



African Information Society Initiative (AISI)

An Action Framework to Build Africa's
Information and Communication
Infrastructure



Economic Commission
for Africa

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Foreword

The information revolution, along with its attendant explosive growth of knowledge, and the related phenomenon of the globalization of the world economy have brought about the Information Age, which affects all aspects of economic, social and political activity. Insufficient appreciation of this phenomenon leaves African countries on the short side of an information and technology gap, marking the disparity between information rich and information poor. At the urging of the member States, the Economic Commission for Africa (ECA) has taken the lead in helping prepare African countries to overcome this gap and utilize these new forces to promote social and economic growth in the region.

The process began in April 1995 with the African Regional Symposium on Telematics for Development organized by ECA, the International Telecommunication Union (ITU), the United Nations Educational, Scientific and Cultural Organisation (UNESCO), and the International Development Research Centre (IDRC). This Symposium brought together some 300 information technology experts, senior government officials, and private sector leaders from over 50 countries and resulted in further conceptualization of an African information infrastructure.

In May 1995 the 21st meeting of ECA Conference of Ministers, which consists of the 53 African ministers of social and economic development and planning, adopted Resolution 795 (XXX) entitled "Building Africa's Information Highway". In response to this resolution ECA appointed a High-Level Working Group on Information and Communications Technologies in Africa to draft

an action framework that would utilize the information and communication technologies in order to accelerate the socio-economic development of Africa and its people.

The High-Level Working Group consisted of 11 experts on Information Technology in Africa. The Group met in Cairo, Dakar and Addis Ababa and communicated further by electronic mail. The result of its work is this document "Africa's Information Society Initiative (AISI): An Action Framework to Build Africa's Information and Communication Infrastructure". The document was submitted to the 22nd meeting of ECA Conference of Ministers in May 1996 and adopted by Resolution 812 (XXXI) entitled "Implementation of the African Information Society Initiative".

Together with numerous collaborative partners, ECA is now working on the implementation of the action framework. The framework will be the basis for ECA's own programme of work in its focus of Harnessing Information for Development. This is one of five focus areas for ECA's entire programme of work. Most importantly, the AISI action framework will serve as the framework for the priority area of Information Technology under the United Nations System-Wide Special Initiative on Africa. The implementation of this priority area involves several key United Nations agencies, including ECA as the lead agency, collaborating with UNESCO, ITU, the United Nations Conference on Trade and Development (UNCTAD), the United Nations Industrial Development Organisation (UNIDO), and the World Bank.

The implementation of the AISI action plan will take place at country level, starting with the development of National Information and Communication Infrastructure (NICI) plans. These plans will be elaborated through

programmes and pilot projects reflecting national needs and priorities. ECA, with its partners, will work directly with countries to assist in drawing up national action plans, to develop programmes and to draft projects to help support systems for government, business and society. Besides national activities, cooperation between African countries is also needed, and regional activities will be undertaken.

Currently all the above-mentioned United Nations agencies and IDRC are in the process of preparing a joint project proposal to seek initial funds to start implementing the AISI action framework. The funds will be used for national policy and sectoral workshops, development of the National Information and Communication Infrastructure plans and for implementation of a few catalytic pilot activities. These latter activities include institution building and human resources development by establishment of national multi-purpose community information and learning centres, the installation of Internet nodes in some countries, and the development of training courses at subregional and regional training institutions. In addition, the project will begin to build African information resources by establishment and operation at ECA of a meta-information electronic clearing house on African development information.

This first project should catalyse further action within the AISI framework to mobilize additional funds for the formulation and implementation of specific projects based on the National Information and Communication Infrastructure plans.

K.Y. Amoako

Executive Secretary

Economic Commission for Africa

Addis Ababa

30 August 1996

Resolution 812 (XXXI): Implementation of the African Information Society Initiative (AISI)

**Adopted by the 22nd meeting of the ECA Conference of
Ministers, May 1996, Resolution 812 (XXXI) States:**

The Conference of Ministers, Recalling resolution 795 (XXX) on building Africa's information highway which requested the Executive Secretary of the Economic Commission for Africa to constitute a high level working group to develop an action plan on information and communication technologies to accelerate socioeconomic development in African countries;

Appreciative of the proposal contained in document E/ECA/CM22.6 related to the building of Africa's Information Society;

Convinced that building Africa's Information Society will help Africa to accelerate its development plans, stimulate growth and provide new opportunities in education, trade, healthcare, job creation and food security, helping African countries to leapfrog stages of development and raise their standards of living;

Sharing the vision of an African Information Society which calls for the building of information and decision-support systems to enhance policy formulation, fostering a new generation of Africans capable of using information and communication technologies, building African information resources and

linking Africa regionally and globally to the information age;

1. Expresses its thanks to the high-level working group for developing the AISI action framework;

2. Adopts the principle of the African Information Society Initiative as an action framework for building Africa's Information Society and calls upon Member States to incorporate the African Information Society Initiative in their national development plans according to national needs and priorities;

3. Calls upon the ECA, in consultation with Member States, along with the International Telecommunication Union, UNESCO, UNCTAD, the World Bank, and international and bilateral partners in the harnessing of information for development priority areas of the United Nations System-Wide Special Initiative on Africa to use the African Information Society Initiative as a guiding framework;

4. Urges Member States to utilize the capacities and experiences of national, subregional and regional African centers of excellence in the enrichment and implementation of the African Information Society Initiative;

Preface

5. Requests the Executive Secretary of the Commission to:

- Take action, in particular mobilizing funding and technical assistance, in cooperation with Member States, regional organizations such as the Pan-African Telecommunications Union and the Regional African Satellite Communication System, non-governmental organizations, the private sector, bilateral and international partners, to realize the goals of the African Information Society Initiative;
- Incorporate the action framework into the secretariat's work programme under the new strategic directions of the Commission programme area on harnessing information for development;
- Set up a regional mechanism to assist in development, follow-up and coordination of the implementation of African Information Society Initiative programmes and projects;
- To establish a gender-balanced African technical committee to advise on programmes and projects and to evaluate results;

6. Requests the Executive Secretary of the Commission to report to the next Conference of Ministers on the progress in implementing this resolution.

Adopted at Addis Ababa

May 1996

1. By its resolution 795 (XXX) of 3 May 1995, entitled "Building Africa's Information Highway", the Economic Commission for Africa (ECA) Conference of Ministers responsible for economic and social development and planning, requested the Executive Secretary to set up a high-level working group on information and communication technologies in Africa, made up of African technical experts, with the purpose of preparing a plan of action in this field for presentation to the 22nd meeting of the Conference of Ministers. To accomplish this, funds were mobilized, the group has been constituted (a list of its members appears in annex I) and has worked in meetings in Cairo, Dakar and Addis Ababa as well as electronically, through a listserv (1).¹ This document is the product of the Working Group.

2. This document is about Africa's development: its challenges and opportunities in an information age. It addresses specifically the role of information, communication and knowledge in shaping African information society to accelerate socio-economic development.

3. This document attempts to address the issues related to information and communications for development. It targets decision makers and leaders in all sectors including, in particular, those responsible for planning, information, telecommunications, economic development, laws and regulations, health, education, trade, tourism, environment and transport. It aims to support the development of Africa's role and policies in a future where information is a crucial economic and social resource, and where electronic networks and information technology

¹ www.uneca.org/aisi/

present a new vehicle for socio-economic and cultural activity, at both local and global levels.

4. The proposed initiative calls for the formulation and development of a national information and communication infrastructure (NICI) plan in every African country. This plan should be driven by national development challenges such as debt management, food security, health, education, population, unemployment, job creation, industrialization, land reclamation, water, tourism, trade, etc. The emphasis is on the need to support decision-making at all levels and provide information and communication infrastructure for government, business and society to enlighten the process of development. Secondly, the initiative proposes cooperation, linkage and partnership between African countries to share the success of accumulated implementation experiences and stimulate regional development in various information and communication fields.

5. Thirdly, the initiative calls for bilateral and regional mechanisms to stimulate cooperation between African countries. Fourthly, the Initiative calls for support and partnership with the friends of Africa including bilateral and multilateral development agencies, regional economic organizations and the private sector. Collectively, the experts believe that Africa can make a transformation towards an information society with tangible economic and social returns:

- If an action-oriented approach is adopted;
- If efforts are made to implement such action;
- If we cooperate and form partnerships to face the developmental challenges;
- If we believe that we can and will make it;
- If we compete in timely fashion;

- If international support is mobilized to help speed its implementation;
- If we keep our perspective;
- If we believe in our African people, the engine of growth, and the means to reach the African information society.

I. Introduction

6. Three major development goals that have been articulated by African leaders in recent times include:

- Improvement of the quality of life for every African;
- Economic integration of the region;
- Improved trade and other linkages with the global community;
- Utilization of information technology can help Africa reach all these goals.

7. The emerging global information infrastructure, in the process of making connectivity available to everyone on the planet, makes the following possible:

- Students study and research using computers, multimedia and networks;
- Doctors diagnose, aided by information accessed through global networks;
- Decision-support systems for debt management help cut external debt by up to 50 per cent;
- Drought and famine warnings provided in time to change planting times;
- Businesses compete more effectively with timely and accurate market information;
- Transport costs are reduced, also resulting in less pollution;
- Cultural heritage is captured electronically, documented and globally disseminated.

8. The global movement to an information age and the worldwide technological innovations of recent years, along with other structural and economic developments, have led to rapidly falling costs for information and communication technologies. Together with changes facing

global and national telecommunication regimes this presents a clear window of opportunity for appropriate “leapfrog” strategies to accelerate the development of the continent. The creation of African an information infrastructure is both a necessity and an opportunity to accelerate development in all spheres of African economic and social activity.

9. The development of the African Information Society Initiative (AISI) will enable African leaders, decision makers and planners to position Africa in the world’s rapidly expanding global economic system and accelerate the pursuit of Africa’s development goals. The new technologies offer the potential to create jobs at much lower levels of capital investment and so exploit Africa’s information resources without the need for corresponding financial wealth. The cost of entry into global markets is becoming virtually insignificant; exploiting the information economy consumes minimal resources and relies rather on the effort and ingenuity of its members.

10. Africa has great potential to leapfrog stages of development. The current investment in older communications equipment in Africa is relatively small, and the vested interests in existing infrastructure in the information area are much lower than in the developed world. With the will and the vision to build upon the accumulated lessons both inside and outside Africa, there is an excellent opportunity for a real jump-start. A high-level commitment from leaders of African nations is a starting point. A strategy to share this vision by the people of Africa, including its politicians, engineers, business community and youth, is essential to bring about the desired change. Africa’s young population is an asset, as adaptation to new ideas and ways of working with new information and communication tools is easier for the youth.

11. The development of the African information

infrastructure will provide the seedbed for numerous benefits. Aside from the clearly apparent advantages for economic integration and for all forms of commerce and education, global information infrastructure will provide African countries with many new low-cost opportunities to disseminate alternative cultural, news and entertainment programmes and help counter the flood of information from the industrialized countries. With minimal communications costs, there is also the opportunity to develop information technology products for markets in the developed countries.

12. Information and communication technologies also offers the potential to reduce the need for migration to the cities. The information age can break the link between jobs and urbanization — some 70–80 per cent of the African population live in rural areas. The challenge is to create the conditions that enable them to make a living where they are.

13. Information and communication technologies can no longer be seen as a luxury for the elite but as an absolute necessity for the masses. Even though non-literate and rural populations may not be able to make direct use of the African information infrastructure in the near future, the positive spin-offs to the country as a whole will still result in benefits for all sectors of society. And while the immediate returns of investment in information and communication technologies may not be readily apparent to hard-pressed administrations concerned with squeezing the most from limited resources, the long-term positive impacts of a proactive strategy cannot be ignored.

14. While the press has recently highlighted some of the potential negative impact of the Internet through, for example, its capacity to distribute pornography and undermine data security, these

problems are generally recognized as transitory. Addressing these issues requires society to develop a better understanding of the new means of interaction offered by the global information infrastructure. Nevertheless, the disadvantages are far outweighed by the potential benefits of a pervasive information infrastructure. While effective controls must of course be put in place, some have likened these concerns to those over the ability of high-speed transport systems to carry criminals quickly away from the scene of a crime.

15. Success in all these areas depends on decision makers taking quick action to eliminate the barriers and create the enabling environment which will allow the development of Africa's information society. Proactive policies on information and communication technologies will bring pervasive benefits to all Africans.

16. This document outlines a vision and an action plan for an African Information Society Initiative (AISI) which proposes a framework for societal transformation to be used by decision makers in African Governments responsible for socio-economic planning. It is also complementary to the telecommunications policy guidelines developed for African Ministers of Transport and Communications, known as the "African Green Paper".(2)

A. Vision

17. The African Information Society Initiative aims at supporting and accelerating socio-economic development across the region. Driven by critical development imperatives, it focuses on priority strategies, programmes and projects which can assist in the sustainable build-up of an information society in African countries. This is in accordance with the regional integration goals of the Treaty establishing the African Economic Community, which foresaw the necessity of information networks and of regional databases, information sources and skills capacities.

18. By 2010, the AISI is intended to realize a sustainable information society in Africa where:

- Information and decision-support systems are used to support decision-making in all the major sectors of the economy, in line with each country's national development priorities;
- Every man and woman, school child, village, government office and business can access information and knowledge resources through computers and telecommunications;
- Access is available to international, regional and national "information highways", providing "off-ramps" in the villages and in the information area catering specifically to grass-roots society;
- A vibrant business sector exhibits strong leadership capable of forging the build-up of the information society;
- African information resources are available which reflect the needs of government, business, culture, education, tourism, energy, health, transport and natural resource management;
- Information and knowledge are disseminated and used by business, the public at large and

disenfranchised groups, such as women and the poor, enabling them to make rational choices in matters related to the economy (free markets). This also enables all groups to exercise democratic and human rights (freedom of speech and freedom of cultural and religious expression).

B. Strategic objectives

19. To achieve the vision outlined above, African Member States will need to:

- Ensure the continuous flow of information within the society by supporting initiatives to improve and create new information and communication services in different sectors of society — education, health, employment, culture, environment, trade, finance, tourism, transport and commerce;
- Create a continent-wide information and telecommunication network that allows low-cost and reliable communication with other users in Africa and across the globe;
- Achieve maximum benefits from available information by encouraging the development of systems that allow wide dissemination to individuals, business communities, non-governmental organizations (NGOs) and the public sector;
- Foster a new generation of men and women in Africa who are able to use information and communication technologies to leverage the development of their nations;
- Link Africa with the rest of the world by improving the flow of new technologies in both directions and exporting intellectual products and services to the rest of the world.

C. Related goals

20. To achieve the strategic objectives of the AISI, each member State will need to consider ways of making the following actions an integral part of national plans and programmes:

- Develop a master plan for building national information and telecommunication infrastructures and a two to five year plan for the implementation of the basic infrastructure;⁽³⁾
- Establish a strong regulatory body, independent from telecommunication operators and their ministries, to stimulate and regulate public/private sector partnerships, with a view to safeguarding the goal of “universal service” and to review fiscal policies (such as tariffs, duties and license fees);
- Eliminate or drastically reduce import tariffs, taxes and other legal barriers to the use of information and communication technologies;
- Establish an enabling environment to foster the development of information and communications in society, including measures which energize the private sector to play a leading market role in the provision of services and in the human resource development needed to use them effectively;
- Implement a policy for using information and communication technologies in government services and develop national databases in all key sectors of the economy and national administration;
- Conduct needs analysis to determine requirements and set up information and communication services in key sectors of national priority, especially education, health, employment, culture, environment, trade, finance, tourism and transport;

- Identify and develop information technology applications in areas with highest impact on socio-economic development at the national level;
- Take immediate steps to facilitate the establishment of locally based, low-cost and widely accessible Internet services and indigenous African information content;
- Prepare and adopt plans to develop human resources in information and communication technologies;
- Adopt policies and strategies to increase access to information and communication facilities, with priorities in serving the rural areas, grass-roots society⁽⁴⁾ and other disenfranchised groups, in particular, women and youth;
- Make special efforts to create awareness among those unfamiliar with the potential benefits of the African information infrastructure, with particular attention to gender equity.

21. Together, Member States will need to develop a coordinating mechanism to ensure successful implementation of the AISI to maximize complementarity, share lessons learned and reduce duplication of activities.

II. African Information Society: Challenges and Opportunities

22. The global spread of the information revolution has moved slowly in Africa. For example, despite rapid progress in the last year, no more than 15 African countries have full access to the Internet and some remain without any electronic connectivity at all. In 1994, the average "teledensity" (number of main lines/100 inhabitants) in Africa was only 1.6 as compared with 45 in Europe (for example), and the average teledensity outside large cities in Africa was only 1.2, according to the ITU World Telecommunication Development Report.⁽⁵⁾ In sub-Saharan Africa, excluding South Africa, these figures are much lower and there are more telephones in New York or Tokyo than in the whole of Africa.

23. This is partly an indication of the general low level of socio-economic development on the continent. The recent ECA report (Serving Africa better: Strategic directions for the Economic Commission for Africa) describes Africa's development as "a classic glass half empty and half full".⁽⁶⁾ Bearing in mind the challenges which reflect ECA's new strategic directions, the following section highlights the opportunities which the global information and communication

revolution offers Africa if the right policies can be promptly and properly initiated.

24. The impact from new information and communication technologies is no longer confined to the communications and information sectors. It has become a pervasive mass technology with a much wider scope of influence, affecting virtually all sectors of society. The telephone, television and computer are merging into single multipurpose devices. Computers and appliances with silicon chips as well as network connections are spreading into every business and home. By 2020, it has been predicted that 12 billion devices will be connected to the global information infrastructure, including such ubiquitous items as light bulbs, heart pacemakers and fridges. At the same time, the low cost of communications and accessibility of the global networks means that it is as easy for an individual to reach one person as it is to reach 10 million.

25. Outlined below are some of the priority challenges which hinder African development and some of the opportunities that the information and communication revolution offer African countries in combating these problems.

A. Job creation

26. The main challenges are:

- What jobs to create?
- Where to create such jobs?
- Who will create them?
- How will they be created?
- What resources will be used to attain a given level of employment?

27. The opportunities include:

- The use of new information and communication technologies offers substantial possibilities for creating new jobs in the emerging information-based economy. These technologies also offer the possibility to manage the existing job market more efficiently;
- Data and information can be made available on employment and unemployment by sector, gender and geographic location;
- New job opportunities include “teleworking” opportunities, and on-line job market/matching;
- Decision-support systems can help manage human resource development;
- Access to the information economies of the world enables new jobs and fields of work, through providing potential for information services, software development, translation services, data entry, data housing, data conversion, system maintenance, training and other information technology related areas.

B. Health

28. The main challenges are:

- Epidemics, spread of infectious diseases, AIDS, etc.;
- Highest infant and maternal mortality rate in the world;
- Lowest levels of life expectancy in the world;
- Lowest world ratio of doctors per capita.

29. The opportunities include:

- Enhancement of health administration and management through medical information systems;
- Establishment of information “health profiles” and decision-support systems on regional, national, rural and district levels;
- Linking health centres, delivery services and medical transport to patients;
- Improving access to skilled diagnosis through tele-medicine;
- Improving distribution and reducing costs of medical supplies.

C. Education and research

30. The main challenges are:

- Africa has the world’s highest illiteracy rate, especially among women;
- Low numbers of teachers and large numbers of students per class;
- Few schools and universities;
- Few libraries and very limited access to international journals;
- Lack of educational materials;
- Lack of researchers and research facilities

31. The opportunities include:

- Providing equitable remote access to resources in support of both distance education and the strengthening of local educational capacity;
- Connecting schools, universities and research centres to national and international distance education facilities, national and international databases, libraries, research laboratories and computing facilities;
- Reducing communication and administrative costs by building communication networks

- linking all educational establishments;
- Promoting and supporting collaboration among teachers and researchers;
- Extending the reach of educational facilities in informal learning, especially to community level.

D. Culture

32. The main challenges are:

- Deteriorating resources for preservation of cultural heritage (monuments, manuscripts, artifacts, music, etc.);
- Lack of regional or local access to national cultural sites;
- Lack of awareness and knowledge about different African cultures.

33. The opportunities include:

- Making Africa's museums accessible to all parts of the region as well as to the rest of the world;
- Electronic preservation and documentation of manuscripts and artifacts;
- Increasing accessibility of rare manuscripts and artifacts to researchers and the general public through the development of cultural CD ROM products.

E. Trade and commerce

34. The main challenges include:

- Intra-African trade is less than 5 per cent of total trade;
- Internal and external trade is hindered by

- poor transport and communication systems;
- Lack of information on procedures, import/export opportunities, markets, prices.

35. The main opportunities are:

- Linking chambers of commerce, trade associations and the business sector to help small and medium enterprises and increase both regional and global trade;
- Reducing commercial transaction costs;
- On-line trade-related information and import/export opportunities;
- Development and marketing of new products through electronic networks.

F. Tourism

36. The main challenges are:

- Lack of information on untapped tourist resources which remain unexploited sources of wealth generation from international and national visitors;
- Lack of information on tourism destinations, services and facilities.

37. The opportunities include:

- Attracting more tourists and other visitors by offering high-quality information and telecommunication services in tourist resorts;
- Reducing the costs of international promotions for attracting tourists;
- Improving the image of Africa through on-line promotional campaigns;
- Building national and regional tourism-related databases for destinations and facilities;

- Providing a mechanism for virtual travel and information gathering utilizing the Internet;
- Provision of tourism-related information and indicators that encourage and facilitate investment in tourism projects.

G. Food security

38. The main challenges are:

- Limited national food production to satisfy market needs because of underutilization of available resources;
- Lack of information on importing from best markets on the best terms;
- Lack of information on agricultural exports with the most competitive advantages;
- Lack of guidance for planning of crop planting and knowledge of new methods and technologies;
- Lack of access to food market information and pricing.

39. The opportunities include:

- Establishment of information systems for monitoring market performance and measuring market failures;
- Development of information systems to address food security issues such as agricultural production, government subsidies for food security, monitoring of water and land resources, disease problems, food transportation and storage;
- Efficient marketing of agricultural products through information and telecommunication networks;
- Provision of equitable access to new

techniques for improving agricultural production;

- Reduced food storage losses through more efficient distribution.

H. Gender and development

40. The main challenges are:

- Gender equity: women constitute 50 per cent of the population but do 60 per cent of work, earn one-tenth of the income and own 1/100 of the assets;
- Women generally have more limited access than men to technology, including communication facilities, and more limited access to the media and information in general;
- There is a lack of readily available information on women in society, culture and economy.

41. The opportunities include:

- Improving the rights of women through access to information and indicators which may be used for tracking gender issues and elimination of stereotypes;
- Ensuring the equitable access of women to information, technology and technological education;
- Enhancing the role of modern communications media to promote awareness of equality between women and men.

I. Human-made crises and natural disasters

42. The main challenges are:

- Environmental degradation, civil strife, earthquakes, floods and other natural disasters often cause chaos in unprepared African countries, especially on the local and village levels;
- Ineffective emergency communication systems limit the effectiveness of responses by the State and international assistance organizations.

43. The opportunities include:

- Implementing networks which, as far as possible, provide access to telecommunications in areas threatened by environmental degradation and natural disasters;
- Facilitating the use of low-cost terrestrial and satellite radio communication systems in emergency situations where there is no access to adequate telecommunications;
- Establishing problem-monitoring information systems with the use of geographic information system (GIS) technologies, remote sensing and satellite early-warning systems, to anticipate crises in advance, thus enabling governments and international organizations to be more proactive and to respond more effectively when the need arises.

III. Components of an African Information Society Framework

44. Building Africa's information and communication sector requires developing and improving four major components:

- Institutional framework and legal, regulatory and management mechanisms;
- Human resources;
- Information resources (infostructure);
- Technological resources (infrastructure).

A. Institutional framework

45. The AISI cannot be realized without the appropriate institutional, legal and regulatory framework and mechanisms at national and regional levels. It is essential to address the legal, regulatory and institutional practices in African countries that inhibit the development of national information services and connectivity to the global information infrastructure.

Obstacles

46. Within an institutional framework, some of the major obstacles which inhibit the development of national information services and connectivity to the global information infrastructure are identified below.

Financial

- The high cost of telecommunication services, which constitutes the major obstacle to the establishment and use of value-added services;
- High levels of taxation for value-added service providers, which are particularly harmful for businesses that are in a start-up phase or are not yet profitable;
- High levels of import duties on information technology and communication equipment.

Regulatory

- Lack of adequate regimes for type approval certification of equipment;
- Prohibitions on the creation of private telecommunication networks (whether based on user-owned or leased facilities) and/or on obtaining the required interconnection with the public networks;
- Difficulty in obtaining licenses to access international telecommunication carriers.

Business environment

- Lack of an appropriate legal framework for the creation of enterprises or associations providing value-added services;
- Lack of needed services for prospective and established value-added services, such as information technology consultancy, training, information strategy planning, support services, etc.;
- Difficulty in obtaining capital for start-up and expansion.

Other obstacles

- Lack of enabling environments for the creation of African information products;
- Underdeveloped intellectual property rights provisions;
- Restrictions on freedom of expression, including measures to ensure law and order or national security, which may be inappropriately applied to electronic information services;
- Lack of adequate management and coordinating mechanisms for the implementation of the AISI at national, subregional and regional levels;
- Lack of understanding of the importance of the development of information and telecommunication infrastructure together with insufficient commitment to the use of information and communication technologies.

Addressing the obstacles

Role of government

47. The role of government is to provide a vision, a strategy and an enabling environment to develop national information and communication infrastructure and to ensure that all sectors of society can benefit from it. To fulfill its role in achieving these objectives, it is recommended that each African Government establish or assign a lead national agency to be responsible for broad-based coordination and collaboration within government as well as with other sectors. As part of this process, government should:

- Promote the use of information and communication technologies in government in particular and society in general to improve the effectiveness of government service delivery and stimulate the information and

communication industries. Special support should also be given to the less well-resourced sectors of public concern, such as academic and research organizations;

- Develop national policies and plans for adopting information and communication technologies within the government or public agencies, and follow up their implementation;
- Establish a framework and mechanisms that ensure the participation of all sectors in implementing the national information and communication infrastructure while coordinating and harmonizing the multiple efforts of the different players, including the private sector, NGOs and the media. It is especially important to encourage the participation of all the major government ministries. This may involve the formation of joint boards (government, industry, labour and consumer associations);
- Liaise with other countries, international organizations and regional bodies to ensure coordinated and harmonious development at regional and international levels;
- Develop the legislative/regulatory framework to address issues of cost and accessibility of telecommunications, universal service objectives, intellectual property, privacy, free flow of information and the convergence of broadcasting with telecommunications;
- Address legal and regulatory issues that currently constrain use of new technologies, to ensure smooth implementation of the national information and communication infrastructure in African countries. This may require modification of laws and regulations in different areas such as communication, intellectual property, privacy and the free flow of information, as described above.

48. The urgency of these issues is likely to require

the immediate establishment of mechanisms for adopting ad hoc regulations to allow experimental networks and pilot projects to feed in to the institutional reform process.

49. The major tasks of government in this respect include (but are not limited to):

Telecommunication: To facilitate the implementation of the AISI, African governments will need to ensure the establishment of adequate communication infrastructure through encouraging the liberalization of national telecommunication and public broadcasting services. This can be accomplished by providing enabling legislation and incentives for private sector collaboration in the development of this infrastructure, as well as by setting up a strong, independent body to regulate public/private sector partnerships, with involvement of the international private sector. In particular, it will be necessary to safeguard the goal of “universal service” and to review fiscal policies (such as tariffs, duties and license fees), in accordance with the “African Green Paper” which also aims at providing guidelines for telecommunication policy development.

Intellectual property: Intellectual property is becoming a major factor influencing the development of information use and its protection. African countries therefore need to adopt a legislative framework that strikes a balance between the commitment to intellectual property as an international necessity and the provision of basic intellectual needs to the poor. Governments should establish and enforce copyright laws as well as spread awareness to the public about intellectual property rights and, at the same time, provide schemes for reducing the negative effects of these laws on society. These

activities should be carried out in cooperation with the existing African Intellectual Property Organization (AIPO) which can also be assisted in contributing to the global debate on intellectual property rights issues.

Privacy: The government has an important role to play in securing citizens' privacy through adopting laws to protect its people against invasion of their lives through the new technologies. African Governments should therefore formulate clear policies regarding electronic recording of personal data and means for controlling its use. It is recommended that a working group of representatives from African countries develop appropriate policies for privacy protection.

Free flow of information: African Governments should encourage the free flow of information within their countries and to/from the rest of the world by ensuring that laws and regulations protect freedom of speech and ensure easy access to information and the provision of value-added services.

Role of the private sector

50. In developed countries, the private sector has assumed a vital role in establishing the information society. It is crucial in Africa that a critical mass of local business ventures arises, capable of supporting and using the information infrastructure. Public policy, in concert with private initiatives, must collaborate in achieving an African information society. The private sector in Africa has to play a major role in realizing the African information society by:

- Stimulating growth and assuming market leadership in developing national information and communication infrastructures through

investment in relevant areas;

- Seizing the new business opportunities that arise from the implementation of the AISI.

51. To achieve this, the private sector can contribute, through the appropriate mechanisms, to empowering the four main private sector components:

- Entrepreneurs and business managers: support for managers of small- and medium-size enterprises (SMEs) in information and communication fields;
- The environment: establishment of a legislative and organizational framework that eliminates constraints and supports business development in this area;
- Investment promotion agencies: encouragement of agencies that can provide finance, marketing and promotional activities to entrepreneurs;
- The market: enlargement of the consumer base through provision of improved and greater ranges of information-related services.

Role of non-governmental organizations (NGOs)

52. Voluntary organizations and consumer and labour groups should play a catalytic and coordinating role with government and the private sector, providing a balance to a market-oriented service industry and helping to ensure that universal service objectives are realized. Specific support for participation in the AISI should be given for:

- Voluntary organizations, which can provide a vital voice in making known the needs of poor and disenfranchised groups, such as rural communities, the homeless, the aged and the sick, and can contribute to developing their capacity to make use of the services offered;

- Consumer associations, which voice public concerns and needs, and national associations of information and communication technology user groups which will be a particularly important force for defining priorities in developing the African information society;
- Labour associations, which are responsible for promoting the concerns of the workforce to employers and government.

53. All of the above associations should work actively with the government in the formulation of its vision, strategies and plans for information infrastructure development, for example, through the joint boards proposed above. A pan-African meeting of NGOs may need to take place to formulate the vision and strategies for their participation in the development and use of an African informatics infrastructure.

Role of the media

54. In addition to being an essential means for information dissemination, the mass media play a critical role in spreading awareness in Africa of the importance and benefits of the information revolution. Newspapers, radio and television provide an easy, accessible and cheap means of carrying information to the end user. Communities in Africa do not have to wait for Internet access to receive much of the information it carries. The mass media can access many of the existing sources of information and provide broad channels of communications to the poor and to remote areas. Media organizations should therefore contribute to the African Information Society Initiative by:

- Creating awareness about the Initiative among the community at large;
- Providing ways and means for disseminating information resulting from the Initiative;

- Opening channels of communication that reach out to all citizens.

Proposed regional programme: ECA to initiate and coordinate the AISI

55. The AISI needs to be well-coordinated and monitored at regional and subregional levels to ensure that all related activities taking place in Africa within its framework complement each other.

56. To successfully implement the AISI on a regional basis, it is recommended that ECA take the lead in coordinating with:

- Other related regional initiatives, such as the United Nations System-Wide Special Initiative for Africa,
- Organizations, such as the Organization of African Unity (OAU) and the African Development Bank (ADB),
- Existing subregional groupings and projects such as the Southern Africa Development Community (SADC), the Common Market for Eastern and Southern Africa (COMESA), the Intergovernmental Authority on Drought and Development (IGADD), the Economic Community of West African States (ECOWAS), the Central African Customs and Economic Union (UDEAC), the Economic Community of Central African States (ECCAS), the West African Economic and Monetary Union (UEMOA), the Pan-African Telecommunications Union (PATU), the Regional African Satellite Communications Organization (RASCOM), the Arab Maghreb Union (AMU) and the Union of National Radio and Television Organizations in Africa (URTNA). This will also be particularly important in making sure that international support is given to those countries in most need.

57. To carry out its task, ECA would:

- Act as the regional executing agency for the AISI, in charge of following up and monitoring its implementation and coordinating the implementation of the regional AISI activities;
- Handle the fund-raising activities for financial support of the implementation of AISI projects in conjunction with the various regional and subregional bodies listed above.

58. Implementation of the AISI would envision the following process for achieving the programme:

- Adoption of this report by the ECA Conference of Ministers;
- Mobilization at regional and global levels of government and generation of commitment by Heads of State and Government for the AISI at regional and global levels through:
 - referral of this Action Plan to the United Nations General Assembly, the OAU Council of Ministers, the Joint OAU/ECA/ADB Secretariat, the Africa Regional Telecommunication Development Conference (Abidjan, 6–10 May 1996) and the Ministerial Conference on the Global Information Society, sponsored by the Government of the Republic of South Africa (13–15 May 1996);
 - facilitation of cooperation between African States and between Africa and the rest of the world through member States adopting regional and subregional programmes and by calling on intergovernmental bodies, such as OAU and ADB to establish interorganizational committees to promote and coordinate activities;

- facilitation of cooperation within African States through establishment of high-level multiministerial coordination committees and active cross-sectoral associations of users and service providers;
- requesting that ECA set up a mechanism for monitoring progress, linking in to other initiatives and involving all potential partners from the government, the private sector, labour, academia, civil society, international organizations, NGOs and the media.

59. It is recommended that an African technical advisory committee be established within the institutional framework required for implementing the AISI. The committee would be constituted of a number of experts from the region who would meet annually under the auspices of ECA. They would be in charge of:

- Advising ECA on regional programmes and projects;
- Monitoring implementation of the AISI;
- Evaluating results;
- Recommending and initiating regional projects.

Proposed national programmes

Programme 1: Development of national infrastructure plans

60. One of the most important steps for each African country to take in joining the "African information society" is to develop a national information and communication infrastructure plan as outlined in annex II. This should subsequently be followed by development, management, marketing and funding of five-year plans (1997–2002), (2002–2007) and (2007–2012).

Programme 2: National sectoral "infostructure" development

61. Great efforts will also be needed in building the information resources — "infostructure" — in each of the member countries. Taking into consideration the major problems and challenges African countries are facing, a number of specific projects in the areas outlined above under "Challenges and opportunities" are proposed for implementation. These projects will contribute to building the information base needed for planning, decision-making, business development, exchange of information, providing value-added information services, and finally building Africa's information society. Other projects could be identified to meet the specific requirements of each country. Brief descriptions including objectives and goals of potential projects are given in annex III.

B. Human resources

62. Africa's social and economic development is to a large extent determined by the size and quality of its work force — its human and intellectual capital. The success of economies of the future will more than ever be determined by the quality

of their human resources as the importance of natural resources steadily diminishes. Preparing Africa for the information age primarily necessitates appropriate investment in its human resources — training, education and promotion will be the cornerstones of Africa's new society.

63. Development of human resources also requires: a new profile of management/labour forces; the ability to adapt, adopt and exploit new technologies and to manage the change; and creation of new job markets where skills and knowledge learned can be applied.

Needs within the information society at large

64. Decision makers need to have a good understanding of the ways to use new information technologies in decision-making; they need access to a wide scope of national information sources covering different sectors as well as access to regional and international information resources. They need knowledge on how to search, extract and use available information resources; and awareness of the need for equitable access to technology.

65. Businesses need to have access to national, regional and international market information, and to value-added information services. They need knowledge of how to best use the available information resources to improve and develop their businesses, and how to conduct secure low-cost transactions through the information and communication networks.

66. Students need:

- Access to national, regional and international electronic information networks, including electronic libraries;
- Knowledge of how to use the new

communication and networking technologies;

- Access to appropriate labs, facilities and resources to best utilize new technologies that amplify the learning process in a wide range of subjects;
- Access to self-teaching and training packages and tools, including distance-learning resources, in different subjects;
- To be able to share knowledge and experience with students of the same level in other African countries and elsewhere.

67. Skilled workers need easy and simple instructional tools, including distance learning resources, to help them learn individually and jointly with other workers; they need knowledge of new techniques and developments in their areas of specialization and the possibility of sharing their experiences and building links with other workers in other agencies in their own country or in other African countries.

68. The general public need to become aware of the importance of information availability and usage; and they need to upgrade their level of computer literacy to be able to use new technologies to communicate as easily and cheaply across town as across countries. People also need to know how to exploit information to enhance their well-being.

Needs within the information and telecommunication industry

69. Information system specialists need to learn how to design and implement information systems in different applications; to capture data, build and administer databases and decision-support systems; and to establish information servers on the World Wide Web.

70. Information service providers need to know how to analyse user needs and identify what information services their users require; to access information available from national, regional and international sources; and to establish systems for updating data on a regular basis.

71. Telecommunication and networking specialists need to learn how to plan, design, install, operate and maintain communication and information networks.

Proposed programmes for information society readiness

72. The following proposed programmes aim at building readiness for the information society among decision makers, the private sector and the public as well as among skilled students and professionals. A major goal of the programme will be to encourage the adoption of new educational paradigms involving the concepts of "life-long learning" and "life-time entrepreneurship", "learning while doing", "just in time open learning" and the constant exploitation of information for problem solving and analysis.

Programme 1: Stakeholder awareness programme

73. The stakeholder awareness programme should aim at producing informed decision makers in both the private and public sectors through increasing their knowledge of: information and decision-support systems; national and international information resources; methods of searching and retrieving on-line information through the Internet, other international information networks, electronic mail and "knowledge networks"; the potential social, economic and cultural impact of the new information and communication systems; and the need for training to adapt organizational

structures and work processes to make efficient use of the electronic resources and electronic venues.

74. Such awareness programmes should be designed and implemented at the level of Africa at large, at subregional level for a group of countries and at national levels in each of the member States. Such seminars and workshops should be modular in nature, capable of being scaled up to subregional and national levels, and adapted for use down to the school, neighbourhood and village. They should contribute to sustained capacity for awareness promotion. They should also be conducted frequently to take account of rapid developments in information and communication technologies.

Programme 2: Educational programme

75. The educational programme should aim at preparing students in schools and universities to deal with the new information and communication technologies. As with the stakeholder awareness programme, it should be modular in nature and capable of being scaled upwards or downwards. This programme should include: the development of frameworks for academic qualifications in information and communication technology studies; development of technology-based training (TBT)/learning packages in different subject areas; adaptation of available packages to the needs and context of African countries; and training of teachers and students in how to use the software.

76. The regional programme should be made up of a series of national programmes tailored to each country, based on national needs and resources available. Exchanging and sharing experiences among African countries should be done through distance learning and virtual education projects. New educational tools and techniques, adapted

to the African context, should be developed and utilized.

Programme 3: Competence development programme for professionals and skilled workers

77. The competence-development programme should aim at improving the performance of professionals and skilled workers in all occupational sectors. Particular attention should be given to the training of information and telecommunication specialists.

78. In different areas, such as such as health, industry, tourism, trade and transport, the general programme should focus on training professionals and skilled workers in using the new technological tools in their areas of expertise to better perform their jobs.

79. The information specialist programme should focus on training telecommunication and networking specialists, information system specialists, and information service providers and specialists.

80. The programme should comprise the following activities:

- Building the infrastructure required, including “centres of excellence” in information and telecommunication technologies, training centres, labs and associated communication and networking facilities;
- Development of technology-based learning packages;
- Training the trainers and teachers;
- Training the professionals and specialists in information and telecommunication technologies.

81. The professional development programme should have regional components and national components. The regional components should provide (sub)regional centralized training facilities for more advanced training and for training of trainers. National programmes for each country should address the broader needs of competence development in the country. Distance learning and computer/multimedia-based training methods should be used to accelerate the process and to maximize the utilization of the educational and training resources available regionally and internationally, including those developed within the framework of the ITU “Global Telecommunications University” and other similar initiatives for the benefit of African countries.

C. Information resources: “infostructure”

82. Communication infrastructure supports both access to content and access to an electronic venue (space) where real social and economic activity occur. The quality of the data or information from global and indigenous sources made available by this infostructure (including such knowledge resources as databases, archives and libraries), and how that information is used, will ultimately be the yardstick by which the benefits of the AISI will be judged.

Opportunities

83. The opportunities for building a wealth of information sources could have substantial positive impact on Africa, allowing it to:

- Enable African decision makers to make much more informed socio-economic planning decisions;

- Make African people producers of indigenous information and knowledge and not simply passive consumers of imported information;
- Export information and knowledge and participate proactively in the development of the global information infrastructure;
- Provide African researchers and scientists with access to information on Africa generated from within the continent;
- Enable African researchers and scientists to collaborate on an equal footing with their peers around the world irrespective of distance;
- Promote Africa’s cultural heritage, including the modern cultural sector of its rich and growing film and music industries.

Recommended actions

84. To build this content, decision makers, planners and information specialists will need to:

- Identify the priority information and communication technology application areas with the highest impact on socio-economic development at national and regional levels;
- Make special efforts to capture data which is otherwise difficult to obtain or is unreliable, and thus ensure timely and accurate provision of information for decision-support systems;
- Develop and use software and data that addresses the variety of languages used in African countries and its oral traditions;
- Encourage the development of value-added information services including electronic publishing and networking facilities;
- Support initiatives which build local content;
- Develop a range of methods for information dissemination, including printed materials

developed from on-line resources such as flash reports and indicator bulletins;

- Encourage the development of an “information brokerage” sector that can act as an intermediary between the knowledge bases and the users.

Proposed programmes for developing national information and knowledge resources

85. In order to establish, develop and improve the information resources required for building the African information society the following programmes are suggested:

Programme 1: Building national information resources

86. This programme aims at building the national information sources of data and information on the African continent and ensuring their coverage of all sectors of the economy. The programme should include:

- Building issue-based local and sectoral databases in accordance with national priorities;
- Establishing mechanisms for the continuous gathering, updating and processing of data;
- Maintaining national databases and information resources.

Programme 2: Provision of value-added information services

87. This programme aims at providing important value-added information services to ensure information availability to the public sector and enhance the competitive advantage of the private sector in Africa. The programme should include:

- Providing an enabling environment for

the growth and sustainability of African information service providers;

- Ensuring Internet connectivity and African participation in the information content of the Internet;
- Providing value-added information services in key areas of the economy such as trade and commerce, employment opportunities, tourism services, legislation, etc.

Programme 3: Development of electronic libraries

88. This programme aims at providing empirical information sources and helping to close the resource gap by making textbooks and periodicals electronically available, especially for schools, universities and research centres. This can be provided through building national electronic (on-line) libraries and providing access to international on-line resources. It would require:

- Automating national libraries and making them accessible on-line;
- Providing mechanisms for the exchange of information among existing libraries in ministries, municipalities, universities and schools.

D. Technological resources: “infrastructure”

89. Effective information and communication systems require reliable, low-cost and widespread technological resources such as computers, software and all the components of the telecommunication infrastructure for processing data and information. Developing these underlying support systems upon which to build the African information infrastructure will require great changes in the technology resources currently available to most Africans.

90. It will be necessary to upgrade and develop the physical and logical telecommunication infrastructure and network at the national level, in addition to improving continental interconnectivity and providing gateways to international telecommunication networks. However, it is here where technological advancements offer Africa cost-effective and appropriate technologies to leapfrog over several generations of intermediate technologies still in use in the industrialized world.

Recommended actions; infrastructure requirements

91. In line with the relevant resolutions of the Regional African Telecommunication Development Conference (Harare, 1992) and the Buenos Aires Declaration (WD-94, Buenos Aires, 1994), it is recommended that African countries greatly increase accessibility to telecommunication networks and services and to the global information infrastructure, in particular for people in rural and isolated areas, using affordable telecommunication systems that match the low level of financial resources in Africa. This involves, inter alia:

- Using new low-cost terrestrial wireless and satellite communication systems to provide access for rural and isolated areas;
- Ensuring national, regional and international interconnectivity and interoperability of telecommunication networks;
- Building reliable access networks to the global information infrastructure, including the Internet;
- Installing cheap, simple and robust technologies using flexible, modular, and scalable network designs for coping with increasing users and traffic;
- Establishing low-cost access from every major town, or distance independent tariffs for calls to the nearest access point;
- Using simple interfaces for the non-literate and those unfamiliar with computers;
- Developing broadband services and bandwidth-on-demand facilities for low-cost multimedia applications;
- Improving network reliability and flexibility by providing redundant links and duplicate equipment;
- Using modern network management systems to optimize and monitor the use of the networks;
- Establishing a clear set of standards and criteria by which to evaluate any national information and communication initiative project;
- Using hardware, software and applications that take into account training and maintenance requirements for durability and ease of use;
- Using voice-based systems where possible to provide for the low literacy levels, oral traditions and diversity of languages in Africa;
- Using software that supports multiple languages and translation systems to allow on-line dialogue between people using different languages;
- Installing access systems in public places (kiosks and community telecentres) and mobile or easily transportable systems to bring the information infrastructure closer to the general population;
- Providing hard-copy output capabilities so that users can take away the results of their information queries or commercial transactions;
- Exploiting broadcast data systems to provide

low-cost information dissemination in areas without adequate telecommunication infrastructure;

- Improving the reliability of the electricity supply to maintain reliable communication networks by using low-cost integrated solar power and battery recharge systems.

Proposed programmes

92. In order to develop and upgrade present communication facilities on the African continent, the following programmes are suggested:

Programme 1: Developing and upgrading national telecommunication infrastructure

93. This programme aims at developing and upgrading the national telecommunication infrastructure in member countries through:

- Upgrading the physical telecommunication infrastructure in countries that lack the facilities required;
- Extending the geographical coverage of the physical infrastructure and adding new capabilities and services;
- Adapting and adopting new technologies to satisfy current demand within the context of individual country circumstances;
- Creating basic national networking services such as email, FTP (file transfer protocol), and the World Wide Web.

Programme 2: Continental interconnectivity

94. This programme aims at interconnecting the African countries through:

- Developing national data communication hubs so as to improve regional and continental connectivity;

- Adopting a regional strategy and plan for the further development of the Pan-African Telecommunication Network (PANAFTEL);
- Providing easy and direct dial-in and dial-out facilities between African countries;
- Establishing the necessary interconnectivity between the telephone and data networks in the African region;
- Providing data communication gateways and bridging facilities between Africa and the rest of the world;

Programme 3: Pilot projects

95. This programme aims at creating a test bed for new technologies, innovative partnership arrangements and tariff and charging mechanisms through the implementation of a number of small, quick-impact pilot demonstration projects in some African countries, as proposed in the Buenos Aires Action Plan.

Programme 4: Integrated rural development

96. Shared rural public access telecentres, kiosks, mobile computing and telecommunication resources will be established at selected locations with support from international donors.

97. The tasks laid out are formidable. However, the information revolution is one that Africa cannot afford to miss. The economic and social costs are less than any other preceding structural change, while the price of being left out is an insurmountable development gap between “information rich” and “information poor” nations. If a swift response is not made the opportunities lost will see Africa’s people relegated to second class status in the new world order. Finally, the group of experts believe that Africa can make it: all that is needed is hard work with vision, strategy, determination and cooperation.

Notes and References

1) A listserv is an electronic mailing list on a particular topic by which all messages posted to the list are sent automatically to all subscribers. The group was provided with institutional support by the Egyptian Cabinet Information and Decision Support Center (IDSC), as well as a large number of individuals who participated in face-to-face and on-line meetings, providing encouraging and valuable feedback. The financial and substantive contributions of the International Telecommunication Union, the United Nations Educational, Scientific and Cultural Organization, the World Bank, the Global Information Infrastructure Commission and the International Development Research Centre of Canada to the high-level Working Group are gratefully acknowledged.

(2) International Telecommunication Union (ITU), *The African Green Paper: Telecommunication Policies for Africa* (Geneva, 1995).

(3) In accordance with the relevant resolutions of the first African Regional Telecommunication Development Conference (Harare, 1992) and the World Telecommunication Development Conference (WTDC-94, Buenos Aires, 1994).

(4) In accordance with the Buenos Aires Declaration and Buenos Aires Action Plan adopted at WTDC-94.

(5) International Telecommunication Union (ITU), *World Telecommunications Development Report* (Geneva, 1995).

(6) ECA, Addis Ababa, 1996.

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Annex I

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Annex II

Guidelines for Developing National Information and Communication Infrastructure (NICI) plans

1. Define vision, mission, strategic objectives, scope.
2. Define the institutional framework.
3. Define the regulatory framework.
4. Define the information technology business sector.
5. Define the development priorities (five-year plan, cabinet directions, etc.).
6. Define the economic and business sectors as well as the market trends.
7. Define education and science and technology infrastructure.
8. Define needs and priorities for information, decision support, networking, information services, etc.
9. Define the data/information and decision-support agencies, actors, etc., at the different levels: national, local.
10. Define the technology infrastructure.
11. Identify, formulate and develop programmes and projects.
12. Formulate strategies for development of NICIs.
13. Develop a detailed action plan, time schedule, priorities and budget.
14. Determine the implementation agencies in charge.
15. Solicit the commitment of policy makers, industry leaders, etc.
16. Formulate the public awareness campaign.
17. Implementation.

Annex III

Proposed Projects

1. The programmes proposed within part III "Components of an African Information Society Framework" to develop the components of the information resources will include different projects. Each programme will be designed to achieve its objectives and based on the design and implementation of a set of projects that will help in achieving these objectives in different aspects.

2. Following are a set of projects that are recommended for African countries to be implemented within the framework of this initiative and within the regional programmes previously recommended.

Debt management objective: Support economic development through better debt management:

- Beneficiaries: society, top-level government decision makers;
- Goals:
 - establish/enhance loan databases and guarantee integrity and validity of loan databases;
 - reduce the national debts of African countries (by 25 per cent by 2005);
 - secure dynamic tracking components for crisis avoidance and debt management.

Education and training objective: Improve basic education and work force skills:

- Beneficiaries: teachers and students in public schools, employees of small- and medium-size enterprises (SMEs) (upgrading their skills and improving their productivity), local libraries (will have access to national and international libraries and archives), people tied to their homes and in remote areas;

▪ Goals:

- linking public schools and the main public libraries to the national communication backbone (all African public schools should be linked by 2010);
- establishing distance learning centres in major cities to support on-the-job training for workers and to promote interaction between researchers, academia and industry.

Higher education and research objective: To act as a vehicle for pooling national and regional intellectual and human resources to help contribute to research and development efforts on the continent:

- Beneficiaries: researchers at universities (have easy access to current research and publications elsewhere), industrial and private research centres, and society (from the diffusion of research);
- Goals:
 - building communication network infrastructure at every university;
 - connecting universities and research centres to the national communication backbone (all African universities should be linked by 2000);
 - promoting and supporting collaboration among professionals;
 - providing remote access to national and international databases, libraries, research laboratories and computing facilities.

Trade and commerce objective: Providing value-added network information services to business people and organizations in order to leverage the continent's competitiveness in trade and investments:

- Beneficiaries: small- and medium-size enterprises, manufacturers, traders, investors, importers, exporters, bankers, and capital investors;
- Goals:
 - link chambers of commerce and trade associations to the national communication backbone (all chambers of commerce should be linked by 2000);
 - provide the business community with timely and accurate economic and financial indicators;
 - provide channels for the promotion of products and services;
 - improve access to stock market and commodity information;
 - improve access to capital markets.

Employment and job creation objective: Reducing the unemployment rate in Africa by increasing accessibility to job openings nationally and internationally:

- Beneficiaries: work force, employers, placement offices;
- Goals:
 - provide on-line job matching on national, regional and international levels (reduce unemployment by 25 per cent by 2005);
 - create/enhance databases on human resources to support education planning at the national level;
 - provide access to national and international teleworking opportunities.

Environmental monitoring and natural resource management objective: Provide the essential infostructure for coordinated environmental management:

- Beneficiaries: society, governmental and non-governmental environmental agencies;
- Goals:
 - improve the management and monitoring of the implementation of environment-related projects;
 - creating/enhancing national and regional databases on all major areas related to the environment: fresh water, sea, air, land, natural resources, etc.;
 - assisting and supporting environment-related decision-making at the national and regional levels;
 - disseminating environment-related indicators to governments, NGOs, research centres, and international bodies.

Tourism objective: Support international and local tourism in Africa:

- Beneficiaries: society, tourists, local businesses;
- Goals:
 - provide international promotion of tourist attractions (increase tourism revenues in Africa by 25 per cent by 2000);
 - assist travellers and tourists in travel planning and booking reservations;
 - create/enhance on-line regional databases of facilities, up-to-date transport schedules and tourism service providers.

Cultural preservation objective: Assist in protecting the African cultural heritage:

- Beneficiaries: society, museums, cultural organizations, research institutes;
- Goals:
 - putting Africa's museums on-line (all museums should be on-line by 2010);
 - preservation and documentation of manuscripts and artifacts;
 - increasing accessibility of rare manuscripts and artifacts to the general public and to researchers.

Health care objective: Achieve more efficient and affordable health care:

- Beneficiaries: society, health care providers;
- Goals:
 - establish and maintain databases on public and private medical centres, physicians and health care providers;
 - provide on-line access to national and international medical databases and expertise (telemedicine);
 - link health administration for improving distribution of drugs and medical supplies;
 - link health care systems with centres for disease control for early warnings of plagues and infectious diseases;
 - link health care systems with insurance companies, medical practitioners, and the public.

Food security and agricultural production objective: Improve the production and distribution of food and agricultural products in Africa:

- Beneficiaries: society, farmers, food producers and distributors;
- Goals:
 - link meteorological centres with agricultural advisory services;
 - provide access to international networks on food production technology and databases on food stock;
 - provide access to databases of national food storage facilities.

Public administration objective: Facilitate government management and improve public service:

- Beneficiaries: governments, public;
- Goals:
 - improve internal revenue management;
 - improve social security administration;
 - facilitate electronic tendering systems;
 - improve accessibility to national public administration networks, especially to citizens who live in rural areas.

Legislation and legal services objective: Support national and regional coordination, cooperation and standardization of regulations and legislation:

- Beneficiaries: organizations, businesses, lawyers, legislative bodies, regional cooperation bodies;
- Goals:
 - creating/enhancing national legislation databases which will be accessed on-line by end-users;
 - linking the databases in a regional forum that allows the exchange of legislation necessary for economic integration and

- business development among countries;
- avoiding duplication of efforts in setting up standards, protocols, procedures, guidelines, systems and tools for establishing national databases.

Transportation of goods and people objective:

Improve the quality of life by electronically managed roads and airways:

- Beneficiaries: passengers, air transport industry, transportation companies;
- Goals:
 - link road traffic control centres for better road traffic management, thus reducing the fuel consumption, air pollution, wasted productivity;
 - create an African air traffic communication system providing ground-to-ground connections between African air traffic control (ATC) centres and air-to-ground connections between aircraft and ATCs across Africa.

Business development and administration objective: Support national and regional business development:

- Beneficiaries: SMEs, business and banking communities;
- Goals:
 - provide international access points for SMEs;
 - establish links to public authorities;
 - facilitate on-line business transactions;
 - link the business community to the banking systems.