently using ICTs in support of people’s human and property rights in Kosovo. Disputes over housing and property rights are among the most complex and sensitive of all challenges facing Kosovo today. As its contribution to this thorny issue, Habitat is developing a cadastral information system in Kosovo. Its goal is to develop a well functioning real property and land market system supporting democratic and sustainable development and economic growth in Kosovo. The programme will help guarantee ownership and security of tenure, support land and property taxation, solve and reduce land disputes, improve urban planning and infrastructure development, support environmental management and produce data and information for decision-making.

292. In all of the above examples, capacity-building is a key component of project design and implementation. The GUO, for example, is developing and testing training modules for the development and collection of urban indicators. An Intranet is being used to both backstop clients from headquarters and to facilitate learning and mutual support among the members of the urban observatory network. The CDP provided training for its network focal points not only in how to use the computers, but also on how to act as a catalyst for bringing stakeholders together in a participatory process to develop national and local plans.

## **Content**

293. The Best Practices Database contains over 650 proven solutions to the common social, economic and environmental problems of an urbanizing world. It demonstrates the practical ways in which communities, governments and the private sector are working together to eradicate

poverty, provide shelter, protect the environment and support economic development. The best practices are documented according to a standard reporting format, but are written by the people themselves, ensuring their “voices” are heard. Furthermore, those initiatives that have been independently evaluated as “Best Practices” have been translated into French, Spanish and Chinese. For more information, please visit <http://www.bestpractices.org>. This database is accompanied by a website where lessons-learned from experience are documented in the form of case-studies, casebooks and briefs that are applied to ongoing training, capacity-building, policy and leadership activities. Case studies and casebooks are disseminated through the Internet and in printed form.

**294.** The Global Urban Indicators Database is a wealth of information on urban population, economics, environment, infrastructure, services, housing and local authorities. It contains more than 20,000 pieces of information on the state of cities world-wide. It includes only city level data and indicators, encompassing a large number of urban development issues with a main focus on the physical conditions of cities. For more information, please visit <http://www.urbanobservatory.org>.

295. The Community Development Programme’s SISCOM contains databases featuring national and regional human settlements plans and initiatives, regional best practices, training materials and policy-development tools. CDP country documents are also accessible to all communities and municipalities networked to the system. For more information, please visit: <http://www.siscom.or.cr>

296. The policy-making and capacity-building lessons from Habitat’s operational and substantive work are compiled every two years in the State of the World’s Cities Report. This report is designed specifically for the Internet and will be increasingly compiled from various Internet-based “State of the City” reports. Supporting the production of the report is network of urban observatories. For more information, please visit: <http://www.urbanobservatory.org>.

**297.** The above-mentioned initiatives are examples of the use of ICT to disseminate knowledge and information. They are complemented by a specific strategy of working closely with global networks professional and civil society organisations that use more conventional forms of information and knowledge exchange, including training manuals, periodicals, newsletters, seminars and audio-visual means..

#### PARTNERSHIPS AND INTERNATIONAL COOPERATION

298. The above use of ICT enables Habitat to closely monitor the evaluation of the use and demand for knowledge based development. Certain trends are clearly discernable – the growth of use of ICT is rapid, if not exponential, in both developed and developing countries. In the latter there is consistent increase in connectivity for civil society organisations. Local authorities, although increasing their connectivity, are lagging behind other sectors.

299. Based on Habitat’s experience described above, the following action-oriented recommendations are proposed:

Bring cities and local authorities on-line, as a matter of priority, through partnerships or targeted public interventions

Sensitize clients to the benefits of ICTs: For national and local activities, clients must be sensitized through hands on experience to the potential of ICTs. In the human settlements

context, they must clearly understand how the technology being offered can, for example, generate local revenue, undertake urban development plans or improve local governance.

Technology should support participatory decision-making processes: The use of ICTs for improving the quality of governance should be encouraged.

Support the use of non-Internet-based media, such as print, radio and, where effective, television to share best practices and lessons of experience.

Language: Special effort should be made to make information available in languages other than English.

## **UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT**

300. Globalization has been defined in many different ways, from the diversification of supply sources to the integration and uniformization of market conditions around the world. It remains that, compared to the post-war decades of rapid growth of trade flows, as well as to the 1970s and 1980s, which witnessed an even faster growth of international capital flows, the true trade mark of the last ten years has to be found in the increasingly ubiquitous use of information technologies. The reason why this phenomenon itself has so deeply affected trade and finance comes from the combination of three major trends, namely: convergence between computer and communication technologies, digitization, and emergence of decentralized worldwide networks such as the Internet.

301. For developing countries, the possible emergence of a global knowledge-based economy should in principle be good news: as the power/price ratio of information equipment continues to rise, and as the unit cost of transferring information across borders keeps diminishing, opportunities to 'catch up' are unprecedented; simultaneously, the portability, flexibility and affordability of such new technologies (in areas such as electronic commerce) allows smaller players to become worldwide competitors. However, these bright perspectives are often clouded by the persistence of long-standing handicaps (lack of infrastructure or education e.g.), and the appearance of new ones, leading to concerns that the positive effects of the 'new economy' might be limited to the advanced side of a 'digital divide'.

302. What are therefore the roles and opportunities of developing countries and economies in transition in the context of information-led globalization of trade and finance ?

303. To address this question in an action-oriented fashion, it is useful to acknowledge that some of the most often quoted success stories about 'information technologies and development' are not necessarily those that will have the most profound effect in the longer run. In the case of India, for example, much more has been said and written about the remarkable success of software exporters from the Bangalore region than about the success with which, thanks to low-cost VSAT technology, the country has been able to improve dramatically the access of its rural areas to telecommunications; yet, software is about one per cent of the Indian economy, whereas an estimated 40 million Indian citizens have gained access to modern telecommunications over the last ten years.

304. It is equally useful to keep in mind that, in some developing countries, information technologies can sometimes meet with negative a priori reactions ( a surprising fact in most developed countries, out of luddite and libertarian circles): the fear of accepting new kinds of dependence from the creators and manufacturers of information equipment, as well as concerns about local governments to monitor the content of information flows crossing national borders, have sometimes been compounded by recent experiences. For example, in the wake of the recent

Asian crisis, much has been said and written about (1) the diminished governability of financial markets in the face of accelerated short term capital flows (the casino economy), and (2) the increased tendency of national financial markets to react to turmoil in others (domino effect). To a large extent, this *casino/domino combination* has been attributed to the increasing reliance of financial operators on information technology and networked-based approaches to buying/selling decisions. In that context, developing countries such as Malaysia or Thailand were described as the victims of the technology which they had contributed to implant and often develop on their own soil. It is a fact that the interconnection of financial markets, and use of IT in arbitrage mechanisms has contributed to amplify rather than buffer some of the shocks which have affected these market.

305. Moreover, it is also an undeniable fact that the emerging 'new economy', characterized by a rapidly increasing reliance of value-creation processes to rely on information and knowledge, is still very much a 'rich country phenomenon'; as it develops, massive restructurings are taking place through mergers and acquisition (Increasingly between major players of the old and new economies), and through the emergence of new ways of creating comparative advantages and acquiring market shares globally. In this game of concentration of 'knowledge-power', will the first-mover advantage gained by the more advanced players become irreversible, or can developing countries and economies in transition use information technologies to avoid further marginalization ?

306. An interesting example to address this issue is that of electronic commerce, an area to which UNCTAD has devoted considerable attention over the last few years <sup>2</sup>.

307. Among the three main types of e-commerce (business-to-consumers or B-to-C, business-to-business, or B-to-B, and business-to-governments, or B-to-G), the last two offer particularly positive prospects to developing countries, in particular from the point of view of participation of smaller firms in international ventures and from that of increased transparency and efficiency in public procurement. Opportunities to maintain and create comparative advantages in developing countries exist not only in the new sectors and service activities which lend themselves to on-line transactions (software, music, distance-servicing of complex systems e.g.), but also in the sectors where developing countries and economies in transition could see their advantages eroded by e-commerce; such activities include transport and tourism, but also all other sectors in which new trading techniques could develop, including manufactured and semi-manufactured goods, and even primary commodities. A key element in the success of e-commerce strategies in developing countries and economies in transition will consist in stimulating exchanges of experiences among the public and private entities having been involved in e-commerce and related activities: in many cases, the 'model' of the first-movers is not the most appropriate for these countries, and innovative cost-effective solutions can be found which are a better fit to local development needs.

308. However, in order to enable developing countries and economies in transition to benefit from such opportunities, a certain number of pre-conditions will have to be satisfied. By and large, successful e-commerce strategies require the combination of three elements: access, content, knowledge, legal environment, and trust. In these five areas, national and international efforts need to be combined.

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<sup>2</sup> For a more detailed analysis see 'Building Confidence – Electronic Commerce and Development', UNCTAD, February 2000. Available from UNCTAD as well as on <http://www.unctad.org/ecommerce>.

309. *Access* — Measures need to be taken to allow enterprises (especially SMEs) to get better access to the telecommunications infrastructure and the Internet; this includes not only a physical access but also economic access. All measures (normative, fiscal, technical, and so on), aimed at bringing down the cost of Internet and electronic commerce access, deserve close attention. In particular, the liberalization and deregulation policies of the telecommunications sector and of Internet access should be considered critical instruments to stimulate electronic commerce. At the same time, the emergence of a critical mass of potential users of e-commerce in developing countries (especially LDCs) can play a critical role in attracting the investments necessary to build and modernize local basic telecommunications infrastructure.

310. *Content* — International information flows are still characterized by a significant imbalance in favour of the most advanced countries. For many enterprises in developing countries, this situation means additional difficulties to their participation in electronic commerce. Therefore, the creation of a more national and regional content is an aim that needs greater cooperation between the State, enterprises and learning institutions.

311. *Knowledge* — In the field of electronic commerce the lack of knowledge could be a major source of “fear” and could hinder a more active participation by developing countries and their enterprises in the most modern part of global trade. On the other hand, the almost daily progress of electronic commerce technologies means that knowledge about it is not available from theoretical books or conceptual analysis. Those who practice electronic commerce are the ones who know most about it. This means that additional efforts should be made to enhance the practice of electronic commerce in developing countries, particularly among SMEs. In this context, the support provided by international and regional organizations could be an essential instrument to contribute directly to the efforts of the Governments and businesses of the developing countries, and to stimulate exchange of experiences among the countries. The development of national and regional capacities in the field of electronic commerce has to be encouraged at all levels. The inclusion of subjects related to information, Internet and electronic commerce within primary and secondary schools and university curriculum can be complemented by training programmes for entrepreneurs. Particular efforts should be made to favour the “training of trainers”, and can include the participation of such international organizations as UNDP, the World Bank and UNCTAD.

312. *Legal and normative framework* — Besides deregulation of the telecommunications sector, measures should be taken to overcome the insufficiency of legal instruments for the development of electronic commerce. The Model Law of the United Nations Commission on International Trade Law can prove to be an instrument of great help for countries that want to establish their own legal framework for electronic commerce. Similarly, on-going efforts to develop globally accepted norms for the authentication and inter-exchangeability of messages (such as those carried out under the aegis of the ITU or of UN-ECE), or in the area of Internet domain names and trademarks (in which WIPO has been playing a critical role) should be considered as of primary importance for developing countries and economies in transition; efforts should be pursued to ensure their greater interest and participation in the relevant fora.

313. *Trust and security* — Trust-based relationships between all actors involved is a crucial element for the development of electronic commerce. More national and regional initiatives are required to create the necessary instruments for the adoption of digital signatures, electronic payments and contractual guaranties for electronic transactions. In this context, international norms could be a vitally important instrument for the participation of developing countries and economies in transition in electronic commerce.

### The Digital Divide is not a fatality

314. Electronic commerce can play an important role in the building of positive globalization, and the relationship between e-commerce and development will be a critical element in this process. However, success in electronic commerce requires much more than technology, strategy and adequate legal instruments. Electronic commerce needs to be seen and promoted as a genuine new culture.

315. It is only if all relevant sectors of the local economy and society are committed to the success of a national policy on e-commerce that such policy has a chance to succeed. This means that dynamic and quasi-organic linkages and synergies must be maintained and used between the so-called “new economy” (the world of bits, information and knowledge) and the traditional economy (the world of atoms, bricks and mortar, roads and bridges). The concept of *e-velopment* has been used in UNCTAD’s recent work on e-commerce to help reflect this approach.

316. By ensuring that nationally, regionally and globally all components of the civil society are involved in designing, adopting and disseminating the economic, social, political and cultural components of relevant e-commerce strategies and policies, the *e-velopment* philosophy has the power to contribute to the emergence of a truly global “knowledge society”. As far as developing countries are concerned, this is an opportunity that needs to be seized with the swiftness and foresight required by the current acceleration of history. The international community as a whole has an important responsibility in ensuring that developing countries have the capability to seize this opportunity, because there is too much to lose if this does not happen.

## **UNITED NATIONS DEVELOPMENT PROGRAMME**

### Characteristics of a knowledge-based economy

317. Together with efforts to open markets and accelerate international trade, information and communications technologies (ICTs) are central drivers of the *globalisation process*, affecting all human and societal activities. The “new economy” taking shape in industrialised countries suggests that a substantial share of GDP growth is attributable to the output and activities of the information technologies and internet-related sector and to an unprecedented rate of technological change. In addition, the overall knowledge content of products and services is increasing. This is complemented by the emergence of “knowledge workers” as a new type of economic actors. In sum, we witness the creation of a “digital economy” or knowledge-based economy and society. In the United States, the IT industry accounts for 1/3 of US economic growth and employs 7.4 million persons at wages that are more than 60 per cent higher than the private sector average.

318. Information and knowledge will be playing a lead role in the world economy of the future - the post-industrial or advanced industrial society -, comparable only to that of other traditional production factors in the past. Today, the volume of information doubles every 5 years; by 2015 it will double every 72 days. Information and knowledge seemingly make time, space and distance to shrink. They affect the international division of labor, bring about new patterns of economic engagement and social interaction, determine the competitiveness of economies and corporations, generate new growth patterns and bring about hitherto unknown products, jobs and livelihoods. The IT industry in the United States accounts for 1/3 of US economic growth and employs 7.4 million persons at wages that are more than 60 per cent higher than the private sector average. And many signs point to a further rapid expansion of the IT sector worldwide: total world bandwidth in 1996 amounted to 200 trillion bits/day; in 2001 there will be a bandwidth of 9,000

trillion bits. Today there are 400 million PCs and about a billion telephones in the world; ten years from now, there are estimated to be 1 billion PCs, one billion high-definition TVs, and 3 billion telephones. These figures must be seen in the context of Moore's Law, which stipulates that the number of transistors on a given piece of silicon (chip) doubles every 18 months.

319. ICTs serve as a transmission belt to generate, access, disseminate and share knowledge, data, information, communications and best practises. Three central features are at the heart of the knowledge revolution. Information and knowledge are instantaneously accessible, they are transportable and can be simultaneously distributed to an unlimited number of users. Indeed, they cannot be depleted. The use by one does not prevent the use or consumption by somebody else. They cannot be owned, though their delivery mechanisms can. Selling them entails sharing not exclusive transfer. Indeed, information and knowledge represent a global public good.

320. A networked structure and networking activities are other novel features of the digital economy. The world, nations and corporations transform themselves into a *networked world economy* where everybody can communicate directly with everybody else, where hierarchies lose in importance and where democratic practises are beginning to be redefined.

321. What then constitutes a knowledge-based economy? It will have undergone a substantial sectoral restructuring, accomplished the integration of new ICT-based production products and processes, and relied on knowledge-based approaches and management. Not only will there be a strong emphasis on the production of ICT-related hardware and software affecting the secondary sector, but there will also emerge entirely new products and services enriching the tertiary sector, which may be labelled information and knowledge services.

322. UNDP's Human Development Report for 1999 has focused on the globalisation processes and in particular ICTs, their shape and impact and, especially, their consequences for the poorer countries in considerable detail. Developing countries face formidable challenges. Above all, they must tackle the digital *divide* – characterised by inequities in terms of endowment and availability, access, affordability and capacity. The divide runs between North and South, between rich and poor, between young and old, between literate and illiterate, between men and women, between urban citizens and rural dwellers.

323. For many countries, the transition to a knowledge economy will not occur automatically. Above all, it requires leadership. The move to a knowledge-based society calls for a broad-based understanding among national leaders, decision-makers and the population at large as to the sea change occurring and the measures to be taken to transform and position countries in the global economy.

324. Leadership, vision, the articulation of policies and a coherent strategy, systematic planning and efficient implementation are critical success factors. The ultimate objective should be a *knowledge and information society*, i.e. *a society endowed with the ability, capacity and skills to generate and capture new knowledge and to access, absorb and use effectively information, data and knowledge with the support of ICTs.*

325. Among the industrialised countries, Finland, the countries of the European Union, the United States of America and Canada have been in the forefront of building national infrastructures, while in the developing world Malaysia, Singapore, South Africa, Costa Rica, Peru, Dubai or Brazil have shown the way. However, many more developing countries can and must seize the “digital” opportunities to avoid a deepening of an already existing digital divide.

Such efforts can be supported through refocused multi- and bilateral development cooperation as well as novel public-private partnership initiatives.

#### Knowledge-based economy and development

326. Beyond inducing a large-scale restructuring of national economies, information and communications technologies (ICTs) are cost-effective development tools. They have the capacity to reach deeper in geographical terms and more people than traditional means of technical assistance, they can deliver faster, with higher quality, and at lower cost.

327. ICT can shape and enhance a wide range of development applications - from electronic commerce and assistance to small- and medium-sized entrepreneurs to the empowerment of communities, women and youth, from the promotion of good governance and decentralisation to advocacy programmes, including the observance of human rights, from long-distance education to telehealth to environmental management and monitoring. The potential to help reduce poverty, foster sustainable development, empower people, build capacities and skills, inspire new and transparent governance mechanisms (e-governance) and reinforce popular participation and informed decision-making at all levels is enormous.

328. However, this potential can only be realised and unleashed when three preconditions are fulfilled: *connectivity, capacity and content*.

329. Unless there is affordable and equitable access and connectivity, prospects for partaking in the knowledge economy are dim. The cost of going online ranges considerably: from US\$ 18/month in Sweden to US\$ 78/month in Argentina and internet access charges for one hour of US\$ 10.50 in Chad, where the average annual GDP per person is US\$ 187. Without requisite human and institutional capacities, the framework and skills required for the use of ICTs and the internet may be lacking making usage all but impossible. Without linguistically and culturally diverse digital content and material, a large portion of people, especially in developing countries may be unable to understand and digest what is being offered.

330. For all these reasons, ICTs have since recently become a new dimension for international development cooperation.

#### The potential for leapfrogging

331. The potential for *leapfrogging* is a special feature of ICTs that instils optimism among some. It implies that countries and societies can leap across one or more generations and stages of technology, without first going through the motions of adapting earlier technologies and introducing cutting-edge technologies directly. Previously, such a process took several years, if not decades; today it can be accomplished with the mere installation of state-of-the-art technology (e.g. satellite phones, cellular or mobile phones, latest PCs).

332. What are examples for such leapfrogging? Access to the internet through mobile wireless phones obviates the need to log on through computers. Voice recognition software removes a hitherto insurmountable barrier to the use of PCs by illiterates.

333. It should also be emphasized that the term ICT does not only refer to the internet, but comprises other tools such as CD-ROM, television, video and (digital) radio as well as satellite technologies. If internet access is lacking, knowledge and information can nevertheless be

delivered by other means, e.g. through CD-ROMs carrying the content of hundreds of internet sites on a single disk, at the cost of less than 50 US cents per piece.

334. A dizzying pace of technical *convergence* is another feature among ICTs, such webTV, wireless Internet access, Internet radio.

335. But other exciting and innovative linkages exist as well: connecting internet access points with community radio networks as has been done by UNESCO in Sri Lanka and by UNDP in Mongolia. A facilitator surfs the internet for information sought by communities and then reads out the results - in local language – directly to the radio audience.

#### Role of the UN- strategy and activities by UNDP

336. UNDP has adopted a comprehensive strategy to guide its support and assistance to developing countries. The key elements are:

337. Promotion of *awareness, advocacy and policy formulation* about the knowledge revolution. This help; this lays the groundwork for the formulation of sound strategies and policies, including the adoption of effective legal frameworks (e.g. in the telecommunications area and for e-commerce), national action plans, the linkage of ICT deployment with microfinance instruments (as pioneered by Grameenphone in Bangladesh) and international governance issues (such as the internet domain name regime, intellectual property rights and cyberlaws). Workshops, conferences and policy advice are the proven tools for that purpose.

338. Building *connectivity* to secure affordable and equitable *access* to telecommunications infrastructure, ICT hardware, software and networking capabilities. Beyond the “pipe”, the availability of and access to computers, related peripherals (e.g. modems) and software represent a no less important facet of connectivity.

339. The introduction and effective use of various ICTs requires a whole array of *institutional and human capacities*. At the institutional level, there is a need e.g. for effective regulatory bodies to oversee and guide measures to ensure affordable, universal access. At the human level, a whole menu of systematic skills and capacity training – especially for women and the youth – must be developed and offered. It should include basic computer literacy, web-browsing skills, desktop publishing and e-mail communications, networking, operation of servers and routers, website creation tools, data selection and interpretation, digital management, data selection and interpretation as well as management and technical maintenance skills.

340. Strengthening *content and cultural diversity*. Only 5 per cent of the world’s some 6 billion people are native English speakers (and overall 10 per cent speak English), yet according to OECD data, 78.3 per cent of all Internet web pages in 1999 were in English, 2.5 per cent in Japanese, 2 per cent in German, 1.7 per cent in Spanish, 1.2 per cent in French, 0.6 per cent in Chinese and 13.7 per cent in other languages. The domination of English is even bigger as regards international online forums. At present English dominates not only the Internet but also the CD-ROM and video content market. If ICTs are to be mainstreamed in the developing world, considerable efforts must be deployed to create digital and other content with the necessary linguistic and cultural diversity and purveying local and indigenous knowledge. The creation of “knowledge broker” and solutions websites, i.e. one-stop shops with hyperlinked access to structured and pre-selected sites, help minimise search time and hence lower usage costs.

341. *Creativity*: new solutions are needed to connect the unconnected – both in terms of technical innovation and social engineering. For its part, industry should be encouraged to respond to the needs of developing countries in the design of systems and hardware. For example, the non-availability of energy grids in many developing countries calls for solar- or dynamo-driven computers and hardware. Or voice-recognition technology may allow – illiterate – users to surf the Web without either touching a keyboard or clicking a mouse. In terms of social innovations, more systematic efforts will be required to create a web of digital community telecentres (often also labelled as multimedia access points, technology access centres, telecabinas, cyberkiosks, cybercafes) as public access gateways at the community level, especially at the rural level. Such telecentres will also serve as platform and hub for various development applications, community training, capacity development and content creation (in local languages). This approach entails a paradigm shift from individual to community connectivity. Other innovations are called for e-commerce, where novel transaction and payment procedures must be devised for an environment with a weak banking infrastructure and unavailability of credit cards.

342. UNDP currently operates three types of programmes:

- global programmes (the IT for Development Programme, the Sustainable Development Network Programme/SDNP and the Small Islands Developing States Network/SIDSNET),
- regional programmes (such as Asia-Pacific Development Information Programme/APDIP and the Internet Initiative for Africa) and
- numerous country-level projects.

343. Based on the needs identified by communities and stakeholders, UNDP has successfully conducted numerous needs-driven pilot projects involving the creation of multimedia community telecentres or multimedia access points with internet links, such as in Egypt, Ukraine, Estonia, Burkina Faso, Jamaica, Guyana, Cameroon, India, Benin, Mauritania, Morocco, Honduras, Pakistan. Since 1992, SDNP alone has a record 43 multimedia access points to its credit and SIDSnet, created in the wake of the 1994 Barbados Conference on Small Island Developing States, links today 42 island countries. Based in these digital hubs, manifold applications and related webpages in local languages have been developed, especially regarding e-commerce, telehealth, environmental issues, community networking and improvements to governance mechanisms. In Egypt alone, three telecentres have succeeded in placing more than 1000 development-related content pages in Arabic on the internet. In addition, the telecentres served as a base for community training and capacity development, especially with empowerment programmes for women, youth and small businesses.

344. As regards awareness and advocacy, UNDP has organised numerous workshops, including for media, women entrepreneurs, community leaders, owners and managers of small and medium-sized businesses, national and local government officials, civil society representatives, such as in Iran, South Africa, China, India, Mongolia, Nepal,

345. With respect to connectivity, the Internet Initiative for Africa has focused on assisting 15 sub-Saharan African countries to develop or enhance Internet connectivity and build capacities required for their operation. In Asia and the Pacific, APDIP has established connectivity for several countries, among them Bhutan, East Timor, Tuvalu and Laos.

346. The Regional Bureau for Eastern Europe and CIS (RBEC) helped establish connectivity in Ukraine and Albania.

347. In the area of capacity-building and training, UNDP has carried out an intensive and broad-based programme. In the Asia and Pacific region, APDIP has focused on training of government and civil society representatives in the use and application of ICTs for social and economic development through several projects. They encompass capacity development, regional server programmes, Internet governance news service, the creation and operation of a mobile internet unit in Malaysia and the operation of APDIP-CISCO networking academies in several countries. For its part, SDNP has trained since 1992 over 20,000 persons in the usage of ICTs, internet access, various capacity building efforts and especially networking techniques and approaches. UNDP has also supported capacity studies for national institutions, such as the Universal Service Agency in South Africa. The Regional Bureau for Arab States launched an e-trade initiative for Arab states, following a 1999 international workshop in Damascus, Syria. In the RBEC region, training programmes were carried out in Armenia, Azerbaijan, Belarus. In Brazil, UNDP is conducting some 30 different ICT projects, ranging from federal data processing, a public policy network, an integrated system of educational financing to institutional development of the electoral system.

348. UNDP through its SDNP network and partnerships with the private sector has introduced the use of open source and public software and made available dozens of internet portals carrying information on sustainable development in numerous languages.

349. More information about the scope of UNDP's projects can be found on the Info21 website <http://www.undp.org/info21/index.htm> which is designed as a structured knowledgebroker and resource content site providing access to a plethora of development information through hyperlinks. Another UNDP-sponsored website can be found at <http://www.knowledgebroker.org>.

#### Suggestions for a future role by ECOSOC

350. ECOSOC's principal task could be defined as raising awareness among decision- and policy-makers about the crucial role of IT and the need to build knowledge societies, if all countries want to partake fully in the dynamically evolving "new economy". Based on such awareness, ECOSOC could articulate a commonly shared vision which would form the basis for future efforts by the UN system, by countries collectively and individually.

351. Furthermore, ECOSOC could put forward a compelling case for public-private partnerships in this area - for reasons of skills and knowledge, pooling of resources etc. - and could call for the conduct of large-scale projects which are scaling available pilot project experience.

352. If Governments were to decide to set up a trust fund under UN auspices, its principal purpose could be to help raise awareness about the new knowledge economy and the strategic and policy implications thereof. Workshops could be organised with available funds to that end.

353. ECOSOC could contemplate setting up an "observatory" (akin to the Committee for Development Planning or the Advisory Board on Disarmament Studies), so that government could receive regular advice as to new developments and feed it into the policy-making process.

354. Likewise, under ECOSOC auspices, there could be semi-annual lectures of visionary and outstanding private sector, governmental and CSO leaders so as to highlight the latest developments to the UN community at large (akin to the Paul Hoffman lectures of earlier years, which were focusing on human development) and to provide a (much-sought-after) pulpit for the

lecturers thus honored by the UN. Such lecturers should be drawn from all regions of the world to foster a true exchange among different approaches and cultures.

355. Delegations to the ECOSOC high-level segment should also be encouraged to appoint business leaders, CSO leaders and parliamentarians to their delegations so that all parties can partake in a common learning exercise and the subsequent policy formulation, which needs to be continued at the national levels.

356. At the ECOSOC session, the substance of its high-level debate should be linked to the consideration of operational activities on its agenda. It would be desirable to articulate a recognition of the fact that IT is a new priority factor on the development scene. In that spirit, ECOSOC may wish to encourage the governing bodies of the operational organisations to adjust their future resource allocations so as to help foster the use of IT and related applications.

357. Coordination could also be accomplished through a well designed website which captures the major activities and might offer a "development marketplace" where partnering could be promoted and where documents, strategies and best practises could be showcased by all stakeholders. Given the page limitations of official UN documents, the website would offer the posting of the full text of policy statements and other material.

#### Partnerships and international cooperation

358. Immense resources – both in cash and kind - are required to create a more level playing field for developing countries in the global knowledge society. Public-private and multi-bi partnerships hold considerable promise. Especially the private sector should be encouraged and welcome to contribute its expertise and resources towards bringing the information revolution to the unconnected and underserved regions of the world. For their part, multilateral and bilateral organisations must match their recognition of the importance of knowledge and information in the development process by allocating considerably more funds for practical programmes.

359. The Secretary-General's Millennium report outlines three partnership approaches where practical progress can be made by scaling and mainstreaming lessons from earlier pilot projects and by forging new partnerships and alliances between the public sector, the private sector and philanthropic organisations.

360. A promising approach is the Global Knowledge Partnership (<http://www.globalknowledge.org>) which resulted from the 1997 Toronto Conference on Global Knowledge for Development, bringing together more than 40 partner organisation from the public, private and civil society sector, among them UNDP, the World Bank, the Governments of Canada and Malaysia, the British Council and the Dutch International Institute for Communications and Development.

361. Sufficient funds should be brought together to provide a critical mass of resources for the launch and sustenance of large-scale projects, validating the scalability of projects nationally, regionally and globally. If successful, they might influence and inform adjustments in the priorities of national policies and budgets.

#### Netaid.org

362. UNDP is also drawing on ICTs and the Internet for advocacy functions. In that regard, UNDP has partnered with CISCO Systems and other private sector corporations to create Netaid,

which was launched in September 1999 with a series of international live concerts carried online through the Netaid website <http://www.netaid.org>. Netaid is a long-term effort to use the power of the Internet to help eradicate extreme poverty. In the first phase, Netaid showcased a plethora of successful projects by UN organisations, NGOs and other partners in the fight against poverty. It also afforded partner organisations a platform to present themselves and their programmes. Drawing on the rapidly growing number of internet users worldwide, Netaid seeks to marshal a huge new international force toward the goal of poverty eradication utilising new techniques and approaches offered by internet technology, and, in the process, involving audience both in industrialised and developing countries. Following the high-profile launch stage of the fall of 1999 with international live and on-line concerts which attracted over 50 million hits since its launch, Netaid seeks to fight poverty through three objectives:

- using the netaid.org site to mobilise action;
- using grants by the related Netaid Foundation - an executive arm of Netaid.org - to help prepare individuals and groups in developing countries for participation in the knowledge revolution;
- using netaid.org partnerships to enhance developing country Internet education, access and connectivity.

363. Currently, there are more than 3,000 NGOs, some 8,500 individuals and some 170 corporations registered on the Netaid.org sites. The Netaid Foundation made its first grants in January 2000, totalling US\$1.7 million to 17 projects in Kosovo and Africa. In March 2000, Netaid.org launched a Mother and Baby Survival Project with TIME Magazine, CNN and the International Rescue Committee (IRC). In cooperation with the United Nations Volunteers (UNV), Netaid has also launched an online volunteering segment. It provides a mechanism for development organisations to post and for anyone in the world to find online volunteering assignments. Coordination within and among governments and countries:

## **UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION**

364. The contribution of UNESCO is divided into two sections: Local Content and Empowerment as key to bridging the digital divide; and Applications for Development, dealing with areas related to the Organization's mandate.

### **PART I: LOCAL CONTENT AND EMPOWERMENT – Keys to Bridging the Digital Divide**

365. Local content on the Internet is both a heritage for social, cultural and intellectual development at the local and national levels and the information capital for new national content production industries. Local content is also the development of the Information Society and especially to its social, political, educational and cultural. In both of these contexts the empowerment of national and local communities to produce, share and exploit local content a key challenge in bridging the gap between the "haves" and the "have-nots" in a global information society, and thus reducing the digital divide.

366. There is a great diversity in the types of local content: literary, artistic, administrative, scientific and technical, including indigenous knowledge in all these domains. The potential producers are also extremely diverse: the press and publishers, governmental institutions, researchers, universities and other educational institutions, NGOs and other civil society

organizations, and individual citizens. As far as the users are concerned, their capacity to exploit local content on the Internet and to take part in its production depends on their levels of literacy, education and mastery of the technologies concerned.

367. Local content can include content used or produced by institutions working at the sub-national or national levels. Local content may also have an international coverage, for example within a common cultural, linguistic or geographic context. Internationalization of local content may also have a strong economic motivation when content produced in one developing country can be made available more economically to other countries than to content imported from the industrialized world. Educational content produced in South Africa and available online is also used in the neighbouring countries, while the Indira Gandhi National Open University is currently offering its programmes in several countries in the Middle East and has proposed to offer them to other developing countries. An expansion of Internet use could allow better co-operation on production and delivery of content at the national and international levels, provided that the view of the individual citizen and community remains the basic reference frame.

368. It is essential that local content and ICT empowerment extend to all populations and encompass language and cultural specificities, as one of the most important in the development of an equitable Information Society. It is important that both the public service and private sectors participate in this effort, and that care be taken to develop appropriate technical, legal, economic and political frameworks that reach out to the largest number of content producers and users.

#### Production of local content

369. The production of local content refers to production of new content and to the digitization of existing content (administrative information, indigenous knowledge, etc.). It covers a wide range of forms: from electronic publications (articles, magazines, etc.) and databases, to individual contributions to discussion groups.

370. The constraints and barriers to content production can be economic, political, administrative, social, cultural and technical in nature. Some of the most important barriers are technical ones, since access to the Internet is limited, and national expertise in informatics and telematics is scarce in developing countries. Telecommunication tariffs and Internet access charges can also be major economic constraints, as can be high customs duties or taxes on the telecommunications and computer equipment necessary to produce or use local content. Legal and social barriers can apply to local content production, preventing users in developing countries from benefiting fully from Internet access. Illiteracy and media illiteracy also constitute an important impediment to the production and the dissemination of local content in the developing countries.

371. Since the production and enrichment of local content are closely linked to its preservation and to its accessibility to producers and users alike, one important stimulus and motivation for these activities is the existence of a viable and identifiable national electronic public domain - encompassing classical and traditional literature and information and data produced with public funds, to which can be assimilated other freely available information.

372. Training and capacity building are pre-requisite for the effective adoption of the Internet as a tool by local content producers and for the emergence of new high value added local content industries. Some existing industries, like those involved in the traditional cultural production, could easily expand their activities to multimedia and the Internet; in Burkina Faso, the cinema industry is particularly dynamic and it is expanding its presence on the Internet with the CINE

NET AFRIK website and that of the biennial FESPACO festival. In India, the active and successful software industry has been important in ensuring generic support solutions, capacity building and training for production of local multimedia and Internet content, notably regarding content adapted to different local and national languages.

#### Indigenous knowledge

373. "Indigenous" or "traditional" knowledge is local knowledge which is unique to individual traditional cultures and societies, it is typically tacit and originally unwritten, and thus difficult to collect, codify and interpret outside of its original context. However, the World Conference on Science of the International Council for Science and UNESCO (Budapest, 26 June-1 July 1999) recognized that such knowledge has, in addition to its unique importance to the originating culture, an immense potential value at the national and international levels, particularly when considered in conjunction with other traditional and "modern" knowledge and that there is a need to preserve, protect, research and promote this cultural heritage.

374. A very large number of websites on the cultures and knowledge of indigenous peoples are available on the Internet, but surprisingly few are actually produced by indigenous peoples' groups. Several international initiatives, for example those of UNESCO and the World Bank, have been established recently to promote the collection, codification, preservation, dissemination and exploitation of indigenous knowledge by developing countries with the help of the Internet.

#### Multilingualism and cultural diversity

375. Only a diversity of languages on the Internet can enable the production of appropriate local content for, and the participation of, everyone, as well as helping to preserve languages which may be threatened with extinction in the digital age. Despite of the growing diversity of the user population in terms of language, a host of hurdles of varying difficulty remains to overcome to achieve multilingualism on the Internet.

376. The original Internet worked with 7-bit ASCII coding for unaccented Roman script, meaning that software conversions at both ends were necessary to transmit the 8-bit codes needed for other alphabets. This problem is disappearing as new equipment is introduced, so that most alphabetic scripts can now be transmitted directly with international standard (ISO 8859), or other agreed, 8-bit coding schemes.

377. A further important development is the Unicode standard 16-bit encoding to support the interchange, processing, and display of the written texts of the languages of the world including historic and archaic scripts. The most current version of the Unicode standard, Version 3.0, contains 49,194 distinct coded characters covering the principal written languages. A remaining problem is that Chinese, Japanese, and Korean (CJK) ideographs share the same code space so that if a Japanese searcher inputs a search string, it can equally match against Chinese and Korean counterparts. Unicode also doesn't contain enough code space to capture all ideographs, so that it cannot perfectly render all CJK texts, particularly classical literature.

378. Multilingual Internet interfaces are developing at a quick pace, but still do not always offer solutions for developing countries' languages. The available Web browsers include at least four with extensive multilingual capability; at least two support Unicode and one claims support for 90 languages. The Multilingual Information Society website of the European Commission has an extensive list of multilingual applications in web available and workable multilingual applications, but these cover primarily European languages.

379. The Internet also has online a great variety of dictionaries, glossaries and other linguistic tools. The "Web of On-line Dictionaries" website provides links to free and commercial products for 177 languages, the vast majority of which have been developed by institutions and enterprises in the industrialized countries. The Kamusi project, developed by Yale University with a world-wide network of volunteers, aims at building new Swahili dictionaries and making them available on the Internet, Swahili being the most widely spoken African language. English-Swahili and Russian-Swahili dictionaries are already available, along with a prototype on-line English-Swahili lexicon which will ultimately be editable on line by the contributors.

380. In addition to the problem of absence or functional insufficiency of international multilingual Internet tools needed many developing country users, a general problem with such tools is that the largest software vendors, in their race to dominate the market, rapidly produce new versions of basic software like browsers and word processors, making it difficult for smaller producers of associated multilingual products to keep up. Another problem is that the older or less powerful computers common in developing countries may not be sufficient to make effective use of these international tools. Several developing countries, particularly in Asia and Latin America are locally producing and using software to overcome these problems.

User empowerment and co-operation

381. Local content published by Government and civil society organizations on the Internet is a stimulus to democratization, both as an empowerment for informed action and as a stimulus for expression and dialogue. For small economic actors in the developing countries, putting their content on the Internet can also mean a role in the global marketplace.

382. The capacity of Internet users to produce or exploit local content depends on their know-how, network access and available infrastructure. In this context, the Internet serves as a tool for empowerment of users, and as a means for them to co-operate to increase their visibility on and mastery of the medium. This co-operative approach is particularly important for users in developing countries who are often at an initial disadvantage relative to their counterparts in the industrialized countries.

383. Virtual communities in which users discuss, co-operatively plan and work, or otherwise relate in cyberspace are particularly important. A virtual community may correspond to a "real" community, in which people interact in face-to-face mode or by traditional media, or may be interlinked solely by electronic means. Different levels of interaction are possible, ranging from textual, audio or video teleconferences to interactive computer simulations which enable members of the community to see, hear, use and even modify the simulated objects in a computer-created world.

384. Multipurpose Community Telecentres (MCTs), can be a natural extension of existing community institutions such as cultural centres or public libraries, empowering local communities, including low-income groups, micro-enterprises, women and youth, to develop and use local content. MCTs can provide facilities for the generation and exchange of community information and forums for participatory democracy, particularly through vernacular-language interfaces and can link to "traditional" community media such as radio for outreach activities.

385. MCTs can be developed in rural, urban or peri-urban settings. The examples cited previously in rural Africa (see part II.5 Governance), can be complemented the urban examples of the Technology Access Community Centres (TACCs) in Egypt, supported within a UNDP pilot

project, which are ultimately expected to develop into hubs for electronic content creation, especially in Arabic, responding to community needs and interests.

386. A fundamental criterion for the success of an MCT is the participation and co-operation of a wide range of local organizations in establishing the facility and in developing content and applications: the private sector, NGOs, the public and also by government at all levels. A MCT is thus distinguished from a "telekiosk" or "public call office" operated strictly as a commercial venture, and from ICT centres set up to serve mainly a single client group (for example, a school system or a government service), but the dividing lines are not always clear in practice.

#### National policies and public incentives

387. Public policies have been widely applied to promote the development of and access to local content in the developing countries.

388. Policy elements to promote it fall into several general areas:

- a. establishment of conditions for development of the digital content industries including intellectual property provisions, promotion of multilingualism and regulation of content;
- b. promotion of content in the public service sector and of an electronic public domain;
- c. assurance of access to the Internet, development of infrastructures and provision of a general basis for Information Society development, including public awareness and,
- d. the strengthening of informatics education.

389. Several developing countries have placed their goals for local content within broad plans for informatization. One of the most evolved examples is Singapore which published "IT 2000: Singapore's Vision of an Intelligent Island" in 1991, concentrating on applications in eight sectors: construction, libraries, education, health, production and distribution, new media and the Internet, public services, tourism and entertainment, as well as cross sectoral activities in training, infrastructure development, and stimulus for ICTs in the private sector. The Korean Basic Law on Promoting of Informatization sets the legal framework to enhance the competitiveness of IT industry, and to construct the Korean Information Infrastructure. In Mexico, the informatics development programme for 1995-2000 gives priority to the development and interconnection of data networks, wide application of informatics in the public sector, and the development of a top quality informatics industry in those niches which can provide greatest added value or a competitive advantage in the international market.

390. The question of intellectual property rights is closely linked with that of local content, because these rights are a principal tool to ensure the protection of, and also access to, local content. Content in digital form requires special consideration since copies can more readily be made and disseminated widely than with traditional media, and possibilities for corruption of works or plagiarism are multiple. On the other hand, a strictly economic interpretation of copyright can upset the balance between the protection of rights owners and the public interest, weakening the original aims of copyright to promote the progress of science and arts.

391. "Public domain" information, which is free of copyright and belongs to everybody, is often paradoxically not well enough known to potential contributors and users because of lack of interest in promoting it, no direct profit being expected due its very "public" nature. Thus

governments and other public service organizations may have very rich and diverse information stocks from which all would gain from their being identified, digitized and made available through the Internet. This information includes that produced by public organizations and that which has fallen into the public domain (e.g. most of the artistic and literary masterpieces of the past), as well as a growing amount of information produced by persons willing to let their intellectual productions disseminated freely under certain conditions such as many scientific research results and open source software.

392. The national electronic public domain is in fact part of a vast and growing international virtual public library that complements, and in fact nurtures, the commercial intellectual property sector. It is in fact a special case of the wider realm of "global public goods", including cultural heritage, environment, education and knowledge, which are a necessary in providing a satisfactory quality of life for all but are under-supplied in today's society. As explained in a recent book sponsored by UNDP, global public goods cannot be regulated by market forces alone, and may require special intervention measures by governments and international agreements to remain viable.

393. Another aspect of copyright, bridging the commercial and public domains, is that of "fair use" which in the pre-digital world made possible the concept of the "public library". For example, the "fair use" provision of the US Copyright Act allows reproduction and other uses of copyrighted works for purposes such as criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholarship or research and additional provisions allow usage with further educational and library activities. An extension of fair use rights for the general public in cyberspace could include the possibility to:

- a. read, listen to, or view publicly marketed copyrighted materials privately, on site or on line;
- b. browse freely on Internet sites;
- c. experiment with variations of copyrighted material for fair use purposes, while preserving the integrity of the original;
- d. make a first generation copy for personal use of a publicly marketed copyrighted work or of a work in a library's collection for such purposes as study or research.

394. Moreover, non-profit and public libraries, archives and documentation centres could be authorized to:

- a. use electronic technologies to preserve copyrighted materials in their collections;
- b. provide copyrighted materials as part of electronic repository consultation service;
- c. provide copyrighted materials as part of electronic interlibrary loan service.

395. Developing countries, where users experience particular difficulties in access to information, have a special interest in adequately developing the fair use concept in the national context and in participating in the international debate on this subject.

396. Policy action and co-ordination at the international level can also be an important aid to promotion of local content, particularly within communities with common cultural outlooks or economic goals.

## **PART II: APPLICATIONS FOR DEVELOPMENT**

### Education and learning

397. The Internet has great potential to reinforce educational reform, due to its flexibility and potential for interactivity. It is particularly relevant to the objective of increasing learner participation in the educational process and of promoting lifelong learning, for example through distance education. The use of Internet tools can also enhance the openness of education by equalizing educational opportunities, providing alternatives to traditional/formal education, and enabling the development of more community-based learning facilities.

398. A major area of Internet activity worldwide has been in higher education where Internet-based courses have been rapidly introduced in the last few years. In primary and secondary education, school networking initiatives, or schoolnets, can improve access to the Internet. Applications in non-formal education (NFE) have also been developing, but at a much more basic level. The new models and initiatives follow a continuum between traditional models and the totally virtual ones. They imply profound changes in educational models and systems, but they must thus also overcome fears and resistance to change.

### Primary and secondary education

399. In primary and secondary education, Internet use in developing countries is generally low, due mainly to limited access. Only a few developing countries have established wide Internet access of schools through nation-wide networks, examples being Chile, South Africa and Thailand.

400. The Enlaces project in Chile, started in 1995, has already linked 5,000 basic and secondary schools to its network. Schools receive equipment, training, educational software, and ongoing support from a technical assistance network of 35 Chilean universities. The goal is to have 100% of secondary schools and 50% of primary schools connected by year-end. Although the network does yet offer full Internet access through the network, a website is available to schools which have already connected with their own means.

401. In Thailand, SchoolNet@1509 was created in 1995 while the Golden Jubilee Network was established the following year. In 1998, the two networks were merged to form the Thai network for education, with 1,500 schools having Internet access by June of that year. Limited resources (120 dial-in telephone lines) obliged the network to establish a system to optimize line use: one account for Web browsing and a maximum of two for Web development were given to each school, with total access limited to 40 hours a month. 14 Bangkok schools are, however, already connected directly to the SchoolNet backbone by leased line. Further solutions expanding access are being examined and the target is to have 5,000 schools connected by 2001.

402. The South African School Net, SchoolNetSA, and its provincial structures provide Internet services to the local schools: connectivity, domain administration, e-mail and technical support. SchoolnetSA has also developed on-line educational content, and many schools have developed their own Web pages. The network has received major support from several national and international companies, which is one the main characteristics of this initiative.

403. Kidlink House in Brazil is promoting virtual "Houses" of two or more schools to conduct collaborative Internet projects. The National Open School (NOS) in India, based on a network of

800 accredited institutions, is presently planning an "Indian Open Schooling Network" to serve students having Internet access at their schools or at home. EDUNET, an educational network in Pakistan, uses Internet mainly for e-mail, in conjunction with CD-ROMs, to bring information to disadvantaged communities. The Brazilian "School of the Future", based in São Paulo, is using the Internet in support of teachers' searches for information and resources and as a pedagogical tool in pilot projects and experiments along with other technologies such as cable based or satellite video conferencing.

404. Two main structural constraints to introducing the Internet in basic and secondary education are the lack of equipment and the lack of trained personnel. Teacher training on and through the Internet should be considered a priority. Another important issue is availability of educational content on line. Among the many sites that provide educational content, such as the EdsOasis, UNICEF CyberschoolBus and I\*EARN websites, most materials are in English and are not always suitable to developing country contexts. The SchoolNetSA website presents an overview of online content produced both in South Africa and world-wide concerning curriculum support, online teaching and learning resources, including resources for courses in the Afrikaans and Xhosa languages. The creation of local content is still insufficient as it requires a greater mastery of Internet tools and the definition of clear objectives in schools and at the governmental level.

405. In an article on the Senegalese experience within the World Bank's WorLD programme, it is clearly asserted that Internet has helped improve educational content and programmes. In Brazil, the 1998 report on Rio de Janeiro's KidLink House activities states that school teachers found "considerable improvement in reading and writing activities" when students learn to use e-mail. Other reports from Africa indicate that many schools in developing countries have been discovering how they can make "meaningful educational use of e-mail and the Internet", which students learn to use quickly and enthusiastically. Those conclusions are similar to the ones drawn in developed countries concerning the use of Internet in classroom activities.

#### Higher education and virtual universities

406. Numerous universities in the developing countries are also now testing or implementing Web-based education. Bangladesh Open University has installed a computer network with two dedicated servers, providing more than one hundred on-campus users and regional centres with Internet facilities, in particular e-mail. The University of Botswana evaluated two distance education methods: an Internet based course, free of charge, during three months, and a video-based course (one-way video and two-way audio/fax) during one week. The Internet course resulted in a statistically significant 49% gain in test results, a comparable result to that obtained with the video technology.

407. An evolving concept critical to today's interest in Internet tools for higher education is the virtual university. The Francophone Virtual University (FVU) launched by the Agence universitaire de la Francophonie (AUF) regards the virtual university as a "meta-university" that provides co-operating universities, especially in countries of the South, with support and services such as distance education infrastructure, advice and assistance, and shared educational material. In Africa, the regional virtual campuses are being installed in the SYFED-REFER centres of AUF in Dakar and Yaounde.

408. The African Virtual University (AVU), with 24 universities in 15 Sub-Saharan African countries, seeks to increase enrolment level of courses for scientists, technicians, engineers, and business managers; improve quality and relevance of instruction in Sub-Saharan Africa; and to

provide an academic environment enabling participation in the world wide community of learning, research and dissemination of knowledge. Although the main focus of AVU is the use of satellites for the transmitting video-based courses, the Internet is used for transferring data files and for access to information.

#### Non-formal education

409. In many developing countries, non-formal education's potential is far from fully realized. Programmes undertaken in the North, especially in the United States, are making substantial use of the Internet. These programmes include the ALTIN (Adult Literacy Technology Innovation Network) focusing on teachers; the SHELCOM (Shelter Communications Literacy Network) for adults in homeless shelters; and Literacy Link, an ongoing distance education project for learners and teachers

410. UNESCO's Learning Without Frontiers (LWF) initiative is working to create new ways of learning and especially to encourage Open Learning Communities to allow individuals to respond to their own lifelong educational needs. LWF has launched several pilot projects in the NFE area including the "Creating Learning Networks for African Teachers".

411. The Commonwealth of Learning is developing a project to pioneer use of ICTs and Internet in NFE in India, Bangladesh and Zambia with IGNOU (Indira Gandhi Open University), OUB (Open University of Bangladesh) and University of Zambia through its Department of Adult Education. Technology-based community learning centres can improve NFE by relying on the Web as a tool for sharing experience at the international level and as an information resource for instructional materials. The Internet can be used to upgrade teacher skills, as a resource for instructional material, as a communication tool, as a dynamic support for participatory projects and as a stimulant for creating local content.

#### Problems, solutions and priorities for the future

412. International collaboration provides a promising approach to promoting access to the Internet for education, in the areas of content and applications as well as in the areas of technology transfer and connectivity. Partnership agreements signed between universities of industrialized and developing countries could bridge the North/South divide. At a regional level, the more advanced countries could play an important role in the planning and initiation of network initiatives. Collaboration would allow large-scale economies through sharing of resources, choice and flexibility in planning and implementation, and vast new possibilities for open learning, distance education and cultural exchange.

413. Collaboration with the corporate sector is often a key element to the introduction of information technologies. In smaller developing countries where the Internet has been introduced mainly by the private sector, a separate academic and research network may not be feasible or sustainable. In this case, educational and research institutions may find it possible to collaborate with private Internet service providers and telecommunication operators to create a virtual backbone facility. This approach is being used in Ghana in a project initiated by a consortium of public service institutions, the Ghana National Committee on Internet Connectivity (GNCIC) with initial support from UNESCO and funding of the World Bank's infoDev programme. The SchoolNetSA project has an impressive number of corporate sponsors and partners sponsors for software, equipment and connectivity, demonstrating that the introduction of the Internet and the ICTs in education can create an important potential market in developing countries.

414. Non-formal education and lifelong learning applications appear to be among the most likely to be developed in the future, as they respond to both global trends and the problems faced in developing countries.

415. Perhaps the most important priority is teacher training as a prerequisite for the implementation of broadly based application of the Internet in education and learning.

416. The Internet has to be introduced in ways adapted to local situations and priorities, with the advantages weighed against more fundamental needs in education such as teacher salaries or basic infrastructure. Bottom-up and local projects should be encouraged. It should also be kept in mind that other technologies such as CD-ROM or cable TV, or a mix of technologies, can be sometimes more suitable, particularly considering the limited number of telephone lines in the developing countries.

417. Maintenance, staff training, quality control and continuing development, are also critical. It is only after a system is well established that one can expect to benefit from economies of scale and sustainable contributions to development. The Internet can also help reduce communications and administrative costs of educational institutions.

#### Information services, libraries and archives

418. On-line library and archives systems have been given a tremendous boost through the Internet which now provides wide access to applications such as cataloguing, archiving, accessing and retrieving information and an overall improvement in interactivity of service and sharing of human resources. The world's stores of information are more and more becoming virtual and digital libraries. Thousands of national libraries, public libraries, university libraries and specialized libraries now on line, mainly in industrialized countries and more and more are offering full text and multimedia documents on the Web.

419. The movement toward digital libraries has been catalyzed by international co-operative projects such as the G8 Biblioteca Universalis pilot project aiming to make the major works of the world's scientific and cultural heritage accessible to a vast public via multimedia technologies including the Internet, and to advance international co-operation towards the establishment of a global electronic library system

420. The Internet is a useful medium for providing world-wide access to archives. An example is the ArchiviaNet website of the Canadian National Archives which contains over 3.5 million records in various databases. Although only a small part of the holdings are directly available on line, ArchiviaNet provides extensive finding aids and descriptions of more than 1.5 million governmental files, of 570,000 audio-visual documents, of 400,000 photographs, and of 160,000 works of art and caricatures which enable users to identify archival documents of interest on the Internet in preparation for subsequent direct consultation.

421. With the growing importance of multimedia, audio-visual archives are also realizing the importance of offering services and collections on the Internet in accordance with the popularity and facility of this medium. The website of the Institut national de l'Audiovisuel in France is responsible for the archiving of the national radio and television production, which are providing an increasing number of holdings on line.

422. The Internet is providing libraries and archives in developing countries with an exceptional tool to overcome these obstacles to dissemination of information and resource sharing as evidenced by the following examples:

#### Public libraries

423. The library "without walls" which can be accessed anywhere is particularly relevant for public libraries in developing countries which can make use of resources on the Internet at the national and international levels, along with development oriented documentation in paper, audio-visual and electronic form, to serve the needs of local communities.

424. The Bulawayo Public Library (BPL) was the first in Africa to offer a public Internet and e-mail service starting in October 1997. Although BPL offers the service at a low charge of ZWD\$ 2 per minute, income from the service has been very substantial, and, at currently more than ZWD\$ 2,000 per month, is the third highest single source of income for the Library. The Library is currently trying to acquire additional computers to extend the service. The Internet service has attracted many new users into the Library and substantially improved the community's access to information. Another success story in Africa is the public library of Nakaseke, Uganda, a rural village about 60 km from Kampala, which has expanded into a multipurpose community telecentre with the assistance of the International Development Research Centre (IDRC), the ITU, UNESCO and other international partners.

425. Another model of a virtual community library is the Belize Electronic Resource and Development Library, run by an NGO on a voluntary basis, which enables people to help themselves by providing free access to information and resources, and to encourage democratic debate to fuel change and economic development.

#### National libraries and networks

426. Numerous major libraries in developing countries have established a presence on the Internet and are using it to promote and access information services. These efforts have been reinforced in several cases through networks within countries or among countries with similar cultures and heritages.

427. In Brazil, the Prossiga website provides an extensive virtual library for researchers, while the Brazilian Virtual Libraries Working Group is preparing a prototype "library of the future", and maintains an extensive catalogue of Brazilian libraries and library systems that helps to link Brazilian libraries and information centres in an effective network. The Brazilian Institute for Scientific and Technological Information (IBICT) has developed and successfully deployed an Internet based gateway called Antares which provides access in standard format to databases of more than 200 institutions in 22 states offering scientific and technological information. There are now plans to extend Antares to other in the Latin American and Caribbean region, using search interfaces in English, Portuguese and Spanish.

428. The National Library of Venezuela presents on the World Wide Web a representative sample of rare photographs illustrating the main stages of the history of some ten countries of Latin America and the Caribbean with comments in English, French, Portuguese and Spanish, as way of disseminating to a wider audience information from a CD-ROM prepared within UNESCO's Memory of the World Programme. The Library is co-ordinating the development of an IberoAmerican and Caribbean Digital Library, to be prepared under the auspices of the National Libraries Association of Iberoamerica (ABINIA) and INFOLAC, involving the

digitization of about 3600 books in the public domain pertaining to the region's culture (about 100 from each country) to be distributed on CD-ROM and on the Internet.

429. MEDLIB is a virtual library network project initiated by UNESCO, in which all archives, libraries and information services located around the Mediterranean, in both developing and industrialized countries are welcome to participate. The project aims to improve information resources on the Internet in all fields of knowledge, but two main areas of coverage are proposed:

- a. national and regional heritage held in collections in the large library and archives institutions of the region, including ancient manuscripts and major literary, philosophical and religious works.
- b. contemporary issues of major interest to the countries of the region, such as environment, hydrological and mineral resources, population and health.

430. The National Centre for Scientific and Technological Information and Documentation (NACESTID) in Vietnam has developed with aid from SIDA (Sweden), IFLA and UNESCO the Vietnam Information for Science and Technology Advancement (VISTA) intranet with 21 databases accessible on-line to government institutions at the provincial and district levels, including science and technology databases and electronic bulletin boards accessible down to the village level. Other examples of the many Internet sites offering on-line databases developed by major information institutions in Asia include those of the National Library and Library Services Board of Sri Lanka, the Department of Science and Technology in the Philippines and the government of Mongolia.

#### Online publications

431. An ever greater number of scientific and technical journals are published electronically, according to a diversity of models ranging from traditional journals which are also made available in on-line versions by their publishers at a cost, to new forms of co-operative publication by researchers themselves. These new electronic resources enable libraries and other information institutions to provide access on the Web to vast amounts of information more quickly, effectively and economically by serving as gateways these resources, by incorporating them into their collections, or by hybrid solutions.

432. Sustainable access to electronic publications in developing countries requires attention to technical details at both the server and user sides. A recent pilot study conducted at four of the best connected African universities by the American Association for the Advancement of Science (AAAS) and UNESCO showed that the feasibility of accessing international journal collections depended strongly on the configuration of the local network and the format in which the articles are presented.

#### Archives

433. Archives in developing countries have generally realized less progress than libraries in using the Internet, due in large part to their more restricted clientele and difficulties in making their vast holdings available in digital form. In Africa, for example, the National Archives of Benin and the National Archives of Namibia have developed websites with information on their services and some finding aids, while guidelines and a pilot project on the use of information and communication technologies in archives in Africa are being implemented by the International Council on Archives, the National Archives of Zambia and UNESCO. As an example in the area of audio-visual archives, the website of South East Asia-Pacific Audio-visual Archival

Association (SEAPAVAA) links to collections in Indonesia and Thailand pertaining to these countries' cultures.

#### The Public Domain

434. A key component of the global electronic library are holdings in the public domain - information free of copyright including classical and traditional literature and information and data produced with public funds at the national and international levels, to which one can assimilate open source software and other information made freely available without cost by its authors. The electronic public domain represents a world documentary heritage which is accessible to all, a window on national cultures and an invaluable support for education and cultural industries in developing countries. An example of an international project promoting the identification, digitization, promotion and dissemination of public domain information is the Humanity Libraries Project (formerly known as Humanity CD-ROM Project) which has developed a "basic needs library" with 1,240 publications now available on CD-ROM at nominal charge and free on the Internet, containing solutions, know-how and ideas needed to alleviate poverty and increase human potential.

435. Another public domain project is UNESCO's Memory of the World (MOW) Programme to promote the preservation and dissemination of the holdings of libraries and archives all over the world. The Memory of the World Register now describes 47 collections from 26 developing and developed countries. Many of these are available in multimedia products and websites.

#### Problems, solutions and priorities for the future

436. Priority should be given to automation of major libraries and information centres and affordable connection of existing libraries in ministries, municipalities, and schools to the Internet. Telematics applications capable of good performance over marginal communication channels will be important in enhancing the coverage of services for information retrieval, library loan requests and electronic document delivery. Libraries and information centres must also seek to develop more user-friendly services, and to extend their holdings and services in the area of audio-visual and computer-based courseware.

437. Some of the greatest challenges in applying electronic library and archives services for development are legal and ethical ones, particularly copyright for digital works and of fair use of electronic material by information systems and their clients. The concept of the electronic public domain is crucial in achieving a balance between meeting citizens' and development needs for information and the encouragement of creativity and entrepreneurship.

438. The increasing popularity of electronic access to information has caused a dramatic increase in use of expensive facilities for print-outs and copying. Computer screens are less easy to read than hard copy and cause documented physiological difficulties; continued R & D will be needed to encourage the development of low-cost on-demand printing solutions and appropriate paperless applications.

439. Success in meeting these challenges will depend to a large degree on ability to train and retrain a large pool of information specialists who are versed in the development and management of ICT based services. The creation of needed educational programmes and institutions for this purpose constitutes a major challenge, which will in turn require the effective application of ICTs in the educational process.

## Culture

440. With the globalization of the economy and with the resultant redefinition of societies, perceptions of culture are changing. Another important question is whether globalization is a threat for cultural identities. Whatever the answer, it was recognized that one of today's and tomorrow's major challenges is to take appropriate account of ICTs in cultural policies. It is precisely because the Internet and ICTs in general are raising questions about the traditional definition of culture that there is a general debate on the need to new conventions on cultural assets including Internet and ICT dimensions.

441. It clear that the Internet is proving to be a valuable tool for the dissemination and the preservation of the culture of developing countries. The Internet provides a natural terrain for the dissemination of cultural products, and is also stimulating, although more slowly in the developing countries, new forms of cultural expression. But since the developing countries are considerably less advanced than the industrialized countries in making use of the Internet for these purposes, the arguments concerning cultural levelling remain as potential concerns.

442. Insofar as content is concerned, it is difficult to draw general conclusions from the very wide variety of available examples, but it can probably be said that co-operative projects at the international level (e.g. the CINE NET AFRIK site of FESPACO, the ITC Virtual Exhibition Centre) as well as at the national level (e.g. the Interactive Museum of Turkey, the National Museum of Korea) create better content. Such co-operation among and within developing countries, with the support of the international community as appropriate, may reduce the risk that the less-developed countries will be obliged to trade part of their cultural heritage for access to the information and communication technology needed to reap the benefits from its dissemination.

443. A number of priorities for the exploitation of the Internet for cultural development can be formulated, taking account of the above examples as well as of the Action Plan established at the Intergovernmental Conference on Cultural Policies for Development (especially Objective 4: "Promote cultural and linguistic diversity in and for the information society"):

- a. Encourage the wide access to the Internet in developing countries at affordable cost, especially for disadvantaged population groups, for example through community telecentres and cultural institutions.
- b. Reinforce efforts to digitize cultural heritage and to create more comprehensive databases, to serve both preservation and dissemination objectives.
- c. Promote networking and international collaboration in the use of the Internet as a means for dialogue among cultures, for example through joint ventures to build and share virtual exhibits.
- d. Encourage the development of the Internet for the purpose of cultural tourism.
- e. Encourage cultural institutions to develop educational material on the Internet.
- f. Take advantage of the rapid development of off-line cultural products, using technologies such as CD-ROM, to develop cultural applications effectively integrating use of these technologies with the Internet.

## Scientific Research

444. The advent and growth of digital telecommunications has accelerated the globalization of science. Scientific and technological research is being distributed increasingly among remote geographic institutions and organizations, relying on new techniques for data sharing, instrument

control, collaboration in an "electronic commons", and rapid, economical dissemination of results to an international audience via electronic publishing.

445. Electronic "virtual laboratories" are emerging as the key embodiments of co-operative research activities that include the vast international human genome collaboration, the planned construction of long-baseline interferometry laboratories in astronomy, and the developing global observation networks dealing with environment issues and disaster management. ICT tools are increasingly being adapted to health/medical applications and to creative activities in the social sciences and the humanities.

446. Broadly defined, a virtual laboratory is "an electronic workspace for distance collaboration and experimentation in research or other creative activity, to generate and deliver results using distributed information and communication technologies." Virtual laboratories have been mainly pioneered in the industrialized countries, making collaboration tools or instruments widely available on the Internet to scientists with common needs or interests, or sharing such facilities within specific research projects.

447. Although most major research institutions in developing countries now have some Internet connectivity, researchers in these countries are often prevented from adequately using the Internet by insufficient national backbone connections, institutional connectivity, or secondary connectivity within their institutions. China is an example of the expanding role of the Internet in research in developing countries. The Chinese Academy of Science and Ministry of Education established the Shanghai Research Centre for Applied Physics (SRCAP) in 1994 to link six research institutes and six universities in the Shanghai area. SRCAP is a virtual centre without its own separate physical infrastructure. Researchers in the member institutions use the centre's facilities located in different locations to carry out joint projects which often involve other disciplines as well as physics. They can share the existing equipment and computer resources to produce successful results more effectively with less cost.

448. An example of international virtual research is the Whole Earth Telescope (WET) which links astronomers and telescopes in 14 countries including five developing countries to coordinate observations of variable stars, link their data sets, share the analysis and write joint publications; in keeping with the needs and possibilities of the collaborators, the principal electronic tools for this collaboration thus far have been telephone and e-mail.

#### Problems, solutions and priorities for the future

449. Scientists in the developing countries still need to access to the large amounts of information mainly produced in the developed countries. Adequate and affordable bandwidth is still the major constraint which they face in this context. The cost of using the Internet to transfer detailed data and information is much higher for intercontinental traffic than in the local area traffic due to a diversity of political, economic and technical factors, and so there is a major bottle-neck problem in reaching the goal of a virtual laboratory on the world-wide scale in the future. These problems can only be resolved by increased international, national and institutional support for connectivity, including the organization of academic and research backbone facilities, by which research institutions can federate demand to reduce costs and optimally configure communication channels.

450. The insufficiency of basic telecommunication services in many developing countries can be overcome for internal and external connections of priority research institutions and scientists in remote or isolated areas by envisaging wireless solutions for Internet access. VSAT technology

is particularly promising in view of declining costs and the launch of new satellites covering most continents on Ku-band which requires smaller terminal equipment. Costs might be reduced even further by using asymmetric satellite links or introducing sharing methods such as Time Division Multiple Access (TDMA). A regional pilot project for Sub-Saharan Africa is being planned by the Abdus Salam International Centre for Theoretical Physics.

451. Creating virtual laboratories connecting research groups in developing countries and around the world will require agreed rules and regulations for the collaboration and mechanisms to resolve legal, social or ethical problems. Software should be developed to support distributed databases and effective group work under the communication conditions available in the developing countries, including reliance on e-mail protocols for pseudo real-time solutions. International assistance should focus on how developing countries can set up and optimize computer networks and applications for scientific research.

452. Access to and quality control of information are major issues facing the development of scientific electronic journals. Scientists have begun to opt for self regulation. The establishment of electronic archives to provide access to past and future scientific results is particularly important, and will require protocols for maintenance, content, structure, eligibility, accessibility and compatibility to be followed by both commercial and not-for-profit publications. Virtual laboratories and electronic journals, as well as digital libraries, must face the issues of intellectual property rights and fair use, which present particular problems in electronic media, and should be actively followed and pursued by the scientific community.

453. All scientists should receive training in information resources and library use and in good authoring skills, adapted to the electronic environment, if possible as early as the undergraduate level. It is also crucial to familiarize the scientific communities with the use of Internet and the many available freeware tools, and to provide local system administrators with the most effective networked techniques for optimizing the use of existing and evolving bandwidth, involving both data communications and applications. In addition to modular training opportunities, it has been recommended that free support (or "help desks") on information technology should be available to these users, along with guidelines and kits with software enabling e-collaboration.

#### Governance

454. The establishment of more governance on line will enable citizens to break through the barriers imposed by geography, demographics, skills and knowledge of people, and ability to pay, which have historically had an impact on the ease of access to government information. This could be especially important in developing countries where poor networks and infrastructures exacerbate the difficulties of communication between citizen and government. On-line governance in industrialized countries is often being promoted as a means of reinvigorating political participation since the steady decline in voting numbers across the developed world. In developing countries, especially those countries implementing new constitutions, it can be an effective way of promoting access to and information about government where it did not exist before. Although industrialized countries have gained a considerable lead in online governance, developing countries, by the adoption of enabling policies and the appropriate matching of technologies to local and national situations, have an opportunity to leapfrog decades of evolutionary development and narrow this gap.

455. Government policies and services can be made more efficient if citizens can quickly learn about them on line. Numerous examples can be found of government jurisdictions that are using the Internet as a vehicle to disseminate information on government programmes and services as

well as on cultural, economic and other topics in the national interest. This application has been developed to a high extent in industrialized countries, but many developing countries are taking this lead and developing their own government Web Sites.

456. In Africa, for example, there are already a quite a few notable official general government websites, such as those of Angola, Egypt, Gabon, Mauritius, Morocco, Mozambique, Senegal, South Africa, Togo, Tunisia and Zambia. As for regional intergovernmental agencies, ECA, SADC (Botswana) and COMESA (Zambia) have built web sites with fairly extensive information on their activities and member states.

457. The South African Government has a website providing detailed information on the various levels of government, departments and their activities, documents and reports, ministers' speeches and legislation as well as the new constitution adopted in 1996. The Brazilian government Web Site has similar information, but also including government news (text, radio and TV) and extensive links to national sites providing information on tourism, business, culture.

458. The Internet can play an important function in providing on-line service, particularly through schemes such as the "one-stop-shop" allowing the process of interaction between citizen and government to be made coherently without the need to pass from one department to another. Use of the Internet by government for administrative purposes is still rare in developing countries. In one province in South Africa, the "one-stop-shop" model is being introduced, with basic development information, statistics and transactions relevant to citizens being made available via kiosks and terminals located in communities.

#### On-line participation

459. ICTs offer the potential for citizens to participate more actively in the democratic process by permitting more involvement and contact with government and channels of response to public policy. Virtual forums for debate can provide a platform for freedom of speech and can involve government officials. E-mail can be a tool for contacting government officials and with official regulation can necessitate a response. Opinion polling and referenda are resources being used more frequently in developed countries to gauge public opinion and even, in Canada for example, to make decisions on certain local laws.

460. Information technologies are potentially particularly useful to local and community governments. Telematics technology can enable the civil society to receive, generate and disseminate information on community life, can put a community "on the map" nationally and internationally, and can be used by local authorities to poll opinion. Much could be done in these directions with a single point of access in a community centre.

461. Making government more responsive to citizens by introducing ICT applications involves changing ways of governing and major changes in the political culture. While horizontal links may be strengthened through ICTs, this does not necessarily mean that more democratic processes will emerge or that the relation between government and citizen will be effected. The ability of government to empower people depends on its will and vision. Furthermore, the possibilities of providing more "open", participatory government in this manner may well be linked to advances the overall environment concerning freedom of expression in a country, including independence of the media.

## Community Access

462. Despite the potential of the Internet in on-line governance, limitations in access, which necessitates a computer, the Internet and associated back-up support, is a severe constraint for such mass applications in most developing countries.

463. One approach to providing appropriate wide access to on-line governance facilities is the multipurpose community telecentre (MCT) concept which has been promoted for several years as a sustainable and largely self-supporting development platform which can be installed in public areas including schools, libraries, community centres or post offices. An MCT provides a range of ICT support (telephone, fax, Internet, photocopy, computers) with associated training and user support, and can act as a resource for local communities to gain access to government and other information, especially in remote, rural and undeveloped areas where information and communication facilities are limited. Building on models first developed in Europe, Australia and Canada starting in 1985, many developing countries have been testing approaches to MCTs in recent years. In Africa, five least developed African countries (Benin, Mali, Mozambique, Tanzania, Uganda) have established pilot MCTs with joint support from the International Development Research Centre (IDRC), the ITU, UNESCO and other international partners, while several additional MCT projects have been sponsored by the IDRC Acacia initiative.

464. In a complementary approach to community access, the Trade Point Senegal (TPS) foundation was established with IDRC support within the Global Trade Point Network of UNCTAD to facilitate a partnership of state bodies and private enterprise, thereby exercising numerous public functions while being regulated as a private company. Creating links between enterprises and government departments and government information (customs, import/export, agriculture) through access to ICTs will help entrepreneurs to enhance their competitiveness on national and international markets. The project will also support small business by hosting home pages and organizing virtual fairs for them. The chief beneficiaries of the project will be the informal sector including groupings of farmers, fishers, artisans and women's groups, as well as small and medium sized enterprises, NGOs and local governments. By focusing on rural areas where information availability is lacking, this network aims to utilize public information to boost economic activity at local, national and international levels.

## Problems, solutions and priorities for the future

465. It has been noted that the benefits of on-line governance are not equitably available, as those with ready access to computers and Internet, the "info-haves", are much better placed to make use of the resource. On-line governance must be developed as part of a social programme in order to distribute this resource effectively to different strata in society.

466. Additionally, concern for Internet security issues has limited the use of the Web in developing countries to the provision of public information rather than the actual transaction of services. This issue will require the creation of a network infrastructure in which connectivity, interoperability and security are assured. Mechanisms for governments to share the cost of such facilities with private sector interests which are using them extensively represent an important option in this context.

467. Studies by the OECD have shown that the constraints in developing interactive governance applications are considerable even in the industrialized countries, and that there has been as of yet little impact of ICTs in promoting citizen participation in policy and the democratic process in these countries. It should thus be expected that, although some "leapfrogging" may be

achieved in developing countries though concentration on priority applications and appropriate technologies, this area of great potential benefit should be seen as having longer-term rather than widespread immediate impact.

468. The COMNET-IT Foundation and UNESCO have recently completed a global survey of on-line governance which has produced a database and analysis of responses of 62 developing and industrialized countries. Among the overall conclusions were the following: non-technology issues may have a greater impact than lack of IT infrastructure (lack of appropriate human resources, IT literacy and policy awareness were identified as other key inhibitors) most public-access services remain relatively limited in scope and diffusion, focusing on basic government information and a central public relations image policy and standards co-ordination remains very much a key objective, even in developed countries. This work is expected to lead to an inter-agency collaborative effort to help developing countries to define their needs and priorities and to undertake appropriate planning, human resource development and pilot projects.

### The Media

469. The Internet is the newest but fastest growing medium for news, entertainment and communication. It has become the fourth largest world-wide media outlet after television, radio and print. Yet the Global Information Highway is a very different source of communication from its predecessors in that the receiver of communication can also be a sender and vice versa, making every user a potential information source. Moreover it is a flexible multipurpose tool combining all three previously existing types of media: print, audio and video, with 70 percent of the most visited sites on the Internet now containing audio-visual content.

470. The mass media in developing countries certainly do not possess the variety or the technology that is seen in more advanced countries. In most of these countries, other development goals have received higher priority than telecommunications infrastructure.

471. Of the more than 3600 newspapers now published on line, the United States boasts the largest number - around 2000, but developing country media are rapidly taking advantage of the Internet with India having 223 on-line newspapers and Mexico 51. The growing number of newspapers offered on line in vernacular languages in developing countries is stimulating local Internet markets while more effectively reaching the target populations. In Tanzania, *The Express* and *Nipashe* are on line in Swahili while in Egypt the *Al-Ahram* is offered in Arabic.

472. One key example is that of the Panafrican News Agency (PANA). Political and management reforms have been accompanied by efforts to develop products on the Internet, including a website with both news and a regional co-operative database called RAPIDE which provides administrative, economic, trade, travel and cultural information on 17 countries. One of many newspaper success stories is that of the independent daily of the Ivory Coast, *Le Jour*. After circulating on-line since 1997, the paper has not lost circulation sales as advertising on-line brings in about the same amount of profits as print advertising. Online advertising has also opened a gateway for national and foreign investors and entrepreneurs.

473. The Media Institute of Southern Africa (MISANET) project illustrates how relatively low-cost technologies can be used to set up a news infrastructure for a group of newspapers. With a view to ensuring a freer flow of news and information in a region hampered by expensive and poorly maintained telecommunication and postal networks, MISA now links 450 newspapers to the Internet.

474. Over 140,000 hours of radio are broadcast every week on the information highway, from more than 8000 stations including more than 300 in developing countries. The World Radio Network (WRN) is an example of universal broadcasting on the Internet. It serves as a gateway to international radio carrying live newscast audio streams 24 hours a day from about 20 of the world's leading public and international broadcasters, including two from developing countries (Caribbean, South Africa) and another from the United Nations. In addition to news, WRN provides broadcasts on culture, music, sports, science and developmental issues, including programmes crafted from material recorded by reporters who are often sent far afield. Two other international non-governmental organizations are active in promoting the exploitation of the Internet by radio in developing countries: AMARC (Association Mondiale des Radiodiffuseurs Communautaires - World Association of Community Radio Broadcasters) aims to support and contribute to the development of community and participatory radio along the principles of solidarity and international co-operation while OneWorld, mentioned above, provides access to a wide selection of radio news programmes from developing countries.

475. The cost of equipment for setting up an Internet radio station is only a few thousand US dollars, substantially less than that of typical FM radio production and transmission equipment, making it economically feasible for existing radio stations to consider increasing their audience through this mode of diffusion. In Senegal, for example, the radio station Sud FM decided to go on-line in order to reach a larger number of people both nationally and internationally. Indeed many radio stations in developing countries are following the model of stations of developed countries and providing their services on-line in English and vernacular languages. And unlike FM, Internet radio isn't just sound, but typically contains text, animation and limited video. Another significant advantage of Internet radio is the absence of in most countries of regulation and less governmental restrictions.

476. Another example is one that combines both radio and the printed press. In 1996 Púlsar was founded as a Latin American news agency for independent and community radio. By its second anniversary, Pulsar had correspondents in most countries of the region and was delivering its text and audio clip news service to more than 1,000 subscribers in fifty countries. In June 1999, a similar initiative enabled the creation of an Internet-based network of twenty local radio stations from all over Indonesia.

477. The Kothmale Internet Community radio project in Sri Lanka demonstrates the successful use of community radio in conjunction with the Internet. With the help of UNESCO and the Sri Lankan government, Internet connectivity has been provided non-stop to the community radio through a dedicated 64Kbps line. With an Internet access point at the radio station and two other access points at nearby community libraries, the rural populace is now able to benefit from the Internet. Moreover a daily two-hour radio programme "radio browses" the Internet scans selective sites and broadcasts relevant information in the local language. In conjunction with a national university, the radio also maintains a Web database for listener inquiries and issues that are most popular. Though connectivity was provided free of charge of a two-year period, the station expects to generate sufficient income from printouts, Internet application services to local enterprises and on-line advertising to make the connection sustainable.

478. The recent surge in audio-visual content on the Internet is due in large part to progress in streaming technology, by which multimedia servers send content in a continuous stream of compressed data that can be decoded and played back shortly after being received, that is, without first having to download the entire file. But even though a streamed video clip can begin to play within seconds, the data still have to be thin enough to be downloaded in real time, requiring

sufficient bandwidth. In general, dial-up access, even at 56 Kbps (V.90) speeds, is not sufficient to provide TV quality spatial and temporal resolution, which limits Web TV to those with broadband access or individual use on with substantially reduced image size. Users in developing countries, who are already facing high connection costs and less than optimum data rates, are highly disadvantaged concerning access to this medium.

479. Another problem with video streaming is that only a certain number of people can download files from a site at a time without exceeding the maximum available bandwidth. Video on demand, by which files are downloaded by different people at different times, may function more easily, particularly in developing country situations, and may also be less demanding in terms of server capacity and specialization.

#### Problems, solutions and priorities for the future

480. There are many immediate constraints involved in applying the Internet to the mass media in developing countries with financial drawbacks ranking high on the list. However, although it may at first appear that the Internet is far more expensive than the "traditional" sources of mass communication, this may not be universally true, particularly given that the Internet can "piggy-back" on telecommunication infrastructure being developed for other purposes. Recent developments in wireless communication such as use of VSAT systems and conventional high frequency (HF) radio it may be possible to deliver the Internet widely at a lower cost. In countries such as India, where cable network subscribers have rapidly grown to 75,000, this network may prove to be a viable channel to deliver multimedia Internet.

481. The new ICTs offer the media a major opportunity for cutting costs and developing new products to remain competitive. The technological changes that have occurred in recent years should encourage the development of co-operation between telecommunication operators, Internet providers and the media with the aim of establishing new partnerships which would fully meet the needs of all parties, including the public, at the technical and commercial levels.

482. There are also several ethical issues, and the political concerns of governments will continue to influence the future expansion of the Internet. Many countries find some of the content on the Internet offensive or undesirable for their cultures, and because of the ease with which information can travel through electronic networks, the Internet is considerably curtailed in many. Moreover information processed, stored, and transmitted in digital form leaves digital trails allowing for greater surveillance. Yet the Internet is too powerful a medium for development of mass communication to be ignored by any society.

## **UNITED NATIONS ENVIRONMENT PROGRAMME**

### **Issue/Problem**

483. The information technology and telecommunications industries are among the fastest growing economic sectors, and represent the cutting edge of advances in science and technology that has transformed global society and the world economy over the last three decades.

484. Telecommunications and information technologies are having a profound impact on society, changing the way business operates and influencing production and consumption patterns, as well as providing unprecedented access for relevant government decision-making. It has establish the basis for the interconnectedness that now characterises our world. It is one of the most powerful instruments through which the forces of globalization have become

predominant. It has the potential to contribute to advancing a development that is sustainable. Yet, if not properly harnessed, it can also be another source of marginalization in the new global economy and, thus, an additional impediment to development.

485. Modern telecommunications technology represents much more than merely connecting people. The proliferation in the array of telecommunications driven devices and technologies, such as Internet, e-mail, e-commerce, e-medicine, e-education, telecommuting, may assist in the global transition to sustainability. With the growing demands that society places on the planet's natural systems and resources, this industrial sector faces the challenge to accept the corporate responsibility that accompanies opportunities in the global marketplace, including participation in the environmental stewardship of the planet. The challenge is to develop a society, operating under market conditions, which runs with high resource efficiency. The telecommunications industry is able to "dematerialize" the transportation of any kind of information at dramatically reduced cost, resulting in a long list of potentially environmentally-friendly utilisations. The aim should be to build a sustainable society where technologies add real and lasting values to people's lives – a society in which the full environmental, social and economic benefits of telecommunications products and services are realized and where any negative impacts are avoided.

### **Brief analysis**

486. The extraordinary expansion of electronic commerce (e-commerce) has the potential of generating environmental benefits. Last year, an estimated \$70 billion worth of business was transacted over the Internet. E-commerce enables transactions to be undertaken more quickly, cheaply and efficiently. By reducing the amount of energy and resources consumed by business, and increasing productivity, e-commerce can contribute to bridging the gap between economic growth and environmental protection. According to one study on the impact of the growing digital economy on global warming, despite historically low energy prices and rapid economic growth, the American economy's energy intensity of production fell by 4% in 1998, on top of a 4% reduction in 1997. These numbers confirm one of the promises of the telecommunications industry, namely that the Internet economy is generating both structural and efficiency gains, that transmission of "bits and bytes" may increasingly lead to new patterns of production that are more efficient in terms of resource use.

487. With regard to environmental information assessment and early warning, digital technology for remote sensing is a vital component in the design and maintenance of a system of information gathering, monitoring and assessment. It has the capacity to maximise the ability of decision-makers to provide early warning of emergencies and analysis for the development of preventive measures of potential natural disasters and environmental degradation. This possibility requires that assistance should be provided to developing countries in building the requested technical capacity, taking into account their particular circumstances and special needs.

488. In response to increasing public and consumer sensitivity to environmental issues, many companies have taken significant steps to develop, implement and improve their policies and practices to address the environmental implications of their operations by establishing comprehensive internal environmental programmes. In 1996, more than 20 European telecommunications companies signed the "Environmental Charter for European Network Operators" which commits them to sustainable development through the provision of products and services that provide significant environmental benefits and a determination to manage operations in a way that minimizes negative environmental impacts. Similarly, the United Nations Environment Programme (UNEP), with others, has facilitated the development, by

several major North American telecommunication companies, of the “Communication Environmental Excellence Initiative” to conduct a dialogue on environmental management principles. The initiative led to the signing, in 1999, of the “Environmental Charter for the North American Telecommunications Industry”. The Charter addresses the many opportunities for innovation in managing the sector’s own environmental impacts. It suggests that the use of telecommunications technology may provide solutions to other sectors in their quest for improved environmental performance.

489. UNEP views these two Charters as an important new model of a voluntary industry code of conduct. In line with the Secretary-General’s Global Compact initiative, in which he calls on the private sector to take part in the implementation of global values embodied in international agreements, UNEP has developed an approach with this sector promoting sustainable patterns of production and consumption. The initiative aims at examining the potential of the industry in contributing to increased resource efficiency in society and to new opportunities for development with lower environmental impacts, particularly in terms of reduced energy and consumption and greenhouse gases emission (GHG). For example, new telecommunications technologies may provide the possibility for developing countries to leapfrog a generation of fixed infrastructure. New technologies make mobile telecommunication cheaper and more accessible. Increasingly, developing countries are using technologies such as satellite links to avoid the need to lay massive and expensive cable networks.

490. Nevertheless, while the new international context increases interactions among all States and actors of civil society, it brings also grave challenges affecting all countries, but in an unequal manner. A large portion of the world’s population is still prevented from sharing the benefits provided by technological and scientific advances. For billions of people that still do not have access to clean water or basic health care and education, telecommunications can seem a remote and irrelevant issue. Therefore, in order to ensure future economic development, social stability and cultural vitality, the information society has to be accessible to all, regardless of location, age, language, disability or income.

491. According to recent assessments, 40% of the population in the developing countries have never made a phone call and 15% of the world population has access to over 70% of the world’s phone lines. The 1999 United Nations Human Development Report talked of a new “digital divide,” with poor countries facing the prospect of being further marginalized in an increasingly knowledge-based global economy. Significant investment is still needed in telecommunications infrastructure in order for poorer countries to participate in, and benefit, from the boom of the information technology. Even if telecommunication systems are installed and accessible, there is reasonable doubt that without literacy and basic computer skills, people will still not have greater access to the information society.

492. Thus, to be fully effective in raising people out of poverty and reducing global inequality, information and communication technology will require a global approach. Cooperation among all players, across sectors and national borders will be necessary to facilitate its development. To flourish and to maximize its economic, social and environmental potential, the information society will have to be guided by respect of universal values and the protection of key public interest objectives.

## **Recommendations**

493. In the context of the Secretary-General’s Global Compact Initiative, the United Nations should continue the dialogue with the industry to address the role of information technologies in

the implementation of sustainable development, particularly as it relates to the industry accountability and responsibility for the environmental impact of its operations and products through their entire life cycle. The industry should be encouraged to pursue the introduction of comprehensive environmental management systems, to develop and implement voluntary environmental guidelines and codes of conduct and to develop further those that exist. Relevant United Nations organisations should be invited to monitor and review the effectiveness of voluntary initiatives and implementation of codes of conduct. In this regard the increase of specific quantified environmental indicators and systems for bench marking from waste management and use of hazardous materials to energy and raw materials consumption should be considered.

494. Based on its scientific and technical capabilities and capacity to analyse, monitor and assess global and regional environmental trends and to provide early warning information on environmental threats the United Nations should seek with the industry appropriate ways to build capacity in and enhancing access to environmental information to decision-makers particularly in developing countries to provide early warning of emergencies and development of preventive measures of potential natural disasters.

495. The United Nations should keep under review the potential that information technology may provide to developing countries in offering new opportunities of development with lower environmental impacts and in particular in leapfrogging a generation of costly and massive infrastructure. In this regard, relevant United Nations organisations should be invited to cooperate with the industry in promoting the transfer of environmentally sound technologies, particularly to small and medium-sized companies in developing countries.

## **UNIVERSAL POSTAL UNION**

### **Background**

496. The communication and information revolution, the term "revolution" is not too strong, is affecting every area of human life, in every part of the world. Information and communication technology (ICT) has an enormous potential to reshape and transform the ways in which people organize their lives, interact with each other and participate in the various spheres of society. These dramatic changes also affect the work of UN organizations and their interaction with civil society. We are at the very beginning of the process of transformation. The future will certainly provide us with new surprising and challenging discoveries in this area.

497. Much has been written on this subject recently. The predominant feeling is that the ICT revolution has a positive impact on our current and future activities. It is, however, important to recognize that the issue is a complex one and the side effects of this global phenomenon constitute a fundamental concern for several organizations, in particular those which deal with social and cultural activities. A number of UN system organizations like the ITU, ILO, UNESCO and the World Bank have addressed these questions in a more detailed and technical manner, attempting to identify and explain the complexity of the issue of ICT and its various dimensions and implications.

498. The UPU also raised its voice in support of the development of new information technology in preparing, inter alia, the joint ACC statement on the Universal Access to information and communication technology - the Right to Communicate and actively participate in the work of the ACC Task force on a similar issue.

499. The position we have tried to convey and which still remains valid was that the infrastructures for physical communications, such as the postal service, in addition to electronic communication services are a means of communicating widely and universally, particularly in developing countries. Despite the proliferation and profusion of new information technology these physical communications systems will remain a valuable alternative and reliable means for the exchange of messages and thus for communication for quite a long time.

500. The above comments mean that substantive and sustainable development cannot be conceived and achieved on a worldwide basis without integrating all existing and future communication infrastructures and services, including the traditional ones. The new IT has enormous potential but is not a sort of medication that can cure all possible diseases in the world. If we believe that this is the case, we overestimate its strengths and are obviously wrong.

501. We must act simultaneously on many fronts, taking care to give due attention to the development of complementary components while maintaining, I must admit, a specific strong emphasis on the promotion of modern technologies.

502. In 1997, the UPU conducted its own study (Post 2005) on the possible future scenarios for the postal core business, trying to draw a precise picture of tomorrow's Posts in view of worldwide structural changes, globalization, market liberalization and technical and technological developments.

503. The postal service is a factor in economic, social and cultural development. The globalization of the world economy and trade affects the pace, direction and global strategy of postal communication services.

504. We are aware of the strategic importance of information technology for the postal business. The study cited above has proved this.

### **Technology – Threat or opportunity. Shift toward a new knowledge and information based economy**

505. The substitution of electronic conveyance of information for physical mail shows clearly that technology is a threat to mail.

506. On the other hand, technology presents opportunities. First, where it is incorporated in equipment, technology can reduce production costs, raise labor productivity and/or allow quality improvements (e.g. electronic bar-coding in mail processing). Clearly, in this role it is a positive influence. Second, where technology enables new mail or other products and services to be offered competitively, it constitutes a clear business opportunity for postal operators. Hybrid mail is a good example of the positive effects of technology on physical mail. It has led to competitive new products as well as to lower costs.

507. Technology incorporating computing and communications has also assisted the posts in providing non-core services such as information provision on an agency basis for third parties, and financial services at competitive prices. Furthermore, technology in the form of E-commerce offers a significant new opportunity for traditional postal operators to leverage their strategic assets and markedly increase their revenues.

508. There is ample evidence that we are shifting inexorably toward a new economy based on knowledge and information. E-commerce alone will bring significant changes to business, consumers, government and the economy. The growth of the Internet and the development of E-commerce, which is still very much in its infancy, are part of a wave of development of similar significance to the railways in the nineteenth century, and of the automobile in the twentieth.

509. Many new products and services will continue to come onto the market – some directly substituting for written communications, others enriching already available data, education, information and entertainment options. Consumers will be offered an ever-increasing range of choices. An attractive opportunity for postal enterprises is the growth in home shopping brought about by the growth in the Internet. Not only parcel delivery, but general logistics, warehousing, fulfillment, payments and other services will be potentially available to them. Postal administrations, through their universal delivery networks, have a structural advantage that they could leverage in a competitive market place.

### **Use of information technology and telematics within the UPU**

510. The use of information technology and telematics within the UPU has increased considerably over the last five years. It has been aimed at improving postal operations and inter-administration communications capabilities and providing postal administrations with accurate and timely access to information.

511. This development has focused on two specific objectives:

- helping postal administrations to improve the management and the quality of the core postal business;
- helping postal administrations to develop and implement new business initiatives, either as natural extensions to the core postal business (for instance: hybrid mail and logistic services) or as new ventures transforming, complementing or enriching the postal service.

512. The UPU has been working towards assisting postal administrations, particularly those of developing countries, to acquire the necessary technological know-how and to implement applications and services aimed at improving their operation and their performance as well as reducing the technical gap separating them from more advanced UPU member countries.

### **Strategic considerations**

513. It is clear that the effective introduction and use of information technologies will be a crucial factor in the international competitiveness of the postal service in coming years.

514. Several postal administrations have already made great strides in this direction. Others, some from developed countries and a large majority from developing countries and the countries of transition, are a long way behind. The UPU is fully aware that this “second category” of countries has still a great amount of work to do in order to take full advantage of the IT revolution.

515. Recognizing the need for timely and reliable access to information, the UPU will continue to focus its attention and action on establishing a global postal electronic communication infrastructure capable of meeting the needs of Posts and their customers.

516. Future UPU strategic policies will focus in particular on:

- mail services (the first and most significant activity) through deployment of telematics systems,
- financial services, through establishment of effective end-to-end financial transaction management and tracking mechanisms,
- electronic services (leading postal enterprises are investigating the possibilities of electronic services. The UPU is working on the definition of a framework through which postal enterprises can acquire the capability to run secure electronic services),
- network services (the UPU has focused on establishing a commonly accepted worldwide postal electronic infrastructure. The UPU POST\*Net network has been identified as the foundation for such a global postal telecommunications network),
- standards development (development of new and coordination of other standards related to telematics activities).

## Conclusions

517. UPU efforts to develop further and maximize the effectiveness of its information and communication technology strategies are illustrated by the following initiatives and actions:

- strengthening of the existing organizational structures both at the headquarters (Berne) and regional level (five regional support centres for telematics activities),
- developing new partnerships with the private sector involved in the postal business and willing to invest in joint projects,
- concluding new financial arrangements and strengthening existing commitments with the UPU member countries and the postal industrial community as a whole,
- organizing or co-sponsoring international conferences and other fora for discussion and exchanges of experience in the area of ICT. Another aim of these conferences is to invite member countries' representatives to contribute to raising the international postal community's awareness of the strategic importance of the new information technologies.

## The WORLD BANK

### B. Characteristics of the knowledge-based economy

#### *a. The knowledge based economy*

518. Knowledge is *more readily accessible* than ever before in the history of the human race. The changing economics of information will make knowledge even more accessible in future, as the unit costs of computing, communications *and* transactions continue to decline towards zero.

519. As a result, all sectors of the world's economy are going through *major and rapid transitions*. The outcomes of these transitions are impossible to predict, as multiple and interacting changes occur simultaneously on many fronts. A principal implication is that economic success in this turbulent environment will require considerable agility and adaptability. Those countries, sectors, and organizations that can adapt will fare better than those that cannot.

520. To cope with the changing economic environment, organizations are increasingly using *new forms of organization*, including cross-functional teams, customer- or product-focused

business units, and work groups - to name just a few organizational forms - to capture and spread new ideas and know-how. Communities of practice and networks are also emerging that promise to complement existing structures and radically galvanize knowledge sharing, learning and change.

521. An increasingly robust finding based on the experience of many organizations and economies is that the *provision of technology by itself has little impact on economic productivity or welfare*. Without the people-based arrangements of networks, communities or other groupings by which individuals can share their knowledge, technology has little if any benefit. While this finding should not distract attention from disseminating information technology throughout the world, it underlines the need to put *even more emphasis on the organizational arrangements* needed to get benefit from the technology.

### ***b. Implications for development***

522. Looking at development from the perspective of knowledge can lead to new understanding of the development process.

523. Although knowledge is more accessible than ever, billions of people still live in the darkness of poverty—unnecessarily. Knowledge about how to treat such a simple ailment as diarrhea has existed for centuries—but millions of children continue to die from it because their parents do not know how to save them.

524. Poor countries—and poor people—differ from rich ones not only because they have less capital but because they have less knowledge. Knowledge is often costly to create, and that is why much of it is created in industrial countries. But developing countries can acquire knowledge overseas as well as create their own at home.

525. Forty years ago, Ghana and the Republic of Korea had virtually the same income per capita. By the early 1990s Korea's in-come per capita was six times higher than Ghana's. Some reckon that half of the difference is due to Korea's greater success in acquiring and using knowledge.

526. Knowledge also illuminates every economic transaction, revealing preferences, giving clarity to exchanges, in-forming markets. And it is lack of knowledge that causes markets to collapse, or never to come into being.

527. When some producers began diluting milk in India, consumers could not determine its quality before buying it. Without that knowledge, the overall quality of milk fell. Producers who did not dilute their milk were put at a disadvantage, and consumers suffered.

528. Poor countries differ from rich in having fewer institutions to certify quality, enforce standards and performance, and gather and disseminate information needed for business transactions. Often this hurts the poor.

529. For example, village moneylenders often charge interest rates as high as 80 percent, because of the difficulty in assessing the creditworthiness of poor borrowers.

530. Considering development from a knowledge perspective reinforces some well-known lessons, such as the value of an open trade regime and of universal basic education. It also focuses our attention on needs that have sometimes been overlooked: scientific and technical training, local research and development, and the critical importance of institutions to facilitate the flow of information essential for effective markets.

531. Approaching development from a knowledge perspective— that is, adopting policies to increase both types of knowledge, know-how and knowledge about attributes— can improve people's lives in myriad ways besides higher incomes.

532. Better knowledge about *nutrition* can mean better health, even for those with little to spend on food.
533. Knowledge about how to prevent the *transmission of AIDS* can save millions from debilitating illness and pre-mature death.
534. Public disclosure of information about *industrial pollution* can lead to a cleaner and more healthful environment.
535. *Microcredit* programs can make it possible for poor people to invest in a better future for themselves and their children. In short, knowledge gives people greater control over their destinies.
536. With communications and computing costs plummeting, transferring knowledge is cheaper than ever. Given these advances, the stage appears to be set for a rapid narrowing of knowledge gaps and a surge in economic growth and human well-being.
537. Why, then, isn't this transfer occurring as fast as we might expect?
538. Acquiring knowledge involves **tapping and adapting knowledge available elsewhere** in the world—for example, through an open trading regime, foreign investment, and licensing agreements—as well as **creating knowledge locally** through research and development, and building on indigenous knowledge.
539. Absorbing knowledge involves, for example, **ensuring universal basic education**, with special emphasis on extending education to girls and other traditionally disadvantaged groups; **creating opportunities for lifelong learning**; and **supporting tertiary education**, especially in science and engineering.
540. Communicating knowledge involves not only **taking advantage of new information and communications technology**, but even more importantly **strengthening the networks and communities** that are essential for any large scale sharing of knowledge.

*What should governments and international organizations do?*

When development is considered from the perspective of knowledge, three key insights emerge:

541. *Narrow information gaps*: Information is the lifeblood of markets, yet markets on their own do not always provide enough of it, because those who generate information cannot always appropriate the returns. Public action is thus required to provide information to verify quality, monitor performance, and regulate transactions to provide the foundation for successful market-based development.
542. Because the market for knowledge often fails, there is a strong rationale for public action. The state is in a unique position to *narrow knowledge gaps*—for example, by adopting an open trade regime, supporting life-long learning, or establishing a sound regulatory environment for a competitive telecommunications industry.
543. The institutional arrangements for sharing knowledge go beyond hierarchical organizations and require *informal networks or communities of practice* to transfer knowledge across organizational and other boundaries.
544. *What can be done?* How should developing-country governments proceed, given the magnitude of knowledge gaps and the universality of information failures? A number of steps that governments can be taken to facilitate the acquisition, absorption, and communication of knowledge. Policies adopted in one area have important repercussions on—and possible synergies with—each of the others. The acquisition of knowledge, whether imported from abroad or created at home, requires the absorption of knowledge, abetted by universal basic education and opportunities for lifelong learning. The exploding capacity and plummeting costs of

communications technology greatly expand the potential for both the acquisition and the absorption of knowledge, creating new opportunities for two-way information flows. Government strategies to narrow knowledge gaps are most effective when they make the most of these synergies. But they also need to address information failures in their design and implementation.

545. The World Bank's knowledge sharing strategy is set out in the attachment.

### ***Partnerships and international cooperation***

546. ***A new framework for development:*** Overall, the emergence of the knowledge-based economy means that the process of development should be viewed not so much as a transfer of financial resources and knowledge from the north to the south, but rather a process of groups, communities and networks learning to learn faster, facilitated by financial flows where appropriate. The transition has many facets, six of which are discussed here.

547. ***Fostering north-south knowledge flows.*** International institutions should take particular care to orient knowledge-sharing programs to the needs and technological capabilities of users in developing countries. One aspect of this challenge concerns technical design. Systems must be geared toward users who have limited technical means, such as low speed modems and minimal computing capacity, so that their low-end technology does not become a barrier to access. The systems should use public rather than proprietary software where possible, and should provide other means of access for those with no computers. Finally, the imposition of user fees for access to knowledge bases should be avoided where they risk becoming a barrier to access.

548. A second aspect concerns the authentication of content. Since human beings often fully trust only the knowledge that they themselves have helped create, development knowledge bases will reach their full potential only if practitioners in developing countries have an appropriate role in authenticating the know-how that is contained there. In the case of explicit know-how, participation in such authentication can be facilitated by opening up knowledge bases for comment and review, and by providing the means to register alternative viewpoints. Where knowledge remains tacit, there should be active participation from developing countries in all phases of knowledge creation — for example, in project design and in building new knowledge bases. A participatory process will make possible joint ownership and use of the knowledge.

549. ***Fostering south-north knowledge flows:*** Development assistance needs increasingly to be seen as not simply a process of financing physical facilities, such as schools and cars, but also a process that is invigorated by people's abundant ideas and inspirations. In this way, a culture can draw on its local know-how, including indigenous knowledge, which is then reinterpreted and developed in light of the most useful approaches from elsewhere. Knowledge systems in the international institutions need to be open and responsive to inflows from whatever source.

550. ***Fostering south-south knowledge flows:*** Developing countries often learn best from each other, since the real experts on development are often those who live the reality of the problems on a day-to-day basis. Programs which link practitioners in developing countries through real or virtual conferences across national boundaries can greatly accelerate these high value knowledge flows. Networks of learning communities in the South can greatly expedite the flow of relevant know-how and information.

551. ***Fostering north-north knowledge flows:*** For collaboration and openness to become the modus operandi of development assistance organizations, stronger partnerships among the major players are needed. The international community thus needs to function as an efficient connector and facilitator to promote the creation and dissemination of knowledge to enhance global welfare.

552. ***Fostering free information flows:*** A prerequisite for knowledge sharing is freedom of information flows. To date, the Internet itself has been open and inclusive in spirit, although

there are continuing efforts from various quarters to make inroads on that freedom. Some countries use prohibitive pricing to preclude access to the Web for much of their populations. There is a need for continued watchfulness to ensure that the Internet as a whole remains an international and freely accessible public good, and that approaches to limit access under whatever guise – commercial priorities or moral values or national pride or linguistic predilections – are weighed against the enormous opportunity costs involved in interfering with the freedom of information flows.

553. ***Helping developing countries share knowledge.*** The same logic that drives the international community to manage its knowledge applies with equal force in developing countries themselves. To cope with a rapidly changing economic environment, they too must establish their own knowledge-bases, authenticate them from their own experience, interpret what is meaningful from their own perspectives, and create a future that meets their own needs. As international institutions themselves learn how to share knowledge more effectively, they can help developing countries to understand what is at stake in terms of sharing knowledge and to nurture similar capacities there. This will be a large-scale and long-term undertaking; international institutions and developing countries can make a start by establishing the appropriate facilitative institutions that can catalyze the process.

### ***Section C. The Digital Divide:***

#### ***Policies for communicating knowledge in the information age***

554. Advances in communications have transformed society before: movable type, photography and telegraphy, the telephone, television, and the fax machine all pushed outward the limits of our ability to store and transmit knowledge. Now the convergence of computing and telecommunications appears ready to shatter those limits, making it possible to send vast amounts of information anywhere in the world in seconds—at an ever-decreasing cost. This new technology greatly facilitates the acquisition and absorption of knowledge, offering developing countries unprecedented opportunities to enhance educational systems, improve policy formation and execution, and widen the range of opportunities for business and the poor. One of the great hardships endured by the poor, and by many others who live in the poorest countries, is their sense of isolation. The new communications technologies promise to reduce that sense of isolation, and to open access to knowledge in ways unimaginable not long ago.

555. A growing number of developing countries are taking advantage of these opportunities to leapfrog to the new technologies, largely skipping such intermediate stages as copper wires and analog telephones. Djibouti, Maldives, Mauritius, and Qatar all have fully digitized telephone networks. In this they have stolen a march on some industrial countries where half or more of the telephone network continues to rely on older technology, more expensive and lower in quality.

556. Throughout much of the developing world, however, access to even basic communications technology is available only to the fortunate few. South Asia and Sub-Saharan Africa have only about 1.5 telephone lines for every 100 people, compared with 64 lines per 100 in the United States. Lower incomes account for part of the difference, but many people in developing countries who are ready and willing to pay for a telephone are unable to obtain one. Standing in their way are inefficient state monopolies and regulatory regimes that unintentionally restrict supply. Worldwide, more than a score of millions of people, nearly all of them in developing countries, are on waiting lists for telephone installation. Given the long and uncertain delay, many others who want a telephone and could afford one simply have not bothered to apply.

557. Fortunately, countries can eliminate these bottle-necks— and lower the costs of telecommunications so that many more people benefit. This can be done by ***adopting a regulatory system that promotes and ensures competition***, to prevent firms with monopoly power in some areas of service provision from using it to gain a stranglehold over others. In most

cases, expanded competition should come before privatization, to avoid turning a state monopoly into a private one.

558. Developing countries are discovering that private involvement can rapidly extend telecommunications services, even when incomes are low.

559. Before its reform, Ghana's telecommunications system was dominated by a money-losing state monopoly, only one in 400 people had a telephone, and there was a 10-year wait. The government sold 30 percent of the state firm to a consortium of domestic and Malaysian investors, approved a competing national franchise that also included foreign investors, licensed five new cellular providers, and approved several Internet service providers, one of which now has an aggressive program to provide rural access through collaboration with the post office. In the first year after the reforms, the number of fixed lines increased by 30 percent, to 120,000.

560. One problem that often remains with privatization is that some isolated rural communities are not served, because they have too few people stretched out across too much territory to attract private service providers. The problem for government is knowing how much subsidy is needed to encourage private service to these communities.

561. Chile has had encouraging success with subsidy auctions, a market-like innovation that induces firms to reveal information about their costs, to the benefit of the poor. The government awarded subsidies on a competitive basis to firms providing telephone service to small and remote locales: firms bid against each other for the right to service these areas. Unexpectedly, for half the locales and nearly 60 percent of the target population, firms proved willing to provide pay phones at no subsidy at all. With additional rounds of bidding going forward, it is expected that 98 percent of Chileans will have access to pay phones by 2000.

562. Expanding telecommunications holds the promise to improve every developing country's capacity to absorb knowledge, for example by providing opportunities for high-quality, low-cost adult learning.

563. Here again, it needs to be stressed that ***communications technology by itself has little impact on economic productivity***. Without the people-based arrangements of networks, communities or other groupings by which individuals can share their knowledge, technology has little if any benefit. While this finding should not distract attention from ensuring rapid dissemination of information technology throughout the world, it underlines the need to put ***even more emphasis on the organizational arrangements*** needed to get benefit from the technology, particularly through fostering communities of practice and informal networks that can accelerate the sharing of knowledge.

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Office of the Program Director, Knowledge Management, World Bank, Washington DC, U.S.A.

## ANNEX

The World Bank

The vision of knowledge sharing

***Sharing knowledge to fight poverty***

Fighting poverty requires a global strategy to share knowledge systematically and energetically and to ensure that people who need that knowledge get it on time, whether from us or others. From a fairly closed organization a few years ago, the World Bank has become a global development partner making it easier for people to find out who knows what and where the best expertise can be drawn upon, wherever it resides. Continuously sharing this global and local know-how with client countries, public and private partners, and civil society will better equip the development community to fight poverty.

### ***The benefits of knowledge sharing***

Speed—responding faster to client needs.

Quality—delivering to clients the experience of many countries, adapted to local conditions.

Innovation—not just doing what we've been doing better, but bringing new services, finding and testing the never-before-thought-of.

### ***Putting knowledge on a par with money***

Because sharing knowledge is an essential ingredient of our comprehensive development strategy, we are giving high priority to:

- Supporting more than a hundred thematic communities of practice in all our areas of expertise so that we can share experience across internal and external boundaries.
- Making reliable statistics on development much more broadly available, including live databases of country economic data and key sector statistics needed to help clients.
- Enhancing our directory of expertise and the ability of staff and outside practitioners to connect with each other.
- Strengthening our advisory services so that staff and clients can find solutions quickly.

### ***Learning from our clients and partners***

Our clients need access not just to the expertise of the individuals in a team assigned to them, but to the entire range of global experience on development issues—and they demand nothing less. That is why we are:

- Adding to our wealth of cross-country know how and expertise by systematically capturing new country-specific experiences and indigenous knowledge.
- Enlisting our clients, partners, and stakeholders in sharing knowledge for development by having them join thematic communities and inviting them to participate in global dialogues on development.
- Using our ability to bring together the world's leading practitioners with our many external partners to exchange experiences and innovations.

### ***Reinforcing continuous learning***

World Bank staff are sharing their knowledge across organizational boundaries in communities of practice (thematic groups) to find the best know-how in or outside the organization. To get our clients better answers faster—and to improve the quality of their operations through continuous learning—we are:

- Making the World Bank more open and transparent so that knowledge flows swiftly across internal and external organizational boundaries.
- Linking our internal and external learning programs with knowledge sharing, taking them out of the classroom and into the world.

- Putting budgets and personnel incentives in place to manage the full array of knowledge services.

### ***Building client capacity and widening client partnerships***

By reaching out to those who previously did not have access to World Bank services and know-how, we are providing the information clients and stakeholders need to do things themselves. We are:

- Building the capacity of countries to tap into global resources online.
- Developing the skills of clients to adapt the best global practices in knowledge sharing and management.
- Making our knowledge much more widely available through direct external access to our knowledge bases.
  - Putting electronic collections of relevant information and knowledge about particular areas of activity—previously available only internally—on the Internet for all those interested in fighting global poverty.

## **WORLD FOOD PROGRAMME**

### **IT improving food security analysis:**

564. WFP is relying more and more on Vulnerability Analysis Mapping -VAM- to provide food security analysis. Focused first of all on our own program design, management and evaluation in both relief and development interventions, it can be an important means to influence decision making and direct interventions in a broader sphere involving all relevant partners especially governments. There are now approximately 50 countries where WFP / VAM staff work in close collaboration with national governments, other UN agencies and the civil society.

565. VAM vulnerability updates contribute to monitoring general food security and vulnerability status of key target groups through the compilation of early warning system information, key informant interviews, and direct field assessments of VAM staff. Technically this involves the use of several data sources to produce a coherent picture of the situation:

- Satellite based vegetation Index data
- Rainfall data from ground and satellite information
- Price monitoring data
- Qualitative data from WFP and other field staff
- and in some cases, incorporation of climate prediction information.

566. Disaster mitigation and contingency planning analysis is facilitated through a re-analysis of detailed vulnerable group profile information. This highlights regions and population groups at risk to specific hazards as well as what indigenous coping or recovery capacities they might have. It also takes into account available institutional and logistics resources. All these, together, provide a basis for prioritizing investments for improved emergency prevention, mitigation, and response capabilities. A recent example of the utility of this approach was the input of VAM analyses in guiding the response in Mozambique.

567. Access to food security related information provides WFP and its partners with the ability to:

(a) *understand problems* at the program-level and at the population-level;  
(b) *define solutions* to program-specific or to population-specific problems and, importantly;  
(c) *influence decision-making* to effect positive change in program implementation and intended population outcomes. To obtain the greatest possible return on investments in information, those efforts must be linked to a well-defined decision-making process to ensure that necessary actions can be taken at the appropriate time in the project cycle.

568. VAM's Program Resource Mapping is an inventory of relevant resource capabilities in food insecure and vulnerable areas that are available - among the indigenous population and resident within government, donor and NGO activities - to complement program operations and logistics, including:

- the level and quality of human and institutional resources;
- access to and quality of natural resources;
- access to and quality of physical and social infrastructure; and
- access to and quality of economic and social services;

Recommendation:

569. The Council may wish to welcome the advances made by various funds and programmes in applying IT such as Vulnerability Analysis Mapping to better target and focus development and rehabilitation interventions and urge collaboration and wider use of such mechanisms, inter-alia in the framework of CCA/UNDAF.

### **Connectivity**

570. In terms of the issue of connectivity, WFP needs an extensive information and telecommunications network to coordinate its assistance and complex logistics operations as well as improve the security back up given to our staff in the field. We need to exchange information in a timely, secure and cost-effective manner between Rome, Geneva, New York and the most remote locations deep in Mozambique, Kosovo, East Timor, DPRK and the like, places where there is no public infrastructure to rely upon.

571. We are meeting this challenge through the utilization of available resources wherever possible, and through the customization or development of specific TC/IT systems. The result is a multi-media network, based on the combination of the widest range of wired and wireless means: standard systems based on land-lines, integrated voice and data satellite networks, the extensive use of radio systems in remote centres. These are integrated seamlessly to create one of the largest humanitarian communication networks today.

572. In light of our specific requirements, in several areas, WFP has had to develop our own communication solutions. The Deep Field Mailing System is a good example: a messaging system developed in Africa's Great Lakes during the crisis in Rwanda, which operates over HF radios, can run independently from electrical power sources, can be made mobile and is very user-friendly. It has proven so useful and cost effective that its concepts have become a standard for the humanitarian community and have even been replicated by several commercial operators in the world.

573. In terms of a recommendation in this area, one would only make sense if there were some discussion of the various developments by UN agencies in this area with an acknowledgment that these are not necessarily sustainable after the withdrawal of the agencies. Thus the recommendation could be exploring the impact.

## WORLD HEALTH ORGANIZATION

### Health Informatics & Telematics\*

574. It is increasingly recognised that governments could not shoulder all the burden and responsibilities – particularly the costs – of the health care services to their populations. That recognition has emerged in an era of increasing demands on the health sector to fulfil what appears to be contradictory objectives: the wider access by all citizens to quality health care services and the reduction of, or at least, check on the increasing costs of such services. That has invariably engaged nearly all countries, rich and poor, large and small, in one form or another of a “reform” of their respective health services.

575. There is a wide range of approaches to such reform. Whichever form it takes and, since health care is an information-intensive sector, it is no wonder that most of the ongoing and planned reforms include differing types, sophistication and depth of uses of information and communications technologies (ICTs). To appreciate the actual and potential significance of the uses of ICTs in health, it is important to understand how information-intensive is the health sector.

576. The provision of health care requires, and generates, a wide variety of information, which need to be collected, processed, distributed and used. Data and information on an individual, a community, a region and the country at large, which may be specifically on health or merely health-related. One way to consider “*the role of information technology in the context of a knowledge-based global economy*”, is through an understanding of the principle information-related functions in the health sector. There are basically five main types:

- Management information: for day-to-day management needs as well as for planning, programming, budgeting, monitoring and evaluation.
- Clinical information: that is information needed to carry out, and is generated by, clinical functions such as diagnosis and treatment.
- Surveillance: that is information on the patterns and trends of diseases (e.g. by age groups, geographic areas, ...) and the progress or impact of related health care measures and services;
- Literature: notes, reports, formal publications and grey literature; and
- Knowledge: that is the actual know-how on a medical or technical task, such diagnosis of a specific medical problem, the conduct of a laboratory test and related treatment.

577. The sources of these types of information range from human professionals and experts to formal information systems and knowledge bases, within and outside the health care infrastructure and located at varying distances from the users. In addition, the uses of technology in the clinical/medical aspects, particularly in the past 10-20 years, steadily grew and include, for example, sensing and measuring equipment, laboratory services, and static and dynamic imaging. With the increased uses of such clinical/medical technologies, it was inevitable that many of such technological services became separated from the mainstream health care institutions - separated

in distance and more significantly in management. So, the communications between such technology-based services and the mainstream health care services, became an important consideration in the scope, efficacy and economy of the health sector.

578. With data and information being the dominant, basic commodity in health, the health sector became, second only to the business sector, a major user, client, seeker and promoter of tools and methodologies to harvest the information and telecommunication technologies. Initially, the health sector merely copied the business/industrial sectors' uses of ICTs, for example, in administration, finance and statistics applications. And, as the ICT technologies advanced, particularly those for the capture, processing and transmission of images, the health sector developed uses and applications that are unique to the sector, for example TeleMedicine.

579. The formal WHO definition of **TeleMedicine** is: *the practice of medical care using audio, visual and data communications; this includes medical care delivery, consultation, diagnosis, treatment, education and the transfer of medical data*. The term education covers both the education of the patient and the continuing education of the health care staff.

580. **TeleHealth** is used as a much broader term than TeleMedicine in that, in addition to TeleMedicine, it also encompasses the uses of computer-assisted telecommunications to support functions other than the clinical aspects of health care, such as: management, surveillance, literature and access to knowledge. The term **eHealth** has also emerged to encompass, with TeleHealth, all the other uses of electronic tools in the health sector, including business transactions.

581. The technological facilities and protocols needed for TeleMedicine are predominantly the same as those for **TeleEducation** and training in health care. That is, the same facilities that would support a general practitioner obtaining consultative advice from an specialist would also support a lecturer delivering a lecture or a training course, with interactive demonstration if needed, to a remote audience scattered over a campus, a city, a nation or the world. The WHO experience in working with and supporting countries has shown that, invariably, the users requirements for TeleMedicine services and facilities include a significant dose of TeleEducation requirements, particularly for Continuing Medical Education which is an important professional requisite and, in some countries, a compulsory requirement for re-licensure of medical practice.

582. Thus, links via computer-assisted telecommunications, or **telelinks**, are today enabling the health sector to overcome some technical and resources difficulties and thus contributing to the hitherto illusive objective of "equitable access by all to quality health care services". For example, telelinks enable poorly staffed health care centres or hospitals to obtain professional services and consultations from experts and specialists located in other institutions, no matter how remote they may be. This is demonstrated by the TeleRadiology link between the general hospital in Beira, a Mozambique city, about 1000 kilometres from Maputo the capital, and specialists in Maputo who tele-receive radiological images, interpret these and re-transmit their findings and recommendations to Beira for follow-up by the general practitioners there. For example, Telelinks enable the sharing of costly equipment and the verification of patients initial diagnosis before they are "referred" to distant referral hospitals. This is demonstrated by the TeleMedicine links between several hospitals in the relatively poorer Chiapas region of Mexico, and specialists in the "20 November" Hospital in Mexico City, which resulted in a drop of over 60% of unnecessary referrals and an improvement in the economy and quality of the locally provided health care. Telelinks enable the monitoring of the health conditions of the elderly in the comfort of their homes, and providing them with speedy interventions when needed, as is demonstrated by a fully operational national project in Malta. Telelinks improve the confidence

in health care interventions, through the ready provision of second-opinions, as is demonstrated in the TeleCancerology link between Tunis and Hôpital Antoine in Nice, France. Telelinks improve the cost-effectiveness of trade in health services as is demonstrated in the link between a few USA university hospitals and hospitals in the UAE and Saudi Arabia, which ensure that patients travel abroad only after reliable diagnosis via the telelinks.

583. The gist of the above cited and lots more other TeleMedicine, TeleHealth and eHealth experience, national and international, is the belief that the world is at the threshold of a new paradigm of health care which is individual-centred, instead of institution-centred; in which the individual will have a major part in looking after his/her own health, well-being and information thereon; in which the health care institutions will closely support each other and share chores and facilities; in which the costs will be met through differing forms of managed care; in which the public sector facilitates the development of the necessary information infra-structure; in which the industry competes to develop and improve the hardware, software and services needed; in which the public and private sectors foster open collaboration in differing aspects of the above; and in which independent nations share and enable access to sources of health information and knowledge, over secure and reliable international networks, mainly Intranets and the INTERNET.

584. The UN organisations, particularly WHO and the ITU, have collaborated with many members states, and with each other, in the introduction and uses of TeleMedicine. There is however a tremendous need to consolidate and build on the experience todate.

585. In recognition that the information infra-structure, or info-structure, is the key impediment to the industrially developing countries cultivating ICTs in the development of their health, education and other purposes, it is proposed that the UN organisations pool their efforts and resources in order to make a significant difference in supporting member countries to build their info-structures. The experience with the development of TeleCentres is a good starting point to evaluate and to conceive a much more concerted approach.

586. Several groups of countries have a framework of regional collaboration and have had concrete collaboration in other sectors, as for example, the Southern African Development Community (SADC) and the Arab Gulf countries. The UN organisations, particularly WHO and UNESCO, can support these countries in developing concrete programmes of regional collaboration in health care and education. Indeed, the time has never been more ripe for such approaches. For example, TeleMedicine consultations and the sharing of specific TeleEducation courses for Continuous Medical Education, could be specified, cost-estimated and introduced within a 12-months concerted effort.

587. The greater uses of networking, such as in Intranets and the INTERNET, is greatly hampered by the lack of reliable identification and authentication of the communicating parties. Several commercial endeavours are in the market today that offer the technological tools to do so. But, there is a tremendous need to address “the content” and the UN organisations should play a key role therein. For example, who certifies that a specialist or a medical laboratory has in fact the expertise claimed, for example, over the INTERNET. The UN organisations can promote a system of certification and authentication whereby the national authorities certify their respective institutions and whereby the national professional associations certify their respective degree holders, and the respective UN organisation certify the national authorities concerned, e.g. WHO for the health/medical field, UNESCO for education, etc. There is ample evidence that the lack of a highly trusted certification and authentication hierarchy is an impediment to fully cultivating ICTs for international collaboration including the opportunities for beneficial participation of the developing countries’ institutions.

\*for further information, contact: Dr S.H. Mandil, HTP/HIT/WHO, Ext. 2426

## **WORLD INTELLECTUAL PROPERTY ORGANIZATION (WIPO)**

588. Globalization and the remarkable pace and nature of technological development in recent years has propelled intellectual property issues to the forefront of policy making considerations. Economic trends indicate that a nation's socioeconomic well-being and its ability to generate wealth and protect its culture depends increasingly on its access to and use of the intellectual property system. Whilst not a panacea for the many complex problems confronting policy-makers in meeting the development challenge, the intellectual property system is a strategic policy instrument that enables countries and individuals to harness their creative and innovative potential and to promote economic development and social wellbeing. The use of information technology in the development of skills and competence to manage the generation, valuation, protection, exploitation and dissemination of intellectual property needs greater emphasis among the developing countries.

589. Recognizing the strategic importance of information technologies to enhance and further improve the intellectual property system, WIPO has launched major IT projects and initiatives. Some of those that relate to the theme of IT and Development are presented here.

### **WIPO Digital Agenda**

590. WIPO has established a Digital Agenda which has as one its main objectives to,  
591. "Broaden the participation of developing countries through the use of WIPONET and other means for 1) access to intellectual property information, 2) participation in global policy formulation and 3) opportunities to use their intellectual property assets in e-commerce."

592. The Digital Agenda also includes entry into force of two major "Internet Treaties" before December 2001 and promote adjustment of the international legislative framework to facilitate e-commerce.

593. The Digital Agenda represents an opportunity for WIPO and its member States to capitalize on the rapid and wide-ranging technological developments to establish an environment that will promote better understanding of the importance, value and utility of a robust international intellectual property system and its contribution to social well-being and economic development.

### **WIPONET Program**

594. WIPONET is a global information network project that will link the operations of intellectual property offices around the world and ensure that all WIPO member states are able to take full advantage of WIPO's intellectual property information services. A key feature of the network will be its ability to provide for secure end-to-end transmission of confidential intellectual property data. This attribute will generate significant efficiency gains for users of WIPO's international registration services. This flagship project will promote international cooperation by facilitating the digital exchange of intellectual property information. It will facilitate access to intellectual property data, and will also serve as a platform to establish new services and to further streamline and automate the basic business functions of intellectual property offices worldwide.

### Intellectual Property Digital Library (IPDL) Program

595. The IPDL project will provide facilities and services to support access to a world-wide collection of intellectual property information by the intellectual property community and the public at large. IPDL will be provided over the WIPONET and will greatly facilitate access to information. Such access by developing countries will be an invaluable tool for technology transfer and economic development benefiting inventors, industry, universities and research and development institutions of those countries.

### Distance Learning Program

596. WIPO WorldWide Academy has launched a distance learning program to provide global access to on-line distance learning programs that will reinforce international efforts to increase awareness of intellectual property, to promote greater understanding of the intellectual property system and respect for intellectual property rights.

### Developing Country Perspectives

597. The WIPO Programs mentioned above are not to be viewed as technology projects alone but as strategic tools for modernization of intellectual property systems in the developing countries and as facilitators of transfer of technology. One of the challenges of developing countries is their capability to sustain and modernize as an ongoing process. As such, WIPO programs are not one-time efforts but rather ongoing processes. They aim to encourage and motivate the developing countries to be equal partners in the projects and be as self-dependent as possible after the initial deployment of technology and services.

More information available at: <http://ecommerce.wipo.int/>;  
<http://www.wipo.net/>;  
<http://ipdl.wipo.int/>.