

**QUESTION 13/I**  
Promotion of infrastructure  
and use of the Internet  
in developing countries



**ITU-D** STUDY GROUP I 2nd STUDY PERIOD (1998-2002)

# *Final Report*

Telecommunication Development Bureau (BDT)

International Telecommunication Union



## THE STUDY GROUPS OF THE ITU-D

The ITU-D Study Groups were set up in accordance with Resolution 2 of World Telecommunication Development Conference (WTDC) held in Buenos Aires, Argentina, in 1994. For the period 1998-2002, Study Group 1 is entrusted with the study of eleven Questions in the field of telecommunication development strategies and policies. Study Group 2 is entrusted with the study of seven Questions in the field of development and management of telecommunication services and networks. For this period, in order to respond as quickly as possible to the concerns of developing countries, instead of being approved during the WTDC, the output of each Question is published as and when it is ready.

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## FOREWORD

The second World Telecommunication Development Conference, held in Valletta, Malta, March-April 1998, approved, *inter alia*, the study of several Questions for Study Group 1, dealing with regulatory, political and financial matters.

Question 13/1, entitled “Promotion of infrastructure and use of the Internet in developing countries”, was first studied by a Focus Group chaired by Mr Dietmar Plesse from Germany.

Public Service Applications of the Internet in Developing countries is the first part of the output of the Focus Group, as adopted by the Study Group 1 in September 2000.

The remaining parts of the report dealing with telecommunication infrastructure, interconnection and human resource development are now under study by the Rapporteur’s group which takes over from the Focus Group as decided by the Study Group 1 meeting in September 2000. The result of their study will be published separately.

The chapters contained in this publication were prepared by UNESCO within its intergovernmental Information for All Programme which provides a framework for international co-operation to build a just and free information society and to narrow the gap between the information rich and the information poor. UNESCO’s research for this study, undertaken within its long-standing close collaboration with the ITU, was carried out by a team of consultants composed of Ms Joan-Claire Mappus, Mr Jack Skillen, Ms Rachelle Tayag and Ms Anushka Thewarapperuma.

The Telecommunication Development Bureau thanks UNESCO and all Member States and Sector Members who contributed to this publication.



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*Telecommunication Development Bureau  
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## FINAL REPORT

### 1 Introduction

The Internet is widely if not universally viewed as the prototype technology of the emerging information era, with vast 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.

The ITU-D Focus Group on Promotion of Infrastructure and Use of the Internet in Developing Countries considered in the brief for its work that there are three main categories of users of the Internet:

- private sector (business);
- public service (government at all levels, not-for-profit organizations);
- individual (residential).

However, the applications of the Internet, other than informal individual communication, can generally be categorized as either public service applications or commercial applications, the main criterion being whether the principal motivation for the application is common welfare or entrepreneurial activity. The present report is intended to provide an analysis of the tendencies, needs, problems and opportunities concerning the application of the Internet for public service in developing countries.

It will be seen, however, that many types of fruitful co-operation on the Internet are possible between public service institutions and the private sector. Such partnerships are in fact increasingly important in addressing sustainable development issues, as the responsibility towards development, whether economic, political or cultural, is accepted by all members of society as a communal effort.

The report treats two principal aspects in the following chapters: the existing and potential use of the Internet in specific development areas, and the generic needs of producers and users of locally relevant content. The final chapter summarizes the conclusions of the study.

## 2 INTERNET Applications focused on development needs

In this section, the role of the Internet in certain core development areas – education, health, agriculture and rural development, environment and emergency management, governance, culture, the mass media, libraries and archives, and scientific research – is highlighted. These and other sectors of public concern should be seen as a potential test bed and driving force for progress towards an information society in developing countries, because they hold stores of knowledge and expertise necessary for this evolution and because of their natural role in informing, educating and mobilizing the public to face tomorrow's challenges. Although the public service sectors have major needs for the Internet and major potential to exploit it for the good of society at large, they are generally disadvantaged by dispersed resources and shrinking budgets. The applications and contributions of sectors of public concern in the area of telematics were considered in detail in a joint ITU-UNESCO study<sup>1</sup>, which recommends a strategy to facilitate access to telematics facilities by these sectors involving i) consolidation of user demand, ii) co-operation with telecommunication operators and the commercial sector, and iii) appropriate public support in terms of investment and enabling environment.

Within each of these sectors, there are many choices that can be made regarding foci for application of the Internet – for example, within education, should one focus on higher education or primary education? In prioritizing these choices it is important to look not only at their direct benefit but also at their ability to create catalyzing spill-over effects in other areas of development. Inversely, there are many concerns which apply to the sectors of public concern as a whole, such as training of users and Internet specialists and providing access to information to the widest possible public. Identifying these priorities and understanding key concerns around them will be an important challenge for leaders in developing countries.

### 2.1 Education and learning

The critical importance of education and learning in today's society is clearly voiced, for example, in a recent ITU report states that: "Education and training are primary determinants of a country's prospects for economic and human development and international competitiveness".<sup>2</sup> ICTs have for many years been considered to have a tremendous potential for enhancing the teaching-learning process, starting with radio and television at the time of their introduction, and extending later to computers, multimedia, and telematics. The Internet holds particular promise in this context as "a virtual classroom in which intense interactivity and the sharing of resources and information constitutes its essence".<sup>3</sup>

In particular, it is recognized that 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 applications in the field of 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.

Education can take many forms ranging from formal education to non-formal, including distance and open education as well as lifelong learning. A major area of Internet activity world wide has been in higher education where the use of Internet based courses has been rapidly introduced in the last few years. In primary and secondary education, one very interesting approach to improving access to and use of the Internet is that of the school networking initiatives or schoolnets. It is at this level that some of the most structured collaborative learning programmes have been implemented, typically involving national,

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<sup>1</sup> ITU and UNESCO. *The Right to Communicate - At What Price? Economic Constraints to the Effective Use of Telecommunications in Education, Science, Culture and in the Circulation of Information*. Paris: UNESCO, May 1995 (CII-95/WS/2).

<sup>2</sup> International Telecommunication Union. *Challenges to the Network: Internet for Development*. Geneva: ITU, February 1999 (Executive Summary at [http://www.itu.int/ti/publications/INET\\_99/ExeSum.htm](http://www.itu.int/ti/publications/INET_99/ExeSum.htm)).

<sup>3</sup> Ibid.

provincial and local institutions. Applications in non-formal education (NFE) have also been developing although at a much more basic level. Consequently, the new models and initiatives are highly varied, and are situated in a continuum between traditional models and the totally virtual ones. The implications are immense since they imply profound and long-term changes in the educational models and systems, but they must thus also overcome fears and resistance to change. A recent UNESCO study examines in detail the methodologies and experiences world-wide in the application of the Internet in education; among the many findings is that the most sophisticated technology is not necessarily the best, and that e-mail, for example, has been considered by several authors as the best Internet tool for individualized learning and teaching.<sup>4</sup>

### **2.1.1 Applications of the Internet in developing countries**

The multiplicity of problems facing education in developing countries is well known. On one level, they are discussed in terms of low numbers of qualified teachers and large numbers of students per class; inaccessibility and inflexibility of schools and universities; outdated and irrelevant curricula and methods of learning; and lack of quality educational materials. On another level, there many learners are not reached by the system, with estimates of 900 million illiterates in the world and 130 million children unable to attend primary school, and very little provision for lifelong learning opportunities. This context offers a vast ground for testing and using Internet applications which are steadily coming on stream in developing countries, although at widely varying levels among individual countries at a substantially lower pace overall than in the industrialized world.

#### **2.1.1.1 Primary and secondary education**

In primary and secondary education, Internet use in developing countries is generally low, due mainly to limited access. For example, in a recent UNESCO-sponsored survey on "Electronic Connectedness in Pacific Islands Countries", 66.5% of all educational institutions had Internet access in New Zealand, 6.4% in the Marshall Islands and 2.4% in Vanuatu.

Only a few developing countries have established wide Internet access of schools through nation-wide networks, examples being Chile, South Africa and Thailand.

The Enlaces project in Chile has already linked 5,000 basic and secondary schools to its network.<sup>5</sup> Enlaces is part of a national governmental programme for basic and secondary education which started in 1995. Schools receive equipment, training, educational software, and ongoing support from a technical assistance network of 35 Chilean universities organized by the Ministry of Education. For the year 2000, 100% of secondary education and 50% of basic education were to be connected. The Enlaces network provides e-mail and asynchronous access to educational resources through the public telephone network, making extensive use of overnight tariff reductions, and a custom software interface called "La Plaza" developed to provide a virtual "meeting place" for teachers and students and facilitate their access to the communication tools. Although it is not yet possible to provide full Internet access through the network, a website has been established and is available to schools which have already connected with their own means. The project has received support from local and multinational enterprises, as well as from USAID and the World Bank.

In Thailand, SchoolNet@1509 was the first nation-wide, free-access network for education in the ASEAN region.<sup>6</sup> The Thai SchoolNet started in 1995 in the capital city, Bangkok, while the Golden Jubilee Network was established in parallel in 1996 as a nation-wide network based on inter-regional

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<sup>4</sup> University Networks of Knowledge (UNICOR). *Analytical Survey: Experience of Internet Usage in Education*. Moscow: UNESCO Institute for Information Technologies in Education, 1999.

<sup>5</sup> <http://www.enlaces.cl>

<sup>6</sup> Network design and resource management scheme in SchoolNet Thailand Project, <http://www.nectec.or.th/users/paisal/inet99/>

leased circuits. In 1998, the two networks were merged to form the Thai network for education. By June 1998, 1,500 schools had access to the Internet. The project's philosophy is to "meet the targets with the minimum resources and the maximum quality service". These limited resources (120 dial-in telephone lines) obliged the network to establish a system to optimize the use of the lines: 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 are being examined to expand the access and the target is to have 5,000 schools connected by the year 2001. The Thai example also shows how local content can be created: starting from the Golden Jubilee event, a website was created through which schools' awareness was stimulated and Thai content made available on the Internet.

The South African School Net (SchoolNetSA) is an interesting example in terms of structure and partnerships. Following a period of local and provincial networking initiatives, two provincial networks proposed in 1997 to establish a "National Schools Network" and the Department of Education was officially designed as its co-ordinator. In 1998, the network received financial support from the International Development Research Centre (IDRC) and the Open Society Foundation to lead a two-year programme. Today, there are four constituted provincial networks (Eastern Cape, Gauteng, KwaZulu-Natal and Western Cape) with two more being established. SchoolNet SA 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 of the main characteristics of this initiative.

There are also many local and institutional initiatives to connect schools in developing countries to the Internet. Kidlink House in Brazil is promoting virtual "Houses" of two or more schools to conduct collaborative Internet projects, and has spread from an initial pilot project in Rio de Janeiro to a dozen other localities.<sup>7</sup> Another example of educational network is the National Open School (NOS) in India, whose mission is "education for all, greater equity and justice in society, and evolution of a learning society", and especially to the least privileged social groups. As NOS is based on a network composed by 800 accredited institutions, it is presently planning an "Indian Open Schooling Network" as a forum serving students having Internet access at their schools or at home. The NOS and its 8 regional centres are already largely computerized, a Local Area Network exists, and Internet tools, such as e-mail have been introduced to improve its network management.

Many initiatives are developing the use of Internet tools in combination with other ICTs. EDUNET,<sup>8</sup> an educational network in Pakistan sponsored by the UNDP Sustainable Development Networking Programme (SDNP), uses the Internet mainly for e-mail and discussion groups, while its database of educational resources is disseminated mainly on CD-ROM to promote educational improvement and reform in disadvantaged communities. The Brazilian "School of the Future",<sup>9</sup> 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.

Two main structural constraints to introducing the Internet in basic and secondary education are the lack of equipment and the lack of trained personnel, making infrastructure support and teacher-training key issues for introduction of the Internet and ICTs in general. For example, in the UNESCO survey on "Electronic Connectedness in Pacific Islands Countries", the lack of computers was found to be the most significant barrier to digital literacy in the region, with ratios of computers per student ranging from one for nine in New Zealand to one for 42 in Vanuatu. Similarly, the percentage of teachers able to use computers is very low in the developing countries of the region (maximum 7.5%).

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<sup>7</sup> <http://www.kidlink.org/brasil/khousefring.html>

<sup>8</sup> [http://pangaea.org/street\\_children/asia/book.htm](http://pangaea.org/street_children/asia/book.htm)

<sup>9</sup> <http://www.futuro.usp.br/ef/menu/menu.htm>

In this very challenging situation, teacher training on and through the Internet should be considered more as a priority than as a trend. One response to this challenge is UNESCO's initiative on "Creating Learning Networks for African Teachers" which, starting with pilot projects in Zimbabwe in 1997<sup>10</sup> and Senegal in 1998,<sup>11</sup> is linking African teacher training colleges to the Internet in about a dozen African countries to support collaboration on educational reform and improvement. Within the SchoolNetSA network in South Africa, two teacher training centres have been established and one planned, with four training sessions for 122 trainees held between April 1998 and January 1999.

International assistance and co-operation programmes have been active in promoting the establishment and interlinking of school networks in developing countries. The World Bank's World Links for Development (WorLD) programme aims to develop Internet access in schools, provide teacher training, and encourage collaborative projects between schools. The programme started in 1997 and 120 secondary schools has already been connected in fourteen countries<sup>12</sup>. The programme planned to have 1200 schools in 40 developing countries connected by the year 2000. There have been, for example, 24 collaborative projects in Brazil, 10 in Uganda and 4 in South Africa, with many more to be initiated. Senegal plans to connect 40 schools by 2001 and has developed a collaborative project with schools in Canada and France to create Internet content on "Hunger in the World". Other projects have focused on "Women and Religion", AIDS, etc.<sup>13</sup>

An example of bilateral cooperation in this area is the LearnLink programme<sup>14</sup> funded by the US Agency for International Development (USAID) which "uses information, education and communication technologies (IECTs) to strengthen learning systems essential for sustainable development." It has launched educational programmes in partnership with local and national government such as the Computer Assisted Teacher Training (CATT) project in Morocco. CATT has created a computerized communications network for pre- and in-service training of primary school teachers in five provinces, facilitates collaboration and information sharing among peers across the provinces, and supports the Ministry of National Education's efforts to introduce the use of computers throughout the Moroccan educational system.<sup>15</sup>

The I\*EARN<sup>16</sup> network of schools and youth service organizations is another international initiative which encourages collaborative learning through the Internet. Collaborative projects usually involve more schools from the developed countries than from developing ones. An interesting earlier example is the "Parev Network", a 1998 Web based distance-learning initiative<sup>17</sup> on Armenian culture and identity involving secondary schools in Armenia, Canada, Lebanon, France and the United States. The project was structured around the collaborative construction of a homepage, not only as a pedagogical tool but also as forum for encounter among cultures.

An important issue which is addressed to varying degrees by national and international programmes is the availability of appropriate educational content on line. It is generally recognized that the Internet is a gateway to many sources of information previously unavailable for teachers in developing countries, but

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<sup>10</sup> <http://lwf.co.zw/>

<sup>11</sup> <http://www.ucad.sn/refes/>, <http://www.ucad.sn/lwf/>

<sup>12</sup> Senegal, Brazil, Chile, Colombia, Ghana, Lebanon, Mauritania, Mozambique, South Africa, Paraguay, Peru, Turkey, Uganda and Zimbabwe.

<sup>13</sup> See the WorLD website (<http://www.world-links.org/senegal/projets.htm>) for a list of all the projects, and "Internet fait école au Sénégal" by Seydou Sissouma (undated article on the WorLD programme in Senegal under "Cahiers & Spéciaux" on the former website of the *Le Soleil* newspaper, <http://www.primature.sn/lesoleil/internetecole.htm>).

<sup>14</sup> <http://www.aed.org/learnlink>

<sup>15</sup> <http://www.aed.org/learnlink/task/index.html>

<sup>16</sup> <http://www.earn.org>

<sup>17</sup> For a description of the project see <http://www.pangea.org/earn/cardener97/t13.htm>

among the many sites that provide educational content, such as the EdsOasis, UNICEF CyberschoolBus and I\*EARN websites, most materials are in English and may not be always suitable to developing country contexts. As an example of a locally oriented approach, the SchoolNetSA website presents an overview of on-line content produced both in South Africa and world-wide concerning curriculum support, on-line teaching and learning resources, including resources for courses in the Afrikaans and Xhosa languages. The creation of local content is, however, still insufficient as it requires a greater mastery of Internet tools and the definition of clear objectives in schools and at the governmental level.

Since introduction of the Internet in educational systems is relatively recent, and as it marks only the beginning of a deep change in education, rigorous evaluation of its use as an educational and pedagogical tool is still limited, particularly in developing countries with their specific problems including weak educational infrastructure and high rates of illiteracy. Thus far, schools in developing countries have followed those in the industrialized countries in using mainly basic Internet tools: Web development and Web search, e-mail, chat, and sometimes CU-See me sessions. In an article on the Senegalese experience within the 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",<sup>18</sup> which students learn to use quickly and enthusiastically.<sup>19</sup> Those conclusions don't differ from the ones drawn in developed countries concerning the use of Internet in classroom activities.

### II.1.1.2 Higher education and virtual universities

Although universities have substantially contributed to the technical development of the Internet, they have received relatively little benefit from it in their basic functions until now, concentrating their research more on technical aspects than on wide usage and "socialization" of the Internet as a tool for education.<sup>20</sup> This situation is now rapidly changing in the industrialized countries, with many universities now offering Web based courses. This trend has been accelerated by the availability of integrated commercial course authoring and delivery suites like WebCT or Lotus LearningSpace.

Numerous universities in the developing countries are also now testing or implementing Web-based education sessions. Bangladesh Open University, in order to meet with its universal education goal and improve its results, 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. At the University of Botswana, two distance methods were evaluated: 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. From the participants' reactions, it was determined that The Internet course resulted in a statistically significant 49% gain in test results, a comparable result to that obtained with the video technology; both technologies were seen to have future potential for such courses and distance learning."<sup>21</sup>

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<sup>18</sup> Yorke, Rodda. "Final Report on a Pilot Project into the Use of Cell Data for Connectivity to Two Rural Schools in South Africa". Report prepared for IDRC, June 1997 (<http://www.pta.school.za/rodda/cell/twozell.html>, referenced in Panos Briefing #28 on "The Internet and Poverty, April 1998, <http://www.oneworld.org/panos/briefing/interpov.htm>).

<sup>19</sup> "Internet fait école au Sénégal", op. cit. (<http://www.primature.sn/lesoleil/internetecole.htm>).

<sup>20</sup> Oillo, Didier. "L'Université virtuelle francophone". 19th World Conference on Open Learning and Distance Education, International Council for Open and Distance Education (ICDE), Vienna, 20-24 June 1999 (<http://www.fernuni-hagen.de/ICDE/>).

<sup>21</sup> Kumar, Krishan Lall. "Teacher Education Via Internet and Video Teleteaching – an Effectiveness Study". 19th World Conference on Open Learning and Distance Education, International Council for Open and Distance Education (ICDE), Vienna, 20-24 June 1999 (<http://www.fernuni-hagen.de/ICDE/>).

These tendencies are accelerating in developing countries, which are often facing an immense challenge of rising numbers of university students, are increasingly implementing open and distance learning solutions. The following table shows that the six largest distance universities in the world are located in developing or nearly developed countries.

### Largest open universities in the world<sup>22</sup>

Country	Institution	Established	Students (Year)	Annual Budget (Millions of USD)	Number of Faculty
Turkey	Anadolu University	1982	577,804 (1995)	30	1,260
China	China TV University System	1979	530,000 (1994)	1.2	31,000
Indonesia	Universitas Terbuka	1984	353,000 (1995)	21	5,791
India	Indira Gandhi National Open University	1985	242,000 (1995)	10	13,652
Thailand	Sukhothai Thammathirat Open University	1978	216,800 (1995)	46	3,536
Rep. of Korea	Korea National Open University	1982	210,578 (1996)	79	2,840
France	Centre National d'Enseignement à Distance	1939	184,614 (1994)	56	4,800
UK	The Open University	1969	157,450 (1995)	300	8,191
South Africa	University of South Africa	1873	130,000 (1995)	128	3,311
Iran	Payame Noor University	1987	117,000 (1995)	13.3	3,665
Spain	Universidad Nacional de Educación a Distancia	1972	110,000 (1995)	129	4,600

All of these mega universities except the China TV University System are known to be using the Internet to some extent, often in combination with other technologies in order to meet their objectives. An example is the Indira Gandhi National University (IGNOU) which has continuously extended its ICT capabilities to meet the need to “impart lifelong education and training particularly to those living in rural and remote areas”.<sup>23</sup> IGNOU’s sophisticated media centre has, among other facilities, a satellite-based communication system, and all of its educational centres are equipped with computers and use e-mail as a communication tool. IGNOU has created an Internet homepage on which general information as well as course material of all programmes can be found, and the number of learners using Internet is expanding. The Internet is still, however, only a relatively small part of a system using a wide range of communication technologies including radio, TV, cable TV and teleconferencing.

An evolving concept, which is critical to today’s interest in Internet tools for higher education, is that of the virtual university. One view of this transformation of the university paradigm sees the Internet as a meeting place for students, researchers and teachers, with the virtual university being “global,

<sup>22</sup> Daniel, Sir John (Vice Chancellor, The Open University). “Technology: Its Role and Impact on Education Delivery – More Means Better” (Fig. 2), Commonwealth Ministers of Education, Botswana Convention (<http://www98.open.ac.uk/OU/News/VC/botswana.html>).

<sup>23</sup> Chaudhary, Sohanvir S. *Communication Technology for Enhancement and Transformation of Open Education: the Experience at the Indira Gandhi National Open University in India*, PAN Commonwealth Forum on Open Learning, Brunei-Darussalam, 1-5 March 1999 (<http://www.col.org/forum/forum.htm>).

multilingual and based on the Internet”<sup>24</sup>. Another view is that the virtual paradigm in higher education corresponds to four organizational modes: the total virtual, total dual mode, the partial dual mode and the mixed mode<sup>25</sup>. Although today there are very few examples of totally virtual modes, higher education can be viewed as going through a transition phase in which these modes will be increasingly enabled. This in turn supposes a pedagogical revolution bringing into question the traditional vertical educational and training modes.

As an example of these trends, the Agence universitaire de la Francophonie (AUPELF-UREF) is supporting the installation of “Francophone Digital Campuses”<sup>26</sup> in existing university centres to improve the performance of universities in developing countries through North-South partnerships for the appropriate use of ICTs in education. Each centre provides faculty and students with facilities for access to information and for production and use of electronic educational resources. Digital Campuses were established by 2000 in the universities of Bamako (Mali), Dakar (Senegal), Libreville (Gabon), Port-au-Prince (Haiti) and Yaoundé (Cameroon) and four more (in Benin, Côte d’Ivoire, Madagascar and Tunisia) are being implemented in 2001.

Another approach has been developed by UNESCO in its Upgrading Science and Engineering Education (USEE) programme to achieve effective integration and utilization of ICTs in higher education in the Arab States region. USEE aims to strengthen the entire chain of interactions necessary to achieve this goal, including the development of networking infrastructure, student access to information, and faculty and student incentives. The key components are “IT Primer” training workshops for faculty, an array of training kits made available through the Web as well as CD-ROM, video tapes, satellite TV broadcasts and printed versions, and support for USEE centres of excellence in the region. In order to help faculty build their own, first-rate courseware while spending minimum effort on development tasks, UNESCO maintains a regional, public domain Web Portal for Higher Education with topical digital libraries of courseware objects such as lecture notes, audio/video clips, interactive applications and problem sets.<sup>27</sup>

One of the most ambitious virtual university experiences underway is the African Virtual University (AVU)<sup>28</sup> organized under World Bank auspices with 29 universities in 15 Sub-Saharan African countries (9 English speaking, 9 French speaking and 2 Portuguese speaking).<sup>29</sup> The programme’s pilot phase was launched in 1997 while the operational phase began in late 2000 under the aegis of a specially created non-governmental organization. The project objectives are 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. The courses, based initially in industrialized countries, are supposed to be self-sustaining and are generally provided on a commercial basis. Although the main focus of AVU is the use of dedicated satellite facilities for the transmission of

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<sup>24</sup> Bridgeman, Noel and John Tiffin. “The Global Virtual University”, 19th World Conference on Open Learning and Distance Education, International Council for Open and Distance Education (ICDE), Vienna, 20-24 June 1999 (<http://www.fernuni-hagen.de/ICDE/>).

<sup>25</sup> Silvio, José F. “The virtual paradigm in higher education : implications for quality, equity and relevance”. 19th World Conference on Open Learning and Distance Education, International Council for Open and Distance Education (ICDE), Vienna, 20-24 June 1999 (<http://www.fernuni-hagen.de/ICDE/>).

<sup>26</sup> <http://www.aupelf-uref.org/programmes/programme4/campus.html>

<sup>27</sup> <http://unesco.uaeu.ac.ae/wportal/default.htm>

<sup>28</sup> <http://www.avu.org/>

<sup>29</sup> Benin, Burkina Faso, Cape Verde, Côte d’Ivoire, Ethiopia, Ghana, Kenya, Mauritania, Mozambique, Niger, Senegal, Tanzania, Togo, Uganda and Zimbabwe.



video-based courses, the Internet is used for transferring data files and for access to information. In one evaluation of the initial results, the students' assessment of the video mode of learning was mixed, but "One of the most exciting benefits [was] the access to digital library" such that "access to Internet becomes a crucial gateway to this literature".<sup>30</sup>

### 2.1.1.3 Non-formal education

Over the past few decades, a wide range of educational possibilities has developed outside the formal system. Non-formal education (NFE) is highly heterogeneous; it applies to many fields, many activities, many audiences, it is financed by various agents, public and private, and offered in varied forms. NFE initiatives target populations that cannot be reached by the formal system, enhancing voluntary, learner-centred, participatory and continuing learning.<sup>31</sup>

Because of its adaptability and flexibility in responding to educational needs of excluded or difficulty reached populations, NFE is a promising and popular form of learning, but it has generally not yet received full recognition and support in comparison to formal education systems. In the poorest developing countries, apart from those which have extensive literacy campaigns, NFE programmes are insufficiently developed and their potential is far from being fully realized. This is probably a reason why there are few examples of Internet-based projects in non-formal education in developing countries, while programmes undertaken in the North, such as the ALTIN (Adult Literacy Technology Innovation Network) focusing on teachers, the SHELCOM (Shelter Communications Literacy Network) for adults living in homeless shelters, Intel's Computer Clubhouse which encourages disadvantaged youths in underserved communities to become confident learners,<sup>32</sup> and Literacy Link, an ongoing distance education project for learners and teachers, all in the United States, are making substantial use of the Internet.<sup>33</sup>

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<sup>34</sup> including the "Creating Learning Networks for African Teachers" project which has already been mentioned. A recent international electronic forum sponsored by UNESCO and the Government of Canada discussed in detail and endorsed the potential of ICTs in adult education, and recommended in particular measures to ensure relevant local content and access.<sup>35</sup>

The Commonwealth of Learning is developing a project to pioneer use of ICTs and notably the Internet in NFE, working 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 as lead partners. Technology-based community learning centres will be established to improve NFE relying

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<sup>30</sup> Aguti, Jessica N. "One year of virtual university experience at Makerere University in Uganda". PAN Commonwealth Forum on Open Learning, Brunei-Darussalam, 1-5 March 1999 (<http://www.col.org/forum/forum.htm>).

<sup>31</sup> Spronk, Barbara (Director International Extension College). "Non Formal Education at a Distance: a Framework for Discussion". Pan Commonwealth Forum on Open Learning, Brunei Darussalam, 1-5 March 1999 (<http://www.col.org/forum/forum.htm>).

<sup>32</sup> <http://www.clubhouse.org>

<sup>33</sup> Wagner, Daniel A. and Christopher Hopey. *Literacy, Electronic Networking and the Internet*. Philadelphia: International Literacy Institute (ILI), University of Pennsylvania, Technical Report, September 1998 (<http://www.literacyonline.org/products/ncal/pdf/TR9810.pdf>).

<sup>34</sup> [http://www.unesco.org/education/educprog/lwf/lwf\\_activities.html#PilotProjects](http://www.unesco.org/education/educprog/lwf/lwf_activities.html#PilotProjects)

<sup>35</sup> Office of Learning Technologies (OLE), Human Resources Development Canada and UNESCO Institute for Education. *Report of the International Forum on Greater Accessibility of Adult Learning through New Technologies – But How?* Hull (Quebec): OLE, 1998 (<http://www.unesco.org/education/uie>).

on the Web as a tool for sharing experience at the international level and as an information resource for instructional materials, and providing of authoring software for co-operative development of instructional materials relevant for literacy programmes in the community context.

Two ongoing international projects can also be highlighted: the World Bank's African network for literacy workers, and the Asia Pacific Literacy Database<sup>36</sup>. The first example is part of the World Bank-initiated project on Basic Education and Livelihood Opportunities for Illiterate and Semi-literate Young Adults (BELOISYA). The network started in spring 1999 making use of a list-server for literacy workers, for which the World Bank is the content editor. The second example is jointly developed by the Asia/Pacific Cultural Centre for UNESCO (ACCU) in Japan and UNESCO itself with the collaboration of literacy, non-formal education and statistics experts from international organizations, governments and NGOs in the region. The database contains literacy facts and figures, literacy materials, a Literacy Resource Centre Network, national literacy policies, etc.

Given its potential wide reach and openness to participatory activity, the Internet offers developing countries new possibilities in NFE in influencing the learning process and expanding the learner's horizon. The Internet can be used to upgrade teacher skills, as a resource for instructional material, as a communication tool to exchange experiences, as a dynamic support for participatory projects at the community level, and as a stimulant for creating relevant local content. In spite of the expectations and new possibilities that the Internet offers, there remains a tension between the introduction of new technologies "offering ... the widest possible horizons" and the needs of communities that should be fulfilled in a relevant and appropriate way taking account of cultural, economic and political realities.<sup>37</sup> This is why special emphasis should be placed on local needs and local content production in NFE in the projects that will be developed in the future.

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

In developing countries, use of the Internet in education is constrained by lack of availability of adequate and affordable network infrastructure. This is particularly true at the school level, but also very critical at the university level, especially considering the greater capacity needed for use in higher education.

In Africa, although universities in most countries have e-mail connectivity at a minimum, as late as 1998 only about 13 countries had universities with full Internet connectivity; in addition, Internet facilities at most of the universities are restricted to staff and post-graduates, and the general student population is usually without access".<sup>38</sup> Although the situation is generally better in other regions, most developing countries are experiencing major access constraints in the education sector, except in the few a relatively small number of privileged institutions. In this context there are two separate but related problems: the lack of access of educational institutions because of cost or administrative or technical constraints, and a lack of "secondary connectivity" in the form of network infrastructure at the institutional level.

"Academic and research networks", providing backbone connectivity to the higher education sector, were the first backbone infrastructure installed in most industrialized countries, but are generally not well developed in developing countries. Except in Latin America where quite a few countries have university networks, only relatively few of the countries in other regions – such as Egypt, China, India and South Africa – have such infrastructures. For example, the China Educational and Research Network (CERNET),<sup>39</sup> funded and implemented by Chinese governmental institutions, already links more than 450 universities out of 1,075, some middle schools, and some education research entities to the Internet.

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<sup>36</sup> <http://www.accu.or.jp/litdbase>

<sup>37</sup> Ibid.

<sup>38</sup> Jensen, Mike. "Where is Africa on the Information Highway". RINAF Day, Dakar, organized by UNESCO, 16-17 October 1998 ([http://www.unesco.org/webworld/build\\_info/rinaf/docs/cari98.html](http://www.unesco.org/webworld/build_info/rinaf/docs/cari98.html)).

<sup>39</sup> <http://www.cernet.edu.cn>

In South Africa, UNINET aims at providing “a computer network to the standards of the Internet, for the use of every academic, researcher and student in South Africa”.<sup>40</sup> In 1997, there were 249 educational institutions connected through this network facility.

International collaboration provides a very 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. The main advantages of collaboration are that it allows large-scale economies through sharing of resources, a good amount of choice and flexibility in planning and implementation, and vast new possibilities for open learning, distance education and cultural exchange.

Collaboration with the corporate sector is often a key element. The SchoolNetSA project has an impressive number of sponsors and partners, including corporate collaboration for software, equipment and connectivity showing that the introduction of the Internet and the ICTs in education can create a very important potential market in developing countries. Another example of the collaboration of the productive sector is the recent agreement signed between the Senegalese National Telecommunication Society (SONATEL) and the Ministry of Education to provide schools with Internet connectivity under special conditions. 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.

It has been seen that the introduction of the Internet corresponds to a transition phase for educational systems world wide. In developing countries, use of the Internet in university education is taking place at a larger scale than for schools, and, at all levels, the Internet is still used mainly for basic educational support (information search and exchange) rather than in dedicated applications. Development is at a crucial point when expectations are high and new models are still to be defined. The usefulness of the Internet has already been proven in some cases, especially in distance and open education. The further potential of the Internet to improve the quality of learning is enormous. 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. And perhaps the most important priority in this context is teacher training as a prerequisite for broadly based application of the Internet in education and learning.

Two important questions for developing countries are: “Is the Internet a priority in education?” and “Are Internet based projects sustainable?” To be successful, the Internet has to be introduced in an appropriate and gradual way, adapted to local situations and priorities, with the advantages weighed against more fundamental needs in education such as teacher salaries or basic infrastructure. In introducing the Internet, and ICTs in general, particularly in basic education, the risks of creating a technologically literate elite and excluding substantial masses of the population from the information society have to be considered, and therefore, 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 most developing countries.

Finally, it is important to understand that the implementation of Internet applications in education is not limited to development and to installation. Maintenance, staff training, quality control and continuing development are also critical, and it is only after a system is well established that one can expect to

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<sup>40</sup> Knoch, Carsten (Global One South Africa). “Uninet, the South African Academic and Research network”. IDRC Study/Acacia Initiative, February 1997 (<http://www.idrc.ca/acacia/outputs/op-unin.htm>).

benefit from economies of scale and sustainable contributions to development. In this context the importance of the Internet in reducing communications and administrative costs of educational institutions should not be underestimated. Many such institutions in developing countries suffer from managerial insufficiencies which can be significantly improved with the application of the Internet, which should result in higher staff morale, greater understanding of learning needs and an enhanced ability to provide educational services.

## 2.2 Health

Telematics applied to health, or “health telematics”, has an enormous potential to improve both the quality of and access to health care regardless of geography. It can, for example, provide access to high quality medical staff to interpret an X-ray or an electrocardiogram or access to relevant health information and communication for local health support groups. Health telematics applications can link all sorts of peripheries lacking in elements of effective health service, to all sorts of centres where information and expertise is far more available. In addition, peripheries can be linked to other peripheries so that mutual problems can be looked at and solutions shared.

Dr Hiroshi Nakajima, former Director-General of the World Health Organization (WHO) stated that ICTs are “one of the main driving forces in the current globalization of trade, economics and politics” and that they have “equally important implications for health”.<sup>41</sup> He emphasized how an adequate and affordable telecommunications infrastructure could help to close the gap between the haves and have-nots in health care.

There are various definitions of health telematics including:

“Health telematics is a composite term for health related activities, services and systems, carried out over a distance by means of information and communication technologies, for the purposes of global health promotion, disease control, as well as education, management, and research for health” (WHO).

“Rapid access to shared and remote medical expertise by means of telecommunications and information technologies, no matter where the patient or relevant information is located” (European Commission).

The Internet is one of the most important tools in the development of health telematics, essentially as a means of storing information and allowing the advancement of joint research over large distances in the hundreds of medical websites and group networks which exist throughout the world, which is, in principle, of equal potential to developed and developing countries. Examples of Internet usage are medical training, medical information access, patient care and support, remote diagnosis and consulting, emergency/epidemic support, teleworking for the disabled and preventative care information.<sup>42</sup>

However, the use of Internet by medical professionals and institutions has been relatively low. In March 1996, it was estimated that less than 1 % of all hospitals had access to their own Web server.<sup>43</sup> The Health on the Net Foundation has embarked on a major project entitled “the Global Hospital” which seeks to help hospitals get Internet access. This is helping make the Internet part of the culture of health service delivery.

The progress being made in PC and Internet quality means that more advanced examples of health telematics through the Internet are emerging including moving image files using Internet protocols, and video conferencing and audio tools which are a valuable resource for remote consultation and diagnosis. In the industrialized countries, these opportunities are steadily being integrated into health services.

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<sup>41</sup> “WHO Director-General Highlights Potential of Telemedicine”, 1997 Press Release WHO/65 (<http://www.who.org/inf-pr-1997/en/pr97-65.html>).

<sup>42</sup> Telecommunication Development Bureau, “Telemedicine and Developing Countries”. Geneva: ITU, 7 September 1997 (ITU-D Study Groups, Document 2/155(Rev.2)-E, Question 6/2: Impact of Telecommunications in Healthcare and other Social Services).

<sup>43</sup> *ibid.*

### 2.2.1 Applications of the Internet in developing countries

With the “double burden”<sup>44</sup> of old and new diseases falling most heavily on developing countries, health services are facing mounting challenges. Every year, more than 12.2 million children in developing countries die under the age of 5 from causes preventable in many cases for just a few pennies each. The disparity between the health services of developed and developing countries is shown by the ratio of doctors to people. While industrialized countries have one doctor for every 200 to 500 people, in East Africa the ratio ranges from one doctor per 6,700 people in the relatively prosperous Zimbabwe, to one per 37,960 people in Mozambique.<sup>45</sup> Clinics and hospitals, where they exist, they are often ill equipped, especially outside urban areas. Inadequate infrastructures such as telecommunications, roads and transport compound these problems, especially in rural and remote areas.

Health telematics should be seen as a highly beneficial resource that can benefit areas or populations which, due to their remoteness or lack of resources, do not have the capacity to provide the necessary services. Although advanced applications may require relatively expensive technology for processes such as long distance consultations and even in the future surgery, the Internet is an inexpensive and flexible resource which can support more and more of these services. The Internet is also a potentially crucial instrument in training and provision and exchange of information to populations to whom this can be hugely important.

There are a number of categories of Internet applications which can help to redress these problems:

#### 2.2.1.1 Information stores

The problems of inadequate medical infrastructure and services are clearly exacerbated and to a great extent perpetuated by lack of access to information. While the average medical library in the developed world would have 3000 journals in its collection, in India, one of the most advanced developing countries in medical research and education, no academic or medical research library receives more than 2100 journals and most only receive a few hundred making access to information very difficult.<sup>46</sup> In Africa many specialized libraries would have no more than 30 journals<sup>47</sup>. This difficulty of access is amplified for the individual doctor: “Honest doctors have so many patients to treat they have little time to do research or read.”<sup>48</sup>

The Internet provides a vast quantity of freely available, high quality information, as well as charge based information, of enormous value as a health care resource to practising physicians, other medical professionals and students, as well as the general public. Despite the generally low usage of these resources by health personnel, they are becoming an ever more essential source of information for practitioners as well as for researchers. Medical databases accessible via the Internet include, for example, MEDLINE, sponsored by the US National Library of Medicine, which contains information on 8 million articles in 20 languages.<sup>49</sup>

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<sup>44</sup> M. Hegener, “The Internet, Satellites and Economic Development”, in *OnTheInternet* Sept./Oct. 1996, Vol. 2, Number 5 (<http://www.isoc.org/isoc/publications/oti/articles/theinternet.html>).

<sup>45</sup> Telecommunication Development Bureau, op. cit.

<sup>46</sup> Jones, Clinton. “The Internet and the Developing World”, AFRO-NETS (<http://www.healthnet.org:80/afronets/afronets-hma/msg01049.html>).

<sup>47</sup> IDRC. “The Use of Information and Communication Technologies in the Health Sector in Sub-Saharan Africa”, International Development Research Centre (IDRC), Acacia Programme ([www.idrc.ca/acacia/old/stuides/irhealth.htm](http://www.idrc.ca/acacia/old/stuides/irhealth.htm)).

<sup>48</sup> Jones, Clinton, op. cit.

<sup>49</sup> Telecommunication Development Bureau, op. cit.

But, while Internet based resources could help to ameliorate the information access restrictions in developing countries, doctors there generally have insufficient computer and telecommunication facilities to make use of them effectively. In addition, the costly combination of usage fees and sheer breadth of information seriously constrains the search of information in the developing world. Trying to locate a specific piece of information for a health worker “can be the proverbial hunt for a needle in a haystack”, especially without proper training in Internet use. This problem is exacerbated by the scarcity of useful information directly relevant to health care practitioners in developing countries; for example, on diseases like leprosy, malaria, or cholera which are of concern mainly to the developing world.

A model for using the Internet to help resolve the problems of access to information relevant access to health information in developing countries is the Virtual Health Library of the Latin American and Caribbean Centre for Health Science Information (BIREME), sponsored by the Pan American Health Organization and WHO.<sup>50</sup> The BIREME website provides access to wide range of local and international health databases and a photocopy request service, and the Virtual Health Library under development will provide access to a network by which users at different levels will be able to interact with a wide range of health information sources organized and stored electronically in the countries of the Region using a common methodology.

Following a proposal of the UN Secretary-General at the 2000 Millennium Conference to deploy ICTs to narrow the digital divide faced by public health care workers, researchers and policy makers in the developing world, a group of UN agencies led by WHO is implementing, in consultation with private sector partners, an ambitious, international Health InterNetwork (HIN) to provide Internet connectivity, training and state-of-the art tools for meeting country-specific population health needs. The programme is starting with six regional projects focusing on completing needs assessments in selected nations and building the content of the Internet portal, stressing priority public health programmes.<sup>51</sup>

### 2.2.1.2 Networking and information sharing

It has been cited that about 40% of medicine consists of information exchange.<sup>52</sup> This illustrates the importance of making this wealth of information on the Internet available to relevant groups and researchers through partnerships and networks. WHO sees that new partnerships must be established with academic institutions, national academies of science, and other academic and research organizations, ensuring the involvement of all relevant, specific disciplines.<sup>53</sup> The use of e-mail and the Internet is proving to be very beneficial in increasing the sharing of information through such networks and in coordinating health campaigns.

HealthNet is the most significant health related implementation of ICTs in Africa, having been implanted in 20 countries. It is the project of a group of scientific and medical researchers known as SateLife. The project was created as a means of combating the isolation of health workers in developing countries and the lack of information that impedes their work. Through e-mail, electronic publishing and access to medical databases, HealthNet facilitates rapid and low-cost communication between health workers in Africa and their counterparts in the rest of the world. In many African countries, health related ICT projects are only viable due to HealthNet. Government departments and agencies, medical facilities and schools, medical libraries and individual health workers use it. One criticism of SateLife has been its

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<sup>50</sup> <http://www.bireme.br>

<sup>51</sup> [http://www.un.org/millennium/media/health\\_kit.htm](http://www.un.org/millennium/media/health_kit.htm), <http://hi-europe.co.uk/files/2000/9937.htm>

<sup>52</sup> WHO. 1997 Press Release WHO/65, op. cit.

<sup>53</sup> WHO *Health Telematics Recommendations*, op. cit.

emphasis on technical solutions over issues of management or development of user interests.<sup>54</sup> This relates to the concerns of WHO which sees health telematics as a responsibility of public health authorities and not of the suppliers of technology.<sup>55</sup>

HealthLink in South Africa believes that their network demonstrates that with the appropriate use of technology, it is possible to meet the basic communication and information needs of health workers in rural and remote areas at reasonable cost, despite severe constraints of physical and human resources. This in turn improves staff morale, reduces worker isolation, enhances interaction between colleagues, allows sharing of information and problem solving, makes information available to information poor areas, as well as facilitating communication of clinical and management material.<sup>56</sup>

Another relevant example in this context is Cuba where, despite the deterioration of an obsolete telephone infrastructure, a home-grown network – the InfoMed national health information system of the Ministry of Health – has been operating since 1992. Among the 500 accounts, more than 80% are shared by more than one person within an organization. InfoMed provides e-mail, discussion groups, file retrieval, database search, and consultation. In 1996, InfoMed was in the process of building a distributed network of 13 servers in Cuban medical schools (supported by Pan American Health Organization and UNESCO)<sup>57</sup>. Such basic telematics technology, although not comparable to large university or corporate networks of many developed countries, is well adapted to providing access to information for local and remote users.

### 2.2.1.3 Telemedicine

Remote medical consultations, which are rapidly developing in the industrialized countries, are more difficult to foresee in developing country situations due to technological constraints and the lack of resources and experience to introduce the necessary organizational arrangements within health systems.

An interesting project using basic Internet technology (not yet fully operational at the time of writing)<sup>58</sup> is the Health Hub of the Council for Scientific Research in South Africa (CSIR). Users are able to click on an icon requesting a specific consultation and are presented with a standard consultation form which can be filled in and e-mailed to a doctor, who can then diagnose the patient. This holds great potential as a method for people in remote areas.

Remote consultation of radiological examinations is constrained in developing countries by low available telecommunication bandwidths. The 3-D teleconsultancy stations to be tested in remote areas of the Aral Sea region, Uganda, the Canary Islands and Azores with UNESCO's support in the TeleInViVo project of the European Commission, are inexpensive, light, transportable, and able to support a large range of applications. 3-D data collected from the patient by an on-site health worker using a portable station will be transferred in compressed format to an expert doctor in the principal hospital, who will be able to view and manipulate the image in three dimensions on a workstation, essentially as he would have done on site. This doctor, who could be working anywhere in the world, can perform long distance diagnoses, analyse cases, and co-operate with other specialists if need be. These systems will operate either both on-line and off-line via the Internet depending on available bandwidth, using ultrasound images as the test application.

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<sup>54</sup> IDRC, op. cit.

<sup>55</sup> WHO. "Telehealth and Telemedicine" 1997 Press Release WHO/98 (<http://www.who.org/inf-pr-1997/en/pr97-98.html>).

<sup>56</sup> Health Systems Trust, "The Way Forward", 1999 (<http://www.HealthLink.org.za>).

<sup>57</sup> Press, L. and C. Armas, "Cuba Networking Update", *OnTheInternet*, Vol. 2, No. 1, Jan./Feb. 1996 (<http://www.isoc.org/oti/printversion/0196prpress.html>).

<sup>58</sup> IDRC, op. cit.

#### 2.2.1.4 Telehealth

Telehealth is distinguished from telemedicine by some specialists. While telemedicine provides telematics support for the delivery of services through the formal medical system, telehealth as used here is concerned with the consumer of the health services – individuals, families and communities – including those who may otherwise not be able to access these services.<sup>59</sup> The distinction thus lies in telehealth's focusing on the needs of the user, and not the service provider. This may include information on first aid, wellness (e.g. nutrition), and on the availability of local services.

The relationship between telehealth and telemedicine should be one of mutual support and synergy, whereas mutual suspicion and even competition between the medical establishment and the self-help health and alternative health care providers have often prevailed. Those concerned with telehealth would want the support of the medical health system to ensure the reliability of information, the appropriateness of advice and the mutual and seamless link between self-administering health and medical intervention. A good example would be AIDS prevention programmes, which, if successfully implemented, could be disseminated over the Internet to other interested communities, with debate on how to customise the process to local conditions and culture.<sup>60</sup>

On-line support groups are a form of community support group whereby individuals provide information, comfort and mutual assistance to each other through the medium of the Internet, by e-mail, newsgroups or web-conference for example. This type of support group is useful in addressing various types of disease (e.g. cancer support, AIDS support) and has become one of the most active areas of health Internet application, complementing the formal health system. Applications usually contain an interactive component such as patient to patient chat rooms and discussion groups, and opportunities to pose questions to leading health experts. This social support has proven itself to be a powerful tool in assisting patient recovery and in reducing visits to physicians and clinics. The challenge in applying such applications to developing countries will be to design a process by which they can be made available to the public, for example through community telecentres or already formed groups such as pre-natal groups or families living with AIDS.

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

Better information services and networks are undoubtedly the most immediate and cost-effective way to improve health through the Internet. WHO has recommended that its global surveillance system be strengthened in the area of mapping health hazards, pathogens and diseases in order to generate and disseminate valid, up-to-date and continuous information for disease control and health promotion within the overall policy of Health for All in the 21st Century integrating health telematics.<sup>61</sup> By exploring and promoting the best use of health information in such wide ranging public health issues as disease surveillance, nutrition, water supply, sanitation and environmental health, and paying specific attention to developing countries and population groups, public health development should be able to be made available to everyone.

In the area of telemedicine, the ITU has proposed a list of 10 potential problems, which could also apply to varying extents more widely in telehealth:<sup>62</sup>

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<sup>59</sup> Gurstein, M. and B. Dienes, "A Community Informatics Approach to Health Care for Rural Africa". Presented at: The Africa Telemedicine Project: CONFERENCE'99 on "The Role of Low-Cost Technology for Improved Access to Public Health Care Programs Throughout Africa", Nairobi, 19-21 February 1999 (<http://ccen.uccb.ns.ca/articles/africa.html>).

<sup>60</sup> <http://www.caps.uesf.edu/FSindex.html>

<sup>61</sup> WHO *Health Telematics Recommendations, 1997* (101st Session Executive Board, Agenda item 8, EB101/INF.DOC/9, 21 January 1998).

<sup>62</sup> Telecommunication Development Bureau, op. cit.



1. Like many people, some physicians may resist use of a new technology which they don't understand. This may on average be especially true in rural areas where physicians may be relatively older and less qualified than in urban areas.
2. There are few insurance providers who will cover risks associated with telemedicine consultations.
3. Rural consultations may be infrequent and it may be difficult to run cost effective systems.
4. Some countries or provinces may require that if a physician is to practise in that territory, the physician must hold a licence granted by that particular government. In other words, a physician will find it difficult to provide a telemedicine service outside his own country or province.
5. Confidential medical data regarding patients must be protected from unauthorized access. (Encryption and password security may help.)
6. To be successful, telemedicine service providers must focus on the needs of the medical profession and the patient and not force-fit existing technology to these services. Patient focus must not be replaced by a product focus.
7. Some telemedicine systems and services require users to have compatible hardware at both ends of the communications link, which reduces inter-operability and the benefits of access to different sources of telemedicine expertise. Similarly, the absence of standards in some aspects of telemedicine can also deter the cost-effective implementation of new telemedicine services.
8. Financing is often complex since telemedicine applications may involve several partners in a single venture (e.g. telecommunication operators and hospitals).
9. Telemedicine may not seem cost-effective since it often enhances the service rather than performing a process more efficiently. This may multiply demand for a previously inaccessible service, thereby increasing costs.
10. Systems management and organizational problems may defeat the successful implementation of technologies, services and intentions which may all otherwise be good.

Developing countries, moreover, are facing three specific critical challenges in the effective development of health telematics applications: access, local content, and sustainability.

#### **2.2.2.1 Access**

The “global village” of telecommunications is still stifled in many developing countries because of anachronistic telecommunications infrastructure and administration which makes long distance and satellite connection unavailable or unaffordable. Impaired access to computer and networking equipment and to know-how is also a major impediment. With health telematics depending upon this accessibility, coherent national policies and budgets, involving both the health and telecommunication authorities, are essential to back the development and functioning of health telematics.

#### **2.2.2.2 Local content**

For health information to be retrievable, relevant and understandable in the context of the community, some mediating structures must be implemented, such as technologically trained health paraprofessionals to translate the needs of the community group into the appropriate Internet search criteria, and to sift, interpret and translate the returned information so that is in a usable format for the community.<sup>63</sup> Information destined to be useful and usable for groups of different cultural and linguistic backgrounds must be evaluated and presented in such a manner that it can be translated, redistributed and reexploited; this especially applies to content which should be carefully assessed, a particularly important problem for information coming from other more developed parts of the world. It is thus important to share experience while maintaining local control and relevance. An example supporting such an approach is Le Forum

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<sup>63</sup> Gurstein and Dienes, op. cit.

d'Analyse et de Concertation (FRAC), which researches and shares information amongst health managers on reproduction policies in 17 French-speaking countries via the Internet. This network focuses on the exchange of experience, strategies, databases and tools for health management.<sup>64</sup>

Another model is to integrate or conjugate health telematics facilities with telecentres, libraries or other existing local organizational structures so that the information is appropriately made available to community groups. However, the translation and interpretation of information by unskilled agents should be avoided insofar as much as possible to avoid mistakes. This remains very much an open question in telehealth.

### 2.2.2.3 Sustainability

For health telematics to be effective it must be adequately supported. Sustainable support systems will typically require the involvement of a range of stakeholders, including National Health departments, semi autonomous groups and NGOs.

The challenge of sustainability is shown in the report of the Healthlink project in South Africa, which encountered problems in sustaining services through their own resources, once established. They have striven to get provincial health IT departments to take over the local administration, but, although overall progress has been good, very few provinces have been able to assume full responsibility for network services and e-mail provision. In most provinces there remain one or two people working with HealthLink to support the service.<sup>65</sup>

While often being a cost that the national health system may find difficult to afford, health telematics can actually take a heavy load off health services and increase their scale of action by decentralizing support and responsibility. However, it should be recognized that the business case for health telematics may be difficult to justify, at least in the short term, and some humanitarian support may have to be pursued on a medium or long term basis to ensure that needed services are provided to local groups, and that the most remote areas are reached.<sup>66</sup>

## 2.3 Information services, libraries and archives

Information has been described as the missing link between prosperity and poverty and between ignorance and enlightenment, in a world where knowledge and the lack of it can make a tremendous difference.<sup>67</sup> Scientific and technological information is in particular one of the main prerequisites for economic and social development. Libraries and archives, traditionally viewed as repositories of books and documents, are more and more seen as critical intermediaries in inventorying, managing and ensuring effective access to the vast stores of information needed for daily life and development which are becoming available on the information highways.

On-line library and archives systems, which have been developing over three decades, 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 microcomputer revolution and the Internet have led to the implementation of the "electronic library in a box", by which end users can set up their own libraries and make them available for others, but this tendency does not mean that the traditional library and archives

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<sup>64</sup> <http://erc.msh.org/frac/>

<sup>65</sup> Health Systems Trust, op. cit.

<sup>66</sup> Gurstein and Dienes, op. cit.

<sup>67</sup> Harun-ur-Rashid. *A case study on the Community Development Library of Bangladesh*, PAN Commonwealth Forum on Open Learning, Brunei-Darussalam, 1-5 March 1999 (<http://www.col.org/forum/forum.htm>).

institutions are less critical or effective; on the contrary, these institutions provide a vital link to the world's stores of information which are more and more becoming virtual and digital libraries.<sup>68</sup> Thousands of national libraries, public libraries, university libraries and specialized libraries are now on line, mainly in industrialized countries<sup>69</sup> and more and more are offering full text and multimedia documents on the Web.<sup>70</sup>

The movement toward digital libraries has been catalyzed by international co-operative projects such as the G7 (now the G8) Biblioteca Universalis pilot project<sup>71</sup> 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. During the period 1995-98 the national libraries of the G7 countries were joined by those of six other European countries to inventory major digitization programmes, develop a prototype system to access a wide range of digitized resources (integrating text, graphics, still images, sound and video information), and propose a common network architecture based on distributed digital servers and a common interface for retrieval and navigation. Co-operation is continuing through an agreement open to other institutions for the period 1999-2001.

The Internet has also greatly facilitated collaboration on technical processes such as co-operative cataloguing by which a document is processed only once and the bibliographic information is shared with other institutions on the network. With such support, small libraries without professional librarians can use the Internet to do their cataloguing. The start of co-operative cataloguing is attributed to the Online Computer Library Center (OCLC), launched in 1971 by several universities and colleges in Ohio (USA) and now serving more than 30,000 libraries of all types in the USA and 65 other countries and territories through the WorldCat on-line union catalogue, the world's largest and most comprehensive bibliographic database.<sup>72</sup>

Archives preserve, and make available to the public, original records of all types, be they text, audio or visual. The mission of the International Council on Archives<sup>73</sup> states that: "Archives, by providing evidence of human actions and transactions, underlie the rights of individuals and of states, and are fundamental to democracy and good governance. Archives safeguard the memory of mankind by preserving records of its past. In pursuing the advancement of archives, a protection and enhancement of the memory of the world is maintained."

Though digital archiving is an option, it brings up the questions of adequacy of resolution, legal status of records, and permanence. The Internet is now proving to be a useful and safe tool for some types of archiving, and especially a medium for providing worldwide access to archives. An example of such use is the ArchiviaNet website of the Canadian National Archives, which contains over 3.5 million records in various databases.<sup>74</sup> 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.

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<sup>68</sup> The term "virtual library" is widely and often ambiguously applied to describe an organized gateway to many types of electronic information services including, library catalogues, bibliographic databases, links to institutions and descriptions of events. The term "digital library" is generally used to mean a library or archives institution which is offering a wide range of electronic services including on-line access digitized primary documents.

<sup>69</sup> <http://www.libraryspot.com/librariesonline.htm>

<sup>70</sup> The Brazilian Virtual Libraries Working Group provides links to 56 major virtual and digital library projects (all in industrialized countries) at <http://www.cg.org.br/gt/gtbv/mundo.htm>

<sup>71</sup> <http://portico.bl.uk/gabriel/bibliotheca-universalis/bibuniv.htm>

<sup>72</sup> <http://www.oclc.org/oclc/menu/home1.htm>

<sup>73</sup> <http://data1.archives.ca/ica/>

<sup>74</sup> <http://www.archives.ca/>

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. An example is the website of the Institut national de l'Audiovisuel in France<sup>75</sup>, responsible for the archiving of the national radio and television production, which provides an increasing number of holdings on line.

### 2.3.1 Applications of the Internet in developing countries

In industrialized countries there is an abundance of libraries of all sorts (national, public, school, university, research, professional) as well as of archives, and funding for these institutions is relatively plentiful. Libraries in most developing countries are, however, facing many obstacles.<sup>76</sup> Economic constraints include a lack of funds to buy books and journals coupled with the generally rising cost of publications. There is usually also a scarcity of trained staff. Another fundamental problem affecting developing country libraries and information centres is their isolation from other libraries in the developing and industrialized worlds. Finally political impediments are also prevalent, with many governments inadequately sensitized to the need to improve library systems and services.

This situation contributes to keeping the demand for information in developing countries relatively small and thus accentuates the problem of low levels of production of information, which in turn increases the expense and reduces the relevance of local library holdings. This tendency is seen from the fact that in 1996 the number of books published in the United Kingdom was 1,845 per million inhabitants as compared to 1.1 in Burkina Faso and 0.7 in Ecuador.<sup>77</sup>

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:

#### 2.3.1.1 Public libraries

The public library, as stressed by the UNESCO Public Library Manifesto<sup>78</sup> serves as the local gateway to knowledge, providing a basic condition for lifelong learning, independent decision-making and cultural development of the individual and of social groups, on the basis of equality of access for all. Many public libraries are now present on the Internet, although very few of these are in developing countries.<sup>79</sup> The University of Michigan (USA) has developed the Internet Public Library,<sup>80</sup> as a reference point for users and developers alike, providing free services to the Internet community and support to librarians wishing to make better use of the Internet. The site has a mirror server in Europe and South America to facilitate access in those regions.

In many developing countries the concept of public libraries has never been very popular and access to libraries has been very limited for much of the public, especially rural populations. And where public libraries do exist, they are often based on the European model of leisure reading rather than targeting development needs such as education and literacy, agriculture, health, and local entrepreneurship. The new concept of a library "without walls" which can be accessed anywhere provides tremendous scope for development, and this concept 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

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<sup>75</sup> <http://www.ina.fr>

<sup>76</sup> Cleveland, Gary. *Packet Radio: Applications for Libraries in Developing Countries*, Chapter 2, "Problems in Developing Country Libraries", IFLA, 1993 (<http://www.ifla.org/VI/5/reports/rep5/52.htm#chap2>).

<sup>77</sup> UNESCO. *UNESCO Statistics 1998*, Paris: UNESCO, 1998.

<sup>78</sup> <http://www.unesco.org/webworld/libmanif/libraman.htm>

<sup>79</sup> A database of more than 600 public library websites (including only four in developing countries at the time of writing) is available at <http://sjcpl.lib.in.us/Databases/PubLibServFind.html>

<sup>80</sup> <http://www.ipl.org/>

oriented documentation in paper, audio-visual and electronic form, to serve the needs of local communities.

An interesting model for public libraries in developing countries may be the Bulawayo Public Library (BPL) which was the first African public library to venture into offering a public Internet and e-mail service starting in October 1997. Although BPL offers the service at a low charge of ZW\$ 2 per minute, and regards the Internet as an extension of its Reference Department, income from the service has been very substantial, and, at currently more than ZW\$ 2,000 per month, is the third highest single source of income for the Library. Queues of potential users are usually found waiting to access the computers, and demand is so high that the Library is currently trying to acquire additional computers to extend the service. The Bulawayo Public Library web page,<sup>81</sup> produced entirely within the library although hosted outside, provides a full introduction to the library's services, plus monthly updates of new books and cassettes added to stock. BPL has already started to convert some of the Library catalogues onto databases before beginning the conversion of the membership records. The Internet service has attracted many new users into the Library and substantially improved the community's access to information; admittedly about half of the Internet users are foreign visitors wanting to send or receive e-mail but the other half are local residents, a sizeable number of whom now have a working knowledge of the Internet and e-mail facilities.

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.<sup>82</sup>

A very different model of a virtual community library is the Belize Electronic Resource and Development Library,<sup>83</sup> established on the Internet by a group of Belizeans who formed an NGO to run it on a voluntary basis,<sup>84</sup> which aims to enable people to help themselves by providing free access to information and resources, and to encourage democratic debate to fuel change and economic development.

### 2.3.1.2 National libraries and networks

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.

In Brazil, the Prossiga website of the National Research Council (CNPq) provides an extensive virtual library for researchers including a large number of full-text articles,<sup>85</sup> while the Brazilian Virtual Libraries Working Group site<sup>86</sup> provides world-wide information on virtual libraries, 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 Brazilian institutions in 22 states offering scientific and technological information.<sup>87</sup>

As one of several regional projects initiated by the UNESCO-sponsored Regional Programme to Strengthen Co-operation between the Networks and the Latin American and Caribbean National

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<sup>81</sup> <http://www.angelfire.com/ky/bpl>

<sup>82</sup> <http://www.nic.ug/nakaseke/>

<sup>83</sup> <http://www.ambergiscaye.com/BzLibrary/index.html>

<sup>84</sup> <http://members.tripod.com/~speculation/digitallibrary.html>

<sup>85</sup> <http://www.prossiga.cnpq.br/>

<sup>86</sup> [http://www.cg.org.br/gt/gtbv/gtbv\\_ingles.htm](http://www.cg.org.br/gt/gtbv/gtbv_ingles.htm) (English version)

<sup>87</sup> <http://redeantares.ibict.br/>

Information Systems (INFOLAC), it is proposed to extend the Antares methodology to ensure access information on the Web pages of libraries in the Latin American and Caribbean region, using search interfaces in English, Portuguese and Spanish, and instruments for automatic registering and cataloguing of the information resources.<sup>88</sup> In addition to promoting the products and services of Latin American and Caribbean libraries, the project aims to augment the presence of the Latin American and Caribbean culture on the Internet.

The National Library of Venezuela presents on the World Wide Web a representative sample of images 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.<sup>89</sup> 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.<sup>90</sup>

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.<sup>91</sup> The project aims to improve information resources on the Internet in all fields of knowledge, but two main areas of coverage are proposed:

- 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.
- Contemporary issues of major interest to the countries of the region, such as environment, hydrological and mineral resources, population and health.

Ultimately it is expected that interfaces of the participating institutions will accommodate the various languages and alphabets used in the region. Among the libraries in the region, which have been supported in developing their presence on the Internet, are the Tunisian National Library (Tunisian heritage database and the national bibliography in both Roman and Arabic script, as well as images of some rare Koranic manuscripts) and the National Documentation Centre of Morocco<sup>92</sup> (databases on periodicals, environment, women and education).

The National Centre for Scientific and Technological Information and Documentation (NACESTID) in Vietnam<sup>93</sup> 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. Planning is underway to re-package the information made available via the Internet and intranet to make it suitable to serve further needs of the rural population. 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,<sup>94</sup> the Department of Science and Technology in the Philippines<sup>95</sup> and the government of Mongolia.<sup>96</sup>

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<sup>88</sup> <http://infolac.ucol.mx/cartera/antares2.html>

<sup>89</sup> [http://www.unesco.org/webworld/mdm/mow\\_projects.html](http://www.unesco.org/webworld/mdm/mow_projects.html)

<sup>90</sup> [http://infolac.ucol.mx/cartera/en\\_9.html](http://infolac.ucol.mx/cartera/en_9.html)

<sup>91</sup> <http://www.unesco.org/webworld/mediter/medlib.htm>

<sup>92</sup> <http://www.mpep.gov.ma/logon.htm>

<sup>93</sup> <http://www.oneworld.org/inasp/newslet/may97.html#3>

<sup>94</sup> <http://www.slt.lk/nlib/>

<sup>95</sup> <http://www.stii.dost.gov.ph/>

<sup>96</sup> <http://www.pmis.gov.mn/>

### 2.3.1.3 On-line publications

An ever greater number of scientific and technical journals are published electronically,<sup>97</sup> 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 to these resources, by incorporating them into their collections, or by hybrid solutions. This mode of dissemination extends the role of the library so that it overlaps with that of the publisher, and thus implies new technical solutions as well as the resolution of intellectual property issues for each resource as shown by the following examples.

Bioline Publications is an electronic publishing service founded in 1993, operated on a not-for-profit basis by bioscientists who believe that scientific information can be distributed more widely and more cheaply on the Internet than by traditional print-based methods.<sup>98</sup> Its initial content consisted of on-line versions of mainstream, printed bioscience journals from the industrialized world, but its scope has increasingly expanded to include the distribution of peer-reviewed but less well-known journals from developing countries. Bioline exploits the potential of the Internet to add value to documents by linking terms within papers to related public domain databases so that the documents become interactive gateways to a vast volume of associated scientific data. In the on-line only journals redistributed by Bioline, authors can include colour photographs and video clips, offering interaction and removing still more of the restrictions of publication in print. Searching and viewing the tables of contents and abstracts is free of charge, as is access to full text of a few journals and reports, but most of the primary information is provided on a charged basis. An organization in Brazil, Base de Dados Tropical (BDT), is responsible for the technical implementation of the system while the editorial and management part of the team is in United Kingdom.

The International Network for the Availability of Scientific Publications (INASP),<sup>99</sup> established by the International Council for Science (ICSU) and UNESCO in 1992, is a co-operative endeavour whose aim is to improve world-wide access to information, especially in countries with less developed systems of publication and dissemination. The African Journals Online (AJOL) project of INASP has succeeded in placing African journals on the Internet, thereby providing alternative means for their publication and marketing. The pilot project covering several science and technology and medical journals was started with initial funding from UNESCO and the National Academy of Sciences (USA). The tables of contents of the journals are digitized and offered at the INASP website, while users are referred to Bioline for full text of the bioscience journals. Users can procure photocopies of the articles at both sites. All income received from this project is returned to the African publishers.

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 depends strongly on the configuration of the local network and the format in which the articles are presented.

### 2.3.1.4 Archives

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

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<sup>97</sup> <http://www.unesco.org/webworld/guidelines/guidelines/pub-links.htm>

<sup>98</sup> <http://bioline.bdt.org.br/>

<sup>99</sup> <http://carryon.oneworld.org/inasp/info/inasp.html>

in digital form. In Africa, for example, the National Archives of Benin<sup>100</sup> and the National Archives of Namibia<sup>101</sup> 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.<sup>102</sup> As an example in the area of audio-visual archives, the website of South East Asia-Pacific Audio-visual Archival Association (SEAPAVAA)<sup>103</sup> links to collections in Indonesia and Thailand pertaining to these countries' cultures.

### 2.3.1.5 World wide projects and programmes

The goal of libraries and archives to preserve and ensure access for all to the world's documentary heritage is being advanced through the gradual development of a seamless world wide electronic network based on the Internet.

International non-governmental organizations in the information field are taking a leading role in promoting the development of information services in developing countries through the Internet, e.g. the International Federation of Library Associations (IFLA),<sup>104</sup> the International Federation for Information and Documentation,<sup>105</sup> the International Council on Archives,<sup>106</sup> the International Association for Sound and Visual Archives<sup>107</sup>, the International Federation of Film Archives<sup>108</sup> and the International Federation of Television Archives.<sup>109</sup> UNESCO is facilitating the involvement of information professionals in developing countries through Web portals enabling the international library<sup>110</sup> and archives<sup>111</sup> communities to maintain and access links to international initiatives, institutional resources, training opportunities and upcoming events.

At the operational level, many international organizations and initiatives are contributing to the development of virtual libraries and portal websites<sup>112</sup> providing primary information and referral links in their areas of competence. Some of the earliest and most extensive of these portals have been established in the area of environment and sustainable development (see the section on databases and information dissemination under "environment and disaster management"). Among the many other interlinked virtual libraries forming this emerging public service network are LINKS, a website of the Polytechnic of Turin linking to resources of interest to developing countries with special coverage of problems of habitat<sup>113</sup>,

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<sup>100</sup> <http://www.unesco.org/webworld/archives/benin/anb.htm>

<sup>101</sup> <http://witbooi.natarch.mec.gov.na/> [to be checked]

<sup>102</sup> [http://www.unesco.org/webworld/public\\_domain/archives\\_newtech\\_africa.html](http://www.unesco.org/webworld/public_domain/archives_newtech_africa.html)

<sup>103</sup> <http://www.geocities.com/Hollywood/Academy/9772/>

<sup>104</sup> <http://www.ifla.org/>

<sup>105</sup> <http://http://www.fid.nl>

<sup>106</sup> <http://data1.archives.ca/ica/index.html>

<sup>107</sup> <http://www.llgc.org.uk/iasa/>

<sup>108</sup> <http://www.cinema.ucla.edu/FIAF/english/default.html>

<sup>109</sup> <http://www.nbr.no/fiat/fiat.html>

<sup>110</sup> [http://www.unesco.org/webworld/portal\\_bib/](http://www.unesco.org/webworld/portal_bib/)

<sup>111</sup> [http://www.unesco.org/webworld/portal\\_archives/](http://www.unesco.org/webworld/portal_archives/)

<sup>112</sup> The term "portal" has a diversity of meanings but all apply to a website which provides sufficiently extensive content and/or value-added user services to make it an essential access point for information for a given category or user or in a specific domain.

<sup>113</sup> [http://obelix.polito.it/forum/links/dev\\_virtual\\_libraries.htm](http://obelix.polito.it/forum/links/dev_virtual_libraries.htm)



and that of OneWorld Online,<sup>114</sup> the Internet arm of the UK based OneWorld Broadcasting Trust, providing extensive news and analysis on problems of development, democracy and human rights based on the websites of nearly 900 partner organizations.

Another very ambitious project is the World Bank's Global Development Gateway (GDG), a wide-ranging Web portal. It is more than a public domain information centre. The Global Development Gateway strongly promotes active participation in contribution to available resources, encourage partnerships and network and develop modules in regards to sustainable development. The World Bank's Global Development Gateway<sup>115</sup> "is intended to serve the needs of a broad array of stakeholders, including developing countries, the official donor community, civil society, the private sector, and other key partners." The Global Development Gateway is a web portal similar to UNDP's Knowledge Broker site, which aims to use the Internet to centralize information, resources, and models in addressing the issues of sustainable development to be available to all sectors of 'civil society'. The World Bank's Global Development Gateway compliments the Bank's current Information Technologies initiatives in addressing the digital divide question while UNDP's Knowledge Broker web site is its initiative to narrow the digital divide. Further, UNDP uses the Knowledge Broker site to promote sustainable human development by taking advantages of the provisions of Information Technologies. Further, the Global Development Gateway heavily relies on partnerships with NGOs, public agencies and the private sector. The Global Development Gateway has been established as a not for profit foundation with its board members representative of its partners. It also follows a flatter organization model to be able to operate in the local level with advantages of global resources.

A key component of the global electronic library is 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 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.<sup>116</sup> Organizations, universities and governments are invited to copy or adapt these to their culture and to their local languages so that they can provide low-cost basic information locally, while mirror sites are planned in developing countries to facilitate access.

Another project with impact on the electronic public domain is the Memory of the World (MOW) Programme launched by UNESCO to promote the preservation and wide dissemination of the valuable 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 which have been identified by an International Advisory Committee and endorsed by UNESCO as meeting the selection criteria for world significance. Many of these collections have been made available in multimedia products and websites. In addition, examples of the holdings of each, along with more extensive examples from nine representative collections digitized within UNESCO MOW pilot projects, are presented on the Memory of the World website.<sup>117</sup>

The UNESCO Network of Associated Libraries (UNAL) links more than 350 libraries from 85 different countries to promote cultural enrichment, improve access to information, support socio-economic

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<sup>114</sup> <http://www.oneworld.org/>

<sup>115</sup> <http://www.worldbank.org/gateway/>

<sup>116</sup> <http://www.oneworld.org/globalprojects/humcdrom>

<sup>117</sup> <http://www.unesco.org/webworld/mdm/index.html>

development and sensitize local communities to global issues.<sup>118</sup> The mission of UNAL includes use of the Internet to advance these goals, and its members, such as the Bulawayo Public Library and the Belize Electronic Resource and Development Library presented above, are innovating and sharing experience in this domain.

UNESCO has developed and makes freely available the CDS-ISIS software package for use by libraries and information centres to create bibliographic and other textual databases. The package includes an interface to make the databases available on the Web.<sup>119</sup>

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

The introduction of telematics based services by libraries and archives in developing countries has expanded immensely with the Internet. However, these advances have for the most part been concentrated in university, national and some specialized libraries, with archives and school and public libraries being largely excluded.

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.

ICTs offer a genuine opportunity to place libraries at the service of community development. Libraries are ideally suited to serve as public gateways to information highways, providing as they do both access and guidance and training to users. With many successful pilot projects being implemented on all continents, developers should concentrate extending access to all communities even at the village level, providing information in vernacular languages and for illiterates, and helping the public to overcome a learning threshold in accessing information. One interesting option in reinforcing this role of libraries is through their participation in the development of multipurpose community telecentres, which will be discussed in detail under “governance” and in the next chapter on “local content and empowerment”.

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

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.

Success in meeting these challenges will depend to a large degree on ability to train and to 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 as discussed above.

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<sup>118</sup> <http://www.unesco.org/webworld/unal/>

<sup>119</sup> <http://www.unesco.org/webworld/isis/index.html> (including links to 27 CDS-ISIS databases of which 14 are in developing country institutions).

Over all, it is of course important for governments of developing countries to adopt policies which accord a high priority to improving and extending access to library and archives services and which recognize the key role of the Internet in providing information for development.

## 2.4 Governance

A key enabling element in the development of an information-society and in the related process of democratization is the application of information and communication technologies to governance. Around the world governments are seeking to improve their efficiency and impact in response to the rising expectations of citizens, financial pressures on the private sector and increased demands for transparency and openness of government. The information technology revolution is providing major opportunities to enable governments to respond to these challenges by developing the relationship between citizen and government as well as within government itself.

Definitions of on-line governance are varied and broad. The G7 Government on-line project refers to it in terms of any government application concerned with putting information and services on-line rather than on paper<sup>120</sup>. In the global survey on on-line governance undertaken by UNESCO and the COMNET-IT Foundation, it is defined as a resource providing citizens with access to computer-mediated information, service delivery or dialogue in liaison with government at any level<sup>121</sup>. This definition implies that a continuous telecommunication link is not necessary, so that a regularly updated stand-alone kiosk could, for example, fulfil an on-line governance function.

### 2.4.1 Applications of the Internet in developing countries

The establishment of more governance on line can 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<sup>122</sup>. This could be especially important in developing countries where poor networks and infrastructures exacerbate the difficulties of communication between citizens 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 on-line 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.

To clarify the achievements, needs and priorities of the world community in the area of on-line governance, with special consideration for those of the developing countries whose situation has not been extensively documented, UNESCO and the COMNET-IT Foundation undertook a global survey in this area in 1999. Questionnaires, sent to national governments to assess the availability of on-line government applications as well as the legal, political and technical environment impacting on their development, were received from 39 developing and 23 industrialized countries. The raw results are presented in an on-line database and an analytical survey report.<sup>123</sup>

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<sup>120</sup> G7 Govt On-line Project, Project Definition Statement ([http://www.open.gov.uk/govoline/10120\\_2.htm](http://www.open.gov.uk/govoline/10120_2.htm)).

<sup>121</sup> Commonwealth Network of Information Technology for Development Foundation (COMNET-IT). *Global Survey of On-line Governance – Final Report*. Paris: UNESCO, December 2000 (CII-2000/WS/09, <http://www.comnet.mt/unesco/>).

<sup>122</sup> G7 Govt On-line Project, Executive Summary (<http://www.open.gov.uk/govoline/execsum.htm>).

<sup>123</sup> Commonwealth Network of Information Technology for Development Foundation (COMNET-IT), op. cit.

The results showed that while many developing countries are substantially behind the industrialized countries in implementing policies and enabling legislation for on-line governance, a large number are according priority to this area. For example, most of the responding developing countries had government websites (ranging from about 70% in Africa to 100% in the Arab States and Latin America and the Caribbean) and most (72% of the developing countries relative to 61% of the industrialized countries) provided all on-line government information free of charge.

Within the broad title of on-line governance, we can distinguish three principal processes in relation to citizens:

- Access to government information (e.g. laws and regulations, inventories of government agencies and officials)
- Access to government services (e.g. license and benefit applications)
- Enhanced participation (e.g. forums, opinion polls).

The applications of the Internet in these areas will be treated below, along with the question of its use in internal governmental management and community empowerment.

#### 2.4.1.1 Access to government information

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.<sup>124</sup> These applications have been developed extensively in industrialized countries, but many developing countries are taking this lead and developing their own government websites.

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. Among ministries and national research centres, however, very few have a website. These limitations are reflected in an ECA survey finding that government employees made up only one per cent of users in Ethiopia<sup>125</sup> and only six per cent in Zambia<sup>126</sup>. As far as regional intergovernmental agencies are concerned, so far ECA, SADC (Botswana) and COMESA (Zambia) have built websites with fairly extensive information on their activities and member states.<sup>127</sup>

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.<sup>128</sup> The Brazilian government website has similar information, but also including government news (text, radio and TV) and extensive links to national sites providing information on tourism, business, culture, etc.<sup>129</sup>

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<sup>124</sup> IBM, Public Affairs, "Rethinking Government", <<http://www.ibm.com/ibm/publicaffairs/rethinking/tech1.html>>

<sup>125</sup> Rorissa, Abebe. "Connectivity in Africa: Use, Benefits and Constraints of Electronic Communications – Ethiopia". ECA, March 1998 (<http://www.bellanet.org/partners/aisi/proj/connect.htm>).

<sup>126</sup> Chifwepa, Vitalicy. "Connectivity in Africa: Use, Benefits and Constraints of Electronic Communication – Zambia Phase 2". ECA, March 1998 (<http://www.bellanet.org/partners/aisi/proj/zamfin.htm>).

<sup>127</sup> Jensen, Mike, personal communication.

<sup>128</sup> <http://www.gov.za>

<sup>129</sup> <http://www.brasil.gov.br/>

### 2.4.1.2 Provision of on-line services

Interactive service applications can save citizens' time and government expense by enabling people to rapidly and efficiently provide information needed by government and to receive information selectively required, through more responsive, "customer oriented" services generally more typical of the private sector. Because most politically passive people, especially those most disadvantaged, have their main interaction with government as consumers of public services, it can be said that they are at a "critical service encounter" at the moment of contact with government. This means that at this moment the efficiency and effectiveness of the interaction is of paramount importance. If the contact is successful, in terms of clear communication, effective delivery and a coherent system, then it is more likely to engender trust and demonstrate that public services fundamentally affect their lives. This affects notions of citizenship, showing that governance consists of more than merely a periodic vote. To this effect, the service delivery route is crucial in developing the relationship between the excluded and marginalized, and government.

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.<sup>130</sup>

### 2.4.1.3 On-line participation

During a 1996 European Information Society Forum meeting it was observed that "the information society is bringing about an enrichment of democratic life by giving citizens a new support for free expression and the discussion of ideas. These new public spaces have no spatial limits (the "global village") as do traditional forums such as public halls, churches or the market place."<sup>131</sup> 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. The specificity of the Internet is its interactivity, which can serve to play a facilitating role between government and citizen. The sentiment of citizens towards government and public policy is often one of distance and disillusion, especially in an age where expectations are higher in terms of openness, transparency and efficiency. 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.

Information technologies are potentially particularly useful to local and community governments, which are widely receiving increasing authority and responsibility in developing countries, without necessarily having commensurate physical infrastructure and financial means. 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 invite and poll opinion. Much could be done in these directions with a single point of access in a community centre.

At a broader level, 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

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<sup>130</sup> Hodge, J. and J. Miller, "Information Technology in South Africa". In: Cooper, C. (ed.). *Information Technology Policy and National Economic Development*, London: Routledge and Tokyo: UNU Press, 1998 (cited in R. Mansell and U. Wehn (ed.). *Knowledge Societies – Information Technology for Sustainable Development*, Oxford University Press, 1998 – p. 77).

<sup>131</sup> European Commission. "Information Society Forum Theme Paper". Brussels: CEC, June 1996.

emerge or that the relation between government and citizen will be effected. The ability of government to empower people depends, rather, on its will and vision.<sup>132</sup> 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.

While there is an enormous amount of discussion in the industrialized countries about how ICTs will impact on democratic processes, there is relatively little practical activity or even research underway on their potential impact on these processes in developing countries. Obvious problems relate to physical and cultural access: the strong bias towards urban areas in access to telecommunications infrastructure and information technology resources, and the high levels of illiteracy in underdeveloped areas requiring specially adapted interfaces for participatory applications. The magnitude of these problems can be seen in the example of South Africa where 97% of Internet users still come from the affluent part of its society while the vast majority of the country has no telephone access<sup>133</sup>.

An exception is Latin America where there have been numerous initiatives to use the Internet to promote a more dynamic citizenship. Because the Internet infrastructure is more advanced there than in most developing regions, such initiatives can gain acceptance more easily. For example the extensive websites of the city of Vitória<sup>134</sup> and of Bahia State<sup>135</sup> in Brazil provide, respectively, for citizen forums and for citizen enquiries.

An interesting application in Senegal, with characteristics of both on-line service and support for democratization, is the website set up during the recent presidential elections to enable the 2.4 million voters in the country and the 170,000 resident abroad to check on their eligibility on the voting list.<sup>136</sup> Although this application fell short of on-line voting, it rendered the election process more transparent and is thought to have improved voter participation, particularly for Senegalese living abroad.

#### 2.4.1.4 Government management

ICTs also offer a potentially valuable resource for the management of government, through the development of more efficient and ultimately cost cutting processes. Governments can particularly improve efficiency through better access for their officials to internal and external information. Telematics technologies can be employed within governments, particularly as intranets to assist in access to regulations, procedures, policies, correspondence and documentation, to ensure seamless links to external databases and contacts through the international Internet, and to provide decision support tools which make use of all available information.

In many countries, however, there is an increasing recognition that the traditional vertical structures in government with few cross-links are inadequate in dealing with increasing demands on public services, and that a co-ordinated approach to the application of ICTs in governance is needed so as to ensure they are used to improve organizational efficiency rather than consolidating incompatible practices. For example, China has been moving fast toward establishing the so called “electronic government”, which means that all Ministries and key institutions must be connected to Internet and provide Internet based information services about their functions and activities. This increase the transparency of governance is a major undertaking of China’s new administration installed in 1998.

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<sup>132</sup> R. Mansell and U. Wehn (ed.), *Knowledge Societies – Information Technology for Sustainable Development*, Oxford University Press, 1998 (pp. 77-78).

<sup>133</sup> *ibid*

<sup>134</sup> <http://www.vitoria.es.gov.br/institucional.htm>

<sup>135</sup> <http://www.sac.ba.gov.br/>

<sup>136</sup> <http://www.mint.sn>

But governments thus face complex challenges in modernizing administrative practices with support of ICTs and in the implementation of appropriate management policies. An analysis of this process in South Africa<sup>137</sup> stresses how attempts to improve the situation have been largely futile as the government IT Executive Steering Committee, which should have been populated by the most senior business managers of state, rapidly succumbed to being attended by lower ranking IT managers, meaning that decisions were not taken by those best able to take them. In the meantime, systems remained inadequate and IT staff were migrating out of government in search of better opportunities, so the capacity within government to make effective IT management policy became even weaker. One response to such a situation could be outsourcing, whereby outside aid is employed to take responsibility for such policy. The authors suggest that this would result in IT policy's being a more effective tool in the running of government beyond being undertaken because it is "fashionable" or "modern" to do so.

An example of private sector co-operation in government management has been initiated, also in South Africa, with the announcement by IBM<sup>138</sup> of the formation of the Institute for Electronic Government in Pretoria to help the country's government leaders, academic institutions, thought leaders, think-tanks and private business sector overcome the complexities of policy and technology challenges associated with governing in the information age. This facility, claimed to be the only one of its kind outside of the United States, will host and facilitate strategy sessions, seminars, workshops and pilot projects aimed at examining and solving specific public policy issues and assessing how ICTs can streamline communication and the delivery of services by government to its citizens. Incorporating high-speed communications links, including a satellite feed, the centre is fully integrated in IBM's global computer communication network to provide on-line access to the main Institute in Washington as well as other world-wide resources in the public services field.

#### 2.4.1.5 Community access

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. It is thus important to envisage how on-line government can reach the citizens, using custom interfaces accessible to ordinary citizens. Deployment of Internet-access kiosk systems in a variety of public locations is one approach to address this issue, but cost, security and maintenance, and user support and privacy considerations may render this option difficult.

Another approach to providing appropriate wide access to on-line governance facilities is the multipurpose community telecentre (MCT) concept which the ITU has been promoting for several years<sup>139</sup> 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 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 northern Europe, Australia and Canada starting in 1985, many developing countries have been testing approaches to MCTs in the past few years. In Africa, for example, five least developed African countries (Benin, Mali, Mozambique, Tanzania, Uganda) have established

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<sup>137</sup> Kahn, M. and R. Swanborough, Information Systems for Public Sector Management Working Paper Series, Working Paper No. 8, "Information Management, IT and Govt Transformation: Innovative Approaches in the New South Africa", Information Systems for Public Sector Management Working Paper Series, Working Paper No. 8, Institute for Development Policy and Management, University of Manchester, 1999 (<http://www.man.ac.uk/idpm/ispswpf8.htm>).

<sup>138</sup> "IBM launches Institute for Electronic Government in SA" (<http://www.za.ibm.com/news/022402.htm>).

<sup>139</sup> <http://www.itu.int/ITU-D-UniversalAccess/johan/telecentremain.htm>

pilot MCTs with joint support from the International Development Research Centre (IDRC), the ITU, UNESCO and other international partners,<sup>140</sup> while several additional MCT projects have been sponsored by the IDRC Acacia initiative.<sup>141</sup> In Latin America, the ChasquiNet Foundation<sup>142</sup> inventories and promotes local, national and regional development of telecentres.

MCTs can be developed in rural, urban or peri-urban settings. The examples cited previously in rural Africa, can be complemented the urban examples of the Technology Access Community Centres (TACCs) in Egypt, supported within a UNDP pilot project,<sup>143</sup> which are ultimately expected to develop into hubs for electronic content creation, especially in Arabic, responding to community needs and interests.

An example stressing appropriate technology for community access is the Little Intelligent Communities (LINCOS),<sup>144</sup> sponsored by the Foundation of Sustainable Development (Costa Rica). Two pilot “digital town centres” have been established in cooperating communities in Costa Rica using recycled standard shipping containers equipped with a panoply of communication technologies, computers and other ICTs. The aim is to create a flexible, economically-sustainable connectivity solution that provides health care, learning technology, government services, banking, soil and environmental testing, as well as culture and entertainment in one package. The LINCOS initiative has uniquely benefited from the full resource support of advanced academic institutions including the Massachusetts Institute of Technology MediaLab’s Digital Nations<sup>145</sup> research consortium, which has increased its potential to impact on development.

In a complementary approach to community access, the Trade Point Senegal (TPS) foundation, regulated as a private company, was established with IDRC support<sup>146</sup> within the Global Trade Point Network of UNCTAD to facilitate partnership of state bodies and private enterprise. TPS is creating ICT mediated links between enterprises and government departments and information to 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, fishermen, 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.

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

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.

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

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<sup>140</sup> Rose, John (UNESCO). “Multipurpose Community Telecentres as a support for Population and Development Policies”. Presented at: ICPD Advocacy in the Global Information and Knowledge Management Age: Creating a New Culture, UNFPA, Ankara, 1-4 December 1998 (summary at <http://www.unfpa.org/modules/ict/fr2finR.htm>).

<sup>141</sup> <http://www.idrc.ca/acacia/telecentre.html>

<sup>142</sup> <http://www.chasquinet.org>

<sup>143</sup> <http://www.tacc.egnet.net>

<sup>144</sup> <http://www.lincos.net/>

<sup>145</sup> <http://gonzo.media.mit.edu/public/web/consortium.php?id=43>

<sup>146</sup> Whyte, Anne. “Telecentre Research Framework for Acacia”, IDRC Study/Acacia Initiative, June 1998 ([http://www.idrc.ca/acacia/04066/whyte\\_2.html](http://www.idrc.ca/acacia/04066/whyte_2.html)).



the creation of a network infrastructure in which connectivity, interoperability and security are assured.<sup>147</sup> 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.

Studies by the OECD have shown that the constraints in developing interactive governance applications are considerable even in the industrialized countries,<sup>148</sup> 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.<sup>149</sup> 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.

The concept of on-line government also holds many possibilities for regional and international co-operation to facilitate exchange of experience and information among governments. However, excepting the websites of regional and international organizations which often contain information on or of interest to governments, and possible diplomatic applications outside of public view, international Internet usage involving governments of developing countries has apparently not yet been extensively implemented. An example of such a potentially useful application would be the establishment of Internet links between Parliaments and their world organization, the Inter-Parliamentary Union, making it possible for databases on legislative debates and decisions to be available internationally at very low costs to the poorest Parliaments.

## 2.5 Agriculture and rural development

The lack of access to information on essential issues such as technology, prices, markets, relevant experiences, financial systems, marketing, and government services and policies is one of the characteristics of poor rural areas. The Internet is now widely seen as a factor accelerating rural development and generally improving the lives of rural and remote dwellers. In the words of one study, the Internet can be used in this context to:

*“Reduce the isolation and marginalization of rural communities; facilitate dialogue among communities and those who influence them, such as government planners, development agencies, researchers, technical experts, educators and others; encourage participation of communities in decisions which impact their lives; co-ordinate local, regional, and national development efforts for increased efficiency and effectiveness; provide information, knowledge and skills training in a responsive, flexible manner; and help overcome physical and financial barriers that prevent agricultural researchers, technicians, farmers and others from sharing information and competence.”<sup>150</sup>*

But although the Internet is expanding rapidly in the developing countries, this progress has mostly taken place in urban areas. Internet access is still generally extremely limited in the rural areas in which three quarters of the population of many of the poorest developing countries live. Introducing the Internet in rural areas implies thinking in terms of prioritization and appropriateness. The usefulness of the Internet in rural development can be undermined by the cost of the technology needed for its installation and maintenance, particularly in view of the insufficiency and unreliability of telecommunication

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<sup>147</sup> IBM, Public Affairs, “Rethinking Government” (<http://www.ibm.com/ibm/publicaffairs/rethinking/index.html>).

<sup>148</sup> Public Management Committee (PUMA), *Information Technology as an Instrument of Public Management Reform: A Study in Five OECD Countries*. Paris: OECD, 4 December 1998 (PUMA(98)14).

<sup>149</sup> Public Management Committee (PUMA), *Impact of the Emerging Information Society on the Policy Development Process and Democratic Quality*. Paris: OECD, 4 January 1999 (PUMA(98)15).

<sup>150</sup> Balit, Silvia and Wendy Truelove. “New information and communication technologies for rural development and food security”. FAO, April 1999 (<http://www.fao.org/sd/cddirect/cdre0055d.htm>)

infrastructures and electricity supply many of the areas concerned. To overcome these constraints, growing efforts are being made by developing countries to develop telecommunications infrastructures and Internet access, coupled where appropriate with the use of alternative sources of energy like solar power. Strategies towards this end include license obligations to serve rural communities (e.g. Mexico and the Philippines), subsidies by means of rural telecom development funds (e.g. Chile and Peru), variations of “Build, Operate and Transfer” arrangements (e.g. Thailand), and low-interest loans.<sup>151</sup>

But perhaps an even more important constraint to reducing the gap between the information-rich and the information-poor is that the majority of people in poor rural areas of developing countries have never used a phone and there is hardly any “demand” for ICTs.<sup>152</sup> The potential of ICTs and of the Internet is thus generally unknown to the rural populations. This is leading to a great deal of experimentation, implementation and promotion of Internet applications and structures for rural development. Recently, many national authorities and experts, as well as development support organizations such as FAO, IDRC the ITU and UNESCO have been promoting the implementation of the Multipurpose Community Telecentres (MCTs) as one of the most appropriate platforms for providing rural and remote areas with telecommunications services, including the Internet. One of the advantages of this approach is that MCTs can provide not only physical access, but also the necessary user support and training to help rural populations to effectively exploit and also develop useful Internet applications. Since MCTs can serve both rural and urban communities, they are covered in detail in other sections of this study.

### 2.5.1 Applications of the Internet in developing countries

Given that the Internet can only have an impact on rural development by reaching and empowering large numbers of development actors, many examples of Internet applications are information systems dedicated to specific groups at the national level such as farmers or local organizations which are working with the rural people.

In Mexico, the FAO funded a programme in 1994 to improve communication and information management through an Internet information system.<sup>153</sup> The beneficiaries are farmers’ organizations and local farmers. A computer network server was installed in Mexicali University in 1995 and was accessed by dial-up connection by 12 farmers’ organizations by June 1996. One of the initial applications was the use of email to submit daily reports on irrigation quotas and planting activities to the local irrigation authority and access to market and weather information from sites in Mexico and the USA.<sup>154</sup> The methodology was further tested in a similar project in Chile, and is now being generalized in the FAO’s FARM-NETs programme.

A second model being developed by the FAO is the Virtual Extension and Research Communication Network (VERCON)<sup>155</sup> which aims to harness the potential of the Internet to strengthen information linkages between agricultural research and extension. VERCON seeks the best balance between human network and technical facilities, foreseeing use of the Internet, often in combination with CD-ROM, in functions including electronic discussion groups, statistical and technical databases, “ask the expert” services and templates to create new extension documents. A prototype is available on the FAO site to demonstrate the possibilities offered, and a series of pilot projects at the national level are in the planning stage.

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<sup>151</sup> Ernberg, Johan (ITU). “Universal access for Rural Development from Action to Strategies”. Presented at: First International Conference on Rural Telecommunications, Washington, 30 November-2 December 1998 ([http://www.itu.int/ITU-D-UniversalAccess/johan/papers/NTCA\\_johan.htm](http://www.itu.int/ITU-D-UniversalAccess/johan/papers/NTCA_johan.htm)).

<sup>152</sup> Ernberg (1998), op. cit.

<sup>153</sup> <http://cucapah.mx/cetys.mx/indexe.html>

<sup>154</sup> Richardson, Don (University of Guelph, Canada). *The Internet and rural development: Recommendations for strategies and Activity*, Chapter 2 : “Current Context and Applications” Food and Agriculture Organization of the United Nations, August, 1996 (<http://www.fao.org/sd/cddirect/cddo/contents.htm>).

<sup>155</sup> <http://www.fao.org/waicent/vercon/default.htm>

Among other models being tested are an information system for rural development being funded by the World Bank's infoDev programme in Peru<sup>156</sup> and an "Agro Industry Information System" (AIIS) of the Rural Agricultural Development Authority, a national organization in Jamaica, developed with the International Institute for Communication and Development (IICD).<sup>157</sup> The former aims at enhancing local government efficiency and economic productivity by providing information to rural producers and municipalities in two disadvantaged rural provinces, while the latter has been designed as a national web-based database to provide information on markets, production inputs and companies for local producers with the aim of increasing the efficiency of Jamaican agricultural productions and their competitiveness the global context.

Other projects have been emphasizing the empowerment of individual rural communities to take advantage of ICTs. One promising approach is the Multipurpose Community Telecentre (MCT) as a platform for providing rural and remote areas with telecommunications services, including the Internet. An MCT has the advantages of serving a large number of users and uses through economies of scale and of providing the necessary user support and training to help rural populations to effectively exploit and also develop useful Internet applications. Since MCTs can serve both rural and urban communities, they have been covered above in considering community access under "governance" and will be further discussed in the next chapter on "local content and empowerment". Other "lighter" solutions for rural community access are being pursued, such as the network of non-profit "RUNetwork-Cafés" managed by "Rural Information Brokers" in Benin, India, Jamaica and South Africa with German assistance<sup>158</sup> and the M.S. Swaminathan Research Foundation's experiment in Pondicherry, India,<sup>159</sup> in which an Internet hub and database centre in a rural town uses fax and wireless off-line e-mail to provide development information to "Village Information Shops" in six small surrounding villages. In all of these approaches the key test will be whether they can be sustainable and whether they can be rolled out beyond the pilot stage to have a significant impact at the national level.

Another important communication platform for rural development with strong links to the Internet is community radio, which will be discussed later under the "mass media".

At the international level, there are also several salient models for networking for rural development. ENRAP is funded by the International Fund for Agricultural Development (IFAD) and executed by IDRC. The beneficiaries will be 16 of IFAD's rural development projects and "in the long-term the poorest communities in the Asia/Pacific region" in Bangladesh, China, India, Indonesia, Nepal, Pakistan, the Philippines and Sri Lanka. The Internet will be used to "contribute to the empowerment of rural communities and help address their development objectives". ENRAP will provide the 16 selected projects with Internet connectivity, training, and further Web development; encourage exchange of experience; use the Internet to meet field level needs. In other words, ENRAP will work in three directions: connectivity and electronic communication; knowledge networking among IFAD projects; and local applications development.<sup>160</sup>

The Western Mindanao Community Initiatives Project in the Philippines is the first IFAD project to be involved in ENRAP. A workshop was held in May 1999 on "Linking Rural Development with ICTs", including exercise sessions on "Identifying Organizational Needs to Enable Electronic Networking" and "Proposal Development". This latter exercise was intended as the starting point for the development and the implementation of local electronic networking applications. Among the proposals made were: "Price

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<sup>156</sup> "Information Systems for Rural Development (A demonstration project in Cajamarca Department, Peru)" (Summary at: <http://www.worldbank.org/infodev/projects/funded.htm>).

<sup>157</sup> *Jamaica – Agro Industry Information System*, executive summary, February 1999; see projects section at <http://www.iicd.org/projects>

<sup>158</sup> [http://www.runetwork.de/index\\_village.htm](http://www.runetwork.de/index_village.htm)

<sup>159</sup> <http://www.mssrf.org/information%20village/index.html>

<sup>160</sup> <http://www.bellanet.org/enrap/>

Monitoring System for Agricultural Products and Basic Commodities in Region IX”, “Establishment of Regional Development Council (RDC) Information Network”, “Pre-connectivity for Gutalal Indigenous People” and “Agricultural Information Exchange”.<sup>161</sup>

FIDAMERICA<sup>162</sup> is another IFAD initiative that was launched in 1995. FIDAMERICA is promoting information systems for the rural poor, structured upon a “network of projects and institutions dedicated to fighting rural poverty in Latin America and the Caribbean”. The network is attempting to improve information and knowledge systems for 41 programmes and projects in 24 Latin American countries by facilitating the systematic evaluation and exchange of experience and knowledge and linking the projects to the Internet. FIDAMERICA organizes training and advisory activities on the use of the Internet as a support for rural development, and has held 12 electronic conferences and debates on specialized subjects in the period 1996-2001. In late 1997, FIDAMERICA organized the Indigenous and Country Women Leaders Autobiography Web Contest which was considered as a particular success in empowering the country organizations to participate the Internet. The FIDAMERICA website provides plans, reports of activity and information on participants and publications, and is being extended to include a series of best practices and project evaluations, but does not provide extensive links to the substantive information which is developed by the participating projects and programmes. The FIDAMERICA 1995-1998 report<sup>163</sup> stated that system had been appreciated by the principal beneficiaries – the IFAD project staff members, but noted that it had not yet substantially benefited the end-users: agricultural producers, their organizations and their families. The 1999-200 report<sup>164</sup> notes advances in terms of the increasing reliance of project staff on electronic mail and lists the 34 project websites linked to FIDAMERICA.

The Centre on Integrated Rural Development for Asia and the Pacific (CIRDAP)<sup>165</sup> was created in 1997 to develop a project to develop an alternative to the slow existing communication system that has a negative impact on the transmission, utilization and exchange of information between rural development actors. The two actions of the project are to i) connect the rural development ministries and development and research institutions to the Internet and ii) test the use of email and Internet between the Community Development Library Centre based in Dhaka, Bangladesh, and its two divisional centres in the country.

An example of an application acting directly in the economic sphere is PEOPLink, a NGO in the USA which is experimenting with electronic fair trade, aiming at “empowering poor producers to use the Internet to maximize the benefit of world trade”.<sup>166</sup> A craft catalogue is available on line and items can be purchased through an on-line security system by credit card. PEOPLink is based on a world-wide network of trading partners, disseminated in 20 developing countries. They are provided with the necessary technological tools (laptop computers and digital cameras) and training. The trading partners are “organized into community based producer groups (PGs)”, the great majority of whose members are women. Among those trading partners, some are dedicated to promoting grassroots and indigenous artisans. For example, the Noakhali Rural Development organization in Bangladesh works to empower the poorest segments in society, that is to say the rural poor and landless in Southern Bangladesh; the organization comprises some 100 artisans, most of which are women without any other source of income. Although PEOPLink is not strictly limited to the empowerment of remote and rural areas, this experience shows how rural, indigenous and poor people can use Internet and benefit from its potential.

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<sup>161</sup> For further details, see the Workshop proceedings, [http://www.enrap.org/index.cfm?Fuseaction=file\\_info&10=46&dir=pub](http://www.enrap.org/index.cfm?Fuseaction=file_info&10=46&dir=pub) [real page needed]

<sup>162</sup> <http://www.fidamerica.cl/>

<sup>163</sup> <http://www.fidamerica.cl/infida98.html> (in Spanish).

<sup>164</sup> <http://www.fidamerica.cl/fida/infoanual.html#4> (in Spanish).

<sup>165</sup> Regional inter-governmental organization grouping 13 countries (Afghanistan, Bangladesh, India, Indonesia, Lao PDR, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam). Its main objectives are: assist national action, encourage regional co-operation, promote rural development through research, training and information dissemination.

<sup>166</sup> <http://www.peoplink.org/>

## 2.5.2 Problems, solutions and priorities for the future

The above examples of information systems and networks show how locally relevant information can be made available to traditionally disadvantaged actors (development institutions, economic actors) both directly and indirectly. Through those projects, the Internet has been shown to be a viable means for rural and remote areas to hook to the information society, and then to ensure local actors' participation in this global framework.

Nevertheless, these applications are still too few or too recent to be evaluated conclusively. One recent study poses this problem as follows: "The growth in rural networks, Internet website, and distributed databases is significant. Do we have a grasp of how these systems respond to users needs? How can we ensure investments in rural connectivity and Information and Communication Technology applications ... yield results?"<sup>167</sup> This central concern among specialists on the appropriateness of the introduction of ICTs and Internet tools in rural development and especially regarding the way they have been introduced was reflected at a recent conference where one of the group recommendations was "listen to, respect and learn from local resistance to the introduction of new technologies in rural communities" and the importance of establishing partnerships was strongly emphasized: "Transfer of technology and knowledge has to be bi-directional and valued in both directions".<sup>168</sup> These general findings have been incorporated into a "three pillars system" for sustainable and relevant telecommunications initiatives: "Telecommunications connectivity and communication technologies can only assist in rural economic, community and agricultural development when it is intimately linked with strategies for forming and sustaining creative partnerships around commonly agreed goals, and with an orientation to improving the accessibility of services and knowledge resources ... for rural people"<sup>169</sup>. The ENRAP workshop in the Philippines was based on this "three pillars" approach.

In rural development, indigenous knowledge is of particular relevance. The characteristics of indigenous knowledge and efforts to promote its preservation, dissemination and exploitations are discussed in the next chapter.

As discussed in the Panos Briefing on Internet and Poverty<sup>170</sup>, the Internet is not the only ICT with a role in rural development, but rather should be developed in parallel with others that may be more appropriate in some contexts. One of these technologies is mobile telephony as witnessed by Grameen Phone's activities in Bangladesh to provide GSM cellular services at affordable prices and irrespective of people's location in Bangladesh. Another is the CD-ROM which can place vast quantities of information at the fingertips of rural development actors with access to a computer, for example within a public library or a MCT. Both of these technologies are of course complementary to the Internet, the first through its potential role in Internet access and the second in providing relatively stable reference and local information which can be complemented by Internet access to timely national and international sources.

## 2.6 Environment and disaster management

Information is an especially crucial component in environmental study and action due to the complexity and interdisciplinarity of this field. Moreover, the global scale of many environmental problems such as biodiversity conservation, weather forecasting or disaster mitigation justifies globalized management in these areas as one of the principles of sustainable development.

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<sup>167</sup> Richardson, Don and Ricardo Ramírez (University of Guelph, Canada). *PACTS for Rural development: Partnerships + Accessibility + Connectivity/Communication Technologies = Sustainability*, 1999 (DevMedia website, <http://www.uoguel.ca/~res/pacts/conceptfrm.htm>).

<sup>168</sup> Partnerships and Participation in Telecommunications for Rural Development Conference, University of Guelph, Canada, 27-28 October 1998 (<http://www.snowden.org/conference/>).

<sup>169</sup> Richardson and Ramírez, op. cit.

<sup>170</sup> *The Internet and Poverty*, Panos Briefing No. 28, April 1998, <http://www.oneworld.org/panos/briefing/interpov.htm>

Therefore, there is a critical need for accurate, rapidly accessible and updated environmental information, through global information and alert systems. The Internet provides a flexible, widely available and relatively inexpensive tool with great potential to enhance the efficiency of these systems and thus of action taken to preserve the environment and to improve its management.

### **2.6.1 Applications of the Internet in developing countries**

In general there are two types of final users who are reached by Internet applications in the environmental field: specialized users such as policy makers, researchers and students who make use of specialized networks and databases; and civil society users who require environmental sensitization and education. Both can make effective use of a range of generic Internet utilities such as e-mail and electronic forums, databases, and distance education tools; in this sense the environment is like any other specialized area of study and development, except that its international and interdisciplinary nature make the Internet a privileged resource. Other, more complex environmental applications of ICTs include global observing systems and disaster alerting and mitigation support systems; here a range of specialized technologies is generally employed, among which the Internet plays a limited yet important role.

The importance of the Internet in environmental study and action is increasingly recognized world wide, and many international, regional and national efforts are underway to develop the infrastructure, human resources and knowledge needed to take full advantage of this tool. One example of such an effort is the project entitled "The Environment and Information: Building Capacity in Central America for the Management of Electronic Information" launched by several Central American organizations (Comisión Centroamericana de Ambiente y Desarrollo, Asociación de Investigación y Estudios Sociales and eight participating universities) and international sponsors (UNEP, UNDP/SDNP, infoDev) in 1998 to set up university based training programmes in use and development of environmental applications on the Internet, aimed first at trainers and data providers in the participating universities and then at those in the private and NGO sectors. The project is also creating websites to promote accessibility of environmental and development data and information on the Internet.<sup>171</sup>

#### **2.6.1.1 Environmental education and training**

In keeping with its overall importance for global education and learning, the Internet can play an important role in environmental education, which is in turn a key element in the perspective of sustainable development.

EE-Link is a project supported by the US Environmental Protection Agency<sup>172</sup> dedicated to developing and making environmental education resources available on the Internet. Their website includes K-12 classroom resources and associated teacher resources, EE-Link also offers Internet services (Web design, training) for environmental organizations. Although most of the EE-Link resources are based in the USA, the project attempts to link to resources in developing countries, and could provide an interesting model for similar projects in the developing world.

The US National Aeronautics and Space Administration (NASA) has begun a three-year pilot programme to bring remote sensing exploration into classrooms around the nation.<sup>173</sup> KidSat is planned and operated through the Internet by students who want to explore Earth from space. Students from their classrooms operate KidSat digital still and video cameras aboard the Space Shuttle, using the Internet to send instructions to photograph specific regions of Earth. The images can be accessed in classrooms in real time, using the Internet, and studied and analyzed by the students. The student-enhanced images are also available on the KidSat Data System so that students can see each other's discoveries. Although participation in the exploration is limited to schools in the USA, the data are available to all students over the Internet.

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<sup>171</sup> <http://rolac.unep.mx/evaluamb/>

<sup>172</sup> <http://eelink.net>

<sup>173</sup> <http://kidsat.jpl.nasa.gov/kidsat/>

There are many advanced-level courses and training materials made available over the Internet in the framework of the distance education facilities discussed in the section on “education and learning”. One example of these is the UNESCO virtual global faculty for coastal and marine remote sensing by which image processing software (Bilko), lessons on the applications of remote sensing to oceanography and coastal management, and accompanying satellite and airborne remotely sensed images are made available globally through the Internet and on CD-ROM.<sup>174</sup>

The Network for Environmental Training at Tertiary level in Asia and the Pacific (NETTLAP) groups institutions and individuals active in environmental education and training at the tertiary level in this region. A database on their website<sup>175</sup> provides information on institutions and individuals working in this field, as well as educational resources on line, such as, for example, a resource manual on “Transboundary Environmental Challenges in the Asia Pacific”.

### 2.6.1.2 Electronic discussion groups and virtual forums

Electronic discussion facilities provide a tool for the dissemination of the environmental information which is complementary to environmental databases and global information systems. Discussion groups represent a very popular and successful form of communication on the environment with more than 80 discussion lists referenced on one site,<sup>176</sup> on topics ranging from habitat in the developing countries (DEV-HABITAT), to women and environment (ECOFEM) and the UN Framework Convention on Climate Change (UNFCCC) process (CLIMATE-L).

Virtual forums are distinguished from discussion groups by their concentration in a limited time period and their typically more focused debate. Using the Internet as a discussion place can be particularly relevant for participants and organizations in the developing countries that could not otherwise take part in international deliberations, and moreover it is an environmentally friendly process.

One of the most notable examples is the series of Web based Virtual Global Biodiversity Forums<sup>177</sup> sponsored by the World Conservation Union (IUCN). These Forums are an extension of the face-to-face Global Biodiversity Forums making them available for a longer time and to a larger number of people.

UNESCO initiated in 1999 a closed Web based forum on Wise Coastal Development Practices for participants from fifteen countries from different regions who had participated in a traditional workshop on coastal management in 1998. The system has now links over 4000 participants who have proposed and evaluated nearly 200 wise management practices; its success has been attributed to careful organization and moderation of the work to ensure quality and to stimulate user involvement.<sup>178</sup>

In Brazil, the first virtual meeting on environment in the Portuguese language, the Meioambiente99,<sup>179</sup> took place in late 1999. This event gathered scientists, professors, executives, administrators, civil servants, students and the public on themes such as environmental quality, environmental education, and environmental communication and information. This initiative, sponsored by UNESCO, was hosted by TuTech of the Hamburg-Harburg Technical University, which organized a similar event in 1998 at the German level.<sup>180</sup>

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<sup>174</sup> <http://www.ncl.ac.uk/tcmweb/bilko/>

<sup>175</sup> <http://www.unep.org/unep/regoffs/roap/nettlap/>

<sup>176</sup> [http://sdgateway.net/noframe/en\\_maillist.htm](http://sdgateway.net/noframe/en_maillist.htm)

<sup>177</sup> <http://www.gbf.ch>

<sup>178</sup> <http://unescosources.org/news/fullstory.php/aid/144>

<sup>179</sup> <http://www.ivig.coppe.ufrj.br/arquivos/tese-msm.pdf>

<sup>180</sup> <http://www.tu-harburg.de/Umwelt98> (in German)

### 2.6.1.3 Databases and information dissemination

*“Most environmental problems already have solutions. Humanity has accumulated a vast fund of environmental knowledge, information and experience over the last decades. Our task, then, is to locate the relevant information and make it available”.* Wo Yen Lee, Director, UNEP/INFOTERRA (1984-93)<sup>181</sup>

This statement illustrates the importance of the dissemination of information in the environmental field. This is true for public sensitization as well as for researchers, students, policy makers, NGOs, field workers, etc. The World Wide Web contains a very wide range of information on environmental issues.

UNDP launched in April 1999 the “Information Technologies – Access to Solutions for Sustainable Human Development” knowledge broker website,<sup>182</sup> which integrates three main components: HORIZON Solutions,<sup>183</sup> INFO21,<sup>184</sup> and the website of UNDP’s Sustainable Development Networking Programme (SDNP).<sup>185</sup> The HORIZON Solutions website provides best practice case studies from around the world on agriculture, air pollution, biodiversity, desertification, toxic chemicals, energy, waste management, etc., with provision for scientific peer review and interactive user comments as well as Web based discussion lists on these themes. The INFO21 site provides access to a very wide range of sustainable development reference links (going well beyond environment to coverage of topics such as e-commerce, human rights and telecentre pilot projects).

SDNP is promoting the publication of on-line content on environment and sustainable development in the developing countries. For example, the Colombian SDNP website<sup>186</sup> provides a wide range of information directly or through links to national and international sources: daily satellite images, weather forecast, current situation of the principal rivers of Colombia, ecosystems of Colombia, environmental legislation etc., as well as discussion and alerting facilities.

At the global level, the Center for International Earth Science Information Network (CIESIN)<sup>187</sup> at Columbia University (USA) ensures access to wide range of specialized data, information and interactive modelling and presentation applications through metadata resources and information systems. For example, the Land and Water Knowledge Management Node information system, created with support from five international organizations and US NASA, allows searches of 11 catalogues of data and information according to precise topical and geographic criteria.

In Latin America, the website of the National Biodiversity Institute in Costa Rica, which aims to create awareness on the biodiversity issue and generate knowledge for conservation, provides a range of news and popularized information for the public. This site also offers a unique resource in the form of the Biodiversity Information Management System,<sup>188</sup> a taxonomic database for specimens of Costa Rican animals, plants and fungi.

Eight organizations in the field of sustainable development launched the “Spinning the Web” project and the SD Gateway website in 1996,<sup>189</sup> and in May 1998 the member organizations developed a formal Network Governance Agreement to provide the structure for their future co-operation. The eight members

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<sup>181</sup> *Access to Environmental Information*, <http://www.unep.org/unep/access.htm>

<sup>182</sup> <http://www.knowledgebroker.org>

<sup>183</sup> <http://www.solutions-site.org>

<sup>184</sup> <http://www.undp.org/info21/index.htm>

<sup>185</sup> <http://www.sdnpp.org>

<sup>186</sup> <http://www.rds.org.co>

<sup>187</sup> <http://www.ciesin.org>

<sup>188</sup> <http://www.inbio.ac.cr/bims/BIMS.html>

<sup>189</sup> <http://sdgateway.net/>



of this network are: the International Institute for Sustainable Development (IISD) and the International Development Research Centre (IDRC) in Canada, the “Consejo de la Tierra” in Costa Rica, Fundación Ambiente y Recursos Naturales (FARN) in Argentina, ENDA in Senegal, the Stockholm Environment Institute, Regional Environment Centre for Central and Eastern Europe in Hungary, and Development Alternatives in India. The purpose of the network is to create an electronic information system on sustainable development based both on the Internet and on its members who act as knowledge brokers to relay the information through traditional media to the public that doesn't have Internet access. The project makes use of WebRing technology<sup>190</sup> to ensure navigation links from each participating site to all the others.

There is also the UNDP's Small Island Network, SIDSNET. This website promotes dialogue, sharing of resources and establishing networks among “the small islands” in the world in addressing issues facing small islands such as capacity building, natural disaster, and land resources.<sup>191</sup>

#### 2.6.1.4 Global and regional observation systems

In the environmental field, timely and compatible observational data at the world-wide level represent a key component for policy, research and the management of natural resources and disasters. These needs are being met environmental data observatories grouped within the Global Climate Observing System (GCOS)<sup>192</sup>, the Global Ocean Observing System (GOOS)<sup>193</sup> and the Global Terrestrial Observing System (GTOS)<sup>194</sup> managed respectively by the World Meteorological Organization (WMO), UNESCO's Intergovernmental Oceanographic Commission (IOC) and FAO and co-ordinated by a larger group of organizations including UNEP, UNESCO and the International Council for Science (ICSU). GCOS, the most advanced of these systems, consists of facilities and arrangements for making observations from stations on land and at sea, aircraft, environmental observation satellites and other platforms; a global telecommunications system for collection and distribution of data; and a global network for co-operative data processing. The data and information made available by these observatories is based on existing information systems such as the ICSU World Data Centres and World Weather Watch, with service centres making an intensive use of electronic networks to move the data. The creation of an integrated global network based on the three existing ones is planned, in view of the “need for a comprehensive approach to formulate, implement and oversee data and information management of the global observing systems”.<sup>195</sup>

These global observing systems are mainly supplied by remote sensing satellites and other dedicated remote data collection channels which can provide the necessary bandwidth and reliability. The Internet is used in these systems mainly to provide data dissemination services to final users and to enhance the collaboration among all actors. For example, data processed from GCOS are already available from websites at WMO or the U.S. National Oceanic and Atmospheric Administration websites,<sup>196</sup> and are helping scientists and other end users to study and anticipate such phenomena as “El Niño”.

In the terrestrial observation area, UNESCO's Man and the Biosphere (MAB) Programme has established the Internet based MABnet to support the development and full use of the international network of

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<sup>190</sup> <http://nav.webring.com/>

<sup>191</sup> <http://www.sidsnet.org>

<sup>192</sup> <http://www.wmo.ch/web/gcos/gcoshome.html>

<sup>193</sup> <http://ioc.unesco.org/goos/goos.htm>

<sup>194</sup> <http://www.fao.org/GTOS/home.htm>

<sup>195</sup> Joint Data and Information Management Panel (JDIMP). *G3OS Data and Information Management Plan*. Draft for discussion, Geneva, 27 January 1999.

<sup>196</sup> Respectively <http://www.wmo.ch> and <http://www.elnino.noaa.gov/>

biosphere reserves, of which 356 existed in 90 countries as of January 1999.<sup>197</sup> More than 40 Biosphere Reserves have established their own home pages, and two major biodiversity databases – MABFauna and MABFlora – are being developed in more than 200 Biosphere Reserves, following the Integrated Biosphere Reserve Monitoring (BRIM) protocol of MAB. Part of the scientific data on fauna and flora species possessed by these sites is already accessible via the Internet.

Environmental observatories are also being implemented at the regional level, through activities which reinforce and link to wider international efforts. The collaborative Mediterranean Hydrological Cycle Observing System (MED-HYCOS) of 30 Mediterranean and Black Sea countries<sup>198</sup> was launched in 1995 with support from WMO and the World Bank and operational assistance of the Research Institute for Development (RID, ex-ORSTOM)<sup>199</sup>. High-quality real-time data on river flows, water quality and certain climate variables are collected through twenty Data Collection Platforms (DCPs) with satellite data transmission capability, and made available along with historical data through the Internet via databases.<sup>200</sup> The project website also provides free access to tools developed to check, to analyze and visualise the data. The information is also made available on CD-ROMs.

Several regional observation programmes are being implemented in Africa:

- The Royal Museum for Central Africa (MRAC) in Belgium will implement the UNESCO GeoNet project for the Central African region. MRAC will develop a central Internet GIS server, installed in Belgium, so that geoscientists from the developing countries can benefit from GIS functions through the Internet. Principal African partners will be provided with local workstations allowing them to update the global database locally. The publicly available data will consist of inventories and bibliographies while the confidential raw data will only be accessible to designed Central African partners. This project is seen as a pilot for Internet access to PANGIS (Pan-African Network for a Geological Information System), a programme supported by UNESCO, the International Centre for Training and Exchanges in Geosciences (CIFEG, France) and MRAC to facilitate exchange of geological data among African countries and between African and non African institutions. PANGIS already includes a bibliographic database of 8,000 items, enriched by 2,500 records processed annually by the thirty African member countries, and is now in the second phase of setting up facilities for management of factual data and the introduction of GIS.<sup>201</sup>
- The WISE-Dev (Web Integrated System for Environment and Development) programme, funded by the World Bank and the European Union and implemented by RID and the French Institut National de Recherche en Informatique et en Automatique (INRIA), aims at enhancing co-operation among African institutions in processing, management and dissemination of development and environmental information. This project will develop a toolbox for multimedia data acquisition and processing which will be available on the Internet. One pilot activity already operational is the WISE-Hydro application (Web Integrated Server for Hydrological Data Release and Observation), developed by the RID office in Ouagadougou, which provides on the Internet hydrological data including information on river flow variation in Central and West Africa collected in real time and transmitted by satellite and other electronic communication networks.<sup>202</sup>

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<sup>197</sup> <http://www.unesco.org/mab/brfaq-6.htm>

<sup>198</sup> Albania, Algeria, Bosnia-Herzegovina, Bulgaria, Cyprus, Croatia, Egypt, France, Greece, Israel, Italy, Jordan, Lebanon, FYR Macedonia, Malta, Morocco, Palestinian Territories, Portugal, Slovenia, Spain, Syria, Tunisia, Turkey, Yugoslavia; Georgia, Moldova, Romania, Russia and Ukraine.

<sup>199</sup> <http://www.ird.fr/fr/>

<sup>200</sup> <http://medhycos.mlp.ird.fr/>

<sup>201</sup> <http://www.unesco.org/science/earthscience/pangis.htm>

<sup>202</sup> <http://www.orstom.fr/services/wiseshydro.html>

### 2.6.1.5 Disaster alert and mitigation

Developing countries suffer immense human and economic losses from natural disasters, accounting for 90% of the population affected world-wide in 1996<sup>203</sup>. Their increased vulnerability relative to the industrialized countries is due in large part to a lack of the infrastructure to manage such disasters including an insufficiency in emergency communication and planning support systems, particularly in the rural and remote areas. This in turn limits the capacity of national and international assistance organizations to respond to emergency needs. Information systems using geographic information systems (GIS), remote sensing and satellite early-warning technologies, as well as alert systems based on technologies such as HF and VHF radio and satellite communications, can be of considerable benefit in terms of disaster prevention and mitigation.<sup>204</sup>

The Internet can play an important role in providing useful real-time information in emergency situations, particularly through the World Wide Web and e-mail. E-mail is valued in disaster relief communication especially for its reliability, low cost and wide coverage, while the Web is used widely to provide the actors in the field with relevant and up-to-date information.

Volunteers in Technical Assistance (VITA), an NGO based in the USA, provides emergency information for both natural and human-provoked disasters. Insofar as natural disasters are concerned, their website provides regularly updated general situation reports on disasters world wide<sup>205</sup> and current information on specific disasters such as the Hurricane Mitch or the recent Colombian earthquake.<sup>206</sup> For the last two examples, VITA also set up listservers. The Webrelief site of the United Nations Office for the Co-ordination of Humanitarian Affairs (OCHA) is also providing disaster information<sup>207</sup>, as does FAO which publishes an Internet locust report<sup>208</sup> that is relayed by VITA.<sup>209</sup> In Southeast Asia, much information was made available over the Internet regarding 1997-98 regional forest fires and haze, through a number of websites from both outside and within the region make extensive use of remote sensing data.<sup>210</sup> In the same sub-region, ASEAN has been working on the establishment of a ASEAN Seismic Network for Rapid Exchange of Strong Earthquake Data (ASNET-RESED), which will be based on the Internet, for which the Indonesian Meteorological and Geophysical Agency is the leading body for training support and acquisition of software.

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

In the environmental field, Internet is proving to be an essential tool to improve the dissemination of the information. The extensive information made available on line has been particularly useful in the research field, while servers and electronic databases created in the developing countries have helped those countries to improve national environmental management. Throughout the examples presented, it is clear that the Internet enhances participatory and regional approaches in environmental programmes.

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<sup>203</sup> *The vital role of Telecommunications in disaster relief and mitigation*, Disaster and Communication, ITU Press & Public Information Service, <http://www.itu.int/newsarchive/projects/ICET/vitalrole.html>

<sup>204</sup> Scott, John (Convener). *Report on Earth Observation, Hazard Analysis and Communications Technology for Early Warning*. Geneva: International Decade for Natural Disaster Reduction (IDNDR), October 1997 (<http://www.gfz-potsdam.de/ewc98/circular2/caap.html>).

<sup>205</sup> <http://idh.vita.org/disaster/sitrep/>

<sup>206</sup> respectively <http://www.vita.org/mitch.htm> and <http://www.vita.org/colombia.htm>

<sup>207</sup> <http://wwwnotes.reliefweb.int/websites/rwdomino.nsf/VNaturalDisastersTheLatest>

<sup>208</sup> <http://www.fao.org/news/global/locusts/Locuhome.htm>

<sup>209</sup> <http://vwww.vita.org/disaster/locust/>

<sup>210</sup> For example, <http://www.ngdc.noaa.gov/dmsp/fires/indo.html>

The usefulness of the Internet in disaster management applications is limited by its low penetration and poor supporting infrastructure in developing countries. Appropriate measures should be developed to ensure that, in case of emergency, the bandwidth necessary for the transmission of the required information, including images, is available on the Internet or other designated networks, avoiding any delay caused by overload by the large number of users not directly involved in crisis management.

It can be concluded that the Internet will become an indispensable tool in the environmental field, but that it should be seen as complementary to other communication technologies in global environmental information systems. The future role of the Internet in complex environmental information systems will depend on the degree to which it can provide the necessary capacity and functionality, but, due to the nature of the Internet as a tool for wide access typically operating at near-saturation levels, it is unlikely to serve in critical data collection operations in the near future.

International efforts should be continued in order to address the constraints faced by developing countries in the effective use of the Internet in environmental training, research and action. An important goal being pursued is the unification of information standards and terminology to facilitate the compatibility of environmental information systems.

There are also economic and political constraints to be considered:

- Environmental data are an important economic commodity. Most of the information is concentrated in industrialized countries due to their possession of remote sensing facilities, where it is sometimes viewed as a national resource to help predict and influence the development of markets such as that of agricultural products. The international community should find ways to ensure that a balance is achieved between commercial interests and the need of developing countries to gain access to data concerning them, whether for disaster mitigation or for open and co-operative scientific research.
- Another challenge is that since the nature of environmental information is very complex, much remains to be done to popularize it and ensure access of the general public to important information. In some cases, the failure of information on disasters to reach the concerned population in time has been due to delays of political leaders. Hence the ethical task of experts to duly inform and sensitize the decision makers and to urge them to provide means and facilities necessary to sensitize the people and draw their attention to environmental problems.

## 2.7 Culture

Culture could be defined as human diversity, which is expressed in many ways by many actors in each society: languages, literature, painting, sculpture, theatre, cinema, etc. The developing countries account for more than four fifths of the world's population, which can be seen as one measure of the importance of their cultures to the world.

With the globalization of the economy and with the resultant redefinition of societies, perceptions of culture are changing. At the Symposium on Market, Culture and Globalization held at UNESCO on 14-15 June 1999,<sup>211</sup> it was asked whether "Culture is a form of merchandise like no other?", and although the growing commercial importance of culture was recognized, so was another nature of cultural products, as containing or referring to values, ideas and meanings. Another important question asked was whether globalization is a threat for cultural identities. One reply was that there is a real threat since globalization naturally favours cultural homogenization while another was that the globalization of markets encourages cultural diversity because technology facilitates it. 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.

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<sup>211</sup> [http://www.unesco.org/culture/industries/html\\_fr/reunion3.htm](http://www.unesco.org/culture/industries/html_fr/reunion3.htm)

At the UNESCO Intergovernmental Conference on Cultural Policies for Development, held in Stockholm on 30 March to 2 April 1998,<sup>212</sup> “Culture and the New Media Technologies” was also discussed. Similar arguments were put forward, but there was an additional apprehension that “Poorer countries are at a major disadvantage in that they lack the resources to compete on an equal basis” and that globalization could lead to a “greater exploitation of cultural assets”. It was concluded that “the promotion of one’s own culture is culture’s best promotion in a world that is more concerned with economics”, and that ICTs are meant to serve culture and development.

The inverse relation between culture and development was well appraised in another recent conference in which one paper<sup>213</sup> asked:

*“What role can culture play in our national development? [...] It has been suddenly become known that countries cannot develop in any of these areas unless that development is firmly rooted in culture; and this holds equally true for development in new technologies”.*

On the other hand, new forms of cultural expression are appearing in the form of cyberculture which a researcher has defined to be “a collection of cultures and cultural products that exist on and/or are made possible by the Internet, along with the stories told about these cultures and cultural products”,<sup>214</sup> and whose impact has been described by UNESCO as follows:

*“The advent of the new information and communication technologies is having an enormous impact on culture mainly because they create new forms and new spaces for human exchange. The new virtual space known as ‘cyberspace’ opens up immense possibilities for cultural expression, cultural access, dissemination of cultural goods, cultural practices and interpersonal communication. [...] Cyberspace is a global open interactive network.”*<sup>215</sup>

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.

## **2.7.1 Applications of the Internet in developing countries**

Cultural institutions, businesses and citizens in developing countries are already using the Internet in a wide range of applications for the preservation, dissemination and expression of culture:

### **2.7.1.1 Preservation of material cultural heritage**

Material cultural heritage encompasses material culture, in the form of objects, structures, sites and landscapes. The emphasis is on cultural continuity from the past, through the present and into the future, with the recognition that culture is organic and evolving. In some instances, it is necessary to document cultural heritage and to preserve elements in an original or earlier state; in other cases it is appropriate to encourage dynamic change, adaptation and development of cultural materials or forms.<sup>216</sup>

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<sup>212</sup> <http://www.unesco-sweden.org/conference/Index.htm>

<sup>213</sup> Abungu, Lorna, Lawrence Monda and George Ombachi (National Museums of Kenya). "Connectivity, Collaboration and Culture: Challenges of African Museums on the Web". Presented at Museums and the Web 99, New Orleans (USA), 12-14 March 1999 (<http://www.archimuse.com/mw99/papers/abungu/abungu.html>).

<sup>214</sup> Silver, David. <http://otal.umd.edu/~rccs/intro.html>

<sup>215</sup> [http://www.unesco.org/culture/creativity/cyberspace/html\\_eng/index\\_en.htm](http://www.unesco.org/culture/creativity/cyberspace/html_eng/index_en.htm)

<sup>216</sup> <http://www.icom.org/bank.html>

The website of UNESCO World Heritage Centre (WHC)<sup>217</sup> presents the 445 cultural properties in 114 countries which the World Heritage Committee has inscribed on the World Heritage List (along with 137 natural heritage sites) and with which WHC is working to make sure that future generations can inherit the treasures of the past. The tasks of the Centre, which are facilitated by the Internet, include updating the World Heritage List and database, developing documentary and teaching materials to raise awareness of the World Heritage concept, and keeping the public informed of World Heritage issues. The e-mail Newsletter of World Heritage is another tool to raise the public's awareness on preservation issues. UNESCO also maintains a Save Our Cultural Heritage website<sup>218</sup> to inform and enhance the support of the public for its international preservation campaigns to safeguard and the restore endangered heritage sites.

A related website is the Information Network of the Organization of World Heritage Cities (OWHC),<sup>219</sup> founded in September 1993. Of the member cities, 4 are located in Africa, 21 in the Arab States, 12 in developing countries of Asia and 20 in Latin America and the Caribbean. OWHC's initiatives, which are geared to the implementation of the World Heritage Convention, cover several areas, including the training of city managers and the heightening of awareness among the public and national and international officials of the importance of better protecting historic cities, and the establishment of an electronic communications network linking member cities through the Internet. The website includes a data bank on the historic cities as well as forums for public discussion.

A specialized support service for cultural preservation is provided at the Art Loss Register<sup>220</sup> website where a database is maintained of stolen and missing works of art and antiques in the world. The objectives are to assist individuals, law enforcement agencies and insurance companies in the process of identifying and recovering stolen works of art. Thus this private initiative, whose revenue comes mainly from subscribing insurance companies, aids in combating illicit traffic of cultural property with the help of the Internet.

### 2.7.1.2 Virtual museums

The role of museums in building cyberculture is fundamental, because of their possibilities to transfer quality cultural content and to promote its democratic utilization.<sup>221</sup> The policy of the International Council of Museums (ICOM) on the Internet, adopted in December 1995, aims at encouraging museums to actively use the Internet to disseminate information on programmes and collections. ICOM has published a prospectus on "*Internet for museums*" and a manual "*Getting connected to the Internet*", and the ICOM website<sup>222</sup> presents an extensive list of museums on line from which the numbers of links to museums and exhibitions in developing countries are presented opposite:

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<sup>217</sup> <http://www.unesco.org/whc>

<sup>218</sup> [http://www.unesco.org/culture/heritage/tangible/html\\_eng/index\\_en.htm](http://www.unesco.org/culture/heritage/tangible/html_eng/index_en.htm)

<sup>219</sup> <http://www.ovpm.org/>

<sup>220</sup> <http://www.artloss.com>

<sup>221</sup> Vinson, Isabelle. "Heritage and Cyberculture", Chapter 15 of *World Culture Report*. Paris: UNESCO, 1998.

<sup>222</sup> <http://www.icom.org/vlmp>

Africa	Links	Arab States	Links	Asia and the Pacific	Links	Latin America and Caribbean	Links
Kenya	2	Egypt	4	Azerbaijan	1	Argentina	23
Namibia	2	Morocco	2	China	4	Bolivia	12
South Africa	13			Fiji	1	Brazil	52
				India	7	Chile	17
				Rep. of Korea	38	Colombia	38
				Malaysia	1	Costa Rica	10
				Thailand	2	Cuba	33
				Turkey	5	Dominican Rep.	12
						Ecuador	36
						El Salvador	4
						Guatemala	11
						Honduras	8
						Mexico	25
						Nicaragua	3
						Panama	5
						Paraguay	4
						Peru	15
						Uruguay	20
						Venezuela	16
<b>Total</b>	17	<b>Total</b>	6	<b>Total</b>	59	<b>Total</b>	344

ICOM has also recently co-sponsored the creation of top-level Internet domain dedicated to museums, called “museum”.<sup>223</sup>

The presence of museums in the developing countries on the Internet can generally be considered in three categories of evolution: websites presenting general information, of interest for example for cultural tourism, but with only limited on-line collections and interactivity; museums presenting extensively documented and illustrated collections, and thus using the Web directly in their preservation and dissemination functions; virtual museums, with a high level of virtuality and interactivity in their sites, thus contributing to cyberculture as a new cultural expression.

Among the best examples in the first category, one can cite the “Cuba Museum Guide”,<sup>224</sup> which presents more than fifty museums through a home page, including a general presentation for each museum along with practical information. The Egyptian Museum<sup>225</sup> in Cairo presents, in addition to such general information, some 32 representative items from its collection of 142,000 objects: accessories and jewellery, architectural elements, furniture, mummies, sculptures, tomb equipment, and manuscripts. On the museum section of the “Culture and Art of Azerbaijan” website,<sup>226</sup> four museums are presented on line; for example, the History Museum of Azerbaijan of Academy of Sciences presents several pieces of its collections of copper, national costumes, embroidery, carpets, etc.

As an example of the many sites in the second category on the Web, the National Museum of Korea<sup>227</sup> which presents a considerable on-line collection of objects from its collection of 120,000 art and archaeological objects. To facilitate access, the collections are presented by category: archaeological

<sup>223</sup> <http://www.musedoma.org/>

<sup>224</sup> <http://www.cubaweb.cu/museos/m0.html>

<sup>225</sup> [http://www.tourism.egnet.net/attractions\\_detail.asp?code=6](http://www.tourism.egnet.net/attractions_detail.asp?code=6)

<sup>226</sup> [http://www.culture.az/museum\\_e.htm](http://www.culture.az/museum_e.htm)

<sup>227</sup> <http://www.museum.go.kr/eng/index.htm>

material, Buddhist sculpture, pagoda steles and stupas, ceramic painting, ancient manuscripts, furniture, etc. For each category, the information can be accessed by historical period or geographic area of origin, and the retrieved items can be viewed in full screen image with explanation and bibliographical details accessible for each piece. A less developed example is the exhibition by the National Museum of Yaoundé in Cameroon of a collection of masks and statues.<sup>228</sup> It should be noted that a large number of virtual exhibitions of the heritage of developing countries are established on the Web by organizations in the industrialized countries who wish to make this heritage better known to people around the world, for example the exhibit of folk paintings by women artists of the Madhubani district of northern India, presented by the University of Florida (USA).<sup>229</sup>

The third category is growing in importance on the Internet as more and more virtual museums can be found. The Museo Virtual de Artes El Pais (MUVA)<sup>230</sup> developed by the *El Pais* newspaper in Uruguay with the participation of the country's Contemporary Art Museum, is based in a virtual building whose three floors can be navigated on line to discover seven exhibitions of contemporary Uruguayan art. In addition to exhibiting museum based contemporary art, the site allows the public to get to know artists' and other private collections that are not usually accessible. The Interactive Museum of Turkey comprises seven virtual galleries including the Anatolian civilizations collection from about twenty Turkish museums and two palace museums which can be visited in virtual reality. The website also includes a resource centre with documentation and related links on architecture, ceramics, dance, graphic design, museum studies, theatre, etc. Another approach to public participation has been developed by the Kenya Museum Art Society, which organizes annually an Arts Festival presenting arts and crafts works.<sup>231</sup> During the 1999 edition, a "Cyber-Hut" – a live Internet link-up – was established at the Museum with the support of a local ISP, along with a chatroom facility used to create a dialogue between the Kenyan public (especially children) and children and schools in the United States and Europe.

### 2.7.1.3 Creativity and cultural content on the WWW

Cultural content of the developing countries on the Internet can be illustrated through many examples. For instance, the Asian part of the Orientation website<sup>232</sup> lists 172 links for literature. However, this kind of content often comes from websites in the industrialized countries.

At the book publishers level, BookAid International publishes an on-line paper called "Partners In African Publishing" as part of a programme that began in 1995 to encourage collaboration between African and European publishers. One of the outputs of this programme is the electronic newsletter,<sup>233</sup> providing publishers and other organizations with useful information. Baobab Books, a small independent Zimbabwean publisher, specializing in Zimbabwean/Southern African fiction, children's literature, and non-fiction with an emphasis on history, culture, and women's studies, presents its catalogues on its website.<sup>234</sup>

The International Poetry Festival of Medellin presents its activity on the Web,<sup>235</sup> including for the last edition an on-line workshop on poetry, as well as maintaining a wide range of links to sites presenting poets and their works, including visual and spoken poetry. Although quite a few of these links present the poetry of developing countries, most of these are apparently prepared in institutions in the industrialized

<sup>228</sup> <http://www.unesco.org/webworld>

<sup>229</sup> <http://www.clas.ufl.edu/users/gthursby/rc/>

<sup>230</sup> <http://www.diarioelpais.com/muva>

<sup>231</sup> <http://www.museums.or.ke/artfest/artfest.html>

<sup>232</sup> <http://as.orientation.com>

<sup>233</sup> <http://www.bookaid.org/resources/partners/index.html>

<sup>234</sup> <http://www.mediazw.com/baobab/>

<sup>235</sup> <http://www.epm.net.co/VIIfestivalpoesia/>



world; an exception is the Brazilian Journal of Poetry site<sup>236</sup> which includes pages of poetry of other Portuguese-speaking countries. The South African Poetry website presents some seventy South African poets and their poetry, including sometimes a short biography<sup>237</sup>. Some poems are in native African languages. The site also includes an on-line poetry magazine. The Página de Literatura Guatemalteca<sup>238</sup> (Guatemalan Literature Page) offers more than 60 presentations on pre-Colombian literature and the country's the major colonial, classical and contemporary authors, including poems or prose extracts for most.

On-line magazines featuring culture of developing countries are numerous, though they are not always based in these countries. One such example is the Akda, Philippine Literary Web Magazine<sup>239</sup>, created by a non-profit organization, and featuring prose, poetry and other creative works by Filipino writers. Another example is the on-line journal for the study and exhibition of the arts of Asia containing information on associations, exhibitions, articles, and galleries.<sup>240</sup>

In Africa, the website of the Panafrican Film and Television Festival of Ouagadougou (FESPACO)<sup>241</sup> links to the developing CINE NET AFRIK website<sup>242</sup> which is intended to provide a continuing view of African film directors and their works. The site can be searched by country, film director and title (but at the time of writing contained only information on Burkina Faso). Another Web based initiative, "Afrique en Créations"<sup>243</sup>, contains databases on African plastic and performing artists and their works, information on exhibitions performances of African art in the world, and a facility to order published guides and reviews on African art.

The Virtual Exhibition Centre (VEC) of artisan products<sup>244</sup> is a joint project of the UNCTAD-WTO International Trade Centre and UNESCO which aims at helping to commercialize artisan products from the developing countries and economies in transition, with a special emphasis on the least developed countries. The website provides an opportunity to view craft works by type and country of origin from a virtual showcase in which each offer is accompanied by a representative image, a description, and in some cases company and sales details. It also includes numerous links to other sites (typically national craft centres or trade associations) promoting artisan work including several in developing countries, which, like VEC, provide commercial information but not electronic commerce facilities (as opposed, for example, to the PEOPLink site discussed under "agriculture and rural development").

Another type of entrepreneurial cultural website is that of the "Los Niños del Mundo" band in Trinidad and Tobago,<sup>245</sup> which specializes in the traditional Parang singing described on the site as the country's oldest traditional art form. The site, which was created with the help of an Australian anthropologist, provides substantial samples of on-line music and promotes the various business services of the band.

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<sup>236</sup> <http://www.secrel.com.br/jjpoesia/>

<sup>237</sup> <http://www.uct.ac.za/projects/poetry/ntombi.htm>, <http://www.uct.ac.za/projects/poetry/nyamende.htm>

<sup>238</sup> <http://ucsbuxa.ucsb.edu/%7E6500jce2/lit.html>

<sup>239</sup> <http://www.nwlink.com/~ria>

<sup>240</sup> <http://www.asianart.com/>

<sup>241</sup> <http://www.fespaco.bf/spfesp.htm>

<sup>242</sup> <http://www.bluturtles.fr/fespaco/index.htm>

<sup>243</sup> <http://www.mediaport.net/AfricArt/>

<sup>244</sup> <http://www.intracen.org/itc/virtexib/vexhib1.htm>

<sup>245</sup> <http://www.freeyellow.com/members6/trinidadtobagoparang/default.html>

The Museum of the Person<sup>246</sup> in Brazil has emerged as a natural manifestation of the development of the Internet in that country. This “museum” extends the idea of oral history into the Internet by creating an electronic database of life histories, and contributing, in a certain manner, to the writing of Brazil’s history. The collection now has about 700 stories submitted since the virtual museum was created in 1992, of which some 120 are on line.

#### **2.7.1.4 Cultural research and policies**

The Internet can also help promote co-operation in cultural research and the integration of heritage management into national development plans. For example, UNESCO recently launched the HeritageNet project in Central Asia<sup>247</sup> to encourage the use of the Internet for promotion of national heritage and cultural tourism in the region. The project aims to establish visibility of Central Asia on the Internet, to promote international co-operation and to facilitate integration of Central Asia into the world community. The site ensures a constant supply of first-hand information and certified data on the region and will include scientific research and the exchange of expertise on Central Asian cultural and natural treasures.

Another example is the website of Culturelink<sup>248</sup>, the Network of Networks for Research and Co-operation in Cultural Development which was established by UNESCO and the Council of Europe in 1989, with the Institute for International Relations (IRMO) in Zagreb, Croatia, as its focal point. Culturelink comprises about 1000 member networks and member institutions from 97 countries in all parts of the world, and one of its major aims is the promotion of regional, interregional and international research projects such as the “Cultural Policies in the World” project, in which most of the members participate. As part of the Network’s long-term objective to develop a world-wide information system for the study of cultural policy, cultural management and development strategies, the Culturelink website provides access to three Culturelink databases as well as to many other information sources, news and announcements in these areas.

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

It is 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 in the introduction to this section remain as potential concerns. The Internet’s potential in preservation appears to be more limited, although it is playing an undeniable part in rising awareness on preservation issues and in allowing actors to communicate more easily.

Insofar as content is concerned, it is difficult to draw general conclusions from the very wide variety of available examples, but can probably be said that co-operative projects at the international level (e.g. CINE NET AFRIK, 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.

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<sup>246</sup> <http://www2.uol.com.br/mpessoa/index.htm>; there is an English version of this site.

<sup>247</sup> [http://www.unesco.org/webworld/build\\_info/informatics/heritagenet.htm](http://www.unesco.org/webworld/build_info/informatics/heritagenet.htm)

<sup>248</sup> <http://www.unesco.org/culturelink/>

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 mentioned above (especially Objective 4: “Promote cultural and linguistic diversity in and for the information society”):

1. encourage wide access to the Internet in developing countries at affordable cost, especially for disadvantaged population groups, for example through telecentres in communities and cultural institutions;
2. reinforce efforts to digitize cultural heritage and to create more comprehensive databases, to serve both preservation and dissemination objectives;
3. 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;
4. encourage the development of the Internet for the purpose of cultural tourism;
5. encourage cultural institutions to develop educational material on the Internet;
6. take advantage of the rapid development of off-line cultural products, using technologies such as CD-ROM, to develop cultural applications which effectively integrate the use of these technologies with the Internet.

## 2.8 The mass media

“The strengthening of peace and international understanding, the promotion of human rights and the countering of racialism, apartheid and incitement to war demand a free flow and a wider and better balanced dissemination of information. To this end, the mass media have a leading contribution to make.”<sup>249</sup>

The above declaration clearly outlines the role that the mass media plays in the modern world. The world has seen an ever accelerating progression of media, which can roughly be viewed as evolving from “one-source” media (billboards, newspapers, magazines, films) to “few-source” media (radio, broadcast television) to many-source media (cable television, satellite television (DBS) and the Internet).

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, reaching an estimated 407 million people world wide<sup>250</sup>. 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 per cent of the most visited sites on the Internet in 1999 containing audio-visual content.<sup>251</sup>

### 2.8.1 Applications of the Internet in developing countries

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, the telecommunications infrastructure has until recently been low on the agenda, and other development goals have received higher priority. Among the Internet users cited above, an estimated 167 million are from North America while Africa possesses only 3.1 million and the Middle East a mere 2.4 million. However the media play a crucial role in the social advancement of the people in developing countries and in the dissemination of knowledge to them.

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<sup>249</sup> *Declaration on Fundamental Principles concerning the Contribution to the Mass Media to Strengthening Peace and International Understanding, to the Promotion of Human Rights and to Countering Racialism, Apartheid and Incitement to War* (Article 1), adopted by the UNESCO General Conference at its twentieth session, Paris, 22 November 1978, UNESCO's Standard-Setting Instruments, IV.C. (1994).

<sup>250</sup> Estimate for both adults and children who have logged on at least once, three months prior to being surveyed, Nua Internet Surveys, November 2000 ([http://www.nua.ie/surveys/how\\_many\\_online/index.html](http://www.nua.ie/surveys/how_many_online/index.html)).

<sup>251</sup> *L'Atelier*, February-April 1999, pp. 27-55.

Undeniably pluralism of information, with diversity of both production and distribution, is a fundamental indicator of an orderly democracy<sup>252</sup>. Yet in many developing countries the media are unable to properly carry out their functions, due in large part to political control. Newspapers and audio and visual broadcasts are censored and limited. Many take on the role of solely providing entertainment. Communication costs run high and there are many technological limits concerning lack of skill, knowledge and capital. The situation is far worse in rural areas where word of mouth is sometimes the most important source of information for people. They have limited access to mass media, and sometimes no control over them. People are often ignorant of events in the next village. Rural communities in general have now come to realize the need to make decisions about their own lives. This has led to use of community radios and newsletters with smaller target groups in mind.

The Internet has proven successful with the media in the industrialized countries. Numerous newspapers and journals are on line, generating discussions and other exchange of information. The Internet also provides a growing data bank of information on any possible topic, which makes it an essential source of public information for both media professionals and the public. Press organizations have traditionally been heavy users of leased telex (teletype) and voice grade lines for data transfer, are making ever greater use of computer data networks including the Internet. Thus the Internet has a substantial potential role of in strengthening and improving the status of the mass media in developing countries.

The extent to which the Internet has already impacted on the media in recent years is shown by the example of the Pacific island countries, for which a recent report<sup>253</sup> shows that 25 per cent of the 46 media organizations surveyed in the region are making use of the Internet, for a wide variety of applications:

Application	Number of Organizations
Receiving news stories from remotely located journalists	15
Researching background information for news stories/articles	13
Sending news stories to other media organizations	13
Downloading materials for re-publication	12
Verifying data for news/articles	11
Receiving advertising copy	11
Exchanging news stories with other news media	11
Arranging contacts, "interviewing" people by email	10
Publishing on the World Wide Web	10
Downloading software, shareware, etc.	10
Exchanging radio/TV programmes with other broadcasters	6
Transferring camera-ready copy to remote printers	5
Participating in on-line discussion groups	5

<sup>252</sup> *Information and Communication Technologies in Development: A UNESCO Perspective*. Paris: UNESCO, December 1996 (CII-96/WS/6 and <http://www.unesco.org/webworld/telematics/uncstd.htm>).

<sup>253</sup> *Electronic Connectedness in the Pacific Island Countries*. Paris: UNESCO, April 1999.

As can be seen from the following examples, successful projects have commenced for nearly all media in all continents.

### 2.8.1.1 The press

Of the more than 3600 newspapers published on line in 1999,<sup>254</sup> the United States boasted the largest number – around 2000, but developing country media had been 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.<sup>255</sup>

Examples of use of the Internet in strengthening the viability, independence and pluralism of the press in developing countries can perhaps best be seen from the case of Africa which has faced some of the greatest insufficiencies in Internet access as well as some of the most intractable media problems. One key example is that of the Panafrikan News Agency (PANA) which was once known as an inefficient relay for the stodgy official news agencies, but has been vigorously pursuing a Recovery Plan since 1993. 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.<sup>256</sup> One of many newspaper success stories is that of the independent daily of the Ivory Coast, *Le Jour*. Since circulating on-line in 1997, the paper has not lost circulation sales, as on-line advertising generates about the same amount of profits as print advertising; on-line advertising has also opened a gateway for national and foreign investors and entrepreneurs. A rapid perusal of the Web in the context of the present study showed about sixty African dailies on line, with about equal representation of English and French publications, as well as about forty weeklies.

In many countries on the African continent the press is parochial, limiting itself to local and national news. Often no information is exchanged with the closest of countries.<sup>257</sup> Conventional news gathering methods using post, telephone, telex and fax are slow, costly and undependable. The use of the Internet is ameliorating these factors. While it would require US\$ 7 to send a fax between London and Accra the same material could be sent at a cost of US\$ .40 via email. Thus it is now easier and cheaper to bring international and regional news to local African newspapers.

MISANET of the Media Institute of Southern Africa (MISA) illustrates how relatively low-cost technologies can be used to set up a news infrastructure for a group of newspapers. MISA<sup>258</sup> a non-governmental organization promoting media freedom and diversity in the Southern Africa Development Community (SADC) region now links 450 newspapers in the region. Founded in 1992 in response to the 1991 Windhoek Declaration on Promoting and Independent and Pluralistic Press, MISA represents independent media workers and the institutions for which they work, and campaigns in particular on media freedom and freedom of expression issues. 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 has linked its members to the Internet.

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<sup>254</sup> *American Journalism Review*, 22 June 1999 (<http://ajr.newslink.org/emcol10.html>).

<sup>255</sup> <http://www.ipl.org/reading/news/>

<sup>256</sup> <http://www.rapide-pana.com/>

<sup>257</sup> "Internet – An opportunity for the media and democracy in Africa?" *PANA and the Panos Institute – Final Report July 1997*.

<sup>258</sup> <http://www.misanet.org/>

The Inter Press Service<sup>259</sup> provides another example of application of the Internet in news gathering and distribution in developing countries. IPS accomplishes this by providing news services in several languages (e.g. Bengali, Chinese and Kiswahili) and also by collecting news stories from local writers in developing countries and sharing those stories with international wire services such as the Associated Press. This offers a means for bridging the gaps between development professionals and rural people through interaction and dialogue, new alliances, inter-personal networks and cross-sector links between organizations.

### 2.8.1.2 Radio

Over 140,000 hours of radio are broadcast every week on the information highway<sup>260</sup>, from more than 8000 stations including more than 300 in developing countries.<sup>261</sup> The World Radio Network (WRN)<sup>262</sup> 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 (the 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)<sup>263</sup> 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.<sup>264</sup>

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<sup>265</sup>. Indeed many radio stations in developing countries are following the model of stations in industrialized countries and providing their services on-line in English and vernacular languages.<sup>266</sup> And unlike FM, Internet radio is not just sound, but typically also contains text, animation and limited video. Another significant advantage of Internet radio is its freedom from regulation in most countries.

Púlsar,<sup>267</sup> founded in 1996 as a Latin American news agency for independent and community media by AMARC was the first experiment of its kind, and by the time the agency celebrated its second anniversary it had correspondents in most countries of the region and was delivering its text and audio clip news service via the Internet to more than 1,000 subscribers in fifty countries. AMARC has recently launched the Moebius Programme-Planet Radio to promote interaction between community radio and the

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<sup>259</sup> <http://ips.org/>

<sup>260</sup> <http://www.cerfnet.com/~amehta/jonogono.html>

<sup>261</sup> A comprehensive list of radio stations with a website and all stations that broadcast live on the Internet is available at <http://wabr.mit.edu/stations/>

<sup>262</sup> <http://www.wrn.org/ondemand/>

<sup>263</sup> <http://www.amarc.org>

<sup>264</sup> <http://nt.oneworld.org/radio/default.htm>

<sup>265</sup> *ibid*

<sup>266</sup> <http://turntable.mit.edu/stations/w-af.html>

<sup>267</sup> <http://www.amarc.org/pulsar/>

Internet.<sup>268</sup> Moebius' first focus is in Latin America and the Caribbean in setting up a radio exchange site on the Internet with satellite access facilities. AMARC surveys the existing infrastructure to determine what is needed in training and technical equipment to create useful and replicable pilot models for radio exchange and distribution services via the Internet and traditional media.

In June 1999, a similar initiative enabled the creation of an Internet-based network of twenty-five local radio stations from all over Indonesia. The country's first democratic elections provided the backdrop to the network's nation-wide diffusion of news and audio clips.<sup>269</sup>

The Kothmale Internet Community radio project in Sri Lanka<sup>270</sup> 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 64KB 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<sup>271</sup> 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.

A more immediate application of Internet technology has been proposed in both India and Bangladesh. The Indian project<sup>272</sup> aims to demonstrate the use of the Internet for the poorest by transmitting health, literacy and other messages to a populace that is illiterate or does not know English. It is envisaged that each village would have community information centres with a multimedia PC connected to the Internet. On this community PC, an audio server could be installed, which in effect would convert it into a radio station, which villagers could use to tape and disseminate audio content. For local broadcast listening without regulatory constraints, output of the sound card on the computer could be fed into an amplifier, and distributed over ordinary copper wire to surrounding houses, each of which only needs a loudspeaker, or by using either telephone wires or coaxial cables used by cable TV operators. In order to receive audio directly from the Internet, households would only need a small Internet Radio, consisting of a simple embedded microcomputer, a loudspeaker, a microphone and a couple of buttons for channel selection. In Bangladesh the Jono-Gono Communicator project is currently at the planning stage with the similar targets.<sup>273</sup>

### 2.8.1.3 Television

Television is increasingly displacing radio as the primary means of receiving information and entertainment, even in developing countries.<sup>274</sup> While the industrialized countries are leading the way in television over the Internet, with hundreds of live and video-on-demand Internet TV sites as well as extensive private broadcasting on intranets, there are already nearly forty stations on line in developing countries including 10 in Brazil.<sup>275</sup>

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<sup>268</sup> <http://www.amarc.org/amarc/moebius-planetradio/english/IndexEnglish.htm>

<sup>269</sup> [http://www.unesco.org/webworld/highlights/indonesia\\_060499.html](http://www.unesco.org/webworld/highlights/indonesia_060499.html)

<sup>270</sup> [http://www.unesco.org/webworld/highlights/internet\\_radio\\_1130599.html](http://www.unesco.org/webworld/highlights/internet_radio_1130599.html), <http://www.kothmale.net/>

<sup>271</sup> <http://www.kirana.lk>

<sup>272</sup> <http://www.cerfnet.com/~amehta/>

<sup>273</sup> <http://www.cerfnet.com/~amehta/jonogono.html>

<sup>274</sup> World Culture report by UNESCO at <http://www.unesco.org/culture/worldreport/index.html>).

<sup>275</sup> An extensive list by country of on-line television stations is available at <http://www.ultimatetv.com/webcasting/intl.html>

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. With traditional multimedia files, such as MPEG (Moving Picture Expert Group) or AIFF (Audio Interchange File Format), the playback device has to wait for the entire file to download before playback can begin. 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 Kbs (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 typically facing high connection costs and less than optimum data rates, are thus at present highly disadvantaged concerning access to this medium.

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. Thus, streaming audio or video often doesn't work too well with live events, despite its popularity. 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.

The role of television has been generally evolving towards one of primarily a source of entertainment, rather than a public service and a disseminator of knowledge, a trend which has been particularly marked in many developing countries over the past decade. The Internet could be seen as a potential means to help reassert the public service function of television, yet developing countries are lagging behind in this area due to technological and financial constraints. This makes it hard to envisage, without a rapid evolution in these constraints, for Web TV to penetrate these countries in the near future, all the more so when rural populations are concerned.

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

There are many serious 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.

The other side of the coin is that the transition towards independent and pluralistic media presents a critical financing problem for the media, which are being forced to cut costs and develop new products to remain competitive. New and more effective use of ICTs should be considered by these media as a major challenge and opportunity in responding to the new environment. The technological changes that have occurred in recent years should encourage the development of co-operation among telecommunication operators, Internet providers and the media with the aim of establishing new partnerships which would fully meet the needs of all both parties, including the public, at the technical and commercial levels.

Technological barriers to information access are also an important issue with users lacking knowledge and skill. Much remains to be done to train journalists and broadcasters to use the Internet. Likewise a major evolution in sensitization, education and empowerment will be needed to bring the advantages of the Internet to the rural populations whose immediate priorities are far different, and who require information in their own language and in a culturally adapted format.



Lastly there are also several ethical issues, and the political concerns of governments will continue to influence the future expansion of the Internet<sup>276</sup>. 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 as we have seen from the many projects initiated thus far, the Internet is too powerful a medium for development of mass communication to be ignored by any society.

## 2.9 Scientific research

The advent and growth of digital telecommunications has accelerated the globalization of science. With the evolution of cost-effective tools and processes to share both instruments and thought, scientific and technological research is being distributed increasingly among remote geographic facilities 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 of scholars, economic actors, and the public via electronic publishing.

Electronic “virtual laboratories” or “collaboratories” are emerging as the key embodiments of cooperative 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 discussed under “environment and disaster management”. The tools employed are increasingly also being adapted to health/medical applications and to creative activities in the social sciences and the humanities.

A recent UNESCO-sponsored expert meeting broadly defined a virtual laboratory as “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.”<sup>277</sup> Virtual laboratories have been mainly pioneered in the industrialized countries, and most particularly the United States, making collaboration tools<sup>278</sup> or instruments<sup>279</sup> widely available on the Internet to scientists with common needs or interests, or sharing such facilities within specific research projects.

At the same time, support for scientific research is stagnating or shrinking in many developing countries, and scientists in these countries lack proper facilities and equipment for conducting research. Developing country researchers and scientists also lack access to scientific research conducted in developing countries and in industrialized countries. Their work is under-represented in much of the documentation and databases that currently exist, and they are also constrained in sharing information with colleagues both domestically and abroad. The result is that researchers and scientists in developing countries are not able to collaborate on an equal footing with their peers around the world, retarding work on development-oriented problems and encouraging the “brain drain” phenomenon.

### 2.9.1 Applications of the Internet in developing countries

In this context, the Internet is increasingly seen as a tool which can assist scientists, planners, and administrators in developing countries to carry out effective research, and reinforce international collaboration in applying science and technology to problems of interest to developing countries.

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<sup>276</sup> Uimonen, Paula (United Nations Research Institute for Social Development). “The Internet as a Tool for Social Development”. *Proceedings of the INet97 Conference, Kuala Lumpur*, Internet Society, 1997 ([http://www.isoc.org/inet97/proceedings/G4/G4\\_1.HTM#s3](http://www.isoc.org/inet97/proceedings/G4/G4_1.HTM#s3)).

<sup>277</sup> James P. Vary (ed.). *Report of the Expert Meeting on Virtual Laboratories, organized by the International Institute of Theoretical and Applied Physics (IITAP), Ames, Iowa, 10-12 May 1999*. Paris: UNESCO, 2000 (CII-2000/WS/1).

<sup>278</sup> E.g. Space Physics and Astronomy Research Collaboratory – SPARC (<http://www.windows.umich.edu/sparc/>).

<sup>279</sup> E.g. the eight remote access instrumentation facilities sponsored by the U.S. Department of Energy within the Materials MicroCharacterization Collaboratory (<http://tpm.amc.anl.gov/mmc/>).

### 2.9.1.1 Networking and electronic information

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. Some are still limited to store-and-forward networks, based on UUCP or simple and robust PC-based technologies like FidoNet, which limit connectivity to basic e-mail and file transfer services.

The development and interconnection of publicly sponsored co-operative “academic and research networks” – dedicated computer networks to provide research centres and universities with basic electronic connectivity and access to specialized computer resources, was the driving force for launching the Internet in the industrialized countries. But although similar priorities have been adopted in some developing countries such as China, South Africa and a number of Latin American countries, this has not been so in many developing countries, notably in Africa, small island countries and Central Asia where the Internet has been organized mainly through commercial initiatives. Internationally supported dedicated networks such as HealthNet, covered above under “Health”, and CGNET, a world-wide network for researchers in the agriculture field originally established in 1984 to serve the sixteen international research institutes of the Consultative Group on International Agricultural Research (CGIAR), have ensured e-mail, data communications and later, Internet connectivity, for a large number of key scientific institutions in developing countries.<sup>280</sup>

A comprehensive picture of the state of information technology in research in developing countries is given in a 1999 study which surveyed 431 leading scientific research centres and universities.<sup>281</sup>

Another study based on a sample of articles in the Los Alamos e-mail based e-preprint archives, a major vehicle used by physicists to exchange scientific papers before publication, showed that about 8% of the authors were from developing countries and only about 1% of the papers involved South-South collaboration; these figures are low, but suggest that electronic exchange may facilitate the work of scientists from developing countries who account for only about 2% of the overall scientific production in scholarly journals.<sup>282</sup> An increasing number of scholarly journals are being published in developing countries, including several available on line as discussed under “information services, libraries and archives”.

### 2.9.1.2 Virtual laboratories

The expanding role of the Internet in research in developing countries can be seen from an example in China, where scientists increasingly use it to more effectively share information and data with colleagues. For example, to overcome the traditional research structure barrier between institutes and universities 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 places to carry out joint projects, which often involve other disciplines as well as physics. They can share the existing equipment and computer

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<sup>280</sup> CGNET now interconnects over 300 locations in more than 100 countries (<http://www.cgnet.com/home.htm>). See also Lindsey, Georg, En Novak, Selçuk Ozgediz and David Balson. *The CGNET Story: A Case Study of International Computer Networking*. Ottawa: IDRC (<http://www.idrc.ca/library/document/026445/>).

<sup>281</sup> Third World Academy of Sciences (TWAS). *Profiles of Institutions for Scientific Exchange and Training in the South*. Trieste: TWAS, 1999.

<sup>282</sup> Canessa, Enrique, Fulvio Postogna and Sandro Radicella (Abdus Salam International Centre for Theoretical Physics). “Enhancing Electronic Collaboration in the South”, *Nature* website for the World Conference on Science (<http://helix.nature.com/wcs/c12.html>).

resources of many different groups to produce successful results more effectively at lower cost. They communicate daily to discuss research problems relying heavily on the use of the telephone, e-mail, fax and the Internet through a 155 Mbps science and technology backbone network recently installed in Shanghai.

An example of an international virtual research is the Whole Earth Telescope (WET) which links astronomers and telescopes in 14 countries including five developing countries to co-ordinate 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.<sup>283</sup>

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

Scientists in the developing countries still need to access to the large amounts of information mainly produced in the developed countries, and 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 (like rich image data) 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.

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 based on data traffic needs and/or introducing sharing methods such as Time Division Multiple Access (TDMA). A regional pilot project Sub-Saharan Africa is being planned by the Abdus Salam International Centre for Theoretical Physics.<sup>284</sup>

The communication infrastructure of the Internet can only be effective if the scientific community organizes its work to take account of the new electronic possibilities. Virtual laboratories connecting these research groups within developing countries and to related groups around the world will be a critical task, requiring, for example, clear understandings among virtual working teams, including agreed rules for collaboration and mechanisms to resolve legal, social or ethical problems. Software should be developed to support distributed databases and effective group work (e.g. whiteboard, 3D viewing when needed) under the communication conditions available in the developing countries including reliance on e-mail protocols for pseudo real-time solutions. International assistance should focus in this context on how developing countries can set up and optimize computer networks and applications for scientific research. Some practical application methods such as mirror servers of major data sites set up in developing countries can be of significant help, although methods need to be improved in the future to more closely emulate true interactivity.

Major issues facing the development of scientific electronic journals concern access to and quality control of information. At recent discussions on these issues, scientists have begun to opt for approaches favouring self regulation. For example, an international conference sponsored by ICSU Press and

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<sup>283</sup> Vary, James P. (ed.), op. cit. The developing countries participating in WET are including Brazil, Chile, China, India and Uzbekistan.

<sup>284</sup> Canessa et al., op. cit.

UNESCO<sup>285</sup> recommended that strict peer review be applied to all scientific material submitted for publication in electronic journals and set in motion consultations of scientific societies in order to formulate codes of ethics and of conduct for electronic publication which would spell out the reciprocal obligations of the scientist and the community on such matters as peer review, citation integrity and authentication of material. 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.

The role of electronic scholarly publication for scientific communities in developing countries was considered in a follow-up workshop<sup>286</sup> involving electronic publishing practitioners from Latin America, Asia and Africa and partner organizations and networks involved in supporting their initiatives. The workshop confirmed that there is tremendous expertise and experience in the regions with less developed scientific and publishing infrastructures, but that greater support, new partnerships, and more effective networking are required to enable sharing and development of appropriate and sustainable models.

Virtual laboratories and electronic journals, as well as digital libraries as discussed earlier, 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.

Insufficient computer literacy of researchers in countries that are new to the Internet is also a problem, usually correlated with insufficient understanding of the potential of the Internet as a tool for collaboration and dissemination (as opposed to its use for accessing information generated elsewhere). 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 pre-prepared kits with software enabling e-collaboration.<sup>287</sup>

### 3 Local content and empowerment

*“Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers.”*

Article 19, Universal Declaration of Human Rights<sup>288</sup>

*“(1) Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits.”*

*“(2) Everyone has the right to the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author.”*

Article 27, Universal Declaration of Human Rights

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<sup>285</sup> International Council of Scientific Unions (ICSU) Press and UNESCO. *Electronic publishing in Science. Proceedings of the Joint ICSU Press/UNESCO Experts Conference, Paris, February 1996*. Paris: ICSU Press, 1996 (ISBN 0-930357-37-X).

<sup>286</sup> Workshop on Scientific Communication and Publishing in the Information Age, organized by the British Council and the International Network for the Availability of Scientific Publications (INASP), Oxford, UK, 10-12 May 1999 (<http://www.oneworld.org/inasp/psi/index.html>).

<sup>287</sup> Vary, James P. (ed.), op. cit.

<sup>288</sup> <http://www.un.org/Overview/rights.html>

The above fundamental rights can only be ensured by the empowerment of citizens to produce and access information content. As one author recently observed: "The technology is only a tool, and only as useful as the information it carries. Thus we must continually be aware of the need for content."<sup>289</sup>

Local content on the Internet refers to applications and content that are relevant to local needs and produced by local people, local NGOs or community groups, or other representative institutions. Local content can also be foreign content that has been validated and adapted for local use. 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 thus also linked to the global context of the development of the information society and especially to its social, political, educational and cultural challenges. Since the development of the information society should support global development, local content production should help to bridge the gap between the "haves" and the "have-nots" in a global information society.

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. Another important element is the cultural sensitivities that influence the level and the need for local content. The definition of local content and the content itself can thus vary according to the target group or public.

Is the content that exists on the Internet useful and relevant to the local end-users? To answer this, several elements should be considered: availability and quality of the content, its social and cultural acceptability, cost-effectiveness and sustainability of content production, and fair access to the Internet.

The scope of local content is often wider than the local community and may well refer to content used or produced by institutions working at the sub-national or national levels. The designation of local content may even be applied to international groupings sharing a common cultural, linguistic or geographic context, for example the Francophone community<sup>290</sup> which has organized international consultations at the highest level and a wide range of assistance programmes for developing countries to promote and ensure the presence of the French language and French speaking cultures on the Internet. The internationalization of the concept of local content may also have a strong economic motivation when content produced in one developing country can be made available more economically to others than content imported from the industrialized world. Thus, educational content produced in South Africa and available on line is adopted in 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.<sup>291</sup> An expansion of Internet use could allow better co-operation on the production and delivery of locally relevant content at the national and international levels, provided that the view of the individual citizen and community remains the basic reference frame.

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<sup>289</sup> Bray-Crawford, Kekula P. "The Ho'okele Netwarriors in the Liquid Content." In: Harcourt, Wendy (ed.), *Women @ Internet*, London: Zed Books, 1999.

<sup>290</sup> <http://www.francophonie.org>

<sup>291</sup> Chaudhary, Sohanvir S. *Communication Technology for Enhancement and Transformation of Open Education: The IGNOU Experience*. PAN Commonwealth Forum on Open Learning, 1-5 March 1999, Brunei Darussalam (<http://www.col.org/forum/forum.htm>).

### 3.1 Production of local content

The production of local content refers to both the production of new content and the digitization of existing content. It covers a diversity of forms ranging from individual contributions to electronic discussion groups to electronic publications, databases and multimedia applications.

The constraints and barriers to content production are well known and can be economic, political, administrative, social, cultural and technical in nature. Barriers to use of local content are also barriers to production because without a local market production is impossible. 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 important 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, likewise preventing users in developing countries from benefiting fully from Internet access. Illiteracy and media illiteracy also constitute important barriers to the production and the dissemination of local content in the developing countries.

Motivations to create local content on the Internet correspond to a large variety of situations, target audiences and needs. Nevertheless, two main major technical advantages can be cited: i) to make needed information available to a larger public, and ii) to take advantage of new attractive possibilities of the Internet as a medium (faster, cheaper and more versatile than the traditional media). These advantages can equally well provide motivation for public service and commercial content creation. In addition, 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.

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 information made freely available without cost by its authors.

Another major consideration is training and capacity building – a pre-requisite for the effective adoption of the Internet as a tool by local content producers and also a first step in the emergence of new high value added local content industries. The capacity building programme for public and private environmental actors in Central America discussed in the last chapter under “environment and disaster management” is an example of an activity responding to this particular professional need. 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.

From the above, it is clear that the Internet is an information medium that can facilitate the production and dissemination of more and of better quality content in the developing countries. But it is also seen that the quality of content on the Internet not only depends on its producers – whether individual, institutional, or corporate – but also reflects the general enabling environment which presents substantial difficulties in many developing countries.

To encourage the production of quality local content, a variety of stimulating initiatives are possible at the national and international levels. Among these are Web competitions which can be very effective in promoting the idea of local content in developing countries, for example the UNESCO Web Prize<sup>292</sup> and the TOP50 Web competition in Africa.<sup>293</sup>

### 3.2 Indigenous knowledge and expression

Indigenous 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, indigenous knowledge, or “traditional knowledge” which is considered here as an equivalent term, 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.

The Declaration on Science and the Use of Scientific Knowledge adopted at the World Conference on Science, Budapest, 26 June to 1 July 1999,<sup>294</sup> recognized the importance of traditional and indigenous knowledge in considering:

*“26. that traditional and local knowledge systems as dynamic expressions of perceiving and understanding the world, can make and historically have made, a valuable contribution to science and technology, and that there is a need to preserve, protect, research and promote this cultural heritage and empirical knowledge”*

and in stating under “Science for Development” that:

*“38. ...There is also a need to further develop appropriate national legal frameworks to accommodate the specific requirements of developing countries and traditional knowledge, sources and products, to ensure their recognition and adequate protection on the basis of the informed consent of the customary or traditional owners of this knowledge”.*

According to one assessment in rural villages in Botswana, Malawi and Tanzania,<sup>295</sup> it appeared that most of information needs in agriculture, health and personal development were being adequately fulfilled by already existing indigenous knowledge, but that this knowledge was being lost due to a disappearance of traditional communication links, to the point that most of the villagers were hostile to its use.

In 1998, the first UNESCO Web Prize was attributed to a Brazilian website<sup>296</sup> presenting two indigenous tribes. This example illustrates the growing presence of indigenous groups on the World Wide Web but also demonstrates the ambiguity of this presence as an expression tool of indigenous people – because the site was created by two Brazilian graphic artists who are not members of the tribes in question.

A very large number of websites on the cultures and knowledge of indigenous peoples are referenced by the resource centre of the NativeWeb website<sup>297</sup>, run by a group of volunteers, and by the Virtual Library section of the website of the Centre for World Indigenous Studies (CWIS),<sup>298</sup> a not-for-profit institution

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<sup>292</sup> <http://www.unesco.org/webworld/webprize>

<sup>293</sup> <http://www.woyaa.com/top50>

<sup>294</sup> <http://www.unesco.org/science/wcs/>

<sup>295</sup> Mchombu, Kingo. “Impact of Information on Rural Development: Background, Methodology, and Progress. Making a Difference”. In: Paul McConnell (ed.), *Measuring the Impact of Information on Development: Proceedings of a Workshop held in Ottawa, Canada, 10-12 July 1995*. Ottawa: IDRC, 1995 (ISBN 0-88936-783-3). Available at <http://www.idrc.ca/books/focus/783/mchombu.html>

<sup>296</sup> <http://www.unesco.org/webworld/webprize/index.htm>

<sup>297</sup> <http://www.nativeweb.org>

<sup>298</sup> <http://www.cwis.org/>

in the USA dedicated to study of and policy advice concerning indigenous peoples. The NativeWeb site also offers discussion groups, message boards, and postings of job offers and relief appeals, and a participatory book review section, all concerning the indigenous peoples of the Americas.

Almost all of the referenced sites are produced by scholarly or other not-for-profit institutions in the industrialized countries, e.g. the Abya Yala Net site<sup>299</sup>, hosted by NativeWeb, which presents extensive information on indigenous peoples in Mexico and Central, and South America and the “Cultura de los Andes” website,<sup>300</sup> which presents various Quechua culture in English and Spanish including songs with words and music, dances, poetry, as well as the Bible in Quechua and some Quechua lessons.

Among the relatively few sites claiming to be produced by or for indigenous peoples’ groups, and voicing their views,<sup>301</sup> are Amanaka’a Amazon Network (environmental education, indigenous rights, rain forest protection),<sup>302</sup> Cyber Jumma (the virtual archive of the Jumma people of Chittagong Hill Tracts, Bangladesh),<sup>303</sup> the Ogiek<sup>304</sup> website (initiated by an international coalition to protest the expulsion of the Kenya’s indigenous Ogiek tribe from its habitat) and Tirisnet<sup>305</sup> (information about the Sahrawi people in refugee camps in Algeria).

Several international initiatives have been established to collect, codify, preserve and disseminate indigenous knowledge with the help of the Internet.

The World Bank is developing the Indigenous Knowledge Initiative, whose objective is to “enable the development partners to learn more about the local practices in client countries so as to better adapt global knowledge to local conditions, and to design activities to better serve the country needs”. A major product of this initiative is the development of an indigenous knowledge database,<sup>306</sup> containing at the time of writing about 200 records of indigenous best practice in Africa, each presented in summary form with reference to the source, be it an institution or individual, a full on-line article, or a bibliographic reference. The information is contributed on a participatory basis, encouraged by networking efforts in several parts of the world, with input so far mainly from scholarly sources, institutions in the industrialized countries or international organizations.

A similar initiative on UNESCO’s Management of Social Transformations (MOST) Clearing House website is the Register of Best Practices on Indigenous Knowledge that is the result of co-operation with the Centre for International Research and Advisory Networks (CIRAN). The MOST/CIRAN Database<sup>307</sup> includes at the time of writing 27 best practice examples from Africa, Asia, Europe and Latin America that can be searched through thematic, geographical and institutional indexes. All best practice examples are accessible in full text on the website.

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<sup>299</sup> <http://abyayala.nativeweb.org/>

<sup>300</sup> <http://www.andes.org>

<sup>301</sup> Often including claims for redress – reference of these sites indicates no opinion whatsoever of the validity of the information presented.

<sup>302</sup> <http://www.amanakaa.org/>

<sup>303</sup> <http://www.shobak.org/jumma/>

<sup>304</sup> <http://www.ogiek.org/>

<sup>305</sup> <http://www.tirisnet.org/>

<sup>306</sup> <http://www.worldbank.org/afr/ik/datab.htm>

<sup>307</sup> <http://www.unesco.org/most/bpikreg.htm>



### 3.3 Multilingualism

Local content should be understandable and appreciated by local users. Although the criteria for the appreciation of images and sounds in different cultures are in large degree subjective, there are also objective criteria by which local content can be evaluated, the most important of which is probably its language(s) of presentation. According to *The Ethnologue, Languages of the World* study<sup>308</sup>, the ten top languages by native speaking population are: Mandarin Chinese (885,000,000), Spanish (332,000,000), English (322,000,000), Bengali (198,000,000), Hindi (182,000,000), Portuguese (170,000,000), Russian (170,000,000), Japanese (125,000,000), standard German (98,000,000) and Wu Chinese (77,175,000). This same work lists 6,703 living languages in the world. Asia and Africa amount for 66% of these languages, while the Americas account for 15%.<sup>309</sup>

Global Reach<sup>310</sup> presents the latest estimated figures for the language capability of the approximately 400 million Internet users on the Internet in early 2001: About 47.5% of the world on-line population speaks English and 52.5% another language, of which 28.9% speak European languages (including about 14 million Spanish and 10 million Portuguese speakers in developing countries), 23.5% Asian languages (Chinese 9.0%, Japanese 8.6%, Korean 4.4%, others 1.5%) and about 0.6% Arabic with about 2.5 million on-line users (African users are apparently all listed as accessing the Internet in a European language or Arabic). Moreover, the non-English users are increasing faster than English speaking users, and this site predicts that they will account for more than 70% by 2003.

Although for technical and commercial reasons it is not feasible to exhaustively inventory content on the Web, the relative amount of content in languages other than English has certainly substantially increased since a 1996 study<sup>311</sup> found that about 82% of websites were in English, and less than 2% in non-European languages, of which the share of indigenous developing country languages was infinitesimal (the first at that time was Malay in 15<sup>th</sup> place with 0.1% of the sites). This equalizing trend can be seen in the 2001 Global Reach data indicating that the number of Internet servers providing information in Asian languages has risen to about 43% of those using non-English European languages. But English is still the dominant language in terms of Web content, and the relative supply of non-English content is still largely insufficient relative to demand in terms of Internet users.

This situation is mitigated by the fact that, due to historical reasons, some developing countries are able to access the Internet in a foreign language. For instance, according to Global Reach perhaps 180,000 users in India and 100,000 in the Philippines are using English to access the Internet. Many citizens of Francophone countries can surf the Web in French, and the official sites of most Francophone developing countries are in French.

Although agreement on international languages in cyberspace facilitates international communication and collaboration, 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 be overcome to achieve multilingualism on the Internet.

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

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<sup>308</sup> Grimes, Barbara F. (Ed.). *Ethnologue: Languages of the World*, Thirteenth Edition. SIL International, 1999 (<http://www.sil.org/ethnologue/top100.html>).

<sup>309</sup> <http://www.sil.org/ethnologue/distribution.html>

<sup>310</sup> Global Reach (<http://glreach.com/globstats/index.html>). Extensive references are given for the figures for individual languages.

<sup>311</sup> <http://babel.alis.com/palmares.html>

transmitted directly with international standard (ISO 8859), or other agreed 8-bit coding schemes. The latter are widely available on the Internet, for example through the Yamada Language Centre<sup>312</sup> which provides pointers to language related websites, newsgroups and mailing lists covering 115 languages, and free downloading of 112 fonts for 40 language scripts.

A further important development is the Unicode<sup>313</sup> standard 16-bit encoding (compatible with ISO/IEC 10646-1:1993) 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 all the languages that can be written in the following scripts: Latin, Greek, Cyrillic, Armenian, Hebrew, Arabic, Syriac, Thaana, Devanagari, Bengali, Gurmukhi, Oriya, Tamil, Telegu, Kannada, Malayalam, Sinhala, Thai, Lao, Tibetan, Myanmar, Georgian, Hangul, Ethiopic, Cherokee, Canadian-Aboriginal Syllabics, Ogham, Runic, Khmer, Mongolian, Han (Japanese, Chinese, Korean ideographs), Hiragana, Katakana, Bopomofo and Yi. However, some scripts are not yet supported, e.g.: Kirat (Limbu), Manipuri (Meithei, Kanglei), Moso (Naxi), Pahawh Hmong, Rong (Lepcha), Tai Lu, Tai Mau and Tifinagh. A more fundamental 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; in addition Unicode doesn't contain enough code space to capture all ideographs, so that it cannot perfectly render all CJK texts, particularly classical literature.<sup>314</sup>

Multilingual Internet interfaces are developing at a quick space, 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.<sup>315</sup> The Multilingual Information Society website of the European Commission<sup>316</sup> has an extensive list of multilingual applications in web available and workable multilingual applications, but these cover primarily European languages.

A great variety of on-line dictionaries, glossaries and other linguistic tools is available on the Internet. For example the "Web of On-line Dictionaries" website<sup>317</sup> provides links to free and commercial products for more than 230 languages, the vast majority of which have been developed by institutions and enterprises in the industrialized countries. For example, the Kamusi project,<sup>318</sup> developed by Yale University (USA) 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.

When it comes to translation services the Internet is home to many language translation sites that offer everything from simple on-line dictionaries to e-mailed translation services. From the desktop, one can request a translation by selecting to pay for human translation. The global nature of the Internet has

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<sup>312</sup> <http://babel.uoregon.edu/yamada/guides.html>

<sup>313</sup> <http://www.unicode.org>

<sup>314</sup> Auh, Taik-Sup (Graduate School of Journalism and Mass Communication, Korea University). "Promoting Multilingualism on the Internet: Korean Experience". Presented at InfoETHICS '98: Ethical, Legal and Societal Challenges of Cyberspace, Principality of Monaco, 1-3 October 1998 ([http://www.unesco.org/webworld/infoethics\\_2/eng/papers/paper\\_8.htm](http://www.unesco.org/webworld/infoethics_2/eng/papers/paper_8.htm))

<sup>315</sup> <http://www.call.gov/resource/language/mulbtool.htm>

<sup>316</sup> <http://www2.echo.lu/mlis/en/present/applicationlist.html>

<sup>317</sup> <http://www.yourdictionary.com/>

<sup>318</sup> <http://www.cis.yale.edu/swahili/>

proven a boon to translation services, such as *TAR Communication* in New York, which translated Web-based press releases into 28 languages during the Atlanta Olympic Games in 1996; business via the Internet is expected to account for 30 per cent of the translation work within the next five years.<sup>319</sup>

Given the volume and variety of messages on the Internet, however, exclusive reliance on human translation appears to be an unrealistic proposition. It is too slow and costly to make it a sensible choice for maintaining multilingual websites. A viable alternative in the longer term is machine-aided translation, which is being vigorously pursued in research and development with somewhat mixed results. At least one major Internet search engine already offers a basic automatic translation facility for Web pages on its website,<sup>320</sup> handling translation to and from English for French, German, Italian, Portuguese and Spanish. The United Nations University's Universal Networking Language (UNL) project<sup>321</sup> is working to develop an Internet plug-in that will facilitate communication between peoples, by allowing all Internet users to translate "enconvert" text from a natural language of their choice into the UNL "meta-language" and then to "deconvert" the text from UNL into another language. The project, started in 1996, will take 10 years to complete, the first phase being devoted to creating conversion modules for Arabic, Chinese, English, French, German, Greek, Hindi, Indonesian, Italian, Japanese, Korean, Latvian, Mongolian, Portuguese, Russian, Spanish, Swahili, and Thai. Its mission is to include all the languages of the 189 member states of the United Nations.

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 are locally producing and using software to overcome these problems. In India, for example, the Graphics and Intelligence based Script Technology (GIST) developed by the Centre for Development of Advanced Computing<sup>322</sup> includes a font library for representation of fourteen Asian scripts, keyboard layouts for Indian scripts, and spell check dictionaries for different languages while another enterprise, Lastech, has developed IndoMail, an email software package available in twelve Indian languages.<sup>323</sup> In Pakistan, the Raakim company<sup>324</sup> offers a free Web-based e-mail service in seven languages written in the Arabic script.

The Lusitano website<sup>325</sup> in Portugal provides access to Portuguese search engines and to the first Portuguese Internet browser, which was developed in co-operation with Microsoft and is designed to economize memory relative to the standard Internet Explorer product. Although not a developing country initiative, these tools developed in the spirit of international co-operation provide an interesting model for other languages as well as being useful to the much larger Portuguese-speaking communities in Brazil and Africa.

"La Plaza",<sup>326</sup> the network interface software developed and used by the Enlaces programme in Chile, discussed in the last chapter, has been specially designed as a meeting place for Chilean students and teachers and to facilitate their access to computer and telecommunication tools. It is composed of four

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<sup>319</sup> Auh, Taik-Sup. Op. cit.

<sup>320</sup> <http://babelfish.altavista.digital.com/cgi-bin/translate>

<sup>321</sup> <http://www.unl.ias.unu.edu/>

<sup>322</sup> <http://www.cdac.org.in/html/gist/articles.htm>

<sup>323</sup> <http://www.lastech.com>

<sup>324</sup> <http://raakim.com>

<sup>325</sup> <http://www.lusitano.pt>

<sup>326</sup> <http://www.enlaces.cl/internet.html>

principal elements: the cultural centre (a tool for collaborative projects, exchange of experience and questions for teachers); mail (an easy-to-use e-mail interface with different mail boxes for students and teachers); the Kiosk (on-line publications organized by theme to stimulate reading and writing) and the Museum (educational material for teachers). On the Enlaces website, an electronic manual provides explanations on installation, configuration and administration as well as a glossary of the terms required.

### 3.4 User empowerment and co-operation

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 not only as a vehicle for production, promotion, dissemination and access, but also 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.

Virtual communities in which users discuss, co-operatively plan and work, or otherwise relate in cyberspace are particularly important in this context. 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. New tools such as Internet based groupware, allowing for example decentralized document or website management, are making more sophisticated interaction within virtual communities increasingly possible for users in developing countries.

The preceding chapter has shown a wide range of examples of virtual communities active in development related activity, representing a diversity of populations including academics, producers, and minority groups working on applications ranging from education and learning (Learning Networks for African Teachers) or agriculture and rural development (farmers in Mexicali, Mexico) to scientific research (Whole Earth Telescope).

Another example is the WON (Women on the Web)<sup>327</sup> project set up by the Society for International Development with UNESCO support to provide a gender-friendly, multicultural perspective on international communication systems. WON’s first aim is to encourage women to use the Internet, particularly in the South and in marginalized groups in the North. The resultant collective presence is being applied to ensure a gender point of view in the emerging cyberculture, to bring together women and men to explore a transnational women’s movement agenda, and to create a Web based resource for these activities. The main mechanism for communication is a discussion list set up in the mid-1997, bringing together academics, activists and technologists from nearly 40 countries, mainly in the South and from concerned international organizations.

Other user communities co-operate with varying degrees of virtuality in self empowerment and in the development of local content. One interesting model is that of the “public service sector telematics user consortium” which federates the telematics experience and demand of the public sector, civil society, and other not-for-profit development actors to share promotional, training and capacity building, negotiate affordable tariffs with telecommunication operators and ISPs, lobby for appropriate public policies, and when appropriate ensure Internet service provision to the least advantaged sectors of society.

An example of such a public service consortium is developing in Ghana where, despite being one of the most advanced countries in sub-Saharan Africa in the telematics area with a liberalized telecommunication sector and four private ISPs serving an estimated 8000 users, public service sector institutions had not been able to take full advantage of the Internet because of budgetary and physical

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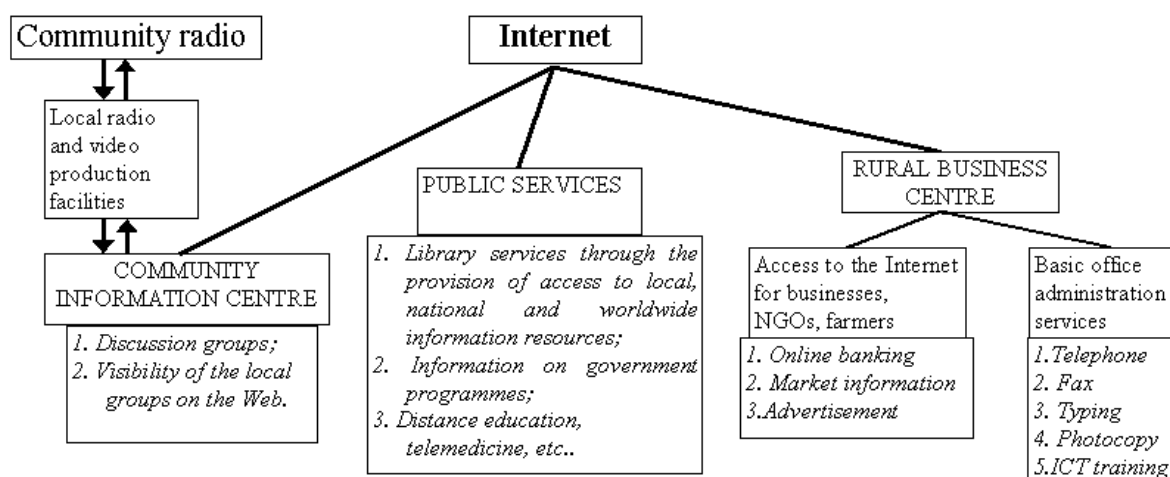
<sup>327</sup> <http://www.sidint.org/won/index.htm>

access constraints. The Ghana National Committee on Internet Connectivity (GNCIC)<sup>328</sup> – with representatives of universities, government departments and other public service institutions – is working closely with private sector operators and public authorities to improve connectivity and stimulate telematics development in the public service sector, with support from the ITU, UNDP, UNESCO and the World Bank. A national Internet Training Centre was set up in 1997 at the University of Ghana to provide facilities for training in network skills for the public and private sectors. A survey of the telematics situation in the country was conducted to identify the size of the problem and seek solutions to it, and was discussed at a National Conference of public service sector telematics users organized in January 1998. Follow-up activity supported by the World Bank's infoDev programme has created a pilot national public service telematics backbone network with points of presence providing a pilot Internet service for 100 public service institutions.

Multipurpose Community Telecentres (MCTs), already discussed in some detail in the last chapter under “governance”, may be seen as 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. 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), although the dividing lines are not always clear in practice. MCTs can also provide facilities for the generation and exchange of community based information and forums for participatory democracy, particularly through interfaces in the vernacular language, and can link to “traditional” community media such as radio for outreach activities.

The integration of information and informatics technologies with mass media facilities, particularly community radio, in a single institution or a partnership, leads to the concept of a community multimedia centre (CMC) which has recently been developed as a programme thrust of the Global Knowledge Partnership under UNESCO “championship”.<sup>329</sup>

The MCT/CMC approach, with its three basic functional areas for content development and access, is presented schematically in the diagram below:



**Functional scheme for a community multimedia centre (MCT plus community radio)**

<sup>328</sup> <http://www.gncic.org.gh/>

<sup>329</sup> [http://www.unesco.org/webworld/public\\_domain/kothmale.shtml](http://www.unesco.org/webworld/public_domain/kothmale.shtml)

### 3.5 National policies and public incentives

Public policies have been widely applied to promote the development of and access to local content in the developing countries. But, as shown by a 1999 report<sup>330</sup> by the International Federation for Information and Documentation (FID) on national informatics policies and strategies in 25 industrialized and developing countries, policy on local content is generally seen as part of an overall long-term evolution of an Information or Knowledge Society relevant to social, cultural, and economic needs at the national level, dependent on building national capacities at all levels. Policy elements to promote it thus fall into several general areas:

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

In practice it is often difficult to separate examples of measures in the first two complementary areas, since most national strategies take both into account.

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.<sup>331</sup> 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<sup>332</sup>. In Mexico, the informatics development programme for 1995-2000 gave 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.<sup>333</sup>

Several developing country strategies are placing a strong emphasis on telematics, starting in the field of government information but extending to other types of local information and applications. In Egypt, the Cabinet Information and Decision Support Centre (IDSC) launched the Egypt Information Highway<sup>334</sup> in 1995 to develop national content on the Internet. The programme was structured in four pilot projects: TourismNet, CultureNet, HealthNet and GovernoratesNet (information on the administrative regions of Egypt). The Egyptian Information Highway now also includes the LibrariesNet and a Government on line section. Most of the on-line content is available in Arabic as well as English. LibrariesNet provides access to a directory of more than 80 major Egyptian libraries and to more than 380,000 bibliographic references. The latest component of the Egypt Information Highway is the TACC community telecentres already mentioned, seen as the last part of a chain linking to the Egyptian population in the perspective of development of the information society.

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<sup>330</sup> International Federation for Information and Documentation (FID). *National Informatics Policies and Strategies: Report on a Study carried out on the behalf of UNESCO*. Paris: UNESCO, 1999 ([http://www.unesco.org/webworld/highlights/fid\\_030699.html](http://www.unesco.org/webworld/highlights/fid_030699.html)).

<sup>331</sup> <http://www.ncb.gov.sg/ncb/vision.asp>

<sup>332</sup> <http://www.fkii.org.kr/english/korea.html>

<sup>333</sup> [http://world.presidencia.gob.mx/pages/library/od\\_informaticsdev.html](http://world.presidencia.gob.mx/pages/library/od_informaticsdev.html)

<sup>334</sup> <http://www.idsc.gov.eg/>

The India Technology Action Plan<sup>335</sup> is a three-pronged programme including the objective of “IT for all by 2008”, the other two objectives being “Info-Infrastructure Drive” and “Target ITEX-50” (software export). “IT for all by 2008” is associated with “Operation Knowledge” aiming to make computer and Internet access available in academic institutions and hospitals by 2003, boost IT for agricultural and integrated rural development, and make governmental information available to the public through the implementation of on-line databases. The National Informatics Centre is already developing the India-image project<sup>336</sup> through which central and state government organizations are assisted to design, develop and host official websites.

In South Africa, the Ministry for Posts, Telecommunications and Broadcasting<sup>337</sup> has the mission to develop universal access for all South Africans not only to basic telephone services but also to the Internet and ICTs. Services such as public information, telemedicine, tele-education will be implemented to improve the general living conditions and contribute to the economic growth of the country, by empowering people in the way they work, live and play.

The Romanian “National Strategy for Informatization and Fast Implementation of the Information Society”<sup>338</sup> foresees in the short term (by the year 2000) the establishment of a national information infrastructure as a backbone for the informatization of central and local public administration, development of a national ICT industry, especially in the software area, and creation of favourable conditions for large scale use of ICTs in industry, trade, agriculture, defence, tourism, health, environmental protection, education, research and culture, while in a longer term (by the year 2005) the empowering information infrastructure will reach the village level.<sup>339</sup> The corresponding Action Programme<sup>340</sup> establishes a schedule to implement a range of local content including the development of data banks for public access (1998-2002), covering legislation, statistics, cultural heritage works, a national catalogue of libraries and museums, patents and inventions, technical standards and recommendations, education and the national archives.

The FID study<sup>341</sup> shows that several developing and newly developed countries have given special emphasis to culture and language on the Internet and in informatics in general. One of the recommendations of the India Technology Action Plan is to initiate a promotional campaign to boost ICT use in Indian languages. In Singapore, content regulation is one of the six principal policy issues identified and is seen in terms of how to “block objectionable materials on the Internet”, “protect national interests against undesirable materials”, and “reconcile conflicting cultural values in information content”. In Romania, it has been proposed that all computers be sold with keyboards with Romanian diacritics.

The Chinese Research Network (CERNET) already mentioned is hosting several institutions and websites all in Chinese as an effort to develop national on-line content and as well as represents an important gateway to Chinese content on the Internet. This website<sup>342</sup> includes links to networks in China, academic journals and institutions, China Homepage (information in Chinese and in English on Chinese regions), free software, travel information, etc.

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<sup>335</sup> <http://www.indianembassy.org/special/itplan/itplan-intro.htm>

<sup>336</sup> <http://www.nic.in>

<sup>337</sup> <http://docweb.pwv.gov.za/>

<sup>338</sup> <http://info.cni.ro/strategy.htm>

<sup>339</sup> <http://info.cni.ro/strategy.htm>

<sup>340</sup> <http://info.cni.ro/a2e.htm>

<sup>341</sup> International Federation for Information and Documentation (FID), op. cit.

<sup>342</sup> <http://www.cernet.edu.cn/>

In Russia, the website of the State Institute of Information Technologies and Telecommunications (“Informika”),<sup>343</sup> a state scientific enterprise committed in the development of ICTs in education and science, includes a wide range of information in Russian including databases and publications dealing with education. Informika is co-ordinating the activity of 89 Regional Centres for New Information Technologies, based in large universities, with a mandate to help introducing ICTs in education and in the society as a whole.

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.

In Vietnam, one of the “Policies and Principal Measures for Promoting IT Development” is the protection of intellectual property and authors’ rights. In this case, the focus is mainly on the protection of rights in respect of software and other ICT-related products, as a requirement in creating a healthy environment for the development of ICTs in the country. The outline of the ICT policy and legal framework for Singapore identifies three concerns with regard to intellectual property rights: how to manage and acquire rights in the digital environment; how to prevent piracy of copyrighted works; how to extend the current copyright regime to include digital works.<sup>344</sup>

In Brazil, Law No. 9.610 of 19 February 1998<sup>345</sup> updates and consolidates the existing legislation on authors’ rights and includes specific provisions relating to audiovisual works and computer programmes, and to their distribution by present and future electronic methods. It also applies to the inclusion of such works in databases, their storage in computers, on microfilm and on other media, as well as any other existing or future modes of usage. A separate Brazilian law of the same date (No. 9.609)<sup>346</sup> makes detailed provisions concerning intellectual property rights for computer software and its commercialization within Brazil. Author’s rights in software are protected for a period of 50 years, and apply also to authors living abroad, providing that their country of domicile grants equivalent rights. These rights are protected whether or not the software is registered; but the law provides for the establishment of an official registration system. Software vendors are obliged to provide users with technical support for their programs during their stated period of validity. Other sections cover the licensing of the use and sale of software and the transfer of technology, and specify the penalties for infractions, which include prison sentences or fines.

The European Commission adopted, effective in 1998, a “Databases Directive” that created a new “Sui Generis” right which protects databases resulting from the mere “selection or arrangement” of any data without the requirement to prove an “intellectual creation”. A similar proposal of the World Intellectual Property Organization (WIPO) has not yet been accepted, because of fears of both users and data producers that it would unfairly encroach on their rights. The Brazilian Law 9.610 mentioned above does, however, include a provision for awarding copyright to a database which ensures the exclusive right to authorize or prohibit its complete or partial reproduction, translation, adaptation, rearrangement or modification as well as the distribution of the original database, copies of it, or the results of operations performed on it.

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<sup>343</sup> <http://www.informika.ru>

<sup>344</sup> International Federation for Information and Documentation (FID), op. cit.

<sup>345</sup> <http://www.mct.gov.br/conjur/lei/lei9610.htm>

<sup>346</sup> <http://www.mct.gov.br/conjur/lei/lei9609.htm>



On the other hand “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), to which may be assimilated a growing amount of “copy-left” information produced by authors willing to allow their intellectual works to be disseminated freely under certain conditions (e.g. respect for their integrity and paternity in the case of scientific research results and obligation to share the benefits of further development in the case of open source software).

The national electronic public domain is in fact part of a vast and growing international virtual public library that complements, and 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 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.<sup>347</sup>

Another aspect of copyright, bridging the commercial and public domains, are the exceptions for “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. The interpretation of these fair use rights for the general public in cyberspace could include the possibility to:

- read, listen to, or view publicly marketed copyrighted materials privately, on site or on line;
- browse freely on Internet sites;
- experiment with variations of copyrighted material for fair use purposes, while preserving the integrity of the original;
- 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.

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

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

Few countries have explicitly considered how “fair use” rights should be defined in the digital environment, leaving ambiguities in interpretation with the risk that these rights will be diluted. This risk is compounded by the increasing use of “pay per view” contracts for access to information published on line, making it very difficult for the user to take advantage of a *bona fide* fair use right. The 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 information society context and in participating in the international debate on this subject.

The above treatment has intentionally emphasized specific examples of policy frameworks to foster the application of the Internet to development. Many of the wider, underlying legal, ethical and social questions which are critical in this context at the national, community and individual levels go beyond the

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<sup>347</sup> Kaul, Inge, Isabelle Grunberg and Marc A. Stern (Eds.). *Global Public Goods: International Cooperation in the 21st Century*. Oxford University Press, 1999 (excerpt available at <http://www.undp.org/globalpublicgoods/>).

realm of the present analysis and have not been treated in detail; the reader is referred to the Observatory on the Information Society<sup>348</sup> and the series of INFOethics conferences organized by UNESCO, the latest of which was held in Paris in November 2000.<sup>349</sup>

## 4 Conclusions

The evolution of Internet applications for development has been diverse and dynamic over the few years that the Internet has been available in most developing countries. Progress has been pronounced in Latin America, in East and Southeast Asia, in Africa with substantial levels of international support, and in numerous other countries of developing regions and sub-regions. As shown in this study, these applications benefit considerably from partnerships, not only with public agencies but also with non-governmental organizations, the international community and increasingly the private sector. Nevertheless, the applications which have been identified are often in the pilot or planning stage, and generally lag behind those of the industrialized countries in sophistication and interactivity. On the other hand, many of these applications have shown that major enabling impact of the Internet can be obtained with relatively simple tools like e-mail or basic WWW sites.

While it is difficult to precisely define "local content" or to measure the impact of public service Internet applications, it is clear that the adaptation of content and applications to respond to local needs by local institutions is a critical criterion in successfully applying the Internet in development.

However, public service institutions in developing countries – such as universities, research centres, libraries, museums, NGOs, local communities and government agencies – which are by their very nature essential actors in innovation and capacity building for the information society, are facing considerable difficulties in participating in the information revolution because of economic and regulatory obstacles, particularly where the Internet has been developed solely on a commercial basis. As opposed to the situation in the industrialized countries where the original "raison d'être" for the Internet was service to and by the academic and research communities in the public interest, regulatory practice and economic reality in many developing countries do not encourage the development of public service, not-for-profit application of the Internet which would empower and enable national development programmes as well as excluded and disadvantaged populations.

### 4.1 Economic obstacles

The greatest problem encountered by potential public service application developers and users in developing countries is limited availability and high costs of access to the Internet, particularly in smaller, disadvantaged and rural communities. With the exception of relatively few major institutions in developing countries, such as research centres, universities and libraries, the immediate public service need is not broadband access, nor improved reliability and security, nor other advanced technical features. It is rather universal access to basic Internet services which is the first step in narrowing the digital divide.

The problem of access costs is in large part determined by the underlying telecommunication tariffs and Internet connection charges which remain high in developing countries where Internet use is still often considered in terms of simple channel occupancy rather than as a competitive market segment, or where the Internet is seen as an elite service rather than for its vast market enabling potential. Another specific problem is that, despite the adoption by the recent World Telecommunication Standardization Assembly of a Recommendation setting out the principle of bilateral agreements between ISPs on international circuit cost sharing,<sup>350</sup> ISPs in developing countries are typically obliged to pay the full cost of a leased

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<sup>348</sup> <http://www.unesco.org/webworld/observatory/index.shtml>

<sup>349</sup> <http://www.unesco.org/webworld>

<sup>350</sup> <http://www.itu.int/newsarchive/press/releases/2000/22.html>

circuit to achieve international connectivity. In order to achieve the expected impact of the Internet on development, public authorities, users, telecommunication operators and Internet service providers should work together in their common interest to reduce costs and increase availability of the Internet, particularly for major development actors and users in rural and disadvantaged areas, as foreseen in the 1995 ITU-UNESCO study on *The Right to Communicate – At What Price?*.<sup>351</sup> In this striving for universal access it is essential that the Internet be recognized as an integral part of society's public service infrastructure and as a basic information utility.

There are many other economic obstacles to Internet development and access to be considered by public authorities and other development actors. Even where facilities for access and content creation are widely available, the more disadvantaged potential users often cannot benefit because they lack the money to pay for an Internet subscription, buy a computer, and obtain needed training, or, even if a public Internet facility is available, they may lack the time to access it. Financial incentives such as exemptions on tax or customs duty for informatics and network equipment represent one possible useful approach in this context.

#### **4.2 Creation of and access to content and applications**

In many developing countries, and particularly the least developed which have the most to gain from local content and user empowerment, efforts to develop local content have been accorded secondary priority relative to telecommunication infrastructure and ICT industry development. It is essential that local content and ICT empowerment extend to all populations and encompass all language and cultural specificities, as one of the most important principles in the development of an equitable information society.

Public domain information is critical for research, education, innovation, social and economic inclusion, national development and the fostering of cultural diversity, and is an essential foundation for an informed, participatory and global information society. Public authorities at all levels are currently the most significant source of public sector information and have a responsibility to citizens to:

- identify and preserve existing resources of public domain information;
- expand the proportion and improve the quality of knowledge resources that are available to the public, notably by encouraging their digitization;
- promote equitable access to this information, notably through the Internet and the development of information networks and services.

The foundations and goals of intellectual property rights are, on one hand, to encourage creation by granting exclusive rights to the creator for a limited period of time and, on the other, to support and regulate the spread of cultural goods, knowledge and ideas. Present developments in intellectual property, especially in the field of copyright and neighbouring rights, could threaten this balance, while new technologies represent a threat for the normal exploitation of copyright-protected works. The balance between the legitimate interests of the right holders and the equally legitimate interests of users to have access to information and culture, and notably the established copyright exemptions for "fair use", must be reasserted in the digital environment.

#### **4.3 The Internet in development**

The harnessing of the Internet for development goes hand in hand with improving infrastructures, training and sensitization for sponsoring organizations, application developers and users, in which the international community has a role but which are primarily the responsibility of the public authorities and user communities.

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<sup>351</sup> ITU and UNESCO. *The Right to Communicate - At What Price? Economic Constraints to the Effective Use of Telecommunications in Education, Science, Culture and in the Circulation of Information*. Paris: UNESCO, May 1995 (CII-95/WS/2).

While the immediate returns on investment in information and communication technologies may not be readily apparent to hard-pressed public administrations concerned with squeezing the most out of limited resources, the long-term potential of a proactive strategy for public service Internet use is considerable. In particular investments in this area can transform the Internet from a channel for transporting large volumes of information into a pool of dynamic communication and learning resources for development. This means that each developing country should adopt investment strategies and programmes concerning Internet applications which are appropriate to the national and local situations, while keeping in view possibilities of synergies between communities, applications and experiences at the national and international levels. The close involvement of the users in the planning, implementation and promotion of applications and services is essential.

In conclusion, it is important that the public service and private sectors participate collaboratively in planning and implementation of Internet infrastructures, support services and applications for development, and that care be taken in developing appropriate technical, legal, economic and political frameworks, which take account of the needs of society as a whole and all its stakeholders including content producers, service providers and users.

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