A Country ICT Survey for

Mozambique

Final Report

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November 2001

Prepared for

Sida

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List of Acronyms

CIUEM	Centre of Informatics, Eduardo Mondlane University
CTA	Confederation of Chambers of Commerce and Industry
DANIDA	Danish International Development Agency
EDM	Electricidade de Moçambique
IDRC	International Development Research Centre
INCM	Instituto Naçional das Comunicaçoes de Moçambique
ISCTEM	Instituto Superior de Ciências e Tecnologia de Moçambique
ISPU	Instituto Superior Politecnico e Universitario
ISUTC	Instituto Superior de Transportes e Comunicações
Sida	Swedish International Cooperation Agency
TDM	Telecommunicaçoes de Moçambique
UEM	University of Eduardo Mondlane

Executive Summary

This report covers one of three country ICT surveys commissioned by Sida as part of its ongoing programme to support the use of ICT in developing countries. The project team used desk research to obtain background information before undertaking two field trips to Mozambique. The first took place in July 2001, followed by a second visit to attend the ICT Policy Implementation Strategy Symposium in October 2001 and to follow up with a number of additional stakeholders. During this period discussions were held with over forty stakeholders across a range of public and private organisations. Discussions were also held with exhibitors at the Symposium. A preliminary report was submitted to Sida before being circulated in late September to all those interviewed. A number of hardcopies were also presented to interested delegates at the Symposium. This final report consolidates all the feedback received to date.

Chapter One describes the study methodology in more detail and briefly examines African and international trends with particular reference to ICT initiatives in Sub-Saharan Africa.

Chapter Two deals with the socio-economic conditions in Mozambique today. Mozambique is still among the ten poorest countries in the world, with around 60% of its population living below the poverty line. Its economy has however grown at an annual 10% rate in 1997-99, one of the highest growth rates in the world, with a zero inflation rate. Agriculture is the largest sector (32%) with Trade and Repair Services as the second. About three quarters of all growth takes place in Agriculture, Trade, Manufacturing, Building and Construction and the Transport sectors.

Chapter Three examines the current status of the ICT Policy Development process in Mozambique, and provides a brief overview of the existing telecommunications legislation as it might affect the future development of an Information Society. The ICT policy was formally tabled in the Cabinet in December 2000 and addresses six priority areas: Education, Health (with a priority on HIV/AIDS), Human Resource Development, Infrastructure, Access and Governance. The Mozambican ICT Policy Commission is presently leading the development of an ICT implementation strategy, which was presented at the abovementioned conference and exhibition in Maputo in October 2001.

Connectivity and Access is covered in ***Chapter Four***, beginning with an overview of the monopoly operator TDM. In common with many SADC countries, the spread of mobile networks has been phenomenal, with mobile users exceeding fixed line users in May-June 2001. Since the launch of prepaid services, there has been growth of about 2 000 new subscribers per week. The number of mobile lines exceeded fixed lines in May-June 2001 – between February and June 2001, the total number of

subscribers increased from 55 000 to 100 000. The mobile coverage is expanding rapidly, and now covers all provincial capitals.

There were about eight licensed Internet Service Providers at the time of going to press, all of which are based in Maputo. There are few Internet cafes (<10), mainly due to the high costs associated with their usage. Accurate Internet user accounts are not available but estimated between about 6 000 to 14 000.
The total number of PCs in the country by the end of 2001 can be estimated at between 20 000 - 25 000. Growth is exponential, and the number should reach 40 000 by 2003 if no special intervention is undertaken.

Chapter Five covers human resources in Mozambique, with particular reference to the 'education pipeline' from primary school through to secondary school and then onto further academic and vocational training. Education in Mozambique is a priority area for attention by the government. The challenges are however huge, with shortages of most resources (buildings, electricity, telephones), under-qualified teachers and few schools at the higher levels. Available statistics on primary and secondary schools are presented.

Five tertiary institutions offer ICT-related courses but to date only the state-owned University of Eduardo Mondlane has produced any graduates. The other four private institutions will be producing their first graduates from this year onwards. All the institutions are Maputo-based, with little presence in the provinces. Technical ICT-related training, particularly shorter courses, is not currently offered and students have to attend courses in South Africa, Portugal or other Northern countries.

Chapter Six deals with the ICT Sector and major users in Mozambique. Mozambique has a very small IT industry. Mozambique's market for IT products and services is still very small and not fully developed, even compared to many other least developed countries. The software industry in Mozambique mainly revolves around two or three companies that produce software primarily for accounting and resource management. The banks, TDM and modern industries such as Mozal, Petromoc and HCB (Cahora Bassa Hydro) operate in a technical environment different from the rest of the economy - when compared with central and provincial government, there are vast differences in management, skills and equipment standards.

In total, the private IT sector may employ between 200 and 300 people, of which only a small percentage has qualifications higher than a technician level.

The public sector in Mozambique in general has a low level of output. Its institutions are not functioning optimally and there is a lack of resources in all areas – human resources, management skills, office equipment, communication and organisational

structure. In many areas, the existing institutions are unable to fulfil their service roles in the society. The higher levels of the civil service are aware of the situation, and civil service reform is one of the priority areas identified in the national ICT policy and implementation strategy. Resources outside Maputo and in the provinces range from poor to non-existent.

Chapter 7 examines the content development industry in the country – although still in its infancy the past year has seen an increasing number of locally developed Websites. A number of government ministries now have Websites although many provide only static information regarding their departments e.g. names of Ministers, telephone numbers, office locations, etc. Most of these Websites do provide some English translation.

Due to the fact that the Mozambican economy is still largely donor-dependent (> 50% of imports), a chapter, ***Chapter 8,*** has been included to provide an overview of some of the major donor agencies supporting ICT-related projects in Mozambique.

Chapter 9 summarises the Mozambican government's ICT implementation strategy and the areas in which it has targeted priority actions and timelines. The highest priority projects are in Infrastructure and Universal Access, Governance, Health, and Education and Development of Human Resources. The Chapter also presents some options for potential Sida support:

- Developing mechanisms for strengthening private sector involvement in government priority projects;
- Human resource development through supporting basic computer literacy, distance learning and the use of computers in the public and private sector through large-scale deployment of training and the provision of IT (PCs, software, Internet access);
- e-Government initiatives, effectively broadening the knowledge base of ICT within government and the public at large, with particular emphasis on developing integrated systems and networks into the provinces; and
- Assisting the government with the development of a strategy for civil administration reform. This could focus on the role of the government, identifying present constraints for an effective administration, needs for change in legislation governing the procedures used in the present administration, and strategic actions to be taken.

Chapter 1. Background

Sida supports the rapid integration of ICT in developing countries in order to improve communications and the exchange of information. It thus intends to expand its support to ICT related projects in partner countries in Africa and funds have been allocated for ICT pilot projects. The quantity and quality of information about the ICT situation in African countries, however, differs from country to country, and in general is limited and fragmented. Therefore Sida has taken the initiative to produce country ICT Surveys that should include information regarding key ratios, connectivity, access, the human resource situation, key institutions, policy and regulatory framework. The ICT surveys have been undertaken in three countries – Rwanda, Tanzania and Mozambique.

This preliminary report represents the summation of the project to date and an assessment of the usefulness of the methodology used in the country surveys. The report will be finalised on completion of a workshop with key stakeholders in Maputo in September 2001.

1.1 Reason for Report

This current study sets out to:

- Gather information and make an assessment of the ICT situation in Mozambique;
- Provide the results to Swedish embassies and units of Sida, as well as stakeholders in Mozambique and the other countries concerned; and
- Develop a suitable methodology for surveys for other developing countries, and for the updating of key information.

1.2 Study Methods and Outcomes

The methods used to achieve the objectives of this study were straightforward. The project team used desk research to obtain background socio-economic information on Mozambique, followed by the collection of previous ICT studies in Mozambique in order to obtain readily available baseline data. The country-specific information could then be placed in the context of African and global activity in ICT.

A local consultant in Maputo was appointed to contact major stakeholders in ICT in the public and private sector and set up times for semi-structured interviews. The interview framework was used to:

- Supplement the available data gathered from existing surveys;

- Corroborate data already available;

- Ascertain priority implementation areas to leverage ICT rollout in Mozambique; and

- Obtain other relevant publications such as vision statements, annual reports, brochures and publications, and to tap subjective opinions as to prospects for ICTs in the country. A two-person team conducted approximately twenty interviews of over an hour each.

The data that was obtained in this manner is summarised in the Appendices, and includes Key Ratios that relate to the Mozambique economy, but with an emphasis on the ICT Sector.

Preliminary results are summarised in this report. We have also applied a current assessment tool known as the *"Readiness for the Networked World: A Guide for Developing Countries"* to assess the state of ICT in Mozambique.[1]

The Guide is intended to provide a rapid means of positioning Mozambique against a fully prepared and networked country. It uses five categories of indicators:[2]

- ***Network Access*** – What are the availability, cost and quality of ICT networks, services and equipment?

- ***Networked Learning*** – Does the educational system integrate ICTs into its processes to improve learning? Are there technical training programmers in the community that can train and prepare an ICT workforce?

- ***Networked Society*** – To what extent are individuals using information and communication technologies at work and in their personal lives? Are there significant opportunities available for those with ICT skills?

- ***Networked Economy*** – How are businesses and governments using information and communication technologies to interact with the public and with each other?

- ***Network Policy*** – To what extent does the ICT environment promote or hinder the growth of ICT adoption and use?

The results of this assessment, as evaluated by the consultants can be found in ***Appendix 3***.

[1] www.readinessguide.org
[2] Readiness for the Networked World: A Guide for Developing Countries: Centre for International Development at Harvard University, p7.

Shortly before the start of this survey, two significant initiatives that have relevance to ICTs in Mozambique were undertaken.

Following the formal ratification of the ICT policy by the Mozambican Cabinet (in December 2000), an ICT implementation strategy process has been adopted under the leadership and guidance of the ICT Policy Commission. The purpose of this process is to develop a strategy that will address practical ways in which the ICT policy can be implemented. The outcomes of this process are discussed in Chapter 9. It is likely that the strategy document will form the basis for requests for financial assistance to develop projects on the ground.

The Centre for International Development at Harvard University, under the leadership of Ms Magda Ismail from the Information Technologies Group, has been working closely with key stakeholders in Mozambique to develop an e-Readiness report for the country. This report is to be included in a Global e-Readiness Report developed jointly by Harvard and the World Economic Forum, and to be published in 2002. The report contains a very comprehensive collection of data relevant to this study. Rather than repeating the information gathering, we have used some of this report as a basis for our work.

1.3 Brief Overview of African and International Trends

1.3.1 International Developments

There is extraordinary interest in ICT throughout the world. One country after another is carrying out surveys, policy studies, programmes and projects to help exploit ICT for social and economic benefit maintain competitive position or avoid suffering the widening of the so-called "digital divide."[3] There is certainly no doubt that major organisations throughout the world are benefiting from ICT-supported business processes, to the extent that for instance the protracted economic boom in the United States has been attributed in major part to the use of ICT.[4] "Electronic commerce" is the phenomenon of the times, and "electronic business" and increasingly "electronic government" are already supplanting that term. While there are genuine fears that ICT will accentuate the economic advantage of the electronic "haves" over the "have-nots," there are also analysts who argue that the developing world will be the major beneficiary of the "death of distance." As one example, the technology now available to transmit reduce dramatically the cost of telephone calls—especially international ones—and relatively speaking the developing world will be the major beneficiaries.

[3] See *www.bridges.org* for a recent and comprehensive report: Spanning the Digital Divide: Understanding and Tackling the Issues.

[4] Economists are hotly contesting this assertion. Recent statistics from the U.S. economy suggests that the productivity growth may have been overstated. The Economist, Aug 11 to Aug 17 2001.

On a global level the United Nations strongly emphasises the potential of ICT and has launched projects such as a volunteer corps called the United Nations Information Technology Service ('UNITeS'), to train groups in developing countries in the uses and opportunities of the Internet and information technology; the Health InterNetwork, to establish 10,000 on-line sites in hospitals and clinics in developing countries and provide access to up-to-date medical information; and a disaster response initiative, known as "First on the Ground," which will provide mobile and satellite telephones as well as microwave links for humanitarian relief workers in areas affected by natural disasters and emergencies. The World Bank's InfoDev programme funds large numbers of in-country ICT projects such as "e-Readiness" assessments and e-government studies.

In July 2000 The group of G8 countries issued its Okinawa Charter on the Global Information Society, and passed a resolution to set up the Digital Opportunities Task Force (DOT Force) and tackle priority areas including fostering policy, regulatory and network readiness; improving connectivity, increasing access and lowering cost; building human capacity; and encouraging participation in global e-commerce networks. The first substantive report from the DOT Force has been released. It was tabled together with a framework for implementation at the July 2001 G8 meeting in Italy.

1.3.2 Developments in Africa

In Africa, the Economic Commission for Africa launched its African Information Society Initiative (AISI) in 1996 and since then has been supporting several country projects to enhance National Information and Communications Infrastructures (NICIs) (see below for its impact on Mozambique). The ECA also hosted the major African Development Forum '99 focusing on ICT. A post-ADF Forum of Heads of States is due in 2002 and will propose ways forward in four key areas: ICT Policies and Strategies, ICTs and Health, Electronic Commerce, and ICTs for Youth and Education. The Common Market for Eastern and Southern Africa (COMESA) recently held an expert workshop to identify opportunities to foster electronic commerce within its community. The Southern African Development Community (SADC) is fostering information society initiatives within that region, including the signing of a telecommunications protocol and formation of a Telecommunications Regulators' Association for Southern Africa (TRASA).

In addition to the significant steps that Mozambique is taking in ICT—discussed in a subsequent section—at the individual country level in Africa there are now several examples of "top-down" ICT-related programmes: South Africa has published long range scenarios for ICT, put in place an ICT Sector Development Framework, is finalizing e-commerce legislation and is in the throes of a phased

telecommunications liberalisation;[5] Namibia recently commissioned a study to produce a draft ICT Policy that has now been submitted and is under review by stakeholders; Rwanda has adopted an ICT Policy and is now considering a detailed five-year implementation plan; Mauritius is working through its National IT Strategy Plan and has promulgated e-commerce legislation; Senegal is pursuing a national ICT strategy and is noteworthy for the widespread presence of phone shops; and Ghana has opened telecommunications to competition and privatised Ghana Telecom.

Given the worldwide "hype" surrounding electronic commerce, it is worth noting recent studies of the potential of e-commerce in Africa. They reveal very significant obstacles in many African countries to traditional commerce in physical goods over the Internet—primitive banking systems, poor logistics systems and time-consuming customs formalities. This points to more promising areas for e-commerce such as off-line teleservices (data capture, digitisation of architectural drawings), and on-line teleservices (call Centres). It also encourages an emphasis on business-to-business transactions and government procurement over the Internet, rather than business-to-consumer activity.[6]

[5] In fact it is experimenting with VoIP for transmission of its own phone calls and is proposing to legalise VoIP in remote rural areas. This step is regarded as a precursor to wider deregulation of VoIP.

[6] In this regard, the May 2001 approval of a COMESA programme on electronic commerce by the COMESA Heads of State is significant and should be tracked to implementation.

Chapter 2. Mozambique Today

In 1992, Mozambique was listed as the poorest country in the world with a per capita GDP of 80$, and inflation rates as high as 50%. Mozambique is still among the ten poorest countries in the world, with around 60% of its population living below the poverty line. Its economy has however grown at an annual 10% rate in 1997-99, one of the highest growth rates in the world, with a zero inflation rate. The growth rate decreased in the year 2000 and 2001 due to severe flooding in both years. Damage was estimated at US$ 400 million.

Mozambique depends heavily on donor funding, which cover one half of country imports. Imports are nearly three times as large as exports.

Most Mozambicans are subsistence farmers, with fewer than 5% using modern technology for farming; agriculture forms 32% of the economy. According to the Household Sample Survey of 1996-1997, 69% of the population has been living in absolute poverty. Most people live within thirty kilometres from the nearest health centre, are illiterate and have no clean water. The average standard of living in Maputo, the capital, is nine times that of the average standard of living in the rest of the country. The average illiteracy rate is 60.5% and average life expectancy is 45,5 years.

Table 1. Basic Socio-economic Data about Mozambique.

Indicator	Value
Population	17,242 million (2000)
Population Density	22 per square km
Urbanisation (% of population)	39% (1999)
Population Growth	2.4% (2000 estimate)
GDP	US$ 4,84 billion (2001)[7]
GNP per capita	US$ 230 (1999) 193rd/206
PPP per capita	US$ 797 (1999) 191st/206
Inflation[8]	4,8% (1999) 11,4% (2000)
Annual real GDP growth rate	3,8%
Exports	US$ 300 million (f.o.b., 1999 est.)

[7] BMI-TechKnowledge Communications Technologies Handbook 2001
[8] KPMG / CTA. 2000 Economic Overview.

Indicator	Value
Export Commodities	Prawns 40%, cashews, cotton, sugar, copra, citrus, coconuts, timber (1997)
Imports	US$ 1.6 billion (c.i.f., 1999 est.)
Structure of Economy	Agriculture: 32%[9] Industry: 24% (manufacturing =13%) Services: 44%
Foreign debt	US$ 896 million[10]
Foreign investment	US$ 963.2 million[11]
Labour force	Agriculture 81%, industry 6%, services 13% (1997 est.)
Child malnutrition under 5	26% (1992-1998)
Life Expectancy	44 years - men 47 years - women (1998)
Under 5 mortality	213 /1000 (1998)
Adult Illiteracy	42% - men 73% - women
Gross Enrolment Rate 1997	25% (all levels of education)
Poverty	<1$/day PPP 38% <2$/day PPP 78%
Human Development Index	0.341 (UNDP 1997)

Source: World Development Report 2000/2001; Institute of National Statistics, Mozambique

[9] Compared to the 1996-1998 figures of 27%
[10] ibid
[11] ibid

2.1 Economy

Mozambique's economy has been growing rapidly in the last 9 to 10 years, with growth rates of over 10 percent in some years. Agriculture is the largest sector with Trade and Repair Services as the second. About three quarters of all growth takes place in Agriculture, Trade, Manufacturing, Building and Construction and the Transport sectors. The following chart shows the sectoral growth in the economy over a three-year period.

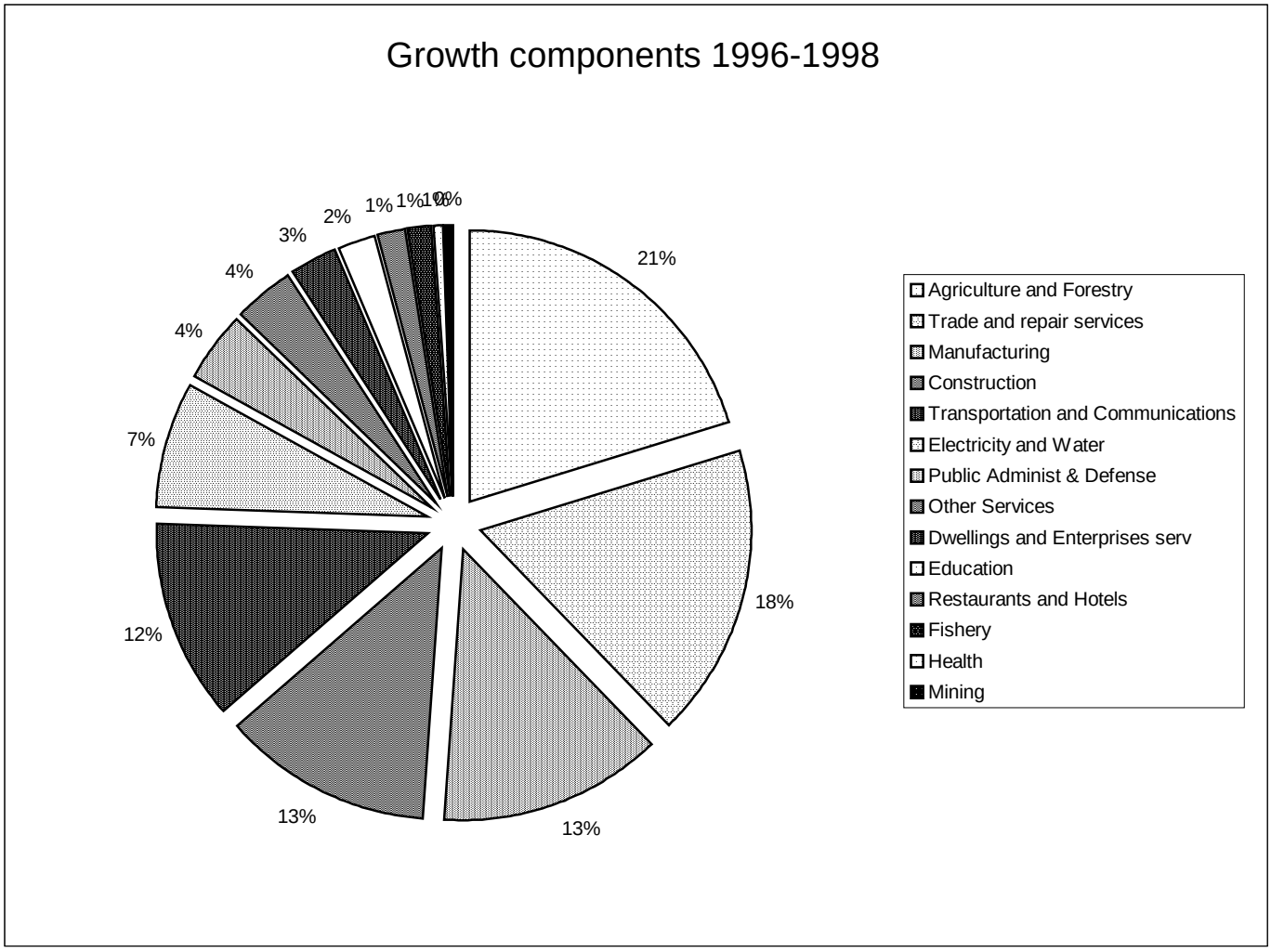

Figure 1. Sectoral growth in the Mozambican Econom, 1996 – 1998.

The sustained high growth has lead to a doubling of the country's GNP in the last ten years. Most of this growth has, however, taken place at the centre, leaving little improvement in the standard of living of the rural poor.

The economy is characterised by a high rate of investment, particularly into infrastructure and communications. TDM, the national telephone company, has maintained an investment level of about US$ 30 - 40 Million per year. Investments in the fixed and mobile networks will increase to about US$ 65 million per year from 2001.[12]

The following is a recent comment to the structure of development in Mozambique.[13] Jeanne Stephens, head of Austral Consultancy, a Maputo-based management consultancy firm, told IRIN[14] that foreign investors in Mozambique were primarily interested in infrastructure when it came to deciding on locations. "Generally RENAMO areas do suffer from poor roads and communications and they are less accessible, things that investors in Mozambique are obviously concerned about," Stephens said.

Although Mozambique has enjoyed several years of double-digit growth, progress has to be gauged against the background of poverty caused by 13-years of civil war that ended only in 1992. Mozambique often cannot afford to build the infrastructure needed to attract foreign investment, resulting in "development pockets" based on favourable geography, natural resources and good road and port facilities. Stephens emphasised that developments along the banks of the Zambezi could be interpreted as a non-partisan approach to foreign investment. "The Zambezi Corridor development is likely to bring significant economic benefits to Tete, Sofala, Zambezia and northern Manica provinces, all areas where RENAMO has considerable support. For example, the fact that there is no bridge over the Zambezi River is a major constraint in linking the north and south of the country, as is the inefficient use of the sea, coastline and port for the transport of local (and imported) goods.

The Beira-to-Tete railway development that will eventually link Malawi to Beira port, is also likely to boost economic development in the areas it runs through. Stephens added that a big investors conference in Zambezia province recently committed foreign capital to agro-industry and hydro resources in the province. "The spectacular growth seen in and around Maputo probably won't be seen elsewhere in Mozambique but there are encouraging signs that economic development is set to be a nationwide phenomena in Mozambique," Stephens added.

[12] TDM: Journal do Cliente, May-June 2001.
[13] IRIN, MOZAMBIQUE: Chissano defends development record. JOHANNESBURG, 11 June 2001.
[14] Integrated Regional Information Networks, an agency of the UN Office for the coordination of Humanitarian Affairs, *http://www.reliefweb.int/IRIN/*.

2.2 Power supply (Electricity and Alternative Sources)

The Electricity Law of 1997 makes allowance for the de-monopolisation of the state-owned Electricidade de Moçambique (EDM), the national utility, and allows private sector participation in electrification projects.

A joint venture has been set up between EDM and the Ministry of Mineral Resources and Energy to address rural electrification. The priority areas for rollout of the electrification grid would be hospitals – the Ministry of Health has planned pilot projects in 140 rural clinics for the use of solar power, of which about 40 are now operational. As part of the Electricity III project, the national grid will be extended to 19 rural towns located in Gaza, Inhambane, (South Region), Tete and Nampula (North Region) provinces. It will also entail the installation of 1,700 street lighting points and the connection of 7,053 consumers including households, service facilities, small industries and businesses, fisheries, and irrigated agriculture.[15] Sida is also financing rural electrification projects, with Swedpower, in the Zambesia province.[16]

The electrification plan aims to electrify all district capitals by 2004. There are plans to establish a rural trust fund, with contributions from the private sector and the government in the form of subsidies. This forms part of a five-year DANIDA supported programme for the Energy Sector.

The World Bank has also been working with the Ministry of Energy and Natural Resources to set up isolated electrical grids, through the Urban Household Energy Project, in two coastal towns in Mozambique. Low-cost electricity services were extended to the two isolated areas after an enabling framework had been created for private sector participation.[17] In addition, the Ministry has been involved in installing power generators at the district level to improve access.

Schools are not presently on the priority list for electrification. However, through the World Bank's Energy Access and Reform programme, a seven-year US$ 8 million programme is under discussion - this will prioritise secondary schools.

In most rural areas, alternative energy sources such as diesel generators or solar power are used. A gasification project is underway in Villancoulos to exploit gas resources found off the coast.

The Cabora Bassa hydroelectric power station in the Zambezi valley has a potential of almost 4 000 MW of power. Until recently, little of this capacity was used in

[15] http://www.afdb.org/knowledge/pressreleases2001/adf_55_2001e.htm
[16] http://www.swedpower.se/swpsite/swppages/bar/news/news_up_date.html
[17] http://www.worldbank.org/afr/findings/infobeng/infob62.htm

Mozambique. Main line electricity is supplied by EDM to about 180 000 customers in Mozambique, i.e. one connection per 100 people. About 60% of all connections are in Maputo, and virtually no rural electricity is available through the grid. The basic power grid is being expanded[18] and a large investment programme to improve and expand electricity is underway. The Mozal aluminium smelter just outside Maputo has an annual capacity of about 250 000 tons, and uses about 450 MW of power[19] – compared with about 220 MW for all other users. Mozal's capacity is planned to double in the next few years.

[18] Despite several attempts to obtain a copy of the electrification plan, this is still not available.
[19] www.mozal.com

Chapter 3. The ICT Policy and Regulatory Environment in Mozambique

3.1 ICT Policy

The Government of Mozambique has been involved in the development of an ICT policy since the mid-90s. Details of the policy formulation process are outlined in Ismail's report (cf. section on Network Policy) and will not be repeated here. Worth mentioning is that lengthy consultative processes were undertaken throughout the country with a variety of stakeholders. Part of the process included the establishment of the ICT Policy Commission, which falls under the Prime Minister's office.

The ICT policy, formally tabled in the Cabinet in December 2000[20], addresses six priority areas:

- Education
- Health (with a priority on HIV/AIDS)
- Human Resource Development
- Infrastructure
- Access
- Governance.

The ICT Policy Commission is presently leading the development of an ICT implementation strategy, which was presented at an ICT conference and Exhibition in Maputo in October 2001. A small working group comprising mainly government officials assisted in developing proposals for submission to the Cabinet. The Implementation Strategy, and possible courses for action, is presented in Chapter 9.

The implementation strategy is also addressing a number of cross-cutting areas such as project management, coordination and integration of ICT-related activities, evaluation, and the legal framework for telecommunications and ICT usage, amongst others.

To support the ICT policy process and provide baseline data for the implementation of the ICT policy, a national IT survey was carried out under the auspices of the ICT Policy Commission. This survey, completed in the latter part of 2000, covered aspects such as IT infrastructure (hardware and software), availability of human resources and skills levels. The survey was based on a questionnaire and follow-up targeted fieldwork in the various provinces. Questionnaires were sent to over 2 000 institutions; 700 questionnaires were returned.

[20] www.infopol.gov.mz

The survey confirmed the figures quoted elsewhere in this and Ismail's report, i.e. there is little IT infrastructure available in the provinces and most of the activity is centred on Maputo. This also applied to skills availability in the provinces.

During interviews with Mr Paulo Maculuve, the project manager of the survey project, there were concerns about the quality of the data, as many respondents did not understand the questions posed and supplied suspect data.

3.2 The Telecommunications Act of 1999

The Telecommunications Act was passed in 1999 (14/99) and includes the following key points:

- TDM's monopoly on basic telecommunications will remain in place until 2004 – the monopoly covers both fixed line and international access, although competition on mobile telecommunications will take place in 2002;

- The INCM, the Instituto Naçional das Comunicaçoes de Moçambique, is given the regulatory authority in Mozambique, reporting to the Ministry of Transport and Communications. The INCM was established in 1992 as the independent regulatory body of the telecommunications sector. The INCM assumes responsibility for licensing, spectrum management, the formulation and interpretation of the telecommunications sector, international relations, and defining and monitoring compliance with the performance targets set for TDM;

- INCM has to approve all telecommunications equipment;

- The regulations do not contain a framework for VSAT installations, but these licences can be purchased through the INCM - they may only be used for data transmission;

- TDM may provide complementary or value-added services in competition with other operators and service providers;

- Voice over IP (VOIP) does not appear to be addressed in the Act;

- The creation of a Universal Service Fund is provided for in the Telecommunications Act of 1999, but there are as yet no mechanisms in place to operationalise it; and

- No wireless technologies are allowed.[21]

The Ministry of Transport and Telecommunications recently hosted a one-day seminar to discuss a draft telecommunications policy document, and submitted a proposal to Parliament to alter Chapter 40 of the 14/99 Telecommunications Law allowing the government to reduce the exclusivity period of TDM. The Ministry also submitted three decrees to the Council of Ministers, dealing with the regulator, interconnection and access to telecommunications services.

The International Telecommunication Union (ITU) is also planning to assist the regulator (INCM) to develop a universal service policy.

There are a number of areas of concern raised by stakeholders:

- The regulator is not perceived as carrying out its regulatory functions adequately. In the light of possible liberalisation, and the issuing of the new GSM licences due in late 2001/2002, several stakeholders raised the need for stronger regulation as a priority area;

- There are no clear priorities in terms of regulating areas such as VSAT, VOIP, wireless frequencies – this creates uncertainty in the telecommunications market and is unlikely to be conducive to stimulating private investment in these areas;

- Creating a new telecommunications fund may push up the price of telecommunications rather than brining it down;

- There is no national ISP exchange;

- There is a contradiction in the 199b Telecommunications Act in that 2004 is stated as the end of the TDM monopoly on fixed-line telephony but in turn it mentions that TDM will maintain its monopoly status for five years after privatisation, yet some of its activities have already been privatised; and

- There is no industry association to lobby on behalf of the private sector. The CTA (Confederation of Chambers of Commerce and Industry) has taken the leadership through its private sector meetings. It proposes that a Board should be created within the INCM structure, which can ensure that the interests of different stakeholders are protected.

- The present legislation does not allow for the provision of fax services through telecentres, a valuable service not provided by other means.

[21] See also Ismail (May 2001) for details of the telecommunications and trade policy.

Chapter 4. Connectivity and Access

See ***Appendix 1 and 2*** for a summary of sector data.

4.1 Telecommunications

TDM (Telecommunicaçoes de Moçambique) was created in 1981 as a result of the split between post and telecommunications, and became a legal corporate body with autonomous administrative and financial functions in January 1993. TDM is a public corporation wholly owned by the government.[22]

TDM was supposed to have been changed into a private company by June 2001. The government is preparing TDM for privatisation by 2003, Consultants have been appointed to prepare a tender by the end of 2001. Strategic equity partners will be identified to meet TDM's lack of financial resources. There is some doubt in Mozambique's private sector that this operation will take place as scheduled.[23] According to the Telecommunications Act of 1999 (Law 14/99) TDM maintains its monopoly on fixed line telephony until 2004.

TDM maintains an autonomous status but reports into the Ministry of Transport and Communications (Infrastructure).

TDM maintains monopoly over local, long distance and international telephony. Mobile, value-added services and Internet service provision are, in principle, open to competition. TDM is presently the only provider of leased line services.

TDM provides the following services[24]:

1. Fixed Telephony
2. Mobile (the only mobile company – mCel)
3. Data communication services
4. ISP services
5. Cable TV
6. Internet access to ISP's
7. Audio-text services
8. Paging
9. Consulting services
10. Terminal equipment
11. Project design of access networks.

Cable Internet services have been available in Maputo since August 2001.

[22] BMI-TechKnowledge Communications Technologies Handbook 2001
[23] At the time this paper was written, the privatisation process had not yet taken place.
[24] Some of these services have already been privatised e.g. cabling and maintenance

The current network can only support a potential teledensity of 0.64 (as compared to the existing 0.46).[25]

TDM is a profitable company. In the period 1993 to 1999 assets grew from about US$ 80 million to about US$ 300 million, and it has shown a profit of US$ 3 to 10 million per year. TDM is currently implementing a three-year investment programme worth US$ 200 million, particularly for telecommunications rollout (fixed and mobile) in rural areas.[26]

4.2 Fixed services

The telecommunications infrastructure is under rapid expansion. An investment programme of US$ 200 million over three years was launched in June 2001, aimed at expanding the technical backbone, upgrading exchanges and adding to the number of fixed lines. From 2001, all exchanges are digital. The number of fixed lines is about 90 000. By 2003, remote areas in the hinterlands between Beira and Chimoio, Chimoio and Tete, and Nacala and Nampula will be connected with a high capacity SDH microwave system. There will be links in Xai-Xai and Massinga, with connections to the more remote rural areas. Urban infrastructure in Maputo will be upgraded with a new ring structure and intelligent network services. To date, ISDN services have only been installed on an ad-hoc basis to the corporate sector.

TDM started to provide access to the Internet to five ISPs in 1997 (within the Leland Initiative). ISP's have been waiting for a long time for additional capacity from TDM and are not satisfied with TDM's service. TDM relegated its Internet services in 1996 to one of its subsidiaries – Teledata - via a joint venture with Portugal Telecom. The Internet connection is through MCI to Boston with a down-link of 576 Kb and an up-link of 192 Kb. Teledata is currently the only company with national coverage. Their main business is to provide fixed line access, and their main customers are Mozambique's commercial banks. They do not provide Internet access to other ISPs.

4.3 Mobile (Cellular) network

Mobile services were launched in November 1997 through the sole mobile operator Telecomunicaçoes Movies de Moçambique Lda (TMM). GSM 900 technology is used; SMS messaging is available. mCel, the sole cellular provider in Mozambique, has budgeted US$ 33 million for remote connectivity construction during 2000-2002.

By September 2000 the number of subscribers reached 23 000. Growth in mobile services increased dramatically with the introduction of the prepaid scheme in September 2000, bringing up total mobile subscribers to 55 000 in February 2001 and 100 000 by June 2001. Since the launch of prepaid services, there has been

[25] BMI-TechKnowledge Communications Handbook, 2001

growth of about 2 000 new subscribers per week. The number of mobile lines exceeded fixed lines in May-June 2001.

The mobile coverage expands rapidly, and now covers all provincial capitals. Areas covered include:
South:

- Area between Maputo and Xai-Xai, along the main route
- Main routes from Maputo to the South African and Swaziland borders
- City of Chibuto and environs
- Western part of Inhaca Island

Central:

- Beira, Chimoio and Manica on the Zimbabwean border

Further expansion is planned for the areas beyond Xai-Xai and in northern Mozambique, including Niassa.

The market will soon be open for two GSM licences, each with an operations licence of 15 years and which will be renewable. The bidding process is planned to end before 2001.

4.4 Alternative Telecommunications Access

Mozambique is a vast country with an area of nearly 800,000 square km, or the size of Germany and France combined. The existing electricity and telephony grids now reach the provincial capitals, but it must be remembered that perhaps 90% of the population are bypassed, and that universal access is a thing of a very distant future. In some cases there are islands of economic activities such as mines, large agricultural estates, tourist facilities etc. far away from grid access. In these cases, satellite or radio solutions are the only options. Mozambique is also looking at RASCOM to provide solutions. RASCOM, the Regional African Satellite Communications Organisation (RASCOM)[27], was established in 1993, is an intergovernmental treaty-based organisation which has as its prime objective the provision, on a commercial basis, of the satellite capacity required for national and international public telecommunications services, including sound and television broadcasting in Africa. Currently the organisation operates by pooling and optimizing space resources leased mainly from INTELSAT. The ultimate aim is to have a dedicated Africa-owned regional satellite system. The first satellite should be operational in 2003

VSAT's require a license and must be bought through the telecommunications regulator, INCM (Instituto Naçional das Comunicaçoes de Moçambique). They may

[26] TDM Jornal do Cliente No 24, May/June 2001, p3.
[27] http://www.atu-uat.org/index.phtml?Page=Projects

be used for data only; voice may be allowed within the nation, for long distance use only. Licensed companies are allowed to have two-way links. TDM holds rights to issue licenses to buy VSAT connections and also operates the international gateway for most ISPs through VSAT. It is quite clear that the regulatory authority lacks the capacity to monitor satellite installations, and that a number of unauthorised installations exist.

The undersea cable being laid between Maputo and Beira should be operational in the first quarter of 2002, and within five to six years up to Pemba. This is part of the AfricaOne project. [28]

4.5 Internet Service Providers

There are about eight ISPs in Mozambique, all of which run their main operations in Maputo. The total number of Internet users is currently estimated at about 6 000[29], increasing rapidly. The main limitations are said to be economic - the relatively high costs of computers, telephone lines and ISP fees. It is likely that at least 80% of all users are in Maputo. Even if reliable telecommunication facilities and ISP POPs now exist in most provincial capitals, unreliable electricity, high costs and lack of skills limit the use outside of the capital.

The major ISPs are Virconn, CIUEM, Teledata and Tropical. Teledata is 50% owned by TDM, whereas Tropical, Virconn and EMIL are fully privately owned. The growth rate is considerable; our guess is 30% per year, which would increase the number of Internet users to 10 000 by the end of 2002. There are some Internet Cafés in Maputo, and several of the better hotels in Maputo offer free Internet access to their guests. Teledata operates four Internet cafés in Maputo, Beira, Nampula and one other provincial capital. There is also apparently an Internet Café in Pemba.[30]

The fees for using Internet café facilities are comparable to other capitals in Africa. Internet cafes in Maputo charge about US$ 3.00 an hour for access and dial-ups subscriptions cost about US$30 per month.

TV Cabo offers Internet access via cable TV in limited residential and business areas of Maputo. The costs, on top of the minimum TV package of US$ 20/month, is US$75/month.

[28] Africa One project is an optical fibre submarine cable network that is planned to go round the African continent with landing points on some coastal countries and connected to global optical fibre submarine cable systems. One of the objectives of the project is to link African countries to one another and the rest of the world with high capacity communications systems that will serve the traffic demands generated by the high growth of the Internet, e-mail, e-commerce and telephone service all of which are stimulated by low tariff rates. The project is expected to be operational in the year 2002. *www.africaone.com*

[29] None of our sources could indicate with certainty the size of the existing user market. According to the BMI-TechKnowledge Handbook 2001, estimated numbers are as high as 14 267 for 2001.

[30] Imensis website, *www.imensis.co.mz*

Three telecentres offering Internet access have been established in Namaacha, Inhambane and Manica, with technical support provided by the Centre of Informatics at the University Eduardo Mondlane.[31] The centres in Namaacha and Manica are about 60% self-reliant, whereas the Inhambane operation looks likely to be self-sustaining despite only being launch in April 2001.

The Kellogg foundation, through CIUEM, will be funding the expansion of the telecentre network by supporting another 3 – 4 telecentres. The IDRC will be supporting the creation of a network between the existing telecentres.

4.6 Computers

About 1 500 PCs were sold in 1995. The total market for computers in 2001 is estimated at about 5 000 units, of which about half are sold by one company, DataServ. The market grows by 30 to 40% per year.[32] The total number of PCs in the country by the end of 2001 can be estimated at between 20 000 - 25 000. Growth is exponential, and the number should reach 40 000 by 2003. There are a small number of mainframe computers and servers installed in a few companies with high IT usage, mainly in the banking sector and TDM.

IT usage in the public sector is largely uncoordinated and fragmented, with a wide variety of hardware and software solutions. It has often been the case that donors have managed civil service reform projects with expatriate resources. In many cases popular software solutions have been imported from the individual donor countries. With the low level of IT skills available in the civil service, this has created difficulties for users and support, as well as effectively preventing data sharing between ministries and authorities. The lack of appropriate management skills in relation to ICTs has also resulted in inefficient use of innovative solutions.

One exception seems to be the Banco do Moçambique, the central bank. A very ambitious investment programme is under way, including installation of a new generation of powerful hardware and software (SAP).

Import tax on new computers is presently 7,5%.

4.7 Broadcasting

Mozambique has a relatively liberal regime for other media. The National Institute for Telecommunications issues licences for broadcasting, and the Office of Information (in the Ministry of Transport and Communications) manages development plans and budgets for radio and TV. There are 30 private companies broadcasting along with the government owned public service channel.

[31] www.telecentros.org.mz

4.8 Radio

The transmissions of the national broadcasting company cover all of Mozambique's territory, and it is estimated that 60 to 70% of the population are reached by national radio. Radio is the medium providing the widest general access. In practice, the most important obstacle for poor people to gain access is the cost and availability of batteries in rural areas. Also, most transmissions are in Portuguese, which is not well understood by poor people in rural areas. Recently windup radios have been introduced.

The first community radios were established about three years, and there are presently nine such stations supported through a UNESCO / UNDP programme. The first was launched in Niassa. Content coverage includes the areas of health, literacy and social education. The Institute for Social Communications has been experimenting with community radio models.

4.9 TV

TV transmitters cover mainly urban areas. It is estimated that national TV can reach 15 to 17% of the population. Cable access is available in Maputo, but economic factors limit its use in rural areas. As mentioned above, broadband Internet connectivity is now available in limited areas of Maputo.

[32] Interview with Mr. S. Norrby, Dataserv.

Chapter 5. Human Resources

5.1 The Education Pipeline – Primary and Secondary Schooling[33]

Education is compulsory from entry at six years till 13 years, with the seven-years of schooling provided through primary schools. Although primary education is compulsory, the statistics show that this has not been enforced and school-going figures are low. The average pupil : staff ratio is 60.8 for Grades 1 to 5 and about 39.0 for Grades 6 to 7. According to 1997 figures about 1,9 million children were attending primary school.

Secondary education is offered in secondary, technical and agricultural schools. Ten per cent of students from primary education go on to this level. Under the National Education System, the best graduates of primary education follow five years of secondary education. In the final year of secondary education students study Mathematics, Physics, Chemistry, Biology, Portuguese, Geography, History, Physical Education and English. The course leads to the Certificado de Habilitações Literárias (Secondary School Leaving Certificate). An entrance examination is necessary to enter university.[34]

5.1.1 ICTs in Primary and Secondary Schools

Of the 113 public schools offering secondary education, only 16 have undertaken any form of ICT installation. Thirteen are connected to the Internet.[35] No public primary schools have any form of connectivity.

The existing school networking initiatives have been carried out under the auspices of the Ministry of Education, funded in a collaborative venture between the Ministry, WorLD Links for development programme of the World Bank and the Canadian International Development Research Centre (IDRC). The Mozambican government allocated 513 million Meticais (US$ 22,7 million) to the project as its contribution.

The objectives of the initiative were to introduce computer literacy into secondary education, explore the integration of ICTs into the teaching process, encourage schools to become centres of information sharing and communication, provide training opportunities on, and promote the use of, e-mail and Internet, and finally access and promote the exchange of experience within Southern Africa.[36]

[33] UNESCO Education system database, http://www.usc.edu/dept/education/globaled/wwcu/background/Mozambique.html
[34] National Institute of Statistics, *www.ine.gov.moz*
[35] IDRC personal communication
[36] *http://www.bellanet.org/gkaims/acacia/acacia_pub_brief.cfm?record_identifier_001=170*

A syllabus for the introduction of ICT training into secondary schools has now been established. This will be limited to computer training and does not address the integration of ICTs into other parts of the curriculum i.e. for the teaching of other subjects.

Some experimentation has been initiated for the introduction of ICT training in teacher training colleges. There is as yet no in-service training for practicing teachers.

The project has experienced many problems since its inception. Quoting from Ismail's report:

> *"There were some logistical problems encountered by this project, namely:*
> - *Security – physical security of the computers*
> - *Budget – Cost of telephone lines – Internet connection is expensive*
> - *Sustainability - Some schools charge students and use the money to get trainers.*
> - *Electricity and Telephony: Many of the schools needed to have electricity connections and telephone lines installed.*[37]
> - *Maintenance – The World Bank donated 125 second-hand computers, 100 of which were functioning properly – there was a need for technical support. These computers were 486's that were not compatible with much of the available software.*
> - *Cost of telephone bills: TDM refused to offer lower rates for schools participating in the project since it insisted that it could only reduce these rates if the government offered to reduce its tax requirements. All schools were connected to the 'Net via dial-up to the CIUEM, some of them making long distance phone calls which were very costly. Consequently, schools were unable to pay telephone bills and resorted to asking for fees for usage of their computers by the learners.*
>
> *Other more[fundamental]… challenges were:*
> - *Implementing an IT project in institutions with no previous tradition/culture of using IT.*
> - *No attention was paid to curriculum and content development."*

The IDRC undertook an evaluation of the SchoolNet projects in 2000 – the report is as yet unpublished but corroborates the conclusions above. Project management has also been one of the greatest challenges since its inception. For the past year, initiatives have been underway to transfer the project to the Ministry. These lengthy delays have resulted in the withdrawal of WorLD from the project until such time as the Ministry has put in place the necessary resources (human, financial, infrastructure).[38] [39]

[37] According to the Deputy Minister of Education, secondary schools generally do have access to electricity.
[38] According to the IDRC, the project is at this stage 75% underspent, an indication of capacity problems to deliver.
[39] During the interview with Solsuni, who have been tasked with installing Sun servers at the schools, there was concern about the slow levels of government implementation on the project.

LearningForAll, a UK-based NGO, initiated a project in July 2000 in which ten multimedia computers were installed at the Chibututuine Teacher Training College, 80 kms north of Maputo. The purpose of the project was to train staff in the use of computers as a teaching aid. The pilot project was designed jointly with the Mozambican Ministry of Education.

The phased project approach was as follows:

1. Teacher training in the use of multimedia as a teaching aid;
2. Install one solar-powered stand-alone multimedia computer in each of 10 primary schools on a trial basis.
3. Educational multimedia CD-ROMs appropriate to the Mozambican culture will be developed for use in the schools.

After a two-year period the impact of the project will be evaluated, and pending a positive evaluation the project scaled up to cover the whole of Mozambique over a ten- year period.

Table 2. Educational Institutions in Mozambique

Institution	Number
Primary schools:	
First level (Grades 1 – 5)	5 689
Second level (Grades 6 – 7)	336
Secondary schools:	
Grades 8 – 10	93
Grades 11 – 12	20
Technical and Industrial Training Schools	38
Public University:	
Universidade Eduardo Mondlane	1
Private Universities:	
Catholic University (Beira)–satellite campus in Nampula	1
ISCTEM	1
ISPU	1
ISUTC	1
Teacher Training Institutes:	
Instituto Pedagógico	1
Universidade Pedagógica	1

5.2 Higher Education (Colleges, Universities and Institutes)

Higher education is the responsibility of the Ministry of Higher Education, Science and Technology and is financed by the State. There are three private higher education institutions (two of which offer ICT-related courses) and one public. Estimates are that a total of between 30 – 40 ICT graduates can be produced per

year. Figures are not available for technicians, but the absence of training institutions at this level would indicate very low levels of expertise entering the market.

The lack of trained staff to offer courses is a problem for all the institutions. Use is therefore made of contract lecturers, and Portuguese and Brazilian expertise.

5.2.1 University Eduardo Mondlane (UEM) [40]

The University Eduardo Mondlane is the only public university in Mozambique. The Department of Mathematics, Statistics and Informatics runs a five-year course (Bachelor's degree plus two years). Between 20 – 30 students graduate per year (out of a total of about 5 762 students in the whole university). . This has been the only higher institution to date that has produced graduates.

The CIUEM (Centre for Informatics) at the University has played a key role in a number of the ICT-related initiatives in Mozambique. It provides ICT support to the University, operates an ISP, and undertakes the project management of several donor-supported projects e.g. the telecentre projects at Namaacha, Inhambane and Manica. It has also undertaken a feasibility study on the telecentres with support from the Kellogg Foundation. CIUEM has trained local technicians to support these projects.

Through an agreement with the Royal University of Stockholm[41], post-graduate studies in ICTs are being offered to UEM staff and graduates. At present there are a total of five PhD students on this arrangement – they are drawn from CIUEM, the Department of Mathematics and Informatics (Faculty of Science) and the Faculty of Engineering.

CIUEM also has an agreement with the Technical University of Delft.[42] The aim of the project is the training of academic and administrative staff in management, information systems and ICT-related subjects.[43]

The Faculties of Science and Engineering also have some postgraduate students in ICTs.

5.2.2 Instituto Superior Politecnico e Universitario (ISPU[44])

ISPU, located in Maputo, is one of three private universities in the country. It has been in existence since 1996 and has an enrolment of over 1 000 students. It has two schools (Management and Technology, and Law) and offers a degree in

[40] *www.uem.ma*; *www.ci.uem.mz*
[41] Funded through Sida's SAREC project.
[42] Funded by the World Bank until 2002.
[43] Comment from the private sector is that UEM offers a more well-rounded course.
[44] www.ispu.ac.mz

Informatics. This includes information management, networking, information systems, programming, and some accounting and general management courses. It enrols about 20 students per year in Informatics. The first six students will graduate in 2001 from the five-year course.

A limited number of scholarships are offered but generally the fees are high (US$250 per month). ISPU has an arrangement with the University of South Africa to share course material and expertise.

A special MBA programme, designed in partnership with the Portuguese university ISCTE, is offered over one or two years, depending on whether or not a dissertation is written.

5.2.3 Instituto Superior de Ciências e Tecnologia de Moçambique (ISCTEM)[45]

ISCTEM is also a private institution that offers courses in ICTs. To date, no graduates have qualified.

5.2.4 Instituto Superior de Transportes e Comunicações (ISUTC)[46]

The ISUTC, a private sector institution based in Maputo, was established in June 1999 through a joint venture between Mozambican and Portuguese partners. It offers a number of technical degrees each of 3,5 years duration. The courses cover technical areas such as information systems, electromechanics, transport and logistics and industrial engineering. Besides addressing the technical aspects required in the degrees, it also includes management courses, as this was perceived to be a weakness in the existing curricula offered elsewhere. No students have graduated yet.

5.2.5 TDM Telecommunications Institute

The well-equipped telecommunications institute offers internal training courses in a number of areas, including informatics, for TDM employees only. Most of the courses are of short duration and ICT related courses include:

- Introduction to Information Systems and MS-DOS (10 days)
- Management of Telecommunications Projects (10 days)
- Windows training (10 days)
- Internet (10 days)
- Network management (10 days)
- Fault reporting
- Various courses on the billing system (GIRAFE)

[45] www.isctem.com
[46] www.transcom.co.mz/isutc

- Analogue and Digital Electronics (30 days)
- Various courses on switching and transmission.

Of interest are the number of English language courses offered at a number of levels for employees.

The institute also runs its own in-house management training courses covering areas such as negotiations, human resources, and business leadership.

5.2.6 Universidade Catolica de Moçambique (Beira)

The Catholic University of Mozambique, established in 1996, is the second largest university in the country. It presently has four faculties: Economics and Management in Beira, Law and Education in Nampula and Agriculture in Cuamba. To our knowledge it does not offer any ICT courses. It has however created CIDDI, the Centro de Investigaçao e Documentaçao para Desenvolvimento Integral (Center for Research and Documentation for Integrated Development). It is presently collaborating with the University of Pretoria (South Africa) and West Virginia University in the US, in the Appalachian – Southern Africa Research and Development Collaboratory. The objective of the project is to research ways to address the problems of uneven development through innovative use of community-level information technologies and international collaboration[47]. This seems to be predominantly focussed on GIS systems and photos.

5.3 Technical Training in ICTs

Technical and professional education takes place in technical schools and institutes. Basic technical education (equivalent to the first cycle of general secondary) trains skilled workers; mid-level technical education (equivalent to the second cycle of general secondary) trains technicians.

To our knowledge there is no technical ICT training offered in Mozambique through these institutions. The private companies undertake their own in-house training of graduates, and generally make use of courses in South Africa or Portugal. There are two private companies that offer Microsoft certification, although there are unconfirmed rumours that these had to close down due to their unaffordable course prices.
Telecentres and church missions e.g. in Inhambane now offer basic ICT literacy courses.

With assistance from Cisco, CIUEM is establishing an ICT institute to provide low-cost Cisco training. This is in response to the urgent need for practical technicians. CIUEM anticipates that most students will be sent by their companies e.g. Mozal,

[47] http://www.rri.wvu.edu/ASARD1/index.htm

TDM, EDM, CFM, banks and insurance companies. The ICT training institute will have linkages to the Cisco training academy at the Economic Commission for Africa (ECA) in Ethiopia.

5.4 Private Sector Training in ICTs

Sislog (Sistemes Technologias Informaticao e Communicao Lda) has recently been accredited to test for the ICDL (International Computer Drivers' License), run under the auspices of the European Computer Drivers License. Local institutions that wish to offer the ICDL will be registered with Sislog as accredited training institutions. Potential training institutions include ISPU and the Bank Training Institute.

5.5 Availability of ICT Skills

Ismail (2001) quotes figures of 50 Ph D and 200 Master's degrees for higher-degree professionals in Mozambique. It is not known how many of these are in ICTs but an estimate would be no more than a few.

ICT skills are in high demand and demand outstrips supply. The private sector is very small and the higher salaries make these more attractive than government positions. Figures of US$ 250 per month were quoted for government positions, and amounts up to ten times that in the private sector. The recent donor interest in ICT-related projects has seen the creation of project implementation units within some departments of the public sector. These projects are able to pay very high salaries. Often the managers do not report into Ministries but are accountable directly to the donor agencies. This has resulted in dynamics not conducive to the overall adoption of ICTs in the Ministries themselves. Experience indicates that alternative models should be investigated and that project outsourcing and BOT (build, operate and transfer) mechanisms should be considered, with much stronger private sector participation.

Most of the skills are based in Maputo, with very little in the other provincial capitals. This is regarded as a major challenge for the roll-out of any ICT implementation strategy, and has been identified as a priority area in the recently tabled ICT policy.

As yet, the brain drain of ICT professional skills to South Africa and further afield is not perceived as a problem.

The import of ICT skills is very problematic, as any transfer of funds for such services first has to be approved by the Ministry of Finance. This makes subcontracting extremely difficult.

Chapter 6. Structure of the ICT Sector and Major Users

With the exception of banking, the private sector is very small, with a small number of companies. The ICT sector is dominated by a small number of organisations, of which the major ones are banks, TDM (Telecom), Mozal, UEM and a few others. Together, they control a major part of all ICT-related investments in the country, as well as a large part of the available skills pool. This chapter deals with the sector under the following categories:

- ICT Industry
- Major users in central and provincial government, and parastatals
- Major users in the private sector.

6.1 ICT industry

InformationTechnology

Mozambique has a very small IT industry. Mozambique's market for IT products and services is still very small and not fully developed, even compared to many other LDCs[48]. With only 15-20 000 computers, 6 000+ Internet subscribers and the high cost of telephone calls, the software industry in Mozambique mainly revolves around two or three companies that produce software primarily for accounting and resource management. Most of the IT companies' activities cover several areas including hardware sales, software development, networking, training and web development.

No figures are available on the size and turnover of the industry,[49] but some data on the number of employees are revealing:

Teledata	70 employees
Solsuni	5
Syscom	28
Exi	ca 60
CL/Cornerstone	14
SORT Lda[50]	8 (with some additional consultants)
DataServ	ca. 35

In total, the private IT sector may employ between 200 and 300 people, of which only a small percentage has qualifications higher than a technician level.

[48] LDCs = Least Developed Countries

[49] It is significant that the first major ICT exhibition is to be held in Maputo in October 2001, in parallel with an ICT conference organised through AITEC.

[50] http://www.sortmoz.com/SortLtd/profile.htm

Piracy is an issue when it comes to the software market. There are as of yet no controls or legislation regarding the illegal copying of software. The high 35% duty on software is problematic.

Telecommunications

No telecommunications equipment is produced in the country, but most major vendors are represented, and their estimated shares in 1998 look as follows:

- Transmission equipment: Alcatel 40%, NEC 20%, Siemens 40%
- Switching Systems: Italtel (GTE) 70%, Ericsson (ASE10) 30%
- Cable: SIETE (Italy) 80%, Siemens 20%
- PBXs: Alcatel 30%, Siemens 70%[51]

Local manufacture of telecommunications cable is conducted in Beira by a joint venture between Group VisaBeira and TDM.

6.2 Public Sector

The public sector in Mozambique in general has a low level of output. Its institutions are not functioning optimally and there is a lack of resources in all areas – human resources, management skills, office equipment, communication and organisational structure. In many areas, the existing institutions are unable to fulfil their service roles in the society. The higher levels of the civil service are aware of the situation, and civil service reform is one of the priority areas identified in the national ICT policy and implementation strategy.[52]

6.2.1 Parastatals

Mozambique is on the road to privatisation of its parastatals and state owned enterprises. One of the first was Aguas de Maputo, the water utility of the country. It is a joint venture between a French utility company and the Government, and a new management team has recently taken over operations. Modern management methods are being introduced, including new systems for water metering, billing and financial control.

The privatisation of other large parastatals (electricity, telecommunications, railways, harbours etc.) is being planned. The administrative and financial capability of these organisations varies a great deal, but generally are characterised by low levels of efficiency. An example from the 1999 accounts of TDM (the telephone company) shows a relation of debtors to turnover of about 45%, i.e. it takes them on average more than 5 months to collect their revenues. The electricity utility company has, in

[51] NICI infrastructure (1998). http://www.bellanet.org/partners/aisi/nici/Mozambique/mozampol.htm
[52] Reform of the public sector was officially announced in October 2001.

cooperation with Aguas de Maputo recently installed a new billing system. This may improve the internal efficiency of the organisation, but many structural features of the organisation – for example its extreme centralisation – are left unchanged.

The on-going reform process will go in parallel with the expansion of the ICT sector. New ownership will activate administrative reform, with the aim of increasing external and internal performance. It is safe to predict a tremendous increase in the number of IT systems and ICT usage in the years to come. The demand for skills and for retraining of existing staff will be a massive exercise for which the current education and training institutions are not ready. The output of the existing ICT training institutions will be inadequate, and parastatals and private enterprises must find their own solutions to the training and retraining of staff. Increased emphasis will also have to be given to management training and marketing skills in a privatised environment.[53]

6.2.2 Central Government

To reform ("re-engineering" is the favourite term) the civil service will be a massive task, requiring good strategic thinking and bold political will. The existing organisational structure, procedures, division of tasks and much of the legislative framework still has its roots in the Portuguese colonial systems, with a strong focus on centralised control and permission granting. Unless fundamental structural changes and changes in the basic objectives of the civil service are made, attempts to increase the internal efficiency and output in the existing system, through the use of ICTs, will only conserve its sub-optimal structure. Mechanisation of outdated business processes will most likely only serve to delay the reform process. The creation of a modern, service- and output oriented civil service must start with a strong goal-orientation, and with the reform of the objectives and tasks of most institutions. This is a long term exercise, but it is clear from the outset that a modern, service oriented civil administration will need massive investments in all the elements of modern administration – process design, systems, hardware, networks, communications, human resource development, and legislation. This reform process will to a large extent be donor funded, and it will be of great importance that the models chosen by Mozambique are not challenged by individual donor agents with home preferences for particular IT solutions.

One example that was brought to our attention was the Government's systems for recruitment and remuneration of staff. There are about 110 000 government employees in Mozambique. A central authority under the Ministry of Finance formally hires all employees. Each change in individual staff conditions, down to simple leave approval, is decided centrally, and is subject to lengthy bureaucratic processes.

[53] Interviews also showed that the need for training in English is critical, as most ICT software and documentation are not available in Portuguese, resulting in the inability to support, maintain and customise installations due to staff only being able to grasp the bare essentials of the ICT functionality.

Individual ministries and authorities do not have the authority to decide on appointments, promotions or conditions of service. The decision process in all HR matters is extremely complicated, legalistic and time consuming. It also lacks transparency, leaving the doors wide open for nepotism, corruption and favouritism. The filing systems are largely paper-based and where database systems do exist, these are not integrated and often run on different platforms. Technical support, which is a scarce resource in most government departments, is therefore not optimal.

A delegation from the Administrative Court of Mozambique, the Supreme Court and the State IT administration authority described the situation to us, and told us about their plans to computerise the HR processes, and to create a personnel administration system for the state. They were under pressure from the highest levels of government to modernise the administration and to increase the internal efficiency of the centralised systems. It was not, however, part of their agenda to re-engineer the civil service sector. IT systems can at best improve local efficiency in the personnel administration, but they will not solve the underlying structural problems.

By the end of 2001, three Ministries will be connected to the newly-developed Human Resource and Payroll System – Planning, Finance, and Public Administration. At a later stage the provinces will be connected.

6.2.3 Provinces

Mozambique is a large country. The capital Maputo is located in the extreme southeast corner, and the colonial legacy has left the country with a radial communication structure, the centre being in Maputo. Distances to all the provincial capitals are extreme, and roads are bad. The centralised nature of the administration causes all information to be brought to the capital where all decisions are made. In a paper based economy, the physical documents needed for the administration have to be transported up and down the radial roads, giving impossible turnaround times for all transactions.

The National ICT survey showed that there is very little ICT infrastructure outside of Maputo, with little in the way of human resources to support any rollout initiatives. For example, the Ministry of Industry and Trade indicated that only two provinces were connected to the Internet, generally with 2 –3 computers. Similarly feedback from the Ministry of Home Affairs indicated that on average there were about 2 - 3 computers per provincial government department, including the police.

The upgrading of the fixed telephone network opens up new possibilities for data transfer and transaction processing using the Internet. The expansion of mobile telephony multiplies the number of access points in the country – in 1997 there were about 65 000 phone connections, and now – 2001 – there are 200 000; more than

three times as many in four years. Telecommunication access is now a reality in Mozambique's provincial capitals. This creates opportunities for expanding ICT access; in which direction will continue to be an open question. For this reason the government and the ICT policy commission should adopt a flexible approach to investments and projects. It would be foolish to predict that the Internet will by default improve the performance of Mozambique's civil service – that requires structural changes, process reform and much education rather than shorter transfer times.

6.3 The Private Sector

The private sector in Mozambique is small, and apart from a very few large companies, mostly consists of small and medium sized enterprises. As ICT users, the banks are the dominant players, followed by TDM. One of our sources indicated that the banks own as much as 50%[54] of all IT equipment in the country. While this probably is an exaggeration, it is still an indication of a very dominating position. The banks, TDM and modern industries such as Mozal, Petromoc and HCB (Cahora Bassa Hydro)[55] operate in a technical environment different from the rest of the economy - when compared with central and provincial government, there are vast differences in management, skills and equipment standards. As a user category, these large and dominating companies are largely unaffected by initiatives such as the ICT Policy Commission, although the Commission has received a great deal of support and encouragement from this group.

In the rest of the private sector, many small and medium companies are rapidly adopting the new technology, thereby improving managerial systems as well as communication. E-mail is now reliable and spreading rapidly, and fax and paper communication is being replaced. This process is limited to a relatively small group of progressive and successful companies.

To date, there generally has been limited involvement of the private sector in policy processes initiated by the National Government. At a recent conference organised by the CTA (Confederation of Chambers of Commerce and Industry in Mozambique),[56] aspects of private-pubic partnerships were discussed. One of the key recommendations to emerge was:

> *"A steering committee or task force consisting of high-level representatives from the public and private sectors should be established to review possible options of the proposed national public-private consultative mechanism and make recommendations regarding its structure, objectives and functions."*

[54] Figures as high as 90% were also quoted during interviews.
[55] Petromoc and HCB implemented SAP/R# installations as early as 2000.
[56] CTA represents Mozambique's private sector, with particular emphasis on the interaction with Government and other institutions.

"The national public-private body should have a formal structure and should be established, preferably through statutory instruments." [57]

The need to involve more of the private sector in ICT-related issues also applies.

6.4 ICT- related Development Initiatives

Many of the development initiatives undertaken in Mozambique have been carried out with donor funding. Details of projects are therefore discussed in a separate chapter (cf. Chapter 8 of this report).

Some mention should however be made of two initiatives in the health environment, particularly since "ICTs and Health" was identified as a priority area:

- A staff member from Eduardo Mondlane University, Emilio Mosse, is presently undertaking a survey of the use of ICTs in health services in the provinces of Mozambique. This is part of his doctoral thesis through the University of Oslo, Norway. The results could add to the very limited base of available information on ICT-related initiatives.

- The ITU's first telemedicine project was undertaken in Mozambique with technology developed at the University Hospital of Geneva. Two central hospitals, one in Maputo and one in Beira have been connected by a telemedicine link using the existing telecommunication infrastructure. The establishment of a link between the sites is expected to be beneficial for clinical and educational purposes. The project will use standard low-cost teleradiology equipment from WDS Technologies, which provides support for the exchange and visualisation of images including radiographs. The user interface is simple and can be used by any technician or doctor familiar with the Windows /NT operating system.[58]

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[57] "Implications and Benefits of Sustainable Public - Private Sector Consultative Mechanisms," Maputo 1 – 2 March 2001.
[58] http://www.wds.ch/RightColumn/Body/itu.htm

Chapter 7. Content Development

Content development is still in its infancy in Mozambique. Over the past year, there have been an increasing number of locally developed Websites, generally in Portuguese and not always easily located through Web searching techniques[59]. ***Appendix 5*** provides a comprehensive list of the more relevant Websites.

A number of government ministries now have Websites[60] although many provide only static information regarding their departments e.g. names of Ministers, telephone numbers, office locations, etc. Most of these Websites do provide some English translation. There has been a remarkable increase in the number of Websites over the past year, particularly in the private sector. Notable websites include:

- University of Eduardo Mondlane – also provides general information on Mozambique
- National Institute of Statistics – provides data in tabular format for a number of sectors such as education, health, manufacturing, agriculture and fisheries, transport and communications
- Official site of the Government of Mozambique
- National ICT Policy Commission
- Imensis, produced by Sislog and which includes a separate section on Computers and the Internet, as well as more general information on the country, events, etc.
- Tropical, the ISP runs a portal
- The Mozambique Acacia Advisory Committee (MAAC)
- A telecentre website.

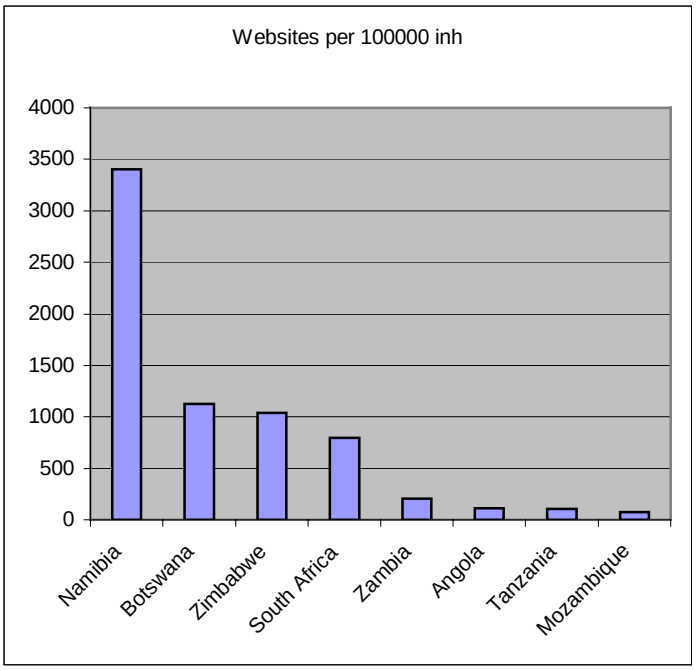
The Table below gives an indication, relative to other southern African countries, of the number of registered domains in selected areas. Although an imperfect indicator, monitoring of these statistics does give some indication of Web-based content development.

[59] It is worth noting that the search engine Google now provides automatic translations of some of these sites.
[60] *www.mozambique.mz* [3 out of 24 government Ministries have websites].

Table 3. Number of Domains / Websites in selected Southern African countries[61]

Country	Domains	Number of Websites				
		Govt	Business	News & Media	Tourism	Total
South Africa	187649	103	1192	40	364	3103
Namibia	3251	22	106	13	127	544
Zimbabwe	2918	7	268	374	61	1250
Botswana	2356	14	56	8	22	169
Zambia	892	3	62	9	23	204
Tanzania	816	18	100	27	131	336
Mozambique	112	3	9	16	7	130
Angola	8	9	19	18	7	136

When the number of websites is compared with the population of the respective countries, the following picture emerges.



[61] Domains are from the January 2001 Network Domains tally, *www.isc.org*; Websites are from the Google country directory, http://*directory.google.com/Top/Regional/Africa* (August 2001). *www.yahoo.com* also maintains country directories and there are significant discrepancies between the two. The table must be treated as a rough guide only.

A private sector enterprise, Pandora Box[62], identified the need to establish CD-ROM based products based on scanned documentation of the official government gazettes and legislation. An index of available materials is also produced to allow for easy access and retrieval of documents.

[62] www.tropical.co.mz/~panbox

Chapter 8. The Role of Donors in ICTs in Mozambique[63]

8.1 Introduction

The Mozambican economy since independence has been heavily dependent on the funding and technical support provided by bilateral and multilateral funding agencies. Some economic figures indicate that this has been as high as 60 – 65% of GDP. In terms of ICT development, there has been continued support from some key donors since the mid-90s. It is therefore appropriate to include a brief overview of the major players in this community. Overall, there are not many donors who have targeted activities in ICTs in their programs. The key agencies are:

- SIDA (Swedish International Cooperation Agency)
- IDRC (Canadian International Development Centre (IDRC)
- USAID (United States Agency for International Development), through its Leland Initiative
- United Nations Development Programme (UNDP)
- Department for International Development (DFID)
- World Bank through its WorLD Links programme (although they have now withdrawn from the school networking project)
- Kellogg Foundation
- UNESCO.

8.2 Swedish International Cooperation Agency (Sida)[64]

Sida has undertaken various projects, particularly in public sector reform. Some of these have included the design and installation information systems for government. Some examples include:

UEM-Sida/SAREC IT Project[65]

Sida is presently supporting the University of Eduardo Mondlane to implement its ICT master plan, expand the EMUNET (Eduardo Mondlane University Network) and ensure that ICTs are used strategically across the university for managmeent, research and education.

The SAREC project (Sida's Department for Research Co-operation) covers five main objectives:

[63] To be completed and details corroborated in September 2001 during workshop visit to Mozambique.
[64] http://www.sida.se/Sida/jsp/Crosslink.jsp?d=483&a=5580
[65] http://www.uem.mz/ictproj/ictsarec/output.htm

- Expand and improve the information and communication technology infrastructure
- Build and improve human resource skills in the field of IT
- Expand the bandwidth available to access the Internet
- Provide E-mail and Internet access for researchers and students
- Contribute to information exchange among the university community

The following actions were defined:

- Developing Local Area Networks (LAN's) and Wide Area Networks (WAN's) – this is particularly relevant since the university has facilities in 13 different locations within kilometres of each other.

- Human Resource Capacity Building through the provision of professional training in the field of IT as well as providing postgraduate degrees in the field of IT. At least one expert per faculty should be trained in order to administrate the IT infrastructure.

- Internet Bandwidth upgrade

- A multimedia laboratory providing computers, digital cameras, voice-recorders, video-recorders and other multimedia equipment that will enable the lecturers to produce CD-ROMs or websites that are sound and video enabled.

Support to Education[66]

Sida has provided support to schools through the provision of schoolbooks to primary schoolchildren. Further activities include support for teacher training, primarily for primary schoolteachers and development of a framework for three-year training and the future role of universities, particularly in decentralised training provision.

[66] Project fact sheet: Swedish Education Sector Support to Mozambique; Personal interview with Karen Andersson, Sida Project Office, Maputo.

ICT and Public Sector Reform[67]

Four projects are underway to address the need for IT-based systems in central and provincial government.

- State Account System (Ministry of Finance)
  This applies to the whole public sector and includes the provision of systems and staff training in IT, at central and provincial levels. At this stage the system is not yet networked between the capital and the provinces.

- Personnel Registration System
  The first phase of the SIP project is the development of a networked personnel registrationg systems that includes information on backgrounds, employment records, etc. All government personnel have been included in the database. As yet there is nolinkage between the SIP system and the payroll system managed by the Ministry of Finance. The "Career and Remuneration" model is however integrated with the SIP system. Some problems aorund confidentiality and data collection (and inputting) have yet to be resolved.[68]

- Administrative Tribunal
  The Tribunal has been supported for one year., through the development of an information system to support the registration of employment contracts. State account control will also be computerised.

Civil Society and Democracy[69]

A joint project has been undertaken with UNESCO to set up a media centre for journalists and the youth in Beira. There are plans for more of these centres to be established. The objective of the project will be to improve local language content, develop community radio projects and strengthen the reach of radio through the use of IT.

ICT inventory in Niassa.

A study was carried out in mid-2001 to assess the level of ICT availability in the Niassa province. A team from CIUEM carried out this work.[70]

[67] Personal interview, Eva Belfrage, Sida Project Office, Maputo.
[68] It is of concern that none of the Ministries interviewed were aware of the development of these systems, which were identified as a priority project by several stakeholders.
[69] Sida semi-annual Report: Mozambique: 1 October 2000 – 31 March 2001.
[70] Eng. Reginaldo Andre Uetela and Eng. Adelino Fernandes Juse Carmona Mathe

8.3 International Development Research Centre (IDRC)

The Canadian International Development Research Centre (IDRC), has been involved in ICT–related activities in Mozambique through its Acacia programme. The Acacia programme aims to empower sub-Saharan African communities through using ICTs. The most prominent project that have been supported include:

- Support for the ICT policy formulation process since 1997. This is being continued through support to the ICT policy commission and the development of the implementation strategy
- The establishment of a national Mozambican Acacia Advisory Committee (MAAC) [71] that has wide representation from government, the private sector, and NGOs and that has played an advisory role in the the identification of priority projects and the development of the ICT policy
- School networking in 16 schools – this has included teacher training (in collaboraion with the WorLD Links programme of the World Bank)
- Establishment of three telecentres
- Evaluation studies of both school networks[72] and telecentres[73]
- A feasibility study for the VSAT satellite in Beira
- The Pan-African e-commerce study that included South Africa and Mozambique[74].

It intends to commit continued support to ICT-related activities in three areas:

- Three-year support for the Inhambane telecentre, which operates out of a senior high school, but also delivers Internet services to the community. It is championed by the school but has backing from the provincial governor. Most of its efforts will focus on ICT education and training – at the school, government offices, and the surrounding communities. CIUEM provided the original training for staff;

- Telecentre networking and content development, which will support local content development depending on an assessment of local needs. It will also assess how such services can increase revenue flows to the existing and planned telecentres funded by the IDRC and the Kellogg Foundation; and

[71] http://www.idrc.ca/acacia/outputs/op-mozam.htm
[72] As yet unpublished.
[73] http://www.idrc.ca/acacia
[74] www.comesaec.org

- Provide support for the development of a national ICT skills strategy, and the development of a national ICT institute which will particularly serve the outlying provincial capitals.

8.4 USAID - Leland Initiative in Mozambique[75]

The Leland Initiative is a five-year US Government effort to extend full Internet connectivity to approximately twenty African countries in order to promote sustainable development. In Mozambique the Leland Initiative has been responsible establishing ICT infrastructure projects to establish gateways in the provinces.

In Mozambique USAID has been responsible for installing new international gateways in Beira, Nampula and Quelimane, and is overseeing the operational rollout. USAID will pay for all the equipment (US$ 150 000 for antennas and US$ 21 million for fibre-optics) and there will be no charge on the three-year lease if service is delivered at a reasonable cost. Licences were bought for US$ 30 000. The objective is to bring down telecommunications costs, and the cost of bandwidth to levels offered in Maputo. USAID is working with TDM to implement this project. Funding for more centres will be provided if these are proved to be commercially viable. Improved inter-urban 64 Kbps leased line access as well as X.25 interurban access will be available in 2001 in two destinations in addition to Maputo. Local access in Maputo will improve as a result of the installation of fibre-optic loops around the city centre.

A priority area for USAID in Mozambique is providing technical assistance for the establishment of an ICT Policy Unit in the Ministry of Communications. International specialists will be matched with local specialists. The World Bank will take over the project once the necessary structures are in place within the government.

8.5 United Nations Development Programme (UNDP)

The UNDP provided support for the Sustainable Development National Programme (SDNP)[76] in SDNP Mozambique. The SDNP was established in 1996 under the auspices of the Ministry for the Co-ordination of Environmental Affairs (MICOA), the government institution responsible for the development of a national strategy for sustainable development. The objective of the SDNP was to provide connectivity, user training and the development of content on sustainable development.

The SDNP set up two Internet nodes in Beira and Nampula, which were serving about 120 people. The SDNP, with support from the UNDP, set up a VSAT system in Beira and Nampula in 1998. The Beira VSAT is located at the Catholic University of Mozambique. A third VSAT was planned for the Northern city of Quelimane. SDNP

[75] http://www.usaid.gov/regions/afr/leland/mozindex.htm
[76] *http://sdnhq.undp.org/countries/af/mz/* and http://www.sdnp.undp.org/it4dev/stories/mozambique.html

entered in a BOT (Build-Operate-Transfer) agreement with TDM. Training in Internet and e-mail usage formed a key component of the project.

8.6 Department for International Development (DFID)

In February 2000, the U.K.'s Department for International Development (DFID) instituted support for a five-year ICT project in Mozambique to provide educational materials for students in five designated regions of Nampula province. This project, promoted by the Commonwealth of Learning, aims to ease demand constraints for secondary school education in these areas.

8.7 World Bank

WorLD Links for Development Programme, has been in partnership with the IDRC to develop a school networking programme for Mozambique.[77]

8.8 Kellogg Foundation

The Kellogg Foundation will be funding the implementation of 3 – 4 telecentres, with CIUEM being the implementing agency.

8.9 United Nations Education, Scientific and Cultural Organization (UNESCO)

UNESCO established the Regional Informatics Network for Africa (RINAF) in 1992, which include the Eduardo Mondlane University as the Mozambique focal point (through Mr Venancio Massingue). The purpose of the Network was to initiate or extend Internet connectivity for education and research.

[77] *http://www.cybersonny.com/mozambique/moztrain.htm*; http://www.worldbank.org/aftdr/connect/default.htm

Chapter 9. The Way forward – an Overview of Possible Strategic Opportunities

9.1 The Government's ICT Implementation Strategy

In October 2001 the ICT Policy Commission of Mozambique launched the government's ICT implementation strategy at an international symposium in Maputo. A copy of the draft strategy as presented at this conference is attached as a separate document. All the documentation presented at the Symposium of 3-5 October 2001 can be found at http://www.infopol.gov.mz/simposio/.[78]

The international donor community was well represented, and it can be taken for granted that considerable financial resources will be coming forth for the implementation of the various projects.

Four priority areas have been identified in the implementation strategy:

- Education and the Development of Human Resources;
- Health;
- Governance; and
- Infrastructure and Universal Access.[79]

Other areas specifically highlighted are:

- The setting up of a judicial framework;
- Agricultural and natural resources;
- Tourism and the environment;
- The academic and research institutions network;
- Women and youth
- Culture and art; and
- Social communications.

The strategy document provides full details of the short- and medium-priority actions and projects. Highlights include the following:

Infrastructure and Universal Access

- National Transmission Networks – establishing fibre-optic digital networks between the provincial capitals and main development nodes
- Modernisation of the Maputo and Suburbs telecommunications services

[78] English translations are not yet available on the Website.
[79] Summary of the ICT Policy Implementation Strategy: ensuring Access to Information by laying the foundations of a Knowledge Society, Maputo 3 – 5 October, 2001

- Modernisation and expansion of digital exchanges
- Installation of VSAT networks for rural and remote areas
- Telecentres and public access points – a network of 144 centres will be set up, one in each district, to support distance learning.

Governance

- GovNet – a fine mesh network for supporting electronic communications within Government.
- GovSys – management information systems for government. Examples include human resources management and administration, civil identification, electoral management, and State finances.
- One-stop shop government information access points
- Baseline Surveys on ICTs in Mozambique.

Health

- HealthSys - a health management system that will address the management of clinical processes, laboratories and blood banks, pharmaceutical and administrative processes.
- Information system on HIV/AIDS.
- Telemedicine.
- Epidemiological Databases.

Education and Development of Human Resources

- Academic and Research Institutions Network - a network between all national institutions of higher education and research.
- Creation of an ICT Institute to provide a stream of technically qualified graduates through a series of shorter courses and certification.
- Distance Learning for Higher Education
- School Networking through the Internet.

The Strategy proposes the setting up of a national consultancy forum that will allow the private sector and civil society to interact with this government-led initiative.

A series of performance indicators have been suggested that will allow monitoring and evaluation of the process.

The implementation strategy is very wide in its scope and has identified a large number of projects and priorities. Many are already being implemented, such as the modernisation of the telecommunications infrastructure, where the national telecommunications operator, TDM, is carrying out a very large investment programme. Several projects aiming at the modernisation of existing procedures and IT systems in various government departments have also been started.

9.2 Constraints and Gaps in the Implementation Strategy

There are a number of areas that are not directly addressed by the implementation strategy but which have to be considered in any future implementation plans, as they present potential opportunities for the future growth of the country.

- Little emphasis is placed on developing stronger management skills in the public and the private sector, yet it is was raised during our study as a major area of concern A deeper understanding of the impact of ICTs on increasing effectiveness, and the need for innovation and rapid change in this fast-moving environment requires more attention to the development of management and financial skills for high-level professional staff and decision makers.

- In-service training in ICTs of the existing workforce could create major leverage opportunities for creating an Information Society. The strategy does include the development of an ICT institute but does not specicifcally mention whether it will be able to provide this type of training.

- The implementation strategy has a strong social developmental focus with little emphasis on economic growth or competitiveness. Sectors that could produce potential wealth for the country have not been identified, nor targeted for specific action. This appears to be a missed opportunity. Aspects relating to stimulating the economy, for example in agriculture and tourism, need to be developed. The potential of the diffusion of ICTs into specific sectors such as the petrochemical and transportation industries, and the potential savings this may bring about, have been excluded. The role of ICTs in stimulating export markets should be explored.

- The high cost of telecommunications, probably the largest constraint in creating an information society, has not been addressed. Synergies need to be put in place between the proposed universal service policy worked on by the regulator, the ICT implementation strategy and the revision of the telecommunications policy.

- The role of the private sector is ill-defined, yet future implementation will rely heavy on involvement and investment by this part of the economy.

9.3 Defining an Increased Role for the Private Sector – An Opportunity for Growing the ICT Sector in Mozambique

Having set the agenda and secured the financing, the question of the actual implementation will be an important issue. Traditionally, much of the implementation of donor-financed projects is done through special projects, created inside existing organisations or government departments. The project organisations have often

become high resource islands in a sea of traditional government. Project resources act as a magnet for the most competent and ambitious of the civil servants, decreasing the resources available for the day-to-day running of the Government. This is often supported, or even insisted upon, by the donors, who each want to see their projects being implemented according to plan. Expatriates often man these project islands where domestic resources are unavailable.

The private ICT sector in Mozambique is still rather weak. One of the main complaints by the private sector leaders is that the local companies are often bypassed when project procurement is being made, and that by and large the resource base in the projects is provided by expatriates working directly in the projects, or by international companies[80]. This lack of involvement of local start-up companies is one of the main reasons for the slow growth of the private ICT sector. The President said in his opening speech at the ICT Implementation Strategy Symposium:

> *"The participation of the private sector deserves particular attention in regard to implementation. The Government must provide special incentives to the private sector in order that it can invest in the development areas considered as priority, as a way of increasing the participation of this sector and to promote its growth at national level"*[81].

There are ways in which a stronger private ICT industry can be created:

- The Government can direct the projects under its control to give priority in procurement to local ICT companies. Such a directive would immediately cause the international consulting companies to move resources into the country[82], setting up local offices and hiring their (still expatriate) staff locally. It would also create business opportunities for the existing local companies, who would be in a better position to compete on equal terms with the international companies. The local companies would for the first time get to bid for to the mainstream of donor finance, and when they are awarded a contract, they will in a position to directly recruit such expatriate staff as would be needed.

- When both international and local companies operate on a local basis, much of the value added from their activities will be reinvested in Mozambique, in training of local staff, in other related ventures, in office and business infrastructure etc. In this way, the resources provided by donors will leverage economic activity in the country rather than abroad.

[80] Most expatriates recruited for projects are hired by international consulting companies. The high international rates charged are often paid directly by the donors to the companies in the home countries. In this way only a fraction of the total costs will actually enter Mozambique, and little value is added in the country.
[81] Summary of the ICT Policy Implementation Strategy as read by President Chissano.
[82] This would in fact be Foreign Direct Investments.

As the situation is at present, the playing field is not level. The donor's preference for isolated project organisations and for international procurement is giving unfair advantages to non-Mozambican resource providers.

If the Government wants Mozambique to build a strong, competent and profitable ICT sector, three possible actions are:

- Move the implementation of projects away from the Ministries and direct them towards private implementing companies selected in the open market;

- Issue a directive that companies operating locally will receive preferential treatment when procurements are made;

- Re-enforce the national training capacity to boost the ICT sector. This could be done by donor-funded projects of Government - Private Sector alliances where the Government would guarantee the:

    - Quantity of alumni per year (e.g. over 400 – 500 alumni/year)
    - Quality of the training (standards),
    - Accessibility (i.e. affordable fees) and
    - Execution of the activities would be carried out by the private sector (under the normative control of the Government).

Appendix 1: Key Ratios

Description	Value/Operators
Number of fixed line telecom operators	1
Number of mobile line telecom operators	1
Number of Internet Service Providers	8 major providers
Possible Alternative Suppliers of Bandwidth	Satellite, but restricted Undersea cable
Number of Internet Points of presence	16-18
International Bandwidth	2048 Kbps[83]
Number of cities with local modem pools for dial-up	6-8
Population of Mozambique	17,242,000
Users	
Number of Fixed Lines installed	78 072 (2001)
Number of Fixed Lines per 1000 inhabitants	5.4
Temporarily inactive	10,000?
Average waiting time	5 months (residential)
Public telephones	3 832 (2001)
X.25 subscribers	140 (2001)
Number of digital leased lines	1 312 (2001)
Fixed line capacity	About 107 000
Expansion Rate: Number of new lines/year	2001: 10,000
Percentage of Digital Switchboards	100
Number of mobile phone subscribers	100,000
Geographical coverage of mobile networks	Major towns in all regions
Number of mobile telephone subscribers per 1000 inhabitants	6.5
Expansion Rate: number of new subscriptions/year	98 – 99: 6 000 99-2000: 20 000 2000-01: 80 000
Number of Internet Subscriptions	6 000? 11 948 (2000)[84]
Number of Internet Subscriptions in the Capital	5 500
Number of Internet Subscriptions per 1000 inhabitants	0.35
Number of new Internet Subscriptions last year	N/A
Number of Internet Hosts	362
Number of Internet Hosts per 1000 inhabitants	0.05
Number of new Internet Hosts last year	161
Number of Internet Cafes	5?
Number of Multipurpose Community Centres (Namaacha, Nampula, Inhambane)	3

Sources: BMI-TechKnowledge Communications Technologies Handbook 2001; Ismail, 2001; Sida Survey interviews

[83] Mike Jensen, 2001
[84] BMI-TechKnowledge Communications Handbook 2001

Appendix 2: Costs of Telecommunication Services (TDM)

Service	Installation (US$)	Monthly Costs (US$)	Per minute (US$)
Fixed Residential Line	$28	$10.00	Local $ 0.03 National 0.23 To mobile 0.36 RSA 0.60 USA/Europe 2.07
Leased line	$460	$16-35	
Leased Line (64k)	$860	(local) $330	
ISDN	Not available		
Internet Accounts: With rented 64 KB line (Tropical) Cable Internet (Telecabo)	 Modem: $300	$ 25-40 $400 Approx $75	

A complete list of TDM tariffs can be obtained from the Website, *http://www.tdm.mz/portugues/tarifas2001/tar.htm*

Price comparison:

Mozambique's telephone rates are extremely high, when compared with neighbouring countries, and considering the country's income levels. Compared with Namibia, fixed line installation is about the same, but the monthly charge is twice as high in Mozambique. Local calls are about the same, but international calls are between three and four times higher than in Namibia.

New Internet alternatives:

Telecabo is a local cable TV company, 50% owned by TDM and 50% by the Portuguese Visabeira group. Maputo with its dense city is suitable for cable TV networks, and by October 2001 about 7000 households are subscribers to the basic TV service. Broadband Internet connections (practical download speed about 500kbps) via a cable modem are available from October 2001, at a price of about US$ 75 per month. This is very competitive compared with a leased line (64 kbps) from Tropical, costing US$ 400 per month, or a dial-up line, costing US$24 per month plus phone charges of US$50 per month for one hour per day.

The cable Internet connection is high capacity, and of reasonable quality. For those buildings in central Maputo where physical access is available, it is by far the best value for money. Technically it may be possible to connect one such line through a company gateway, allowing constant internet access for many users, and technically

allowing Voice over IP with international charges for a fraction of TDM's current international charges.

International TDM Tariffs

Group	Destination	Tariff	Initial 3-minute period	Additional Minutes
			US Dollars (US$)	
I	South Africa Botswana Lesotho Malawi Namíbia Swaziland Tanzania Zambia Zimbabwe	**Normal** 06:00- 20:00	1,81	0,60
		Economy 20:00 – 06:00 Sat/ Sun/Holidays	1,72	0,57
II	Angola Cape Verde Guinea Bissau Sao Tomé e Príncipe Kenya Uganda	**Normal** 06:00- 20:00	3,51	1,17
		Economy 20:00 – 06:00 Sat/ Sun/Holidays	3,33	1,11
III	Rest of Africa Europe Asia America Oceania	**Normal** 06:00- 20:00	6,21	2,07
		Economy 20:00 – 06:00 Sat/ Sun/Holidays	5,90	1,97
IV	MARISAT/INMARSAT (satellite)	**Normal** 06:00- 20:00	17,34	5,78
		Economy 20:00 – 06:00 Sat/ Sun/Holidays	16,46	5,49

Appendix 3: Readiness For The Networked World

As is the case in most SADC countries, in Mozambique there is currently little evidence of 'new economy' products and services such as electronic commerce, distance learning, multi-media, etc. Such aspects result from a complex of factors, many of which are not directly technology-related, but which combine to make a country 'ready' for the new economy. The ability of a country or region to participate in this 'Networked World' has received much attention over the past few years, and various models have been developed to try to assess the state of a country to participate in this development.

Using a guide developed by the Centre for International Development at Harvard University ('Readiness for the Networked World')[85], the consultants assessed the ability of Mozambique to participate in the 'new economy'. As in other countries in the region, however, disparities between the main city and areas beyond are very great and at the very least require separate urban/rural assessments. Note that the ratings are on a scale of 1 to 4, where 1= unprepared and 4= fully prepared.

In the assessment guide, suggested values for the Key Performance Indicators are contained in the text e.g. to be rated a '4' or fully prepared in the Information Infrastructure aspect, Teledensity would need to be 40+ mainlines per hundred people and mobile penetration would be 14% of the population or more.

General comments

- Since this assessment guide was published, the pace of change has increased, so that the 'hurdle' of moving up a category is probably lower than it should be.

- The assessment guide should be used in conjunction with other information about Mozambique, since it uses a very broad classification. Since it was not tested with local stakeholders, it should also be regarded as a very rough guide only.

- The guide confirms the impression that Network Access is becoming easier in Maputo and that the emphasis needs to shift to affordability. This is particularly true if one considers projects that are under development to provide enhanced access. Low ratings were achieved in most categories where affordability was either explicit or an important element e.g. Internet affordability, Hardware and Software, ICTs in the workplace.

[85] A full description of the Assessment Methodology can be found at: *www.readinessguide.org*

- Most of the more sophisticated applications that will allow local business to become internationally competitive are not in evidence. The lack of business-to-business applications and the corresponding lack of e-Government programmes (which tends to mean that Government does not understand the opportunity and will not actively support business) represents a barrier to progress that must be addressed.

- The lack of ICT in Education particularly in primary and secondary schools represents an opportunity. Trying to improve the learning environment without the use of ICT, given the legacy of under-funding within education, provides seemingly insurmountable obstacles. ICT does have a leverage effect that could be exploited in a well-conceived programme.

Table 4. e-Readiness Assessment for Mozambique

Aspect/Category	Key Performance Indicators	Maputo	Rural
Network Access			
Information Infrastructure	Teledensity Mobile Penetration	3	1
Internet Availability	Inhabitants/ISP Public Internet Access Competitive leased Line Providers Connection Reliability	2	1
Internet Affordability	Rates vs. Income Competition	2	1
Network Speed and Quality	Success Rate Dropped Connections Faults/10 Mainlines Transfer Speeds – Dial-up Transfer Speeds – Leased Line Backbone Capacity Packet Loss	3	1
Hardware and Software	Local Vs Imported Affordability	2	1
Service and Support	Mainline Installation Time Problem Resolution ICT Personnel	2	1

Networked Learning	Key Performance Indicators	Maputo	Rural
Educational Access to ICTs	Access at Different Levels Computers/Student Availability of Computer Labs Latest technology Networking Access to Internet	2	1

Enhancing Education with ICTs	Training of Teachers Use by Teachers/Pupils Sophistication of Use Included in Curricula	2	1
Developing the ICT Workforce	Opportunities for Training Scope of curricula On-Line Learning	3	1

Networked Society	**Key Performance Indicators**	**Maputo**	**Rural**
People and Organisations Online	Awareness of Internet Use of Internet (%) Gender of Users Domains/1000 people Extent of advertising in traditional media	3	1
Locally Relevant Content	Number and Dynamism of local websites Use of Local languages Sophistication of Use Web-Based Training Opportunities	3	1
ICTs in everyday Life	Telephone Access and Usage Household commerce use Public Internet Access Options	2	1
ICTs in the workplace	Efficiency Gains through use of ICT Networking Extent Employee Internet Access Own e-mail accounts Publicise e-mail addresses	2	1

Networked Economy	Key Performance Indicators	Maputo	Rural
ICT Employment Opportunities	Requirement for Technical Skills Economy based on 'Knowledge Worker' ICT seen as Strategic by Organisations	2	1
B2C Electronic Commerce	Use of Websites by Business Volume of online Retail	1	1
B2B Electronic Commerce	Efficiencies in B2B Electronic Commerce Incorporation of Web into Key Processes Order processing and delivery executed electronically Electronic B2Blarge and growing	1	1
E-Government	Ministries post key Information on Web Interactive Government websites Procurement/other interactions online	2	1

Network Policy	Key Performance Indicators	Maputo	Rural
Telecommunications	Liberalisation Universal Access Options for Services Incumbent networks open to competition Competition in mobile Value-Added Services	2	1
ICT Trade	Tariffs on ICT equipment Trade in services liberalised No additional tariffs on e-commerce Foreign Direct Investment	2	1

Appendix 4: List of Organisations and Individuals Interviewed

Organisation	Contact Details
Parastatals	
TDM (National Telco Operator)	Gomes Zita (Deputy Managing Director)
Agua de Maputo	Dr. José Santana Mouta – Investment Director
TVM (Televisão de Moçambique E.P.)	Dr. Arlindo Lopes – Chairman of the Board
EDM (Electricidade de Moçambique)	Engº Tamele Dr. Raimundo Gulube IT Director
NETCABO	ICT Exhibition, October 2001
Government	
ICT Policy Commission	Salomão Manhiça Kate Wild (Consultant to ICT implementation strategy)
Ministry of Mineral Resources and Power (National Directorate of Energy)	Dr. Horácio Belengueze Cabinet of The Ministry Mr José Matsinhe Head: New and Renewable Sources of Energy
Ministry of Industry and Trade	Dr. Jorge Chicamba Chief, Department of Informatic Systems Mr Alexander Schalke Market and Trade Information Expert
Ministry of Education	Deputy Minister Telmina Paixao Pinho Pereira
Ministry of Finance	Patrício Sande – ICT Working group
Ministry of Home Affairs Administrative Court State Administration Superior Court	Dr. Armando Correia Secretary General Patricio Sande Andre Chaile Carlos Mbuchili

Organisation	Contact Details
Ministry of Transports and Communications	Dr. Abilio David Portimão Permanent Secretary
Educational Institutions	
ISPU (Instituto Superior Politécnico e Universitário)	Engº Assane Miquidade – IT Manager
ISUTC (Instituto Superior de Transportes e Comunicoes)	Andre Nunes de Carvalho
UEM(CIUEM)	Engº Venâncio Massingue – Vice-Chancellor Engº Francisco Mabila – CIUEM Assistant Director Engº Lourino Chemane Polly Gaster
Private Sector	
SOLSUNI	Engº Rogério Lam Managing Director Claudia Esmael Commercial Coordinator
SYSCOM	Engº Fernando Neves Managing Director
TELEDATA	Engº José António Correia – CEO
Dataserv	Sven Norrby Finance Director DataServ Lda
Microsis	Joao Martins
Pandora Box Lda	Fernanda Cabanas - CEO Wenke Adam
Banco de Mozambique	Paulo Maculuve
ICL	Keirum Ismail - Managing Director
EXI	Jose Murta Managing Director

Organisation	Contact Details
Funding Agencies	
USAID	Enrique Portillo
Sida	Eva Belfrage Karen Andersson Lars Carlsson
IDRC	Shafika Isaacs Nigel Motts (responsible for Mozambique)

Appendix 5: References and Web-based Information Sources

General Information

African Governments on the WWW
www.gksoft.com/govt/en/africa.html

CIA World FactBook.
www.cia.gov

Commercial Code for Mozambique [under development through the Ministry of Justice]. *www.commercialcodemoz.co.za*

Harvard Global e-Readiness. *www.readinessguide.org*

International Telecommunication Union – Global Telecommunications Indicators.
www.itu.org

Jensen, Mike (September 2000). African Country Internet Status Summary.
http://www3.sn.apc.org/africa/afrmain.htm.

KPMG. Mozambique: Economic Overview 2000.
http://www.kpmg.co.mz/artigos-port/economia-Mo%C3%A7.htm

Leland Initiative
http://www.usaid.gov/leland/tanindex.htm

Mbendi - Mozambique Country Profile. Basic information, economic overview, investment information, the mining industry, the oil and gas industry.

Mozambique On-Line - (In Portuguese). Extensive annotated directory of web sites about Mozambique, arranged by subjects including news, the economy, music, literature, language, art, theatre, traditional stories, proverbs, food, photographs, contemporary postcards, travel, history, education, women, human rights, landmines, the Internet, etc. Founder/editor: Wim Neeleman of the e-newsletter, NoTMoc - Notícias de Moçambique.
http://www.mol.co.mz/

Official Government of Mozambique Website.
www.mozambique.mz [3 out of 24 government Ministries have websites].

Time Out (Maputo) (In English and Portuguese). Lists hotels, entertainment, public holidays, has information for the major cities.
http://www.mozambique.mz/turismo/timeout/index.htm

TRASA Mozambique profile.
http://trasa.worldweb.net/memberstates/mozambique/profile.html

Tropical Portal, *www.maputohoje.co.mz*

United Nations Economic Commission for Africa (ECA). The NICI initiatives.
http://www.bellanet.or/partners/aisi.

United National Economic Commission for Africa (ECA). *NICI Country Profiles.*
http://www.un.org/Depts/eca/adf/nici/nici%20subregion.htm.

USAID (1999). *The Rural Telecommunications Restructuring Project (RTR). [terminated in late 1999]*
http://www.tiaonlnie.org/international/regional/africa/rtr.cfm?ID=6.

World Higher Education Database 2000. Source: International Association of Universities/UNESCO / International Centre on Higher Education.
http://www.usc.edu/dept/education/globaled/wwcu/background/Mozambique.html

Yellow Pages/Páginas Amarelas de Mocambique (In Portuguese and English). Mozambique yellow pages. From the Official Phone Guide of Mozambique edited by LTM - Listas Telefónica de Moçambique for TDM - Telecomunicações de Moçambique.
http://www.paginasamarelas.co.mz/

ICT Sector in Mozambique

Insys Africa.
www.insysafrique.org

Ismail, Magda (1st May 2001) Moçambique: e-ready? Unpublished report.

Leland Initiative in Mozambique.
http://www.usaid.gov/regions/afr/leland/moz1196.htm

Mozambique case study:
http://www.bellanet.org/partners/aisi/policy/cntry/mozambiq.htm

ECA/ IDRC Pan-African Study on e-Commerce.
www.comesaec.org

Freeplay Radios In Post-Flood Communications Initiative In Mozambique.
http://www.freeplayfoundation.org/News/NewsItems/MozEval.htm

SAREC Project.
http://www.uem.mz/ictproj/ictsarec/output.htm

Simbine M. (June 2000). Overview of the Internet in Mozambique. The African Internet & Telecom Summit, Banjul, The Gambia, 5-9 June 2000.
http://www.itu.int/africainternet2000/countryreports/moz_e.htm

SORT Lda *http://www.sortmoz.com/SortLtd/profile.htm*

TDM (Telecomunicações de Moçambique).
www.tdm.mz/

USAID. Mozambique*:* FY 2001 Program Description and Activity Data Sheets
http://www.usaid.gov/pubs/bj2001/afr/mz/mozambique_ads.html

Telecentres

http://www.telecentros.org.mz

http://www.communitysa.org.za/africaict/mozambiict.htm

Internet Service Providers

Teledata Website
http://www.teledata.mz

EMIL Internet Access Provider
http://www.emilmoz.com

GARP Internet Service Provider.
http://www.garp.co.mz
Internet Solutions Internet Access Provider
http://netserver.isl.co.mz

Micronet-Tropical Alliance
http://www.tropical.co.mz

Sort Lda Internet Access Provider
http://www.sortmoz.com

Virtual Connection
http://www.virconn.com/

ICTs in Education (SchoolNet and others)

Centre for Informatics, University of Eduardo Mondlane.
http://www.ci.uem.mz

Mozambique Acacia Advisory Committee
http://www.mozambique.mz/informat/maacs/indexe.htm
http://www.mozambique.mz/informat/maacs/projsche.htm
http://www.bellanet.org/gkaims/acacia/acacia_pub_brief.cfm?record_identifier_001=170

Sida SAREC Project.
http://www.uem.mz/ictproj/ictsarec/ictsarec.htm

UNESCO Educational Database
http://www.usc.edu/dept/education/globaled/wwcu/background/Mozambique.html

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www.cicat.tudelft//PenS/i.cfm?/PageID=2752

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Miller, J. and James T. (August 2000). Assessing the Need for and Potential Nature of a Regional Policy Secretariat for Information and Communications Technology (ICTs) in Southern Africa. Unpublished report prepared for the International Development Research Centre (IDRC).

Ministry of Education.
www.mined.gov.mz

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Republic of Mozambique (May 2000). *Draft Policy For Information and Communication Technologies (in English; final policy available in Portuguese only)*. www.infopol.gov.mz

SADC documents

SADC (March 1998). *SADC Protocol on Transport, Communications and Meteorology*. Southern Africa Transport and Communications Commission Technical Unit (SATCC-TU).

SADC (1999). *1999 Theme Document – The Challenges and Opportunities of IT for SADC in the new Millennium.* Lusaka, Zambia.

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Southern African Transport and Communications Commission, the Transport and Communications Sector Coordinating Unit for SADC member states. *http://www.satcc.org*

Telecomm Regulators Association of Southern Africa (TRASA). www.*trasa.worldnet.web* and *www.trasa.org*

TRASA (February 2001). Workshop on Universal Service / Universal Access, Social and Economic Development and Promoting a Regional Framework for Licensing Practices (USAID / RCSA Rapid Task Order 2.1), 19 – 21 February, Swaziland. Unpublished papers.

Appendix 6: Education Statistics for Schools and Tertiary Institutions[86]

Table 5. Schools, registered students and teaching staff by level of public education, 1997

Primary schools by province								
Província *Province*	1997							
	1º Grau (1 - 5)				2º Grau (6 - 7)			
	Escolas *Schools*	Alunos *Students*	Professores *Teach. staff*	Relação média Aluno / Prof. *Student/teacher ratio*	Escolas *Schools*	Alunos *Students*	Professores *Teach. staff*	Relação média Aluno / Prof. *Student/teacher ratio*
Total	5 689	1 745 049	28 705	60.8	336	154 482	3 965	39.0
Niassa	439	79 818	1 737	46.0	14	5 735	211	27.2
Cabo Delgado	557	121 972	2 230	54.7	22	6 657	205	32.5
Nampula	1 061	269 747	5 109	52.8	48	15 143	460	32.9
Zambezia	1 317	330 253	5 051	65.4	34	15 628	387	40.4
Tete	459	124 304	2 517	49.4	23	9 748	360	27.1
Manica	283	101 004	1 707	59.2	22	11 136	234	47.6
Sofala	303	111 179	1 980	56.2	19	12 127	316	38.4
Inhambane	465	159 838	2 340	68.3	44	16 567	352	47.1
Gaza	497	173 737	2 198	79.0	53	14 995	298	50.3
Maputo Prov. / Province	220	130 344	1 576	82.7	19	14 786	361	41.0
Maputo Cidade / City	88	142 853	2 260	63.2	38	31 960	781	40.9

[86] National Institute of Statistics, *www.ine.gov.mz*

Ensino secundario geral por província *Secondary schools by province*								
Província *Province*	1997							
	1º Ciclo (8 - 10)				2º Ciclo (11 - 12)			
	Escolas *Schools*	Alunos *Students*	Professores *Teach. staff*	Relação média Aluno / Prof. *Student/teacher ratio*	Escolas *Schools*	Alunos *Students*	Professores *Teach. staff*	Relação média Aluno / Prof. *Student/teacher ratio*
Total	63	45 211	1 292	35.0	12	6 343	263	24.1
Niassa	4	1 694	85	19.9	1	334	16	20.9
Cabo Delgado	5	2 522	90	28.0	1	309	23	13.4
Nampula	7	4 159	142	29.3	1	583	35	16.7
Zambezia	5	3 748	76	49.3	1	382	15	25.5
Tete	6	3 124	87	35.9	1	341	18	18.9
Manica	3	2 392	80	29.9	1	201	16	12.6
Sofala	7	3 814	140	27.2	1	574	19	30.2
Inhambane	5	3 262	121	27.0	1	220	18	12.2
Gaza	6	3 940	92	42.8	1	284	16	17.8
Maputo Província	8	4 328	157	27.6	1	426	17	25.1
Maputo Cidade	7	12 228	222	55.1	2	2 689	70	38.4

Ensino técnico – profissional *Technical education*								
Província *Province*	1997							
	Nível elementar				Nível básico			
	Escolas *Schools*	Alunos *Students*	Professores *Teach. staff*	Relação média Aluno / Prof. *Student/teacher ratio*	Escolas *Schools*	Alunos *Students*	Professores *Teach. staff*	Relação média Aluno / Prof. *Student/teacher ratio*
Total	2	253	23	11	23	11 748	542	22
Niassa	-	-	-	-	2	634	30	21
Cabo Delgado	-	-	-	-	3	311	38	8
Nampula	-	-	-	-	3	795	74	11
Zambezia	-	-	-	-	2	772	22	35
Tete	-	-	-	-	3	812	61	13
Manica	-	-	-	-	1	653	22	30
Sofala	-	-	-	-	1	2 427	95	26
Inhambane	1	120	10	12.0	2	540	24	23
Gaza	-	-	-	-	2	676	29	23
Maputo Província	1	133	13	10.2	2	1 097	66	17
Maputo Cidade	-	-	-	-	2	3 031	81	37

Higher education

Ensino Público / *Public education*				
Instituição *Institution*	l995/96		l996/97	
	Alunos / *Students*	Professores / *Teaching staff*	Alunos / *Students*	Professores / *Teaching staff*
Total	**6 844**	**921**	**7 156**	**954**
Universidade Eduardo Mondlane	5 200	689	5 762	711
Universidade Pedagógica	1 489	201	1 249	217
Inst. Superior Relações Internac.	155	31	145	26