

SAITIS BASELINE STUDIES:

A Survey of the IT Industry in South Africa

September 1999

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ACKNOWLEDGEMENTS

We wish to thank all those individuals and organisations that gave of their time to contribute towards this project. The insights, suggestions and challenges which were raised during individual interviews, telephonic discussions, and workshops have enriched the outcomes of these baseline studies.

We hope that the findings presented in this report will provide useful input into the South African IT Industry Strategy Project. We believe that these studies will provide a springboard for future direction which will result in a stronger and vibrant IT industry sector, capable of creating a broader base of wealth and economic growth for South Africa.

A particular word of thanks to Dr Jonathan Miller and Dr Bob Day who provided insights on the Foresight project. Jonathan Miller also made valuable inputs into the final report, and provided the project team with access to his networks in the industry.

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*This study was supported by the Canadian International Development Agency (CIDA),
with additional support provided by the
Acacia Program of the
International Development Research Centre (IDRC)*

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PROJECT SUMMARY

This baseline study, a Survey of the IT Industry, is the first of a two-part study to provide an overview of the status of the information and communications industry in South Africa. These two studies feed into a three-year, \$ 3,5 million Canadian) dollar programme called the South African IT Industry Strategy (SAITIS) project. SAITIS is being funded through a bilateral assistance programme launched by the Canadian International Development Agency (CIDA), in conjunction with the Department of Trade and Industry (DTI). Additional support has been provided for this baseline study the Acacia Programme of the International Development Research Centre (IDRC).

The main objectives of the study are to determine the:

- Status of the South African IT Industry as a whole; and
- Status of jobs and skills in the IT Industry.

A combination of research into available secondary sources, together with about 40 interviews and four discussion groups, was used. Presently a questionnaire survey is underway to gather data on jobs and skills in the IT industry. The survey will however also provide up-to-date information on the industry in general, which will be available by the end of the year.

The OECD definition of the IT Industry was used as a basis for the study, although data categorised in other ways formed a significant part of the analysis. The problem of fragmented and inconsistent data is one which emerged throughout the study and will be addressed in future activities of the SAITIS project.

This report provides an overview of global trends in the IT industry, in particular the paradigm shift from manufacturing to an information economy, and the rise of the Internet and electronic commerce. The effect of these trends on a developing country such as South Africa are discussed, and the South African response in the broader economy and in the IT industry is examined. Important national initiatives pertaining to the industry such as the Foresight Process, various government initiatives within the Department of Trade and Industry and the newly-established South African IT Agency (SITA) are covered in some detail.

A brief overview of the South African regulatory and policy environment is provided, and particularly as it pertains to important legislation such as the Telecommunications Act of 1996 and to areas of legislative and regulatory uncertainty in the dynamically growing field of electronic commerce.

The major players in the IT industry are reviewed, both local and multinational. This section also includes IT suppliers, IT users and associations. The IT Industry in South Africa has been characterised by the use of effective use of foreign technology, with relatively few innovative products developed internally.

A major component of this report presents available statistical data on the IT industry. Aspects such as profitability, IT spend, growth in the IT industry, IT hardware, IT software, professional services and telecommunications are covered. Financial data is provided by ISIC categories as well as product where applicable. Developments of particular interest (e.g. the Internet) are treated separately.

Finally, an assessment of the challenges and opportunities facing the industry leads into an analysis of key actions needed to increase participation across the whole of society, turn the South African IT Industry into a significant engine of economic growth, and devise a strategy that assists the industry to be globally competitive.

A full Executive Summary will be released for both parts of the baseline studies.

LIST OF ABBREVIATIONS AND ACRONYMS

AHI	Afrikaanse Handelsinstituut (Afrikaans Chamber of Commerce)
AISI	African Information Society Initiative
AMEU	Association of Municipal Electricity Undertakings
ANI	African Networking Initiative
ATM	Asynchronous Transfer Mode
BCs	Bargaining Councils
BITF	Black IT Forum
CA	Certification Authority
CAD	Canadian Dollar
CAGR	Compounded Annual Growth Rate
CCNA	Cisco Certified Networking Academy
CCNP	Cisco Certified Network Professional
CDE	Centre for Development and Enterprise
CIC	Community Information Centre
CIDA	Canadian International Development Agency
CITA	Centre for Information Technology in Africa
CITI	Cape Information Technology Initiative
COMESA	Common Market for Eastern and Southern Africa
COMTEL	COMESA Regional Telecommunications Initiative
COSATU	Congress of South African Trade Unions
CRM	Customer Relationship Management
CSIR	Council for Scientific and Industrial Research
CWU	Communication Workers Union
DACST	Department of Arts, Science, Culture and Technology
DBSA	Development Bank of Southern Africa
DECT	Digital Enhanced Cordless Telecommunications
DGIS	Dutch Ministry for Co-operation
DOC	Department of Communications
DOE	Department of Education
DPSA	Department of Public Service Administration
DSE	Department of State Expenditure
DTI	Department of Trade and Industry
ECA	United Nations Economic Commission for Africa
ECASA	E-commerce Association of South Africa
EDI	Electronic Data Interchange
EIF	Electronic Industry Federation
ERP	Enterprise Resource Planning
ESKOM	Electricity Supply Commission (South Africa)
ETQA	Education and Training Quality Assurer
FCC	Federal Communications Commission
FRD	Foundation for Research Development
GATT	General Agreement on Tariffs and Trade
GATS	General Agreement on Trade in Services
GDP	Gross Domestic Product
GEAR	Growth, Equity and Redistribution
GIS	Geographical Information Systems
GMPCS	Global Mobile Personal Communication Systems
GNP	Gross National Product
GSM	Groupe Speciale Mobile
HDI	Human Development Index

HLHR	High-Level Human Resources
HSRC	Human Sciences Research Council
IAPs	Internet Access Providers
ICANN	Internet Corporation for Assigned Names and Numbers
ICT	Information and Communication Technology
IDC	Industrial Development Corporation
IDRC	International Development Research Centre
IDZs	Industrial Development Zones
IFIP	International Federation of Information Processors
ILO	International Labour Organisation
IMF	International Monetary Fund
IPR	Intellectual Property Rights
IRG	Information Resources Group
ISAK	Institute of Software Applications and Knowledge
ISETT	Information Systems, Electronics and Telecommunications Technologies
ISIC	International Standard Industrial Classification codes
ISP	Internet Service Provider
IT	Information Technology
ITA	Information Technology Association
ITITB	IT Industry Training Board
ITNQF	Information Technology National Qualifications Framework
ITU	International Telecommunication Union
ITUC	IT Users Council
JCSC	Joint Communications Security Council
JSE	Johannesburg Stock Exchange
LRA	Labour Relations Act
MEA	Miller Esselaar and Associates
MCSE	Microsoft Certified Systems Engineering
MPTC	Multipurpose Telecentre
NAICS	North American Industrial Classification System
NGO	Non-Governmental Organisation
NITF	National IT Forum
NQF	National Qualifications Framework
NRF	National Research Foundation
NSB	National Standards Body
NTOs	National Telecommunications Operators
NTUG	National Telecommunications User Group
OECD	Organization for Economic Co-operation and Development
OHS	October Household Survey
PATU	Pan African Telecommunication Union
P&DM	Wits School for Public and Development Management
PICTA	Programme for Information and Communication Technologies in Africa
PITs	Public Internet (Information) Terminals
PKI	Public Key Infrastructure
POPs	Points of Presence (Internet Access)
PWC	Price Waterhouse Coopers (Canadian Executing Agency for SAITIS)
PSC	Public Service Commission
R&D	Research and Development
RDP	Reconstruction and Development Programme
RSA	Republic of South Africa
RTR	Regional Telecommunications Restructuring Program
SABC	South African Broadcasting Corporation
SABS	South African Bureau of Standards
SACAC	South African Council for Control and Automation
SADC	Southern African Development Community

SACOB	South African Chamber of Business
SACSA	South African Co Communications Security Agency
SACU	South African Customs Union
SAITIS	South African Information Technology Industry Strategy project
SANDF	South African National Defence Force
SAPO	South African Post Office
SAQA	South African Qualifications Framework
SATCC	Southern African Telecommunications Coordinating Commission
SATRA	South African Telecommunications Regulatory Authority
SAVA	South African VANS Association
SBDC	Small Business Development Corporation
SDA	Skills Development Act
SDH	Synchronous Digital Hierarchy
SDI	Spatial Development Initiative
SET	Secure Electronic Transactions
SETA	Sector Education and Training Authorities
SET	Science, Engineering and Technology
SEZ	Special Economic Zone
SGB	Standards Generating Body
SIC	Standard Industrial Classification
SITA	State IT Agency
SMMEs	Small, medium and micro-enterprises
SWOT	Analysis of Strengths, Weaknesses, Opportunities and Threats
TELI	Technology Enhanced Learning Initiative
TOR	Terms of Reference
UCT	University of Cape Town
UNCSTD	United Nations Commission on Sustainable Technology for Development
UNECA	United Nations Economic Commission for Africa
USAID	United States Agency for International Development
UNDP	United Nations Development Program
Unesco	United Nations Educational, Scientific and Cultural Organisation
UNITRAL	United Nations Commission on International Trade Law
VAN	Value Added Network
VSAT	Very Small Aperture Terminal
WIPRO	World Intellectual Property Rights Organisation
WTO	World Trade Organization
Y2K	Year 2000

Chapter 1

INTRODUCTION

1.1 Background to the SAITIS Project

The Canadian International Development Agency (CIDA), in cooperation with the South African Department of Trade and Industry (DTI), has launched a bilateral development assistance project which will develop an Information Technology (IT) Industry Strategy for South Africa. This project, referred to as the South African IT Industry Strategy (SAITIS) project, will be carried out over three years and has a value of CAD\$ 3,5 million.

This report was developed to establish baseline data for the SAITIS project, and to assist in creating a framework for monitoring the eventual outcome and impact of the strategy. The results presented in this report should also provide a useful input into the working groups which have been established to assist the Canadian executing agency, Price Waterhouse Coopers Canada.

Two studies are being conducted, the first a survey of the IT sector as a whole, and the second a survey of the current status of IT jobs and skills. Due to significant overlap in these two areas the project team used an integrated project methodology, outlined in detail in Chapter 3. The studies, based on a review of secondary sources, interviews, focus groups and a questionnaire survey, are being conducted over a five-month period between June and November 1999. This report presents the results of the survey of the industry. The study of the IT jobs and skills requirements will be completed in November 1999.

The baseline studies also determined, through interviews and workshops with a broad range of stakeholders, the perceived barriers and constraints for development of the IT industry in South Africa. Current and future priorities for the South African IT industry, and some recommended actions were assessed. Research needs which should be addressed in the SAITIS project were also identified.

The questionnaire survey is being undertaken to provide a more complete picture of the IT industry and to start to fill in some of the gaps in available data. The results of this questionnaire are not available until November 1999. It will feed into the jobs and skills scan as well as provide information of value to this IT industry report. A copy of the questionnaire is provided in Appendix 5.

1.2 Objectives of the Baseline Studies

The objectives of the baseline studies are indicated in sections 1.2.1 and 1.2.2 below.

1.2.1 IT Industry Scan

The main objective of the IT industry scan was to determine the status of the IT industry in South Africa. This included aspects such as the:

- Identification of the major players
- Categorisation of the IT industry
- Geographic spread by province and city
- Revenue streams and profitability
- Contribution of the IT industry to the GNP
- Investment flows

- Levels of R&D investment by companies
- Training spend per category (cost, time, how long)
- The existing market for IT goods and services in SA, SADC, Africa and internationally
- Y2K readiness
- Use of IT as a development tool e.g. in RDP applications
- Overview of the political and regulatory situation for the IT industry in South Africa

1.2.2 IT Jobs and Skills Scan

The purpose of the analysis of IT jobs and skills, was to determine the current status in the country. Due to the paucity of available data in this area, most of the available information will be gathered from a questionnaire survey which is being undertaken in collaboration with the Information Technology Association (ITA) and Cape Information Technology Initiative (CITI) in the Western Cape. Aspects which were addressed include:

- Supply/demand in the job market, including the brain drain into international markets
- Geographic spread of jobs within South Africa
- Existing and planned jobs
- Job levels (programmer, project manager, user, systems analyst, etc)
- Labour intensity in the sector
- Job losses through IT
- Remuneration levels
- Race/gender/disability
- Levels of unionisation in the IT sector
- Requirements for training

Chapter 2

DEFINING THE IT INDUSTRY

2.1 Introduction

As technology convergence proceeds apace, setting the bounds of the IT Industry becomes ever more difficult. Inevitably, standard definitions in long use become outdated and perhaps even misleading. This needs to be offset against the clear requirement to maintain comparable statistics in order to discern trends and to make inter-country comparisons.

This study will utilise the OECD definition of the IT industry as outlined in Section 2.2 and will, where possible, categorise the results obtained into the Standard Industry Classification system (SIC) and the North American Industry Classification System (NAICS).

2.2 Applying the OECD Definition of the IT Industry

The OECD definition of the IT industry forms the foundation for this study: "it is a compromise, limited to those industries which facilitate, by electronic means, the processing, transmission and display of information, and it excludes the industries which create the information, the so-called 'content' industries." The definition would include the following International Standard Industrial Classification (ISIC) codes:

Table 1: International Standard Classification (ISIC) codes

Manufacturing	
3000	Manufacture of office, accounting and computing machinery
3130	Manufacture of insulated wire and cable
3210	Manufacture of electronic valves and tubes and other electronic components
3220	Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy
3230	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus, and associated goods
3312	Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment
3313	Manufacture of industrial process control equipment
Services -- goods related	
5150	Wholesale of machinery, equipment and supplies
7123	Renting of office machinery and equipment (including computers)
Services -- intangible	
6420	Telecommunications
7200	Computer and related activities

It is clear that the ISIC definitions are somewhat out-of-date. This was recognised by the US Census Bureau and led to the development of the North American Industry Classification System (NAICS); an approach to incorporate this for SAITIS is discussed later.

2.3 Definition Constraints

The use of the OECD definition and indeed the SIC classification codes have a number of constraints for this study. These are:

- The SIC codes, in particular, do not adequately reflect the reality of technology changes that have occurred over the past decade or more, and are hardly used in South Africa outside of a few Government agencies.
- Accordingly, industry specialists (such as BMI-T and the Price Waterhouse Coopers (PWC) Technology Forecasts), associations and companies offering mailing lists do not normally classify their data in this way. Data captured using another classification scheme has to be 'mapped' onto the SIC (or NAICS) codes, with a corresponding loss of accuracy.
- South Africa has traditionally been a user and distributor of technology developed elsewhere, and has, and has always had, a relatively small manufacturing industry. The SIC system has a heavy emphasis on manufacturing, with little differentiation in the areas that concern South Africa (e.g. in the area of services)
- Many South African companies show a high degree of vertical integration. They do not, for instance, report separately on the manufacture of smart cards in a business which manufactures, markets, distributes, integrates, develops software and maintains smart card systems. Therefore, it may be difficult to extract meaningful information from these companies which correspond with SIC categories.
- This report is likely to be read by a wide audience. Therefore, it is important to provide the output in a relevant way.

2.4 Categorisation of the IT Industry

BMI-TechKnowledge, whose data has been used extensively in this report, uses vertical sector definitions as employed by International Data Corporation (IDC) worldwide. A cross-tabulation based on overlap of sectors and some estimation was used to map the IDC/BMI-T sectors to requirements of this study. This mapping is notional, and not exact. According to this mapping, the following sub-sectors and specific large organisations are included in the re-mapped sectors in this report.

Manufacturing

This sector includes the following sectors under manufacturing and distribution.

- Iron and Steel
- Light and Heavy Engineering
- Pulp and Paper
- Petrochemical
- Chemical
- Food and Beverage
- Non food Consumables
- Automotive
- Electronics

Mining

This sector includes all facilities that mine minerals/quarrying of ore and the like. This sector is large in its contribution to the South African economy, but makes up only 3% of the overall IT market spend in South Africa.

Retail

All retail sectors by SIC classification.

Wholesale

All wholesale sectors by SIC classification.

Finance, Insurance and Real Estate

BMI-T's Banking and Finance sector includes all banking institutions, including the South African Reserve Bank, Development banks, as well as brokers, portfolio management firms and the Johannesburg Stock Exchange.

BMI-T's Insurance sector includes short term and long term insurance companies as well as pension fund administrators and medical aid societies.

Real Estate is estimated from secondary sources on the proportion of small and medium organisations that are in the real estate sector.

Services

BMI-T's research and education sector includes tertiary educational institutions, as well as research organisations such as the Council for Scientific and Industrial Research (CSIR) and the South African Bureau of Standards (SABS).

Other services categories are estimated from secondary sources on the proportion of small and medium organisations that are in the services sector (excluding those specifically nominated in other categories)

Public Administration

This sector includes all national, regional and local government. The following specific large departments, inter alia, are included in this sector:

- Central Computer Services / State IT Agency
- South African National Defence Force
- South African Police Services

Transportation, Communications, Electricity

BMI-T's transport sector includes Transnet Group including South African Airways, as well as all other providers of transport services.

BMI-T's Parastatal Utilities sector includes Telkom, Eskom, SA Post Office, SABC and other smaller state-owned enterprises.

Agriculture, Forestry and Fishing

Estimated as a proportion of BMI-T's "Other" category which includes all sectors not yet mentioned, excluding home office (e.g. agriculture, building and construction and entertainment).

Construction

Estimated as a proportion of BMI-T's "Other" category which includes all sectors not yet mentioned, excluding home office (e.g. agriculture, building and construction and entertainment).

2.4.1 SIC and NAICS Classifications

Tables of the SIC divisional structure plus the broad SIC/NAICS correspondence tables can be found in Appendix 2. Information emanating from the Survey will generally be classified into SIC/NAICS divisions only. The second level groupings are included for completeness and will be used where meaningful data is available.

The major groups associated with SIC divisions are provided in the following table.

Table 2: SIC Divisions and Groups

Division	Groups	Description
A	01-09	Agriculture, Forestry and Fishing
B	10-14	Mining
C	15-17	Construction
D	20-39	Manufacturing (Includes Major Group 35: Industrial and Commercial Machinery and Computer equipment and Major Group 36: Electronic and Other Electrical Equipment and Components, Except Computer equipment)
E	40-49	Transportation, Communications, Electric, Gas and Sanitary Services (Includes Major Group 48: Communications)
F	50-51	Wholesale Trade (Includes Major Group 50: Wholesale Trade – durable goods)
G	52-59	Retail Trade (Includes Major Group 57: Home Furniture, Furnishings, and equipment Stores)
H	60-67	Finance, Insurance and Real Estate
I	70-88	Services (Includes Major Group 73: Business Services and Major Group 87: Engineering, Accounting, Research, Management and Related Services)
J	91-99	Public Administration

Where the SIC classification loses 'definition' in the South African context is in areas which are of interest to South African business such as Major Group 73: Business Services.

2.5 Redefining the IT Industry

There may be merit in producing two 'views' of the IT Industry, one for comparative purposes and the other in a format which South African business would probably relate to more easily. Alternatives here are the vertical definitions used by BMI-T and the IDC. Another classification that is well received in South Africa is the Price Waterhouse Coopers classification used in their Technology Forecasts, reproduced below:

Bandwidth

- Telecommunications Services
- Wireline Transmission
- Wireless Transmission
- The Internet and Intranets
- Electronic Commerce
- Networking Systems and Protocols

Hardware

- Computing Platforms
- Storage
- Microprocessors
- Smart Cards

Applications

- Corporate Applications
- Data Warehousing
- Applications Development
- E-mail and Groupware
- Knowledge and Document Management

Enterprise Management

- Database Management
- Security
- Systems and Network Management
- Distributed Computing
- Operating Systems

Chapter 3

METHODOLOGY

3.1 General Approach and Assumptions

A common approach to meet the needs of the IT Industry Survey and the Jobs and Skills Survey was adopted. It was recognised that, given time and budgetary constraints, reliable secondary sources of data should be used where available. It was also recognised that, given the nature and planned activities of the overall SAITIS study, “hard” data needed to be supplemented by informed opinion from people knowledgeable about the IT industry.

Accordingly the baseline study methodology comprises data gathering from primary and secondary sources as well as individual and group interviews of stakeholders in the industry.

3.2 Secondary Sources

As mentioned elsewhere in this report, a major study of future research and technology directions in South Africa has been underway at the same time as the SAITIS project. While that Foresight project is not yet complete, the team had access to unpublished material from the forthcoming report of the IT Working Group and has made liberal use of it to assist this study. The material included commissioned reports on the international and local IT arena, a SWOT analysis of the IT sector in South Africa carried out by the Working Group, and an extensive nation-wide Delphi survey of expert opinion on IT futures in the country.

The main secondary source of data for this study derives from existing studies by the BMI-T group. BMI-T conducts quantitative and qualitative primary research exercises on many aspects of the IT Industry in South Africa and publishes those reports. Qualitative data e.g. market revenue, share and shipment data is obtained from on-going telephonic surveys and personal interviews with vendors of technology products (equipment, software and services). This data is verified by additional interviews and surveys conducted with supply chain members both up and down stream. The company conducts in excess of 10 000 telephonic interviews per annum with the end user community, supplemented by personal interviews. Over 5 000 interviews are conducted with members of the supply chain - country offices, distributors, resellers and dealers. The data supplied in this study was sourced from a variety of the above mentioned contacts. Typically the contact respondent would be at IT manager level or above in the case of users and at General Manager/Director level in the supplier instance.

Additional secondary data was gathered through desk research into other papers and reports listed in the reference section.

3.3 Interviews and Group Discussions

To gain insight into leading opinion on the IT industry and establish the face validity of conclusions drawn from the various primary and secondary data sources, members of the project team conducted a series of individual interviews and group discussions. Drawing on lists of industry participants (especially from Forge-Ahead BMI-T and the Foresight project) and personal contacts, people representing business, labour, professional associations, academia, state-owned enterprises, government and recruitment agencies were invited to participate. The full list of interviewees is provided in Appendix 1.

Interview topics included:

- Views on the international IT marketplace and industry
- Opinion as to the current state and future direction of the SA economy
- Views on the current and potential SA IT marketplace
- What the country should do to build on strengths and address weaknesses
- What the particular interviewee's organisation could be doing in that context
- What the particular organisation needs (in the case of business and labour) and can offer (in the case of government) to further the cause of the IT industry

Subsequently four two-hour discussion sessions comprising 10-15 people each were held, three in Johannesburg and one in Cape Town. The invitees were drawn from the same sources mentioned above and are also recorded in Appendix 1.

The objective was to give feedback as to the results of the individual interviews, plus background on the industry data already gathered. With that background, the group facilitators led discussions designed to lay out key points and determine the group's perceived barriers to growth of the industry and priorities for the future.

To get the most from the limited time available, in each case the facilitators applied a well-known structured and self-documenting group methodology known as Visual Gathering.

3.4 Primary Data Gathering

3.4.1 Questionnaire design

A national survey was designed and conducted to gather reliable and current data that was not already available from secondary sources. The questionnaire used for the survey is shown in Appendix 6. It is based on questionnaires used repeatedly by IRG, one of the members of the study team, who have conducted several similar studies of the skills market in South Africa, in particular around racial and gender issues.

This is the first time, however, that such a study has targeted the IT sector in this country. Therefore, to gather specific data on the nature of the IT workforce in different categories of work, the questionnaire uses the domain structure recently decided upon by the South African Qualifications Authority (SAQA) as recommended by the Skills Generating Body for the IT industry.

The industry information structure is based on the major SIC categories with additional open-ended questions enabling more detailed subdivisions to be derived where possible.

A pilot test of the first draft of the questionnaire suggested that it would likely be too long and complex for many respondents, especially in the SMME sector. Therefore a second, more concise version, retaining the essence of the longer version, was created and used for the primary survey (See Appendix 6).

As a separate exercise, IRG is continuing to poll large companies with the original questionnaire. These results will also be available to the SAITIS project.

3.4.2 Sample Design and Selection

Despite the simplification of the survey instrument, it was recognised that companies would not necessarily have much of the requested industry, and jobs and skills data readily available in the desired form. This was especially the case for smaller companies and classification of IT skills according to the SAQA domains. Also in the nature of the survey, data representative of both

large and small companies on both the supplying and using sectors of the IT industry were desired.

The team therefore paid careful attention to sample selection and questionnaire administration.

With regard to sample selection, the objective was set to generate 500 responses, made up as shown in the tables below. The mailscan will be conducted in an iterative manner, using projected response rates after initial feedback has been received, and then using further lists of candidates (readily available) to achieve the desired responses.

:

Table 3: IT Suppliers

Category	No of Companies	Targeted No of Responses	Planned Number in Mailshot
1. Listed	83	8 (83*)	83
1.1 Main Board			
Electronics and Electrical	22		
Information Technology	37		
Telecommunications	6		
1.2 Development Stage	3		
1.3 Development Capital	7		
1.4 Venture Capital	8		
2. Major and Large unlisted - including Parastatals, NGOs, etc	>200	20	200
3. Unlisted SMMEs	>7000	172	1720
Very Small/Small Enterprises		86	860
Medium Enterprises		86	860
TOTAL		250	2500

Note that in this sector, much of the required information can be obtained through public sources for purposes of aggregation of industry figures. However, the information from the skills section of the questionnaire is not generally available.

Table 4: IT Users

Category	No of Companies	Targeted Number of Responses	Planned Number in Mailshot
1.Listed	> 700	80	800
2. Major and Large Unlisted - including Parastatals, NGOs, etc	>5000	20	200
3. Unlisted SMMEs	>135000	150	1500
Very Small/Small Enterprises		75	750
Medium Enterprises		75	750
TOTAL		250	2500

With the objective of constructing a stratified random sample of companies meeting the above requirements, the team approached most of the company “list providers” in the country. None are ideally suited for the purposes of the study as shown in the following commentary:

- The more comprehensive lists of companies e.g. **Braby’s** do not include employee numbers, or for that matter anything else which could be used to distinguish the size of the company.
- Some of the more detailed lists e.g. **Matrix Marketing** have a discernible bias but do show employee numbers and other information which may be used to size the company. Matrix has comprehensive data on the IT Industry.
- Arguably the best list for this project is that of **Introye**, who are attempting to capture details of the whole South African marketplace and have a good level of detail across a broad range of companies. However, their database does not closely monitor holding company data, leading to the possibility of double-counting.

In addition to the selection of a representative list of companies, the team had to consider possible return rates, costs and timing. It was decided that only 2500 questionnaires would be mailed, but the mailing would be followed up with telephone calls to encourage and help the respondents. With that in mind, in the end 2500 companies were mailed as follows:

A stratified random sample of 1000 companies from Introye, consisting mainly of SMMEs.

80 JSE listed user companies selected from 800, were obtained from Profile Media.

The 83 IT companies listed on the JSE.

The IT Association membership list of about 250 IT companies.

NGOs selected from categories as grouped in the PRODDER database.

120 Black empowerment IT companies provided by Forge Ahead BMI-T

100 IT companies selected from the Western Cape list maintained by the Cape IT Initiative (CITI)

100 companies from the national UIF list in the possession of IRG

650 companies from the members of the Breakwater Monitor maintained by IRG.

While it is recognised that in total the above collection is not necessarily representative of South African companies, it is hoped that it will yield a good response rate. Once the data is available, it will be possible to identify the sources and draw a combination of “judgement” and “representative” conclusions as required.

Chapter 4

GLOBAL TRENDS IN THE IT INDUSTRY

4.1 The Paradigm Shift from Manufacturing to Information Economy

The following information is taken from the International Technology Scan which was carried out by the Canadian International Development Research Centre (IDRC) for the Foresight process (unpublished, 1998). It is quoted extensively since it gives a good overview of the background against which the South African IT industry has to be viewed.

Introduction

The process of globalization is the determining feature of political, social and economic discourse at the end of the twentieth century. It implies changes in perceptions of time and place. The concept is closely linked to developments in the arena of ITs: technological developments drive globalisation and globalisation stimulates the extension and adaptation of technologies. The trend towards globalisation has been reinforced by paradigmatic changes in modes of production and service and by the consolidation of political and economic philosophy under the primary influence of the United States.

Two expressions add specificity to the notion of globalisation: the Global Information Society (GIS) and the Global Information Infrastructure. They are not synonymous although they are sometimes used interchangeably. The first concerns people, knowledge and information. The second concerns technologies that underpin the GIS. It is the GIS - and its component National Information Societies - that provides the goal. The infrastructure - global or national - is a means to achieve national information societies and a global knowledge balance that better reflects the kind of understanding needed to promote development - locally, regionally, nationally and on a global basis.

The concept of globalisation masks a number of tensions within and between societies, the resolution of which will be instrumental in determining the future and which will be explored below.

The main challenge for countries outside the developed world will be to shape a concept of globalisation that represents their own realities and responds to their own aspirations in a way in which previous 'global' paradigms did not, i.e. being pro-active rather than reactive. Central to this challenge will be the need for nation-states to maintain their own sovereignty, which is increasingly under threat.

A shift of tech-economic paradigm

The Industrial Revolution produced a social compact among governments, workers and employers which, while exploiting the ordinary worker, sustained growth in capitalist economies for over a century and spawned competing ideologies to the right and left. That balance is now being challenged by a shift to new IT-mediated modes of production of goods and services [where ICTs refers to the broader area of information and communications technologies].

Table 5: Changes in Techno-Economic Paradigm

'Fordist' Old	'IT' New
Energy intensive	Information-intensive
Standardised	Customised
Dedicated plant and equipment	Flexible production systems
Single firm	Networks
Hierarchical Management structures	Flat horizontal management structures
Centralisation	Distributed intelligence
Specialised skills	Multi-skilling
Government control and planning	Government information, regulation, coordination and 'Vision'
Minimal training requirements	Continuous training and re-training
Rather stable product mix	Rapid changes in product mix

Source : UNCTAD

The Fordist paradigm which is being replaced in the industrialised world impacted on but did not represent the reality in much of the world. Trade, while increasing rapidly and enhancing quality of life in the North, was primarily among Northern countries and based on raw materials from the South. Much of the developing world labour force remained outside the formal economy.

Assessing the policy implications of IT use

The social and economic impact of the new IT paradigm is difficult to predict. Technological innovation is occurring at different speeds and with different benefits and risks in the developed and developing worlds. "Since these technologies have hardly begun to be used in many of the least developed countries, the social conditions, modes of economic organisation and political processes that will be necessary to produce the benefits associated with IT use cannot be directly inferred from empirical studies in these countries. The best option is to compare the experiences of countries that are further along the learning curve with their own circumstances and to encourage creative ways of matching local conditions to the availability of new technologies." (DACST, 1998)

IT - driven employment shifts

The potentially revolutionary social and economic impacts of ICTs are visible in changes to the organisation of work, in the disappearance of jobs and the creation of new forms of employment. Labour unions around the world representing unionised workers in the IT sectors are recognising that many traditional jobs, especially in the installation and maintenance of telecommunication networks, will be eliminated as advanced technologies are introduced and markets are opened to competition. The impact of ICTs on the workplace and on organisations has been and will continue to be tremendous. This includes flattening of organisational structures and the increased vertical integration in the different sectors of the economic activity. The impact on employment has been an issue of concern for policy makers. This concern was reinforced by the pessimistic projections suggesting that ICTs will have negative impact on overall employment. However there are also empirical observations suggesting that some negative effects of ICTs are offset by the redistribution of human resources and are only felt in certain jobs.

The perception that jobs have been transferred from developed to developing countries has prompted an outcry from organised labour in the developed world and an international debate over the linkage between the application of international labour standards (child labour, rights to organise, working conditions and so forth) and trade. Does the so-called 'social clause' debate

reflect genuine concern about the welfare of workers in the developing world? Or is it rather an attempt by the industrialised world labour movements to entrench its existing advantage in an increasingly competitive global environment? The debate has been taking place within the International Labour Organisation and the World Trade Organisation: a consensus has been reached which encourages the application of labour standards but does not link them explicitly to trade agreements. Pressure will continue to be put on developing countries to improve labour conditions while opening their markets to competition - but without the immediate threat of retaliatory trade measures.

Globalisation also brings a further decline in the political influence and economic bargaining power of organised labour. Globalization is characterised by an open world labour market. This market operates by mobile capital selecting locations with the best deal in terms of labour costs and supply as well as taxation and incentives. Therefore the trend of global outsourcing, and the global mobility of Capital and the relative national fixity of labour favours those countries with the most tractable labour forces and the lowest social overheads of labour competence.

4.2 Global Economic Trends

The following information is taken from the Technology Foresight report (unpublished, 1999).

In keeping with the techno-economic shift, ICTs (together with other, related trends in management and business practice) have affected the workplace in a number of significant ways.

Developments, for example, with ICTs mean that geographic distance and time are no longer limiting factors in production. Companies can process information and carry out many of their administrative backstopping tasks far from their headquarters.

Companies can therefore choose where to sight operations based on local labour skills and costs, and local taxation and incentive arrangements. By positioning activities in different time zones, they can work on a twenty-four hour basis - increasing output rates and reducing product development times.

Flows of information make it easier for business entities to exist independently and focus on core activities. Work is increasingly being out-sourced and/or done by collaborative consortia and 'virtual business entities'.

ICTs are also at the heart of advanced product development and manufacturing techniques and organisational financial and management systems - all of which are the cornerstone of global competition. IT-based systems are performing many of the tasks previously done by humans. ICTs have also enabled more efficient, information-centred management and contributed to the breakdown of the bureaucratic/industrial organisational model. Both public and private sectors are downsizing and flattening the hierarchy - stripping away middle management and creating relatively autonomous units and project teams. A static work week is becoming less common with more people working part-time, more flexible hours and shifts to short-term flexible contracts. In the workplace generally, and in the advanced manufacturing sector specifically, it has been demonstrated that ICTs can provide opportunities to change traditional practices and that the introduction of ICTs can often change the accepted social distribution of power within organisations.

The shift towards knowledge work has accelerated the rise of the services sector, creating new work opportunities. Reduction in constraints of time and distance have enabled outsourcing, as well as various forms of telework, either within or outside organised work units, to generate an increasing proportion of national wealth. Telework offers, at least in theory, the opportunity to work from geographically isolated communities as easily as from urban areas and is seen as a means of reducing trends towards urbanisation, particularly movements of young people from

rural communities. It may bring with it, however, problems of isolation, associated with less opportunity for social contact in the workplace. It may also allow exploitation by absentee managers as the traditional bargaining tools of organised labour are eroded.

The effect of this, and other related changes in management philosophy, is that life-long, stable employment is no longer the norm for much of the industrialised countries' work force. There have also been changes in the location of jobs. This labour market flexibility may reinforce tendencies to insecurity and isolation in the industrialised world and lead to less tolerance of different conditions and value systems.

Financial Sector

The distinctiveness of national financial space is being eroded, reflecting the disempowering of other economic actors, particularly those rooted in space, such as regulators and planners. The growing power of financial institutions that operate beyond and across national financial spaces has important implications for the coherence of national financial space. This might lead to the decline in importance of locally and regionally oriented financial institutions as the financial system becomes increasingly subject to processes of capital centralisation and capital concentration, bringing about a high level of financial homogenisation within the borders of the nation-state.

Trade Liberalisation

There is a spread of unilateral liberalisation. Neighbouring countries - which are natural trading partners - will be drawn together as they liberalise. This opens up new market opportunities and also allows the strengthening of coalitions for joint bargaining in third markets. This decade has been dominated by the global trend towards trade liberalisation of telecommunications. This concerns in particular the European Union, Canada [CRTC adopted measures to fully liberalise Canada's market], Japan and 68 countries including 35 economically less developed countries which signed the WTO Basic Telecommunications Agreement to open up the world's market to competition. These countries represent 93% of the global market. In 1997 the European Union was marked by the final preparations for the full liberalisation of its market by the 1st of January 1998. There was also a move towards the establishment of independent national regulatory authorities and a trend towards privatisation of incumbent telecommunications operators: a notable example is the partial sell-off of France Telecom and Italia Telecom.

Investment

Capital mobility is not producing a massive shift of investment and employment from the advanced to the developing. Rather foreign direct investment is highly concentrated among the developed countries and the developing countries remain marginal. Market mechanisms alone are unlikely to be sufficient to generate adequate investment funds for developing countries. Governments are experimenting with two-way investment partnerships between local and foreign firms. However these initiatives require a coalition of resources from the public and business sectors and this mechanism has yet to be fully exploited.

Commodity markets

The developing world still relies on primary products for over 70% of its export earnings and into the latter half of twentieth century the expansion of most primary product exports has been less than that for total world trade. Moreover the developing countries' share of exports has been falling.

Interest rates and the debt burden

Developing nations’ debt at the end of 1990 totalled US\$1.34 trillion. Since 1983 many of these countries have experienced net negative capital outflows (i.e. they are paying back more money than is received in the form of new loans). According to the OECD between 1982 and 1990, total resource flows to developing countries amounted to US\$927 billion. This amount included all official multilateral and bilateral aid grants by private charities, trade credits and direct private investment and bank loans. During the same period developing countries remitted US\$1 345 billion to the creditor countries in debt service (i.e. interest and principal) alone. This amount does not include other outflows such as dividends, royalties, repatriated profits and unpaid raw material exports.

Barriers to market entry for developing countries

Developing countries’ exports continue to face formidable barriers in the markets of developed countries. These include firstly lack of skill: though software exports are often “low skilled” they still require graduate technical knowledge and experience and such workers are in serious short supply in developing countries. Secondly, there is lack of infrastructure. The software export trade increasingly demands a sizeable installed computer base, reliable and pervasive telecommunications links both domestically and internationally, and reliable electricity; in general developing countries are still struggling in this sphere. Thirdly there is a lack of market information. Exports are based on understanding of export markets and access to trading contacts in that market. Such information is not readily available within the developing countries other than to small elites. Not only do entrepreneurs lack information, but governments lack experience in creating the appropriate environment for innovation - regulation, human resource development, financial incentives and partnerships between government, academia and business. Countries need to be very smart to compete - the US spends approximately 40% of its R&D budget on the IT sector.

Table 6: Barriers to the development of IT/Software Capabilities in Developing Countries

External Factors
<i>Mistrust</i> The ‘not-invented here syndrome’
<i>Identification of User Needs</i> Problems in establishing the needs of users in different geographical and cultural locations
<i>Maturity of Software Industry</i> Limited-as indicated by developing country participation in the world supply of software packages
<i>Languages Barriers in non-English Speaking Countries</i> Difficult to produce good documentation
<i>Ability to Enforce Intellectual Property Rights</i> Poor-Leading to lack of protection
<i>Marketing Costs</i> High cost of Launching a new product in a foreign market Reluctance of foreign dealers/distribution to commercialise software from small developing country firms

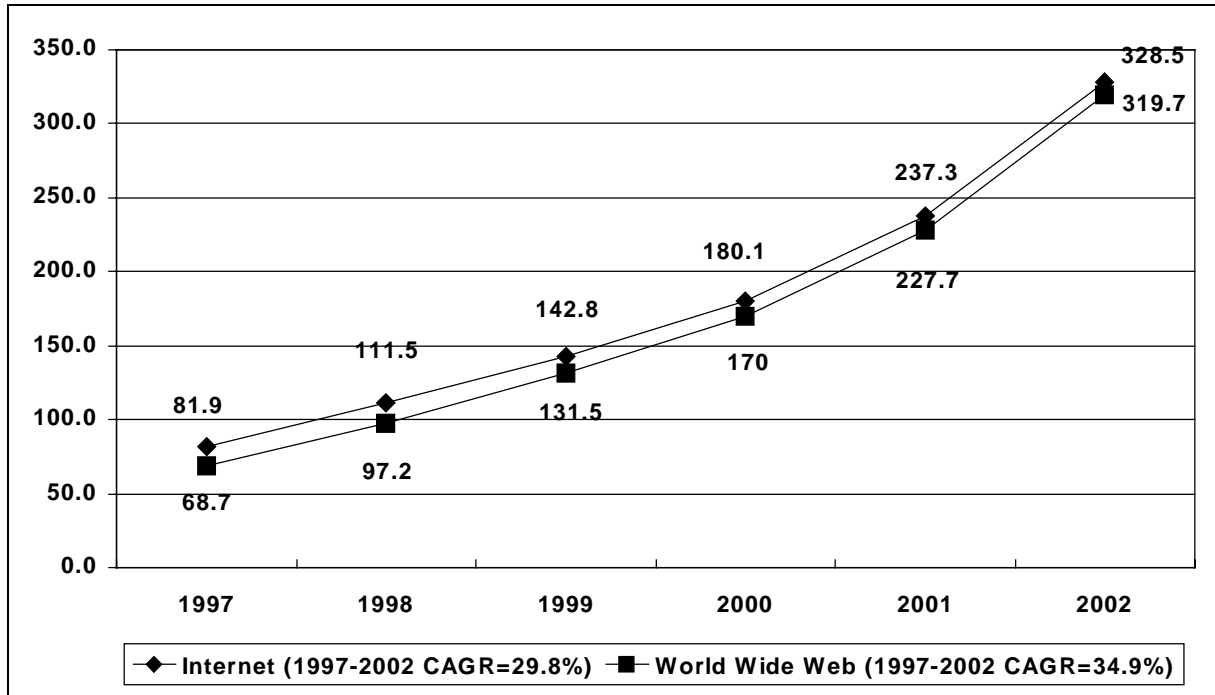
4.3 International IT Trends

4.3.1 The Internet and e-commerce

The total number of World Wide Web (WWW) users in 1998, according to the IDC, was 97.3 million, which is 87% of all Internet users (i.e. 111 million). Originally the domain of engineers, researchers, and scientists in government, education and private industry, the Internet is increasingly becoming the province of individual home users and commercial users. More than half (60%) of total Internet users in 1998 are 'home' users. Business users (35%) and education and government (5%) made up the rest.

According to IDC, the number of home users of the Internet and WWW will grow at a little more than 36% a year from 1997-2002. Small businesses will also exhibit strong growth in user numbers with Internet users increasing 34% each year until 2002, and WWW users increasing 48% for the same period. Smaller businesses that now use the Internet for only e-mail and non-graphical forms of communication will begin to implement browser-oriented communications solutions.

Figure 1: Worldwide Growth in Users of the Internet and World Wide Web, 1997-2001



Source: BMI-TechKnowledge and International Data Corp, 1998

4.3.1.2 African Trends

Africa is currently undergoing a rapid transformation and is outpacing the global average for growth in number of Internet host systems. From July 1998 to January 1999, the number of Internet hosts grew at a rate of 38 percent (from 7,800 to 10,703) while the worldwide average growth rate stood at 18 percent. These statistics were presented at a recent International Telecommunications Union workshop on telecommunications reform in Gaborone, Botswana.

One factor driving the growth is the assistance provided by various foreign organisations. In particular, there is strong support from various Francophone support agencies concerned about the dominance of English on the Internet. The result is that French-speaking countries have a far higher Internet profile and more institutional connectivity than non-French speaking countries. Mike Jensen of Communications Consulting argues that continent-wide, northern and southern Africa are leading the west and east in terms of Internet development and central Africa is grossly lagging behind.

South Africa in particular is developing rapidly, with about 225 000 dial-up accounts and hosting between 700 000 to 800 000 of Africa's 1,2 million Internet users. South Africa also has more than 70 POPs (points of presence) in both metropolitan and rural towns, unlike most of Africa. In southern Africa, Angola and Botswana are also developing Internet quite rapidly, while in the north, Egypt and Morocco are leading, with Tunisia following. Eastern Africa's leaders include Kenya and Uganda, while in West Africa, Senegal, Ghana and Benin are leading. Cameroon is ahead of the rest of central Africa, followed by Gabon and then Nigeria. The increasing use of the Internet in Nigeria may cause major changes on the continent because it is the most populous nation. The country has authorized some 38 Internet service providers to operate, and out of this number, 12 are already functioning.

Internet development in Africa is constrained by poor telephone infrastructure, low international bandwidth and high dial-up tariffs levied on Internet users. This has limited Internet access to mainly the elite who have a good education. Access to the Internet is mostly in major cities, sidelining the 70 percent of Africans who are rural dwellers.

4.4 Regional IT Trends

Africa has recently been moving towards regional integration in the area of telecommunications. Several initiatives are currently underway and need to be mentioned since they are likely to impact on the South African IT industry. New business opportunities may emerge from these regional initiatives, particularly since they will affect connectivity rollout in the region.

4.4.1 Southern African Development Community (SADC)

Originally known as the Southern African Development Coordination Conference (SADCC), the organisation was formed in Lusaka, Zambia, on April 1, 1980, following the adoption of the Lusaka Declaration - Southern Africa: Towards Economic Liberation - by the nine founding member states. The Declaration and Treaty establishing the Southern African Development Community (SADC), which has replaced the Coordination Conference, was signed on August 17, 1992 in Windhoek, Namibia (www.sadc.int). Member States are Angola, Botswana, Democratic Republic of Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe.

Each Member State co-ordinates a sector or sectors on behalf of the others. The Transport and Communications sector is co-ordinated by Mozambique through the Southern African Transport and Communications Commission (SATCC) based in Maputo, Mozambique.

The Southern African Regional Telecommunications Restructuring Project (RTR) has recently been established under the auspices of the SATCC. This is a four-year program which is funded by the United States Agency for International Development (USAID). Regional activities are co-ordinated from program headquarters in Gaborone, Botswana. The RTR Program also operates a U.S.-based information centre which conducts research and sector liaison activities.

The objective of the RTR program is to ensure that SADC member states realise the economic and social benefits of a modern information infrastructure and have the resources, both technical and financial, to develop it. To reach this goal the RTR program works to:

- Deliver technical assistance in support of restructuring efforts, including privatisation, as well as to assist in the resolution of policy and regulatory issues;
- Promote increased interaction among the U.S., international and Southern African telecommunications communities; and
- Provide management and technical education.

4.4.2 Common Market for Eastern and Southern Africa (COMESA)

The Common Market for Eastern and Southern Africa (COMESA) comprises 21 member states and represents 385 million people. It was established to encourage regional economic integration and co-operation as a means of increasing investment, production, and growth in the region. (www.comesa.int)

In early 1998, an initiative was undertaken to promote the establishment of a regional telecommunications network, known as COMTEL. This was the outcome of a study on telecommunications network inter-connectivity and tariff harmonisation which was undertaken by Telia Swedtel on behalf of COMESA and had financing from the African Development Bank. The aim of COMTEL is to facilitate increased trade relations within the region of eastern and southern Africa. The project will be implemented by COMTEL, an offshore company to be registered in Mauritius. The network will be managed as a private limited liability company with an investment cost of approximately US \$300 Million.

It is envisaged that the project will bring together a number of regional and international investors in the telecommunications sector. Regional participation will primarily be spearheaded by various National Telecommunication Operators (NTOs), representing different COMESA member States. The actual share holding structure is yet to be agreed upon. Share allocations consist of :

- NTOs representing COMESA member States, who will own 25%
- One strategic equity partner with experience in telecommunication, who will be entrusted with various aspects of implementation and management of the company. This strategic partner will have 30% of the shares.
- The private sector will be entitled to the remaining 45% of shares.

The membership includes the following countries; Angola, Botswana, Burundi, Comoros, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Lesotho, Malawi, Madagascar, Mauritius, Mozambique, Namibia, Rwanda, Seychelles, South Africa, Sudan, Swaziland, Tanzania, Uganda, D R Congo, Zambia and Zimbabwe. A Working Group comprising National Telecommunications Operators was formed, chaired by South Africa.

The Regional Network will use Asynchronous Transfer Mode (ATM) technology. However, the proposed company will select the appropriate technology on a country to country basis. For example, in some countries optical fibre networks may not be practical or possible, in which case microwave or satellite technologies will be used. The network using existing layout infrastructure where available as well as new transmission routes employing a mix of fibre-optic cable, digital microwave and satellite systems. COMTEL aims to provide service quality as well as competitive rates to its customers (the chargeable rate is estimated at US\$ 0.1/minute). The viability study carried out based on the required investment costs and traffic projections show good returns on investment.

4.4.3 African Connection

The African Connection initiative began last year when 44 member nations of the Pan African Telecommunication Union (PATU) adopted a strategy called the African Connection. It aims to effect major improvements in the telecommunication infrastructure on the continent, with a major target of 50 million lines to be installed over the next 5 years. The African Connection aims to provide a network that will allow African countries to communicate with each other as easily as with the rest of the world.

The first phase of the African Connection was the African Connection Rally in which South Africa's Post and Telecommunications Minister (at that time, Jay Naidoo) drove from Africa's most northerly point to its southern tip. The rally aimed to promote the development of information superhighways across the continent, highlighting the telecommunication needs and investment opportunities to improve connectivity in Africa. During the rally Naidoo opened public access telecentres in several countries and encouraged the twinning of cities in South Africa with others on the continent. The rally was sponsored by Siemens, Telkom and Vodacom.

An African Connection Secretariat has been established and is housed within the Development Bank of Southern Africa (DBSA). The second phase of the African connection project is the establishment of the telecentres in each of the 53 countries in Africa.

4.4.4 African Information Society Initiative (AISI)

The AISI process was conceived in 1995 at the African Regional Symposium on Telematics for Development organised by ECA, the International Telecommunications Union (ITU), the United Nations Educational, Scientific and Cultural Organisation (Unesco) and Canada's International Development Research Centre (IDRC). The Symposium united information technology experts, senior government officials and private sector leaders from over 50 countries and was the first multi-stakeholder attempt to place information and communications at the centre of African development decision-making. The Symposium put in place an African expert group to draft the conceptual and implementation framework for AISI.

The African Information Society Initiative (AISI) was adopted by African Ministers responsible for Economic and Social Development and Planning at their thirty-first session in Addis Ababa in May 1996, and endorsed the same week by the African Regional Telecommunication Development Conference in Abidjan, and subsequently by the Organisation of African Unity Heads of State (Yaounde) and by the G-7 in Denver.

AISI is an action framework to build Africa's information and communication infrastructure, to be implemented by the United Nations Economic Commission for Africa (ECA) and its partners who work together with African member States in the Partnership for Information and Communication Technologies in Africa (PICTA). AISI is a framework through which to identify priority strategies, programmes and projects to support the sustainable build up of an information society in African countries in accordance with regional integration goals. ECA has sourced extra-budgetary funds to develop the AISI framework and fund specific initiatives. But for the most part the funding for the many projects and programmes needed to achieve AISI objectives must come from governments, the private sector or the donor community. Various partners have taken the lead in implementing component areas of the AISI including policy, content development and democratising access to the Information Society.

Chapter 5

NATIONAL TRENDS IN THE SOUTH AFRICAN IT INDUSTRY

5.1 The Socio-political Environment

Since 1994 and the first democratic election in South African history, South African society has undergone a dramatic transformation. Despite the 'political miracle' of 1994, the country continues to be socially and economically divided. The country is burdened with the economic reality of having to redress the legacy of apartheid in terms of education, poverty alleviation, inequitable health care and a burgeoning crime and violence situation. At the same time it has to rebuild relations with the international community, and deal with the reality of the emerging global economy. Increasing membership of the WTO is dissolving trade barriers, whilst encouraging multinationals in their quest for market dominance (Foresight unpublished report, 1998). The South African government is also presented with the challenge of creating jobs and moving towards stronger economic growth.

Population

South Africa's current population, based on the 1996 Census is estimated at 40,58 million, of which 54% are urbanised. Urbanisation covers a range from the highest figure (97%) in Gauteng, to the lowest in the Northern Province (18%). The population spread shows Kwazulu-Natal with 8,4 million, followed by Gauteng (7,3m) and the Northern Cape at the lowest with 0,8 million.

Although South Africa appears prosperous compared with her neighbours, approximately 46% of the population live on or below the subsistence level. The country's human development index (HDI) is 0.677, ranking it 86th of 159 countries.

Education

6% of the population has post-school qualifications, but this needs to be contrasted with 19% of the population, over the age of 20 years, which has never attended school.

Access to Infrastructure

58% of the population has access to electricity, and 45% has running water in their homes.

Communications

Table 7 below gives an indication of the number of households which have access to radios, TVs and telecommunications (SABC, Broadcast Research Department; Stats SA). Only 48,3% of African households have TV sets, compared with 96,5% of white households.

Table 7: Number of households having access to radios and TVs.

Percentage of households owning radios				
Year	Africans	Coloureds	Indians	Whites
1994	84,8	85,9	96,0	98,0
1996	86,7	85,4	95,5	98,4
Percentage of households owning TV sets				
Year	Africans	Coloureds	Indians	Whites
1994	41,9	81,3	95,8	95,7
1996	48,3	84,0	96,0	96,5

The 1995 October Household survey also gives an indication of the distribution and access to telecommunications in South African households.

Table 8: Percentage distribution of telecommunications in South African households.

Telecommunication by population group - Percentage distribution and total number of dwellings						
Telecommunication	Total dwellings 1/	Total	Africans	Coloureds	Indians	Whites
RSA	8 802	8 802 1/	5 951 1/	748 1/	246 1/	1 858 1/
Total	8 802	100,0	100,0	100,0	100,0	100,0
Cellular phone only	37	0,4	0,2	0,2	0,4	1,3
Cellular phone and telephone in dwelling	152	1,7	0,2	0,5	3,4	7,0
Telephone in dwelling only	2 651	30,1	13,2	36,5	70,4	76,6
Access to telephone at neighbour	682	7,7	8,1	17,3	9,2	2,6
Communal telephone (pay phone)	1 444	16,4	21,6	13,7	3,4	2,4
Access to telephone at shop/clinic	1 028	11,7	16,2	4,3	2,2	1,6
None	2 809	31,9	40,6	27,6	10,9	8,5

1/ Thousands Source: October household survey, 1995

Employment

Current unemployment rates in South Africa are estimated at 37,6 % (Stats SA, 1997).

Table 9 below indicates that the highest unemployment levels are found in African women (52,4%) and African men (34%) (Stats SA, 1996 Census).

Table 9: Unemployment levels by race and gender (Stats SA, Census 1996)

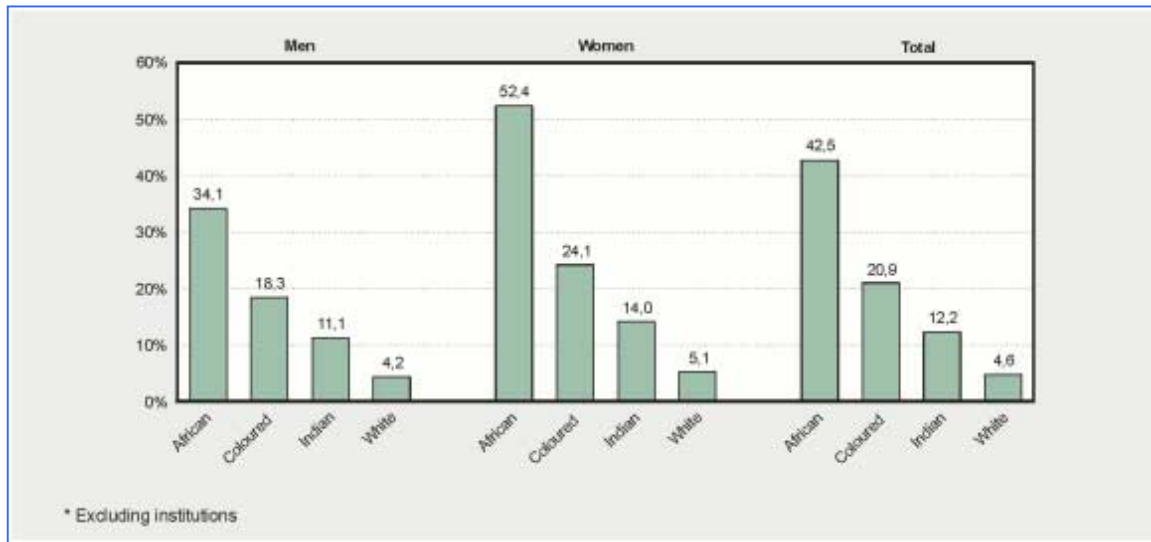


Table 10 below gives an indication of the spread of employment per province and per sector. The community, social and personal service sector (including the public sector) employs 31% of working people in the country.

Table 10: Economic sector amongst the employed aged 15 - 65 years by province (Stats SA, 1996 Census)

	Eastern Cape	Free State	Gauteng	Kwazulu-Natal	Mpumalanga	Northern Cape	Northern Province	North West	Western Cape	South Africa
Agriculture, hunting, forestry and fishing	70,470	102,335	36,094	118,071	102,863	48,646	83,019	81,707	171,144	814,350
Mining and quarrying	7,154	123,191	168,065	15,860	55,703	18,556	27,625	121,556	3,836	541,546
Manufacturing	97,035	43,774	327,588	265,701	59,158	8,812	27,912	55,119	234,875	1,119,973
Electricity, gas and water supply	5,598	7,363	36,522	14,103	17,800	2,397	6,954	7,532	11,064	109,334
Construction	43,635	32,122	158,359	85,021	41,540	10,402	42,790	38,885	102,375	555,129
Wholesale and retail trade	83,818	62,953	351,762	169,861	70,836	23,099	58,582	86,418	190,723	1,098,051
Transport, storage and communication	32,851	32,011	170,093	86,900	27,100	9,963	25,409	31,167	68,159	483,652
Financial, insurance, real estate and business services	35,181	26,045	318,708	98,602	21,102	7,733	20,851	25,199	126,734	680,156
Community, social and personal services	183,188	108,512	421,125	255,539	80,423	39,724	127,189	122,951	242,032	1,580,684
Private households	102,863	104,342	308,037	173,558	69,568	26,887	77,355	93,890	96,602	1,053,103
Unspecified	125,025	58,526	267,889	287,357	59,830	19,305	72,443	60,862	126,631	1,077,868
Total	786,818	701,175	2,564,243	1,570,573	605,925	215,523	570,129	725,287	1,374,174	9,113,847

Unionisation

There is virtually no unionisation in the sector, other than at Telkom, whose workers are predominantly represented by the Communications Workers Union. A more detailed description of union activity is included in Part 2 of the study, which deals with jobs and skills in the IT sector.

5.2 The Economic Environment

5.2.1 GEAR

In June 1996, South Africa's Finance Minister, Trevor Manuel, announced the country's macroeconomic strategy, designed to achieve the goals of the Reconstruction and Development Programme. GEAR (Growth, Employment and Redistribution) promised to increase growth to an average of 4.2%, create 1.35 million new jobs by the year 2000, boost exports by an array of supply-side measures and drastically improve social infrastructure. According to local economists, the crux of GEAR lay in an anticipated massive increase in private investment. This would be achieved by driving the budget deficit down to 3% of GDP by 2000, keeping inflation in single digits, reducing corporate taxes and providing tax holidays for certain investments, completing the phase out of foreign exchange control regulations, encouraging wage restraint by organised workers, creating a more flexible labour market and speeding up privatisation.

At its inception, the consensus was that GEAR was much more oriented to the corporate sector than labour, despite its apparent targets of substantial job creation. Since then, instead of spurring labour-intensive growth, GEAR has presided over significant job losses. According to analysts, one critical reason for this is a fundamental mismatch between the policies of the Ministry of Labour and the vision embedded in GEAR. However, the Finance Minister argued in a 1998 speech that:

- Exports have responded strongly to the changed policy environment with four years of strong export growth. The current expected account deficit for the year is below 1.5 per cent of GDP.
- Good progress was made in reducing the deficit. For the 1997/98 financial year, the deficit was 4,1 per cent against a target of 4 per cent. For 1998/99 the target is 3,5 per cent.
- Restructuring of state assets continues to be an important part of the strategy. A number of deals have been successfully completed: Telkom; Airports Company; radio stations and Aventura. On the agenda for this year are: Transnet; and Safcol.
- South Africa is in its sixth year of economic expansion. Real structural transformation of this economy has really just started and it will take time. The depreciation of the Rand and the consequent tightening of monetary policy requires a review of growth assumptions which are currently taking place.
- Capital inflows for the first quarter of this year were strong with a net inflow of capital not related to reserves of over R11 billion. As a result of Asian flu there was significant pressure on currency in the past three months and consequently there have been capital outflows. South African reserves are R32.65 billion (US\$5,3 billion) and the NOFP is US\$ 22,9 billion.
- Inflation has been brought down – the CPI increase for the twelve months to June 1998 was 5.2 per cent. Although the recent depreciation of the Rand will put upward pressure on inflation, average inflation for 1998 is expected to be around 6,5 per cent.

(See Section 6.2 for further commentary on GEAR).

5.3 R& D investment

The 1998 unpublished Foresight report (Local Study) includes an overview on R&D investment in South Africa, and is quoted here.

A reasonable, though imprecise, measure of a nation's ongoing technological development can be gained from the R&D indicators. South Africa's R&D expenditure is currently about 0.8% of GDP (\$942m in 1997), a slight recovery from the stagnant economy of the 1980s. Though below most OECD countries (2.5 - 3% in Japan, Germany and the USA), this compares fairly well with many newly emerging countries and developing countries (Taiwan 1.1%, Mexico 0.6%), and is well in advance of other African countries.

Since IT is a basic technology which is increasingly used in almost all fields of research, accurately estimating the amount of R&D in the IT sector is problematic. One approach is to split IT R&D into:

- pure IT research i.e. research on the basic technologies of the IT industry; and
- applied IT research i.e. the innovative application of IT in any other sector.

For example, pure IT R&D might be a new generation of CPUs, whilst applied IT R&D could be a vehicle tracking system using mobile communications and computer software. The estimation problem is worst for applied IT R&D where it may well be recorded as R&D in the sector of application rather than as IT R&D.

According to a Foundation for Research Development (FRD, now the National Research Foundation) survey of local R&D in computer sciences and communications, South Africa spent only R58.6m in 1993 on research into the computer sciences, representing about 2.3% of total R&D spending. The funding has been decreasing, and is down 33.5% from the 1991 level. The business sector has a greater involvement in computer science R&D, representing 63.4% of total funding. This suggests that IT R&D is more geared to business applications than to the more exploratory basic research conducted at academic institutions.

Table 11: Table: Computer Sciences and Communication R&D Inputs by Sector (in R000's)

Sector	Computer Sciences		Communications	
	1991	1993	1991	1993
Government	11,706	17,045	4,402	8,297
Tertiary Education	8,852	4,454	2,413	1,375
Business	67,649	37,164	61,967	66,258
TOTAL	88,207	58,663	68,782	75,930
% of Total R&D	3.2	2.3	2.5	3.0

The National Research Foundation's Programme on Competitive Industries has an annual 1999 budget of about R 8 million. Table 12 below gives an indication of the amount made available to researchers in tertiary institutions for ICT-related research. The ICT sector is one of 8 thrusts addressed through this Programme. Of concern is the reduction of grantees, as well as the fact that in the last two years, none of these grants were allocated to historically disadvantaged universities.

Table 12: Trends in grant allocation by the National Research Foundation in ICT

Year	No of grants	Grant size
1997	26	R 1,8 m
1998	23	R 1,9 m
1999	20	R 2,3 m

5.4 The Internet and E-Commerce

During 1998 demand in South Africa for connectivity to the Internet grew even more rapidly than in the preceding four years. The number of dial-up subscriber accounts of all ISPs combined grew by more than 100%, reaching 370 000 by yearend 1998. Growth took a sharp upward turn at the beginning of the year, and has remained fairly consistent at 16 000 new subscribers a month for most of 1998. This is significantly higher than growth in the preceding 12-month period. Growth in 1999 is expected to be somewhat moderated, but still significant.

Correspondingly, the number of individual Internet users, including those who have access via corporate networks, reached nearly 1 million at the end of 1998, and is expected to reach 3.5 million by 2003. This growth rate could be accelerated if there is even more aggressive competition between the ISPs (e.g. should free Internet Access services take off significantly), with corresponding stimulation of user numbers at the expense of a lower growth rate in revenues.

Table 13: Analysis and Forecast of Internet Access within Households, South Africa, 1996 – 2003

	1996	1997	1998	1999	2000	2001	2002	2003
% Households with Internet access in the home	0.5%	1.8%	4.1%	6.0%	7.4%	8.2%	9.2%	10.5%

Source: BMI-TechKnowledge, Internet Access Market Model© (IAMM), 1999

Although there is already a thriving non-Internet e-Commerce market, the Internet will be the major catalyst for further growth in e-Commerce in the years ahead. There is now a substantial installed base of devices and users accessing the Web, and in many areas, there is an incentive for these users to transact on-line. There is also a growing local merchant presence on the Web. While many local merchants are still catching up with global role models, South African Web shoppers can also buy directly from overseas. In 1998 there was a huge investment on the part of major IT and other industry players seeking to be facilitators of the future e-Commerce supply chain. While consumer Web commerce is a component, the biggest action will be in business-to-business (i.e. supply chain automation). There has also been a huge upsurge in e-mail usage, to the extent that e-mail is now a de-facto business communication method in 1999 for the vast majority of large, medium and small businesses in South Africa.

Table 14: Notional Estimates of Key Internet and E-Commerce Indicators

	Installed base of Internet-enabled PCs yearend 1998	1998 Value of e-Commerce Transactions (Rm)
Agriculture Forestry Fishing	50 000	500
Mining	50 000	750
Construction	25 000	50
Manufacturing	150 000	6 000
Transportation Communications Electricity	75 000	50
Wholesale	25 000	1 000
Retail	150 000	2 500
Finance Insurance Real estate	175 000	2 000
Services	200 000	3 000
Public Administration	100 000	150
Total	1 000 000	16 000

Note: E-Commerce transaction value is the total for Internet and non-Internet. The vast majority of transactions in 1998 were non-Internet.

Subscriber Base of Internet Access Providers (IAPs)

The number of dial up subscriptions for the individual ISPs is displayed below:

Table 15: Number of Dial Up Subscribers by Leading ISP, 1996 – 1998

	No. of Subscribers			% Growth		% Share	
	1996	1997	1998	1997	1997	1998	
The Internet Solution (ICON)	10667	21000	38000	97%	81%	13%	10%
UUNet Internet Africa	24000	50000	77500	108%	55%	30%	21%
Global Internet Access	8500	23000	39800	171%	73%	14%	11%
SAIX-enabled IAPs	500	33000	85000	6500%	158%	20%	23%
M-Web	-	20000	71000		255%	12%	19%
Others	15933	17753	58736	11%	231%	11%	16%
Total	67600	164753	370036	176%	125%	100%	100%

Source: BMI-TechKnowledge, Internet Access Market Analysis and Forecast, October1998

Rationalisation between dial-up players is continuing in 1999, resulting in two dominant players: M-Web with approximately 150 000 subscribers, and Vodacom's Yebo!Net, with about 120 000. Yebo!Net is currently in the process of acquiring ICON's dial-up subscribers from Internet Solution.

International Internet Bandwidth

International Internet bandwidth has increased significantly over the past two years, and was expected to reach 112 Mbps by yearend 1998. Since then an emerging group of satellite-based access providers have put in broadband international connections (e.g. Satellite Data Networks claims to have a 45Mbps international link), and established players like Internet Solution are planning to increase their own capacity to close to 90Mbps by yearend 1999. Although the adoption rate of growth of new Internet users will begin to slow down in 1999, the bandwidth is expected to grow dramatically, reaching 1Gbps by 2002. This bandwidth will be easily consumed by more intensive Internet usage, and a rapid growth in Virtual Private Networks tunnelled via the public Internet. Bandwidth intensive applications include multimedia content (graphics, video, audio) and electronic commerce. However, the most important growth driver will simply be increased traffic, including more e-mail messages and files transferred per individual Internet user.

Table 16: Internet Service Providers International Bandwidth

	Bandwidth (Mbps)			% Growth	
	1996	1997	1998	1997	1998
The Internet Solution	4	12.5	24.5	225	96
UUNet	2	12	20	500	67
GIA	1	0.7	16	600	300
SAIX	5	9	38	80	322
M-Web		9	14.5		61
IBM	1	2	4	100	100
Total	15	45	117	223	141

Source: BMI-TechKnowledge, Internet Access Market Analysis and Forecast, October1998

Table 17: International Internet Bandwidth Forecast

1996	1997	1998	1999	2000	2001	2002
15 Mbps	45 Mbps	117 Mbps	300 Mbps	600 Mbps	1000 Mbps	1800 Mbps

Source: BMI-TechKnowledge, 1999

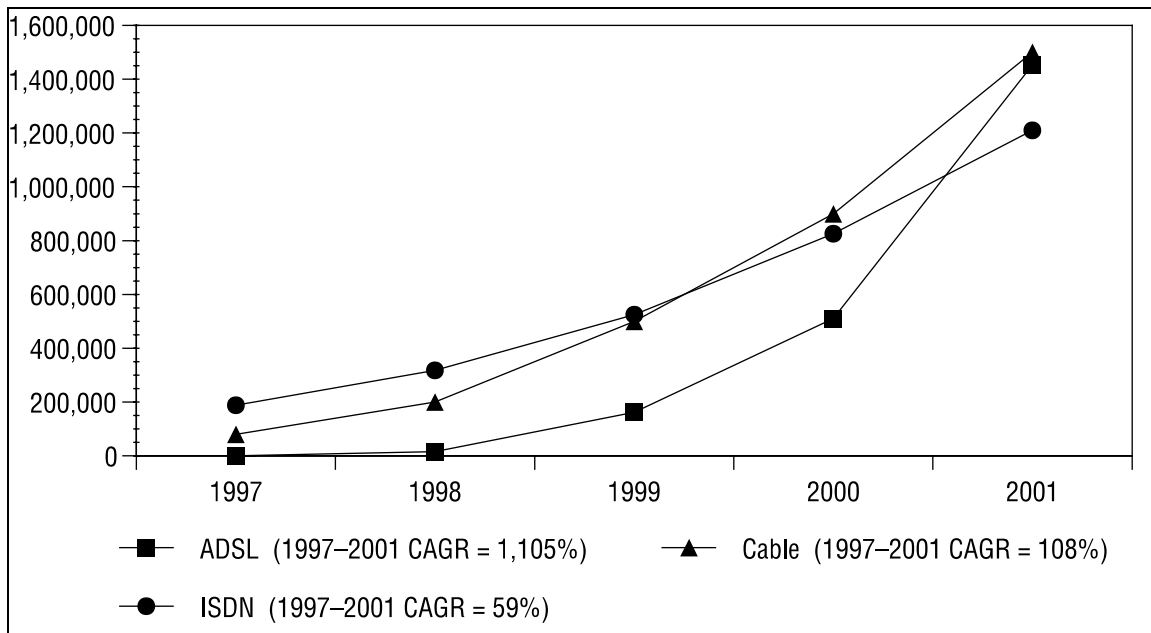
The forecast takes into account the current infrastructure rollout plans, as well as observation internationally that Internet bandwidth is doubling every 100 days. DSL rollout is also underway and Megabit access will soon be available to at least some individual large corporate customers.

Outlook for ISDN, DSL and Satellite Access

Only about 3% of the dial up subscribers in South Africa made use of an ISDN facility to connect to their Internet Service Provider in 1998. Most of the ISDN users are business customers. Telkom has announced accelerated roll-out of ISDN services to all its local exchanges commencing in 1999, and has begun to launch bundled services with PCs.

Satellite access has been launched in South Africa with at least three providers offering high speed Internet access services. This type of service will gradually become available to consumers (households) as prices fall (e.g. in step with innovative service packaging options such as bundling Internet Access with DSTV services). Take-up of this type of service could ultimately mirror that of Cable TV residential Internet access in the USA, as projected in Figure 6 below, and could leapfrog ISDN adoption in South Africa.

Figure 2: High-Speed Residential Internet Access Technology Subscriptions (Revenue-Generating Lines Only), USA, 1997 – 2001



Source: BMI-TechKnowledge and International Data Corporation, 1998

Alternative Internet Access Devices

The advent of lower cost Internet access devices, including the so-called “Information appliances”, will also make Internet access more affordable. Initially it will be mainly the same upper income, PC-owning households and business users that will acquire them, in many cases as a second or even third Internet-capable device. By 2003, the average on-line South African household will own 1.7 Internet access devices. Interestingly, this point will be reached in the USA three years earlier (i.e. in the Year 2000)s.

By 2003 there will be more than 1 million individuals accessing the Internet from schools or other educational establishments, a third of whom will not have any form of home access. In addition, there will be nearly 200 000 persons using public information terminals of various descriptions, for whom this will be their primary mode of access.

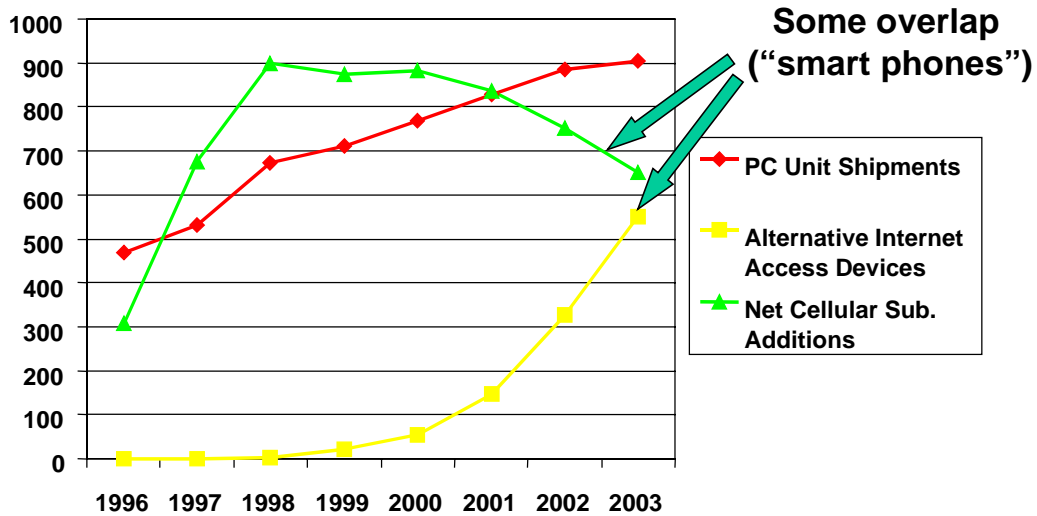
BMI-T forecasts that, by 2003, there will be at least 3.5 million unique, active Internet users, three times more than there are currently. It should be noted that this is a conservative definition, counting only those who regularly and consciously access the Internet for browsing or e-mail purposes. It does not include casual users, or unconscious usage of the public network in applications in which it forms an invisible part of the network infrastructure.

IDC believes that the “Information Appliance” market is poised for explosive growth in the next four years. The lion’s share of the information appliance momentum has moved toward netTV,

gaming devices, and smart handhelds, according to IDC. The latter shows the greatest promise for deployment on an absolute unit shipment basis. This includes cell phones, which in future will provide almost universal connectivity for applications such as online banking and ticketing.

The figure below shows BMI-TechKnowledge's forecast of unit shipments of traditional Personal Computers and alternative (non-PC) Internet access devices in South Africa, against the backdrop of net cellular phone subscriber additions. Some overlap occurs between these categories in the "smart handheld device" subcategory.

Figure 3: Device Unit Shipments vs Net Cellular Subscriber Additions (1996-2003)



Source: BMI-TechKnowledge, Internet Access Market Model© (IAMM), 1999

Public Internet Access

BMI-TechKnowledge expects that public access to the Internet will grow in leaps and bounds as a broader base of South Africans are exposed to Internet applications that make sense in a public context, e.g.:

- banking and payments
- making/confirming reservations
- ticket dispensing
- information on products/services
- obtaining directions to physical locations

As such, public access is more about applications and the localities of terminal devices than the specific details of the devices themselves. Public information terminals and kiosks will be located

in shopping and banking malls, in specific stores (e.g. TicketWeb kiosks are located in a specific chain of music retail outlets), airports, libraries, and other public places.

Clearly this concept is not new, considering ATMs and self-service terminals in banking malls have been with us for nearly two decades. Indeed many of the applications listed above have been and will continue to be delivered via kiosks, which are not necessarily Internet based. Extending the range of applications is one avenue for development. Using the Internet as part of the network backbone to connect these devices is another.

A number of specific initiatives warrant mentioning, which give insight into possible players in this field in future:

- Cyberhost is a listed company which was launched in 1999 with the intention of “bringing Internet access to the masses”. They plan to launch 1000 coin operated Internet kiosks (dubbed CyberXpress) in public places across the country. They have already put contracts in place for 220 kiosks, to be located in airports, video rental stores and shopping malls. The intention is to charge R5 for 10 minutes of Web browsing, and R2 for 10 minutes of e-mail usage. These kiosks can also be customised to a specific purpose (e.g. the video store application could include movie previews). The company will also market a set-top box for TV Web browsing.
- TTS have launched the Guestlink hotel television system, which will provide interactive services and access to hotel facilities along with Internet access in hotel rooms. Guests will be charged a premium for this service via their hotel bill.
- The South African government announced its plans to launch its “Information Communication 2025” project, with the aim that “every citizen must be offered cheap Internet access at public kiosks using a pre-paid card”. The intention is to implement this using a public-private sector partnership (PPP) for which R20 million in seed capital has been set aside – it is hoped that the initiative would be largely privately funded. A company called Info.com was to be launched, which would put as many government services as possible on the Internet. As of November 1998, 6 terminals were already on trial with Telkom providing the phone lines. Existing banking ATMs could also be part of the infrastructure.
- The government announced its intention to ensure that every school and village in the country has Internet access. The SchoolNet SA project is underway which has already linked 400 schools and there are potentially 500 000 tertiary students who have access via UniNet.
- YTECH Holdings Ltd “offers services and products to the hotel and tourism industry, and plans to introduce country-wide Internet kiosks to provide free access to the buying public and tourists. Enables one to pay accounts, shop, print movie tickets”.

Other initiatives that are not primarily aimed at providing Internet access for its own sake, but could be expanded in this direction, include:

- Vodac “has commissioned 500 kiosks for Vodago recharging, using any ATM card. Subsidiary Cell-f-services plans to develop services like electronic bill payment, e-banking and ticket reservations”.
- TicketWeb, with its kiosks installed in Musica stores country-wide.
- Paradigm is “setting up e-Commerce kiosks to focus on electronic bill payment, tickets and reservations etc”.

5.5 National Initiatives relating to the IT Industry

5.5.1 The Foresight Process in South Africa

Several countries engage in long range scenario-planning exercises to try to shape technology policy and especially IT policy. The United Kingdom, Japan, Germany, Australia, Vietnam, Korea are just a few examples of countries that conduct one-off or regular exercises to suggest

appropriate directions for technological policy. Initiated by the Department of Arts, Culture, Science and Technology, South Africa commenced its own Foresight study early in 1998 and the final report is expected September/October 1999. Working groups of 20-30 people each were formed to represent diverse interests and experience in each of twelve sectors. Along with IT, in which some members of this project team and the SAITIS Steering Committee are prominent, there are groups studying the environment, biodiversity, education, youth, health, mining, energy, business and finance, agriculture, manufacturing, tourism and safety.

At the start, the IT Working Group commissioned two substantial studies – an International Scan of IT Trends and a Local Study of the State of IT in the country. This report draws on the International Scan and extends and updates the Local Study. The group commenced a series of eight two-day workshops during which several tasks were tackled. They defined the boundaries of the IT sector and focus areas to frame the rest of the work. These focus areas were:

- IT and global trends;
- the individual and the home;
- the Organisation;
- learning;
- innovation;
- the IT industry;
- the public sector; society; and
- the labour market.

Sub-groups then conducted analyses on each of the focus areas. This analysis addressed questions such as:

- What are South Africa's specific strengths and weaknesses as regards IT and what opportunities and threats lie in the environment (i.e. a SWOT analysis).
- Given the strengths and weaknesses what strategies could be devised to deal with the latter?

Recognising that the Foresight process does not set out to forecast, but rather to explore possible technology futures, an important element was the creation of plausible socio-political scenarios for the country. Four scenarios were created and the SWOT outcomes were tested for robustness against each of the scenarios. The outcomes of the SWOT analysis are of significance to the SAITIS baseline and Table 17. below provides a summary (Foresight unpublished report, 1999). A detailed explanation of the SWOT analysis is included in Appendix 3.

The general outcome of the SWOT analysis is that South Africa, with a small but strong skills base and infrastructure, and a relatively high international profile and GDP, is well positioned to take advantage of niche opportunities to develop a software development industry, and an emerging IT empowered middle class. However, the threatening problems of the skills flight and the existing social barriers to IT access, particularly the low levels of literacy and education of the vast majority of the population, present serious obstacles to this objective.

An aggressive national IT vision is urgently needed to counteract the problems of obstructive policies, uncoordinated efforts, lack of funding, inadequate skills training, and the absence of a culture which fosters the development and effective use of IT.

Table 18: Summary of ICT SWOT analysis (Foresight study, 1999)

Strengths:	Weaknesses:
S1. Accelerated roll-out of infrastructure S2.1. Education and learning in the IT field S2.2. Existing skills base in place [pockets of excellence] S2.3. English - ICT's lingua franca S3. Government will to introduce IT facilitated Public Sector Services S4.1. Existing IT Infrastructure S4.2. IT Costs are relatively low S5.1. South Africa's IT Leadership in Africa S5.2. South Africa's International IT links S6. IT is a new driver of the Economy	W1.1. Inequitable Access W1.2. Lack of a National IT strategy W2.1. Low Levels of Literacy and Education W2.2. Inadequate IT Skills Base, worsened by the brain drain W2.3. IT "Phobia" and Elitism W3.1. Poor Government Services hamper IT roll-out W3.2. Industrial Age management is still being used in the IT age W4.1. Small Local IT Market W4.2. Poor Technology Transfer W5. International lack of clout in IT W6. Poor conditions for investors W7. IT precipitated antisocial behaviour
Opportunities:	Threats:
O1. Emerging Information Society O1.1. Accelerated Roll-Out of telecommunications infrastructure O1.2. Policies to foster an Information Society O2. IT enabled Learning/Education/Training O2.1. Distance education O3.1. National policy to stimulate IT development O3.2. Public Service Delivery through IT O3.3. Transformation of Government using ICTs O4.1. Software development to address developing world problems O4.2. Indigenous knowledge exported via ICTs O4.3. Less legacy infrastructure than the developed world O5. International links solve several IT weaknesses. O6.1. Various ways of financing IT operations O6.2. SMMEs, the future of the IT industry O6.3. Work patterns are more flexible O7. ICTs can enhance security and safety	T1. IT worsens disparities in the Information Society T2.1. Lack of IT skills in the labour force T2.2. Education funding is low T2.3. Distance education is not a mature medium T3.1. Government Inefficiencies - too sluggish for the fast moving IT sector T3.2. Government policies may lead to job losses T4. Redundant and Inappropriate Technologies T5. Globalisation favours the developed world T6. A weak economy is further threatened in a global information society T7. New social problems arise

A major part of the project comprised the construction and issue of a national "Delphi" survey questionnaire. The survey presents a list of statements that reflect possible future technologies and processes to a wide audience of people knowledgeable in the field. The "experts" are asked to rate each potentiality as to how important each item might be for wealth creation and improvement in quality of life, South Africa's comparative standing in relation to other countries, the likely time frame for realisation of the particular item, and other aspects. 1500 questionnaires were issued to respondents selected from a variety of lists of IT professionals in the country, about half drawn from the membership of the Computer Society of South Africa. Over 220 responses were received, analysed and then returned to the respondents. A second round questionnaire was issued so that the original respondents could adjust their responses, preferably with written motivation. Some 80 people responded in the second round.

The final analytical stage of the IT Working Group's efforts comprised a careful study of the Delphi statements of all other eleven Foresight Working Groups noted above. This allowed the group to identify important areas where IT could make a strong contribution to major sectors of the economy. . Many of those related to what might be called "FutureWeb" and Knowledge Management applications, The following are a few examples of more sophisticated technological applications:

- Biodiversity — Satellite-based monitoring of habitats,
- Agriculture — Micro-irrigation for individual plants,
- Mining — Robotic miners,
- Health — Intelligent artificial limbs and prostheses,
- Education — Virtual Reality learning applications.

To meet those “demands,” the group constructed an IT “Technology Map,” comprising a series of *strategic technology nodes*, *applied and base technologies*, and *infrastructural needs*. Strategic technology nodes and their associated technologies represent potential focus areas for basic and applied technology research and development. They included Knowledge Management, FutureWeb, Intelligent Systems, Bio-IT, Content Development, E-tagging, Advanced Software Development Platforms, Smart Materials, and IT-Supported New Learning Methods.

The conclusions will form the basis for firm recommendations to government in order to shape shorter-term industrial policy and longer-term technology-related research and development policy.

5.5.2 Programmes of the Department of Trade and Industry

The Department of Trade and Industry (DTI) designs and administers many programmes to stimulate economic growth. For instance, the DTI web page (www.dti.pwv.gov.za/dtiwww/) offers brief comments on each of the following, which could be applicable to IT firms.

- Industrial Investment Incentives
 - Tax Incentives
 - Industrial Development Finance Incentives
 - Regional Industrial Development Incentives
 - Industrial Export Incentives
 - Import Tariff Protection and Tariff Relief
 - Development Programmes for Specific Industries
 - General Incentives
 - Competitiveness Fund
 - Short-Term Export Finance Guarantee Facility
- Medium-Term Loan Financing

5.5.2.1 Sector Partnership Fund

The DTI offers 65% of the costs (up to a maximum of R1 million) for collaborative projects that aim to improve the competitiveness of organisations. The fund targets partnerships and looks to activities such as:

- Provision of projects to improve the productivity and competitiveness of members in areas such as technical, marketing, training, R&D etc.
- Gathering of information on trends and new developments in the relevant sub-sector both domestically and globally
- Creation of a forum to facilitate networking and information sharing among members
- Use of external support or network service providers.

Partnerships are regarded as being voluntary associations of member organisations and should have at least five members. They should be in the manufacturing sector or provide business services related to manufacturing. Examples of the seventeen or more partnerships already approved are:

- the Kwazulu-Natal and Eastern Cape Benchmarking Clubs
- Ship Building and Clay Brick Consortia
- South African Footwear and Leather and Fish River Motor Industry Clusters.

5.5.2.2 *National Industrial Participation Programme*

In operation since 1996, the mission of this programme is to leverage economic benefits and support the development of South African industry by effectively utilising the instrument of government procurement. All government and state-owned enterprise purchases or lease contracts for goods, equipment or services with an imported content equal to or exceeding \$10 million are subject to an Industrial Participation Obligation. The contractor is obliged to submit and implement business projects comprising new or incremental commercial/industrial activity equal to or exceeding 30% of the imported content. Such projects must be self-sustainable after the expiration of the contract. The projects could be in the form of investments, joint ventures, sub-contracting works, licensee production, R&D Collaboration, export promotion or supply partnerships with South African industry.

5.5.3 THRIP

The Technology and Human Resources for Industry Programme (THRIP) was established in 1991 and is a joint venture between industry, research and educational institutions and government. The National Research Foundation, as an agent for the Department of Trade and Industry, is responsible for THRIP. The programme supports the development of technology and appropriately skilled people for industry to improve South Africa's global competitiveness. THRIP performs this task by providing resources and mechanisms in support of collaborative research in the areas of science, engineering and technology (SET). Research groups in natural science, engineering and technology within educational institutions can participate in collaboration with any private company or consortium of companies. In 1997, more than R110m was provided from government and industry for THRIP research projects.

The objectives of THRIP are:

- To contribute to the increase in the number and quality of people with appropriate technological skills for industry.
- To promote increased interaction among, and financial support of researchers and technology managers in industry, higher education and Science, Education and Technology Institutes (SETIs), with the aim of developing skills for the commercial exploitation of SET.
- To stimulate industry to increase its investment in research, technology development and innovation promotion.

In promoting the objectives of THRIP, the following thrusts receive high priority:

- Support for an increased number of black and female students who follow technological and engineering careers.
- A focus in the promotion of technological know-how within the small, medium and micro enterprise (SMME) sector.
- Facilitation and support of multi-company projects in which companies collaborate and share in the project outcomes.

Contributions are provided by industry and government to finance the research efforts of the academic partners provided that such research projects involve the training of students. THRIP will consider contributing R1 for every R2 invested by the private sector in SET research projects of which the project leader and project are based at a higher educational institution or SETIs. THRIP matching funds for contributions in kind are only provided for projects based at historically

black universities or at any technikon. To address the priorities of THRIP, support for the project upgrades to a maximum of R1 for R1 if certain criteria are met.

A review of the programme at the end of 1997 noted that, “after a very slow and shaky start” THRIP had “quickly and substantially expanded the allocation of its funds” and concluded that the programme was meeting a real need.

5.5.4 Innovation Fund

The 1996 White Paper on Science and Technology identified the need for government to support the National System of Innovation. One of the steps taken to address this need was to set aside funds to be accessed through competitive bidding. These funds constitute the Innovation Fund (IF) which is a programme of the Department of Arts, Culture, Science and Technology (DACST).

The IF is a programme of support that addresses problems "serious enough to impede socio-economic development or affect our ability to compete in products and services". It also supports large-scale science, engineering and technology (SET) innovation programmes. They should generate new knowledge leading to novel products, processes or services. It can be accessed by statutory research and technology institutions, the higher education sector, the business and industrial community, and non-governmental bodies. The fund encourages multi-disciplinary collaboration through consortia-type partnering. The key objectives of the fund are to:

- Promote technological innovation within the research community;
- Permit a reallocation of funds from the historical patterns of government sciences towards the key issues of competitiveness, quality of life, environmental sustainability and harnessing IT;
- Increase the extent to which funds for the activities of Government SET institutions are obtained via competitive processes;
- Promote cross-sectoral collaboration within South Africa’s national system of innovation.

Year	Description
1997/1998 (First limited round)	Funds targeted the area of crime prevention.
1998/1999 (Round 1)	R30 million per year were available to bidders. 177 projects were submitted to technical evaluators, 19 awards were made for a proposed total of R38,5m was awarded as follows: <ul style="list-style-type: none"> ▪ crime prevention (R12m) ▪ promoting the information society (R11m) ▪ value addition (R15,5m).
1999/2000 (Round 2)	This round has a budgeted value of R45 million and support will be available for projects in the areas of promotion of <ul style="list-style-type: none"> • An information society (key areas selected for support – local content applications, service delivery enhancement, advanced software development, decision-support for Government) • A value-adding drive (key areas of support – advanced technologies in materials and manufacturing) • Biotechnology (key areas selected for support – biomedicine, diagnostics, agriculture and fisheries, food and beverages, and minerals, materials and chemicals).

In the 1998/99 round, projects were selected in a process relying on technical evaluation by independent referees and final selection was made by three groups of stakeholders drawn mainly from the major government departments, both national and provincial. The titles of the five projects that were classified as “information society” are:

- Culture Preservation (preserving culture through the use of multi-media based cultureware)

- The Impact of Information and Communications Technologies on the Physical Environment for Education.
- Development of Technology for a High speed Microwave Radio Modem
- Establishing a National Health Knowledge Network
- Towards a South African Integrated Spatial Information System (covering aspects of Agriculture, Marine Areas and Biodiversity)

Proposals must involve projects that generate products/processes for commercialisation or new methodologies for development programmes oriented towards service delivery. A minimum annual funding requirement of R1 million and a maximum of R5 million has been set for large, 2-3 year, collaborative projects. The proposals are evaluated on the following criteria:

- national benefit,
- innovation,
- technical details,
- potential for utilisation of results/commercialisation,
- capacity.

Overall 206 proposals were submitted this year, but less than last year were deemed suitable for detailed review. Indications are though, that more rewards will be made this year compared to last year (including in the Information Society category) and that R10m will be spent per year on IT projects for the next three years in this round alone.

5.5.5 info.com 2025

The Department of Communications has launched a wide range of IT-related projects which, collectively, are intended to establish a networked information community that empowers people in the way they work, live and play, and to make South Africa globally competitive.

The general objectives of info.com 2025 are:

- improving overall government management efficiency
- increasing opportunities for the private sector and all citizens
- co-ordinating management and flow of government information
- focusing on vision and strategy rather than on problem-solving
- increasing the geo-political stature of the nation in the region, in the African continent, and in the world

The table below shows the original framework laid out in the final report launching Info.Com.

Policy Management & Institutional Framework	Information Access Infrastructure	Government Information Technology	Education & Training	Private Sector Development
To create specific institutional support for managing policy-making process	To facilitate the creation of physical infrastructure for information access	To facilitate the objective of specific Internet-based public service delivery applications	To facilitate and promote education and training through the use of telecommunications technologies	To enhance policies and facilitate activities that have direct effect on labour market demand and opportunities for private sector entrepreneurship
Telecom Policy process	Community Information Centres (CIC)	Government Internet Framework	Houwteq Academy	Cyber City
Commission for Information Technology for Africa (CITA)	Public Internet Terminal (PIT)	Paperless Government	Distance Learning	Cyber Malls
Africa Telecom Fund	Internet 2000	Tele-democracy	Centres of Excellence	Electronic Commerce
		Tele-medicine		Global Community
		Government Information and Network Restoration		
		Cabinet Web		

Source: Department of Communications, info.com final reports

Projects that appear to have progressed most strongly and/or received the most publicity are:

The Houwteq Academy (Now called the Institute of Software Applications and Knowledge (ISAK))

The Department established a software-training institute in the Western Cape at what was the Denel Aerospace Division facility, Houwteq, situated near Grabouw in the Cape. It was originally established in the 1980s to build a satellite for military purposes, but the project that was stopped in the early 1990s. Houwteq has facilities that include an electro-magnetic compatibility laboratory, a thermal vacuum chamber and an acoustic environment test chamber. Several computer laboratories of varying types have been, or are being, established at Houwteq.

In 1998 36 historically disadvantaged students who showed potential for science, engineering and technology took a ten-month technical programming course in telecommunications. A recruitment week for students was held towards the end of 1998 and was very successful with Telkom, Ericsson and UNISYS recruiting students. In 1999, 75 students are attending Houwteq. The following learning streams or programmes are run:

- Programme 1: Postgraduate Diploma in Engineering (PDE) presented by the University of Stellenbosch at Houwteq.
- Programme 2: Microsoft Certified Systems Engineering (MCSE) stream.
- Programme 3: *Cisco Certified Networking Academy (CCNA) and Cisco Certified Network Professional (CCNP) Streams.*

Currently, industry participation at Houwteq includes relationships with Telkom, Cisco, Microsoft, Gilat, Systems Applications Products (SAP), Services for Optical Fibre CC (SOF), Bay Networks, Lucent, Motorola, Iridium and Nokia.

Community Information Centres (CIC)

Designed to increase access of previously disadvantaged people to information services and community understanding of the benefits of the Knowledge Society, these centres are variously called multipurpose community centres, telecentres, multipurpose telecentres (MPTCs), etc. The Universal Service Agency, which was created by Act of Parliament, took on the task of rolling out MPTC's throughout the country. A goal of 4000 was set but the reality is still far from the goal. Some tens of MPTCs have been implemented so far, with several struggling to be viable. The South African experience mirrors that elsewhere in the world, where there is much interest in MPTCs as vehicles to connect remote and rural communities, but great difficulty in launching them and even more so to make them sustainable. To the extent that there is a collaborative world-wide telecentre "movement," South Africa is very much part of it and likely to benefit from alternative models and "best practice" as it emerges.

Internet 2000

The objective of this project was to offer access to the Internet to a defined percentage of schools by the year 2000. The project has re-formed to bring it into alignment with current Telkom initiatives. Originally, Telkom launched the 1000 Schools project to bring computing and connectivity to 1000 schools. Those schools were indeed identified and supplied with computers and connectivity. That project has, however, shifted direction under the recently formed Telkom Foundation. Called the Internet 1000 project, it is being enhanced in two ways. First 100 of the 1000 schools will be selected to establish computer centres of approximately twenty computers each, to be used as local resource centres for other schools. Second, teachers in those schools will receive advanced training. Thintana, the consortium of Telkom shareholders is funding a parallel project, also called Internet 2000, whereby 2000 computers will be deployed in 200 schools. Further implementation in both these projects is through SchoolNet SA.

Public Information Terminals

Now termed Public Information Terminals (PiT), these devices have been designed and piloted in several regions. They are intended to provide access in public places like libraries, schools, post offices etc., to e-mail facilities, electronic commerce, local government information etc. Access will be via smart cards. Tenders have gone out for the manufacture and rollout of production quantities of these terminals.

Electronic Commerce

The Department commissioned the preparation of a discussion document on electronic commerce. That document has been completed, building on the OECD framework for electronic commerce. It was presented to the Minister of Communications in July 1999 and is the basis for a so-called "electronic commerce debate" in the country. The e-commerce debate is designed to draw together all stakeholders in electronic commerce and develop a Green Paper and then a White Paper and ultimately legislation to maximise the benefits of electronic commerce in the country. Presently, nine working groups dealing with separate aspects of electronic commerce are in place and formulating their respective positions. Those positions will be co-ordinated by a central technical group who will produce the Green Paper for widespread circulation and discussion.

5.5.6 Universal Service Agency (USA)

The Universal Service Agency (USA) is a statutory body established by the Telecommunications Act of 1996. It was established in 1997 and is responsible for ensuring universal access to all telecommunications services (voice, fax, Internet etc.). South Africa's existing definition (Partnership for the Future, May 1997, DOC) is:

“Universal Access is defined as living within 30 minutes travelling time of a telephone, Universal Services is more than 50% of economically eligible households within a telephone and service for 24,000 priority customers.”

To assist in the development of universal access, the USA operates the telecentre programme. The USA receives its financing from the license fees paid by telecommunications operators (about \$4M a year initially into the Universal Service Fund) and from donor agencies. In the future it is possible that value added network service (VANS) providers will have to pay license fees.

As part of this process the USA, in collaboration with SATRA, has been mandated by the Telecommunications Act to develop definitions of defining universal access and universal service for telecommunications in South Africa. The key objectives of this process are to establish national definitions for and to set national achievable goals for universal access and universal service for South Africa. A first draft discussion document was completed in October 1998, a second document was prepared incorporating comments from the public hearings in the 9 provinces as well as written submissions, and a national colloquium was held in August of this year.

The Telecommunications Act stipulates that the USA will:

- Promote universal service. The USA will:
 - Directly advise the Minister on ways to bring about universal service.
 - Foster the adoption and use of new methods of attaining universal service and universal access.
 - Define universal service and universal access.
- Monitor and research. The USA will:
 - Develop and collect statistics as well as measure impacts on economic growth and social benefit.
 - Advise SATRA on matters relating to universal service and universal access.
 - Monitor the obligations of Telkom, Vodacom, MTN and other service providers.
 - Survey and evaluation the extent to which universal service has been achieved.
- Manage the Universal Service Fund. The USA will manage a fund to support projects bringing telecommunications to the people – in particular telecentres.

The telecentre project has been the lead project for the agency in the field. However, the agency has failed to deliver on its intended delivery targets for a number of reasons. For instance, political pressure to deliver, from both the public and from within the Ministry of Post, Telecommunication and Broadcasting, has resulted in the agency to over committing beyond what it can actually deliver. This has resulted in a fundamental shift within the agency from its main policy mandate to become almost a project management organisation. The internal capacity of the USA is not sufficient to cope with its current plans and commitments.

5.5.7 The State Information Technology Authority (SITA)

The Department of State Expenditure (DSE) and the Public Service Commission (PSC) originally investigated the problems concerning the Information Technology (IT) function within the Government. On transfer of certain PSC functions to the Department of Public Service and Administration (DPSA), the investigation regarding the IT problems was taken over by the DPSA. As a result of consultations and workshops during 1997, involving IT role-players throughout

government, the main problems regarding the IT function within the Public Service were identified as:

- The inability to recruit and retain appropriately skilled personnel.
- The inability to manage IT procurement and especially consultants and to ensure that the government gets value for money.
- The inability to position the government to use IT tools to support the policies of the government and in particular governance and service delivery to the public; and
- The ineffective utilisation of expensive IT resources.

As a solution to government's IT problems, and by Act of Parliament, the State Information Technology Agency (Pty) Ltd came into existence on 29 January 1999. This company, in the initial phase, comprises the Central Computer Services, Infoplan - the IT facility for the Department of Defence, which is an operating division of Denel (Pty) Ltd, and the IT facility for the South African Police Services. It is to provide IT related services exclusively to the Public Service with guaranteed performance levels.

Individual state departments are at liberty to use the services of SITA or not. The first department to contract with SITA was the Department of Welfare, in June 1999.

The position of Chairperson of the Board, three positions of Director, including the Managing Director (MD) and a non-executive member with business experience were advertised during November 1998. However, these positions have not yet been filled.

5.6 Provincial Initiatives Relating to the IT Industry

5.6.1 CITI

The Cape Information Technology Initiative (www.citi.org.za) is an independent Section 21 company promoting the development of the cluster of information technology (IT) industries in the Western Cape. The initiative is grounded in the current theory and practice of cluster development and came about because of informal discussions among members of the private sector, academia and provincial government during 1997. There it was recognised that the brain drain of IT professionals from South Africa was serious and growing, but at the same time areas such as the Western Cape could well become a magnet for high-tech investment. CITI's membership is growing and includes individuals, large and small businesses, educational institutions, non-government organisations (NGO's) as well as local, provincial and national government. CITI facilitates initiatives to grow the IT industry through business incubation, provision of venture capital, IT education, industry research and marketing, and networking of individuals and organisations.

CITI has obtained funding from membership fees, the Western Cape Provincial Administration and the Cape Metropolitan Council. It is using its funds to employ a part-time project manager and a public relations officer and to develop its Web site. The purpose of the CITI website is to be a communication hub for the IT cluster, provide information to potential foreign investors, provide career and education information to potential students, market the suitability of the region for IT business, and importantly to collect and disseminate statistics on the regional industry. Accordingly, CITI participated in a UCT Development Policy Research Unit study into the high-tech sector in the Western Cape—now completed— and is following up with a comprehensive survey of all IT firms in the region. The latter is a collaboration with the Information Systems Department at the University of Cape Town and the SAITIS Baseline Study team. CITI is using the questionnaire designed for the SAITIS project and will apply it to the whole population of several hundred IT firms in the region. The results of the study will be in the public domain on a database accessible at the CITI web site.

Other activities include:

- Addressing the IT skills shortage directly by spearheading an enquiry into fast-track immigration
- Assembling a group of people to develop and plan the CITI incubator for startup IT firms
- Actively examining ways of making venture capital available to Cape-based ventures
- Hosting regular “listening lunches” to enable networking and sharing of information on particular themes
- Organising so-called Cluster Musters twice yearly. The first comprised a whole day facilitated brainstorming session led by an international authority on cluster development. The second was a progress report on CITI, with Anglo American’s Clem Sunter leading a discussion on business transformation.. The next is scheduled for the first week of November led by the CEO of a prominent US business incubator.

Although not planned as such, CITI could well become a model for other regional high tech cluster initiatives in South Africa.

5.6.2 Gauteng SDI

The South African Government has created a programme to establish Spatial Development Initiatives (SDIs) and Industrial Development Zones (IDZs) which aim to attract investment, and create new, viable jobs around clusters such as tourism, manufacturing, agriculture (www.sdi.org.za).

The Gauteng SDI more closely resembles the international concept of a Special Economic Zone (SEZ). The objective of the Gauteng development is the:

- promotion of a high-technology manufacturing sector, with emphasis on value-added and stable manufacturing;
- improvement of productivity and competitiveness in the region through the application of high technology;
- promotion of science, technology and innovation; and
- improvement of the infrastructure that underpins growing industries and economic potential in the Province.

The Council for Scientific and Industrial Research (CSIR) was requested to conduct a feasibility study on the Gauteng SDI. The original study focussed on avionics and defence, and manufacturing (including the automotive industry and IT /Telecommunications). Subsequently, further research has been conducted into international experience and lessons in high-tech industrial promotion. These include the feasibility of developing stratospheric communications platforms. The Gauteng initiative will focus on the services sector and will involve close collaboration with research institutions such as the CSIR and Denel.

5.7 The Y2K Situation in South Africa

The National Year 2000 Decision Support Centre was established by the government in 1997.

5.7.1 Private Sector

The South Africa Chamber of Business (SACOB) is monitoring the Y2K situation on behalf of business both in South Africa and globally and the extent to which measures to implement Y2K compliance are progressing. In general larger enterprises have embarked on compliance testing and taken remedial measures but there is concern that many smaller firms have not yet looked at

the problems that could face them. It is anticipated that South Africa's businesses generally will have reached 60% Y2K compliancy, although it is difficult to ascertain an accurate estimate.

SACOB has formed several working groups which are analysing the probability of disruptions in services beyond the control of businesses and compiling guidelines for businesses to follow in drawing up their own contingency plans. Guidelines cover small business, foreign trade, transport, human resources and security.

Activities in a number of sectors include:

- The SA Reserve Bank's technology systems are already Y2K compliant and it is confident that the country's 60 registered banks will meet its deadline for compliancy. It has announced stringent penalties for defaulting banks.
- The Johannesburg Stock Exchange (JSE) became compliant a year before the new millennium. It is closely monitoring the progress of its 660 listed companies and has made Y2K disclosure mandatory for all of them.
- Oil industry companies banded together in 1997 and established a Year 2000 Forum to tackle the Y2K problem and ensure uninterrupted supplies from producer to user. Business and manufacturing systems and equipment are the main focus of attention and testing is progressing according to schedule.
- A Shipping and Transport Industry Year 2000 Forum has been set up to co-ordinate efforts to achieve Y2K compliancy.
- Major food retailers got together in early 1998 to establish the Retail Forum to look at their responses to Y2K issues. Important areas of the trading chain and computerised local and wide area networks were among the first areas to receive attention.
- Both private and state healthcare sectors are well advanced in their Y2K programmes.
- Cellular network providers, Vodacom and MTN, spent US\$8.3 million (approximately R50 million) on their projects and have completed end-to-end Y2K testing of their networks and related systems.

5.7.2 SMMEs

SMMEs are a vital part of South Africa's economy but it is estimated that only 30,000 are Y2K compliant. The rest suffer from lack of both the funds to tackle the problem and the IT skills necessary to implement any remediation programme. SMMEs regarded as most at risk are those doing business in the manufacturing, construction and retail sectors of the economy.

President Mbeki has called for "an extraordinary effort" to increase Y2K awareness among SMMEs and, where necessary, help them overcome the impediments blocking any meaningful compliance efforts. To protect SMMEs from the Millennium Bug phenomenon, the National Year 2000 Decision Support Centre has for the past year been exposing SMMEs to the problems it will bring. An added incentive for compliance is the fact that many large private corporations have indicated that they will continue to do business with only those SMMEs whose compliancy status will not have an adverse impact on their own company's Y2K standing.

5.7.3 Government

5.7.3.1 *National*

The departments' vital to day-to-day governance systems are expected to be Y2K compliant in all key areas. Key mission critical areas nationally have been identified by government as

- electricity and water supplies
- health and emergency services
- telecommunications

- transport
- sewerage
- garbage removal

Twenty of the government's 38 departments which have a direct or indirect link with these areas of national priority, have been targeted for a concerted effort to achieve Y2K compliance. Virtually all of the departments are in remediation and final testing phase; several have completed testing and have already announced Y2K compliancy. The national effort is expected to cost around US\$4 billion (approximately R24 billion).

Major government emphasis is also being placed on a national contingency plan to deal with the rollover period to the Year 2000. The government has declared two additional public holidays during the rollover period and has announced it is cancelling the leave of its senior civil servants during some periods in December, pending further identification of problems.

Towards the end of 1997 President Nelson Mandela's Cabinet official recognised the threat of the "Millennium Bug" and formed a special ministerial committee under executive deputy president Thabo Mbeki. The National Year 2000 Decision Support Centre, better known as the Y2K Centre, commenced operations in February 1998. This is a Y2K watchdog body to raise national awareness levels and to monitor the country's progress towards Y2K readiness. The Y2K Centre has a team of 25 specialists and budget of US\$6 million (approximately R36 million) for its official three-year lifespan.

Most of South Africa's public utilities launched Y2K compliance programmes nearly three years ago and most of them are on track for Y2K compliance.

5.7.3.2 Local

Local authorities are responsible for delivering essential services such as electricity and water to communities and businesses. Investigations by the Y2K Centre have revealed that fewer than half of the 843 local authorities countrywide are actually strategically placed at the end of the essential services supply chain. It also emerged that 240 municipalities supply power to 60% of all South African consumers of electricity. The Association of Municipal Electricity Undertakings (AMEU) has set up a Y2K database reflecting compliant and non-compliant equipment and is liaising with Eskom on the Y2K issue. Water supplies are regulated by electro-mechanical means and do not depend on at-risk electronic systems.

The main obstacles for local authorities to achieve compliance have been lack of funds to finance their Y2K projects and lack of in-house technological skills. A Memorandum of Understanding (MOU) now links the SA Chamber of Commerce (SACOB), the Afrikaanse Handelsinstituut (AHI), the SA Foundation, and the SA Local Government Association with government, and state-owned enterprises Transnet, Eskom, Telkom and the Association of Water Boards, in a joint effort to provide the resources necessary to assist municipal Y2K efforts. The government has budgeted about US\$50 million to assist local authorities with critical equipment replacement. In addition, the inter-ministerial committee for disaster management is devising contingency plans to cover municipalities and other areas which may not be compliant when the year 2000 rolls around.

This year a task team known as the "Bug Busters" hit squad was launched by government to tackle the apparent lack of Y2K preparations among local authorities. Private sector business as well as state-owned enterprise utilities have joined with government to support this initiative which is to provide local authorities with hands-on expertise to kick-start or improve their existing Y2K efforts.

5.7.4 Conclusions

The government and most large businesses began their preparations for Y2K early and have dedicated significant resources to tackle the problem. There have been a number of co-ordinated efforts by different sectors and, as a result, South Africa is relatively well prepared for the millennium. The World Bank ranks South Africa as among the 15% of countries it sees as taking concrete steps to fix the Y2K problem out of 139 countries surveyed and South Africa also rated seventh internationally for the compliance it has already reached. According to the Y2K Centre June 1999 report, the country as a whole is expected to be at least 70% ready by the Year 2000. However, there is still a lot more work to be done and of particular concern is the SMME sector and local government.

5.8 Development Initiatives

5.8.1 International Agencies

International agencies are realising that ICTs offer new opportunities to leapfrog stages of development in Africa, including problems associated with weak infrastructure. These include service delivery problems in health and education, and limited communications between governments and remote communities. The basic framework for co-operation in Africa, essential because of the limited resources, grew out of two major international initiatives:

- In 1996 a High Level Working Group conducted a study on future information infrastructure building activities in Africa under the umbrella of the African Network Initiative (ANI), a collaborative program of IDRC, BellaNet, UNECA, UNESCO and the ITU. It identified a substantial number of IT-related development projects and proposed a framework: the African Information Society Initiative (AISI) referred to previously.
- In parallel, a group of organisations including the Internet Society, the World Bank, USAID and UNDP were actively promoting connectivity in government, academic and NGO organisations throughout the region.

At a meeting in Rabat in April 1997, both these groupings came together to consolidate donor and agency collaboration in line with the AISI, producing the Programme for Information and Communication Technologies in Africa (PICTA). Three important developments bear comment:

- the increasing interest and investment in information infrastructure and ICTs in Africa;
- moves towards co-ordination by most international funding agencies under the umbrella PICTA programme, with leadership from both the UN and ECA; and
- the universal recognition that Africa will only achieve wide access to the potential benefits of communications facilities through significant private sector investment.

Over seventy donor programmes are now at work on a wide variety of information and communication projects in Africa. Previously many donors had treated information and communications as a supporting mechanism for their operations and projects but increasingly there is an acceptance of a relationship between knowledge and development. For instance, the Information Society and Development Conference (ISAD), held in South Africa in May 1996, focussed attention on the development potential of access to ICTs by poor, mainly rural, communities in the developing world - and particularly in Africa.

Projects can be found in many areas including policy reform, infrastructure, e-commerce, education, health, agriculture, natural resource management and the environment. The core aim of most of these programmes is to create an enabling environment in which people and institutions in developing countries can effectively exploit knowledge for development. While

many of these projects address local connectivity issues through some form of telecentre or school network there is also a recognition that the extension of access requires changes in policy and regulatory frameworks and a number of programmes focus in this area.

The challenge therefore is to identify ways of attracting private sector investment by demonstrating the market-growing potential of community access to ICTs in the remote areas which are home to most of Africa's population. Some of the major initiatives addressing this challenge are summarised below.

International Development Research Centre (IDRC) Acacia initiative:

The Acacia Initiative aims to support access to information and communication technologies (ICTs) at the community level in Africa through integrated programmes that address policy, infrastructure, technology and content. The Acacia programmes are designed to support initiatives in sub-Saharan Africa aimed at appropriating information and communication technologies (ICTs) to indigenous development ends. Four target countries have been selected for the initial programme, including South Africa and Mozambique. Close to 3 million Canadian dollars has been earmarked for programme development in these countries in Year One. These programmes are managed from IDRC's Regional Office for Southern Africa in Johannesburg.

Under development are projects to support telecentres and school networking activities and to develop impact assessment methodologies. There is a widespread belief today that the extension of communication and information infrastructure to poor and disadvantaged communities will enable them to participate much more effectively in development planning and decision-making and open up possibilities for developing countries to leapfrog stages of development. Public investment in infrastructure extension is posited on this belief and assumes that access through telecentres, school networks or other mechanisms will stimulate economic activity, and eventually lead to the development of markets which will attract private sector investment in community-based information and communication technologies (ICTs).

The Leland Initiative (USAID); Africa GII Gateway Project:

The Leland Initiative is a five-year, \$15 million US Government effort to extend full Internet connectivity to 21 African countries. Policy and technical experts will assess ICTs in each country. Assistance consists of advice on policy reform, equipment, expertise, training and free circuits for one year. About \$0.5 million is earmarked per country to assist with Internet connectivity in return for agreements to liberalise the market to third party Internet service providers (ISPs). Although Leland has negotiated bilateral policy agreements with many African countries, none appears yet to have been established with South Africa.

In addition to these two initiatives, there are a wide range of donor IT projects (for more information on these projects see Mike Jensen's "Summary of International IT Development Projects", www3.sn.apc.org/africa/projects.htm). Examples include:

- The World Bank World Links for Development (WorLD) programme is supporting the linking of a number of public schools in South Africa.
- The British Council organised the Building the Information Community in Africa (BICA) conference in Pretoria in February 1999. The conference focused on the use of ICTs at the community level in Africa and was supported by the USA, IDRC and other development agencies.
- The Dutch Ministry for Co-operation (DGIS) is funding various Dutch technical universities to provide support to African Universities for upgrading their IT infrastructure.
- CTA, the agricultural information support agency of the ACP/Lome Convention based in the Netherlands, carried out a connectivity survey among its African members. It has established a project for a Regional Agricultural Information Service for States in Southern Africa based at the University of the Free State in South Africa to respond to queries for agricultural information.

5.9.2 National NGOs

South Africa has a vibrant NGO community focussing in development-oriented initiatives. While there are different levels of use and awareness of ICTs by this sector, it is increasingly being adopted as a tool for development. At the moment the majority of the IT projects by national NGOs are small-scale and in a wide range of areas (more information about these projects can be found in the PRODDER directory produced by HSRC). There are a few operating on a larger scale such as SchoolNet South Africa which is a national organisation working under a Board led by the Ministry of Education.

NGOs are also increasingly using ICTs to achieve their aims. They are being helped by organisations such as SangoNet which is a non-profit Internet service provider for the NGO community. SangoNet is a regional electronic information and communications network for development and human rights workers.

Chapter 6

DEFINING THE SOUTH AFRICAN REGULATORY AND POLICY ENVIRONMENT

This report is based on an analysis of laws pertaining to the IT environment, on policy statements emanating from Government, and on studies emanating from bodies such as the World Trade Organisation (WTO) and the International Labour Office (ILO).

The documents on which this overview is based are:

- Discussion Paper on Electronic Commerce, prepared on behalf of the Department of Communications (DOC), and launched at Gallagher Estates on 29th July 1999 (www.ecomm-debate.co.za)
- The Telecommunications Act of 1996
- South Africa: Task Force on Country Studies on Globalisation – International Labour Office, Geneva (February, 1999)
- WTO Trade Policy Review, Republic of South Africa (April 1998)
- An unpublished paper by James Hodge, “The State of the Telecommunications Industry in South Africa and the Potential Costs/Benefits of Liberalisation”, Trade and Industrial Policy Secretariat (TIPS) (Sept 1999)
- The New Competition Act and the IT Sector – unpublished report by Edward Nathan & Friedland (supported by the IDRC)
- Growth, employment and economic policy in South Africa: a critical view – Centre for Development and Enterprise (1999)

6.1 International Context

This report is essentially about the South African regulatory policy environment. However, it will briefly be placed in a global context since this influences policy and regulatory options.

South Africa is a founding member of both GATT (General Agreement on Tariffs and Trade) and the WTO and grants at least Most Favoured Nation status to WTO members. In addition, South Africa is a member of the South African Customs Union (SACU) and, more recently, joined the Southern African Development Community (SADC). South Africa has also bound market access and national treatment under the General Agreement on Trade in Services (GATS) for several categories of services and pursues a reasonably open policy on Foreign Direct Investment with some exchange control and immigration limitations.

South Africa is a member of the World Intellectual Property Rights Organisation (WIPRO), and is a signatory to Conventions such as the Paris Convention for the protection of Industrial Property and the Berne Convention on Copyright.

There is international momentum towards trade liberalisation, particularly regarding the rapidly growing e-commerce marketplace. This implies a general lowering of tariff barriers and the creation of a transparent process to manage those tariffs that do exist. In the Trade Policy Review (April, 1998), the WTO stated that

“In line with the RDP, the Government has introduced a 5-year trade liberalisation programme comprising, inter alia, a Tariff Rationalisation Process and a restructuring of incentives. “

It also stated that,

“Quantitative import restrictions are now largely absent and the tariff has been somewhat simplified, rates have been lowered and almost all lines are bound; nevertheless the tariff remains complex and is frequently changed for selective protection”.

6.2 National Economic Policies

An analysis of the effects of various policy initiatives on the broader economy of the country is beyond the scope of this document. Nevertheless, the following points should be noted as they influence, or will influence, the policy and regulatory environment of the IT sector.

There is general agreement that the Growth, Employment and Redistribution strategy (GEAR) , is not working and has in fact contributed to overall job losses through, inter alia, its emphasis on export promotion. According to the Centre for Development and Enterprise,

“South Africa’s job crisis stems ultimately from comparatively weak long-term growth and rising capital intensity. Almost two million jobs have been lost over the past two decades as a result of investment being channelled increasingly into capital-intensive sectors and technologies”.

In the South African wage bargaining system, under the new Labour relations Act (Labour Relations Amendment Act, no 127), the Minister is obliged to extend agreements with the various Bargaining Councils (BC’s) to non-party firms (i.e. firms that do not subscribe to the council). This has the effect of ‘compulsory centralisation’ and of forcing smaller firms to pay higher wages as a result of the extension system. However, in defence of GEAR,

“One of the problems in evaluating GEAR is that in some crucial respects it was neither implemented as proposed, nor was it ‘integrated’ as its proponents claimed. The most dramatic example concerns labour market policy, where the vision outlined in GEAR is very different to the policies followed by the Department of Labour.”

There are significant differences of opinion of the reasons for the low growth in employment in South Africa. However, the fact remains that South Africa cannot afford to ignore the consequences of this trend, and will need to take policy action, probably in a number of areas, to change it. (See also Section 5.2.1)

6.3 Policy and Regulations Effecting the IT Sector

The most significant legislation that effects the IT sector is the Telecommunications Act of 1996. In particular, the granting of a monopoly to Telkom until the year 2002 has been extensively criticised. In addition, the rapid implementation of e-commerce over the Internet has highlighted the need for new legislation to cover issues not previously envisaged; it may be advisable to implement new structures to accommodate the dynamic nature of the industry. These aspects are clearly not the only regulatory or policy factors effecting the industry but because of their importance they will be dealt with in some detail.

In terms of new legislation, the recently introduced Competition Act No 89 of 1998

“ ..dramatically reforms competition law in South Africa, by creating new and more robust institutions and remedies to deal with anti-competitive conduct”.

The main provisions of this law of particular relevance to the IT sector are:

- The old Competition Board combined the investigative and adjudicatory functions, whereas the new Act establishes a Commission Competition to investigate alleged offences and a Commission Tribunal to adjudicate those cases where an offence is believed to have been committed.
- A substantial degree of political independence is accorded both the Tribunal and the Commission.
- The Act explicitly deals with anti-competitive behaviour in terms of restrictive horizontal and vertical practices and the abuse of a dominant market position.
- Mergers and acquisitions above a minimum threshold level must be pre-notified to the Competition Commission.
- In the case of the Telkom exclusivity position, dealt with more fully below, the Act provides regulated conduct exemption and it is thus immune to Competition Commission review.

There are many other regulations and policies which effect the industry, such as general provisions on privacy, security and trademark protection. Well-researched reviews of these aspects, particularly as they relate to the IT industry, have been produced, most notably by the attorneys Edward Nathan and Friedland. However, two aspects are considered particularly relevant, namely the Telkom monopoly in the provision of basic telecommunications services, and the lack of certainty on the provision of e-commerce services. These are dealt with in more detail below.

6.3.1 The Telecommunications Regulatory Environment

The regulatory regime for Telkom emanated from a report issued by Coopers and Lybrand in 1992 and was embodied in the Telecommunications Act in November 1996. It includes:

- an exclusivity period until 2002
- resale of voice capacity prevented for 3-5 years
- stringent licence conditions for Telkom during the exclusivity period
- the establishment of an independent regulator (SATRA)
- the immediate issuing of two mobile communication licences
- liberalisation of the VANS and customer equipment markets

The issuing of the mobile licences (1994) and the opening of the VANS and customer equipment markets (1993) were activated before the Telecommunications Act became law in 1996. However, the 5-year monopoly period for Telkom that had been recommended in 1992 only came into effect in 1997. This occurred in a very different global market, raising a question about the applicability of this delayed decision. According to Hodge (1999), "In particular it called for the following social goals to be part of the objectives of a telecommunications policy:

- promote the universal and affordable provision of telecommunication services;
- ensure that, in relation to the provision of telecommunication services, the needs of the local communities and areas are duly taken into account;
- encourage ownership and control of telecommunication services by persons from historically disadvantaged groups;
- encourage the development of human resources in the telecommunications industry;
- promote small, medium and micro-enterprises within the telecommunications industry;

The most important economic goals expressed in the objectives were:

- promote the provision of a wide range of telecommunication services in the interest of the economic growth and development of the Republic;

- encourage investment and innovation in the telecommunications industry;
- encourage the development of a competitive and effective telecommunications manufacturing and supply sector;
- ensure fair competition within the telecommunications industry;
- ensure efficient use of the radio frequency spectrum;”

At the same time, the South African Telecommunications Regulatory Authority (SATRA) was established. SATRA was devised to regulate the industry in terms of the Telecommunications Act and to pursue new policy directions issued by the Minister of Communications subject to certain conditions. However, a major point of contention is that the process of opening parts of the market to liberalisation is left to the discretion of the Minister. A more detailed analysis of the implications of this policy and further analysis of other provisions of the Act is contained in Hodge (1999).

6.3.1.1 *Debate on Further Liberalisation*

The implications for the country of allowing the present Telecommunications Regulatory position to continue are felt to be significant in many quarters, and not just in the private sector. Hodge, once again, provides a thorough analysis of the “Potential Impacts of Full Deregulation and Trade Liberalisation”. Much of this analysis is based on an OECD study of the potential impacts of regulatory reforms. It would be superfluous to reproduce much of this material here, but the major points that are made are as follows:

- There are likely to be clear moves towards greater efficiency of the pricing mechanism as well as overall improved productivity if the monopolistic regime is changed;
- The rapid pace of technological progress in the telecommunications industry means that dynamic gains from the introduction of new products or processes could far outweigh the static benefits;
- Deregulation could have a significant effect on Internet and e-commerce usage through lowering the cost of access. Pricing in deregulated markets has generally moved towards higher connection charges and lower call charges;
- A strongly expanding Internet/e-commerce market creates demand for multiple lines to households;
- Even amongst developed countries Labour Productivity and Capital Productivity indices varied widely. The OECD study took this to be mostly due to a lack of competition and trade (Table 18 below).

Table 19: Margins in OECD telecommunications sectors and the potential impact on profits of reforms (OECD, 1996)

	USA	Japan	Germany	France	UK
Labour Productivity Index (composite of access lines and call minutes per employee, 1994, USA =100)	100.0	96.0	72.0	n.a.	n.a.
Capital Productivity Index (Call minutes per unit of capital service, 1994, USA=100)	100.0	46.0	38.0	n.a.	n.a.
Potential Impacts of reform					
Labour productivity	10%	15%	30%	40%	20%
Capital productivity	10%	40%	40%	50%	20%
Innovation effect on output	10%	15%	30%	30%	15%

The size of all these numbers reflect how fast process and product innovation has been occurring in the telecommunications sector, and continues to occur. Continuing to uphold monopoly market structures is only going to result in a widening of the productivity and product range gap with countries like the USA. As this gap widens, so does the cost of not

reforming these markets and the penalty to the domestic users of telecommunication services.

- Analysts foresee that the deregulation of the telecommunications sector will result in employment gains along with gains in output and prices. The assessment of a few OECD countries is presented below.

Table 20: OECD assessment of potential sectoral output, employment and price effect of regulatory reform

	USA	Japan	Germany	France	UK
Output Prices	-6%	-16%	-23%	-30%	-13%
Sectoral Output, of which	13%	23%	41%	45%	21%
Price induced	3%	8%	11%	15%	6%
Innovation induced	10%	15%	30%	30%	1h5%
Sectoral employment	3%	8%	11%	7%	2%

Source: OECD 1996

These benefits accrue to the telecommunications sector itself and do not include the potentially significant downstream benefits which are discussed below. It is also important to note that these are the estimated benefits from deregulation, over and above the natural growth of this sector under current monopolistic conditions.

- Broader macroeconomic benefits could apply if a co-ordinated and widespread liberalisation program is adopted, leading to increased investment, lower inflationary pressures and higher productivity (Hodge, 1999: p 33).
- The provision of Universal Access to low skilled workers may not lead to much benefit when compared to higher skilled workers because of the industry demand for these higher-level skills. Hodge states that “However, because countries are able to keep a less distortionary version of their universal service programme under a more liberalised market, the effect on universal service from liberalisation cannot be anything but positive” (Hodge, p33).

6.3.1.2 *Potential Constraints*

South Africa, along with most developing countries, differs from the OECD countries being studied. Therefore, the potential barriers to the realisation of these gains need to be examined. They include:

- Lower technological capability because of human resource scarcity and a lower productivity environment
- Lower average incomes leading to a limited adoption of new services
- Higher market risk driving firms to look for higher returns
- Potential shortage of skilled labour

6.3.2 The Internet and E-Commerce

The Internet and the provision of e-commerce (particularly but not only over the Internet) are seen as being of particular importance for South Africa because they provide the means to either strongly stimulate economic growth through creative use, or to exacerbate the growing rich/poor divide that exists both nationally and globally.

The ability of companies to simply ‘move house’ if an enabling environment is perceived to be unfavourable, is an important consideration because it means that there may be no great outcry from business – they will simply move their business to more favourable locations.

There is a body of opinion which holds that the current legislative framework is inadequate to handle the changes required to accommodate a competitive e-commerce environment at the speed that is required. This is probably not true in the cases where there is a strong layperson's interest (e.g. issues of privacy, security and the like) where the issues are very industry-specific and rapid implementation could provide competitive advantage (e.g. the creation of a National Certification Authority, legislation on the authenticity of digital signatures, etc). However, there is a good case to be made for introducing a 'fast-track' legislative process or even a body with regulatory powers to handle this.

The Discussion Paper prepared by the DOC provides an excellent basis for future research and need not be elaborated on here. However, aspects where we believe a contribution can be made to the debate are covered in Appendix 5.

6.4.2.1 *Trust*

The expansion of e-commerce clearly depends on a high degree of public trust. This is particularly relevant in South Africa where there is not a high degree of trust in either business or government. Since the major issues have been covered in some detail in the e-commerce discussion paper from the Department of Communications, the following observations are intended as a contribution to the ongoing debate and analysis of the subject. Trust is probably the best catch-all term to be used when referring to the combination of the following:

- Security
- Privacy
- Digital Signatures
- Certification by Certification Authorities (CA)
- Interpretation of legislation Affecting Digital Signatures and Electronic Data
- Contracts on the Internet
- Delictual Liability
- Jurisdiction and Enforcement

Most of these topics are receiving on-going attention, both at a National and International level. Further detail is contained in Appendix 5.

6.4.2.2 *Taxation*

Taxation of electronic data is fundamentally difficult to enforce. In order for data to be taxed, there must be a distinction between taxable and non-taxable data (and there is not). Moreover any software that is developed to try to filter out such data will inevitably be bypassed by programmes designed specifically to confound such a filter. "Bit taxes" are not an option since this amounts to a restriction of the availability of the Internet, and an ultimate frustration of the whole concept of an information superhighway.

In the light of the difficulties involved in taxing electronic data a moratorium was declared by the WTO until such time as a solution to the problem has been decided. A recent paper published by the Alliance for Global Business proposes that the initial one-year moratorium preventing imposition of customs duties on electronic transmissions mentioned above, should be made permanent.

6.4.2.3 *Intellectual Property*

Intellectual Property Law is the law of intangible assets, particularly Copyright and Trademarks. Intellectual Property is a universal concept which is regarded as a natural right by many countries (excluding South Africa) and is heavily influenced by the Trade-Related Aspects of Intellectual Property Rights (TRIPS), a WTO brokered agreement which has been in operation since 1

January 1995. South Africa is a party to this agreement. South Africa is also party to the Berne Convention (1886) and its revisions.

In the area of Intellectual Property the “free-for-all” attitude of the internet has given way to legislation and litigation in what was once a vast ungoverned area. South Africa unfortunately has very few cases dealing with these aspects, most of the domain name disputes for example having been settled out of court. However it is anticipated that precedent will emerge shortly, and so the issues need to be examined. The future development of e-commerce rests heavily on two major intellectual property rights (IPR) issues, namely:

- the protection of copyrights and related rights; and
- the protection and equitable allocation of trademarks and domain names.

These concerns have been a primary focus of international deliberations in recent years, for example through the WTO, which has negotiated an Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), making intellectual property an integral part of the multilateral trading system since 1 January 1995.

Once again, Appendix 5 builds on the solid foundation laid by the Discussion paper prepared by the Department of Communication and attempts to further the debate.

Chapter 7

PLAYERS IN THE IT INDUSTRY

7.1 Overview of the Industry

Essentially, this category includes companies (or Divisions where these are readily determined) that derive most of their revenue from the supply of products and services as defined by the OECD. However, in order to make the analysis more meaningful and to provide a framework which will incorporate current trends in the industry, the industry has been divided along generic lines as indicated below.

Traditionally, the South African IT industry developed through the transfer of technology from the West (largely the USA, but substantial contributions were made by the United Kingdom during the 1960s and 1970s) and the subsequent catalytic effect of this transfer on education and skills. In the early days, there was a clear separation of the IT and communications industries, the latter being relatively small and unsophisticated by today's standards.

This sector has grown from humble beginnings and a market offering limited choice where the struggle for market share took place between IBM and 'The Bunch' (Burroughs, Univac, NCR, CDC, Honeywell). However, it has grown from about R2-billion in 1985 to just under R20-billion in 1998, with a forecast to exceed R40-billion by 2003.

7.2 Composition of the IT Industry

The IT industry is becoming increasingly complex to categorise because many companies operate in multiple market segments. Because of this, no attempt has been made to locate companies within these categories. Companies do not, in general, report their results in the framework defined and trying to extract these may not be feasible. It remains to be seen whether the results of the SAITIS Baseline Questionnaire Survey will shed any light on the subject.

The broad structure of the OECD definition is retained, but since the manufacture of IT products is relatively undifferentiated in South Africa, some of the categories are combined.

The IT suppliers can be categorised into:

- Manufacturing
 - This would generally be taken to include the manufacturing **and assembly** of the products concerned.
 - Manufacturing of computers, office machinery and electronic components (ISIC codes 3000, 3210)
 - Manufacture of television and radio transmitters/receivers, sound or video recording (ISIC codes 3220, 3230)
 - Other Manufacturing (ISIC Codes 3130, 3312, 3313)
- Services
 - Wholesale and Distribution of machinery, equipment and supplies (ISIC code 5150)
 - Renting of office machinery and equipment, including computers (ISIC code 7123)
 - Telecommunication Network Providers

The worldwide strategy in the deregulation of the Telecommunications industry is to separate the network from the services being run on it, although they are often integrated.

- Telecommunication Service Providers
They operate the infrastructure on which various communication services are run. They may further be separated into fixed line or mobile providers.

7.3 Players

7.3.1 IT Suppliers

Generally speaking, the major players are either companies listed on the Johannesburg Stock Exchange (JSE) who import, market and distribute products derived from Europe and North America and provide a variety of services to the South African market, or they are subsidiaries of multinationals (e.g. IBM, that operate in a similar fashion, or they are State-owned enterprises such as Telkom).

The rise of the Internet is providing companies such as Amazon.com with global reach even though they may have no physical presence in this country. Their impact is difficult to assess, particularly if one includes companies such as Dell who are represented in South Africa but conclude much of their business electronically.

Since the Telecommunications Sector is dominated by a few major companies, most of whom are not listed, this section will be split into the IT Industry in general, with a special section on the telecommunications industry for the purposes of reporting.

Listed Companies

There are three sectors on the JSE which would broadly be classified as belonging to the IT Industry. These are, with their Market Capitalisation indicated as of Sept 10th 1999:

- Electronics and Electrical R 9 722 million
- Information Technology R 56 280 million
- Telecommunications R 2 729 million

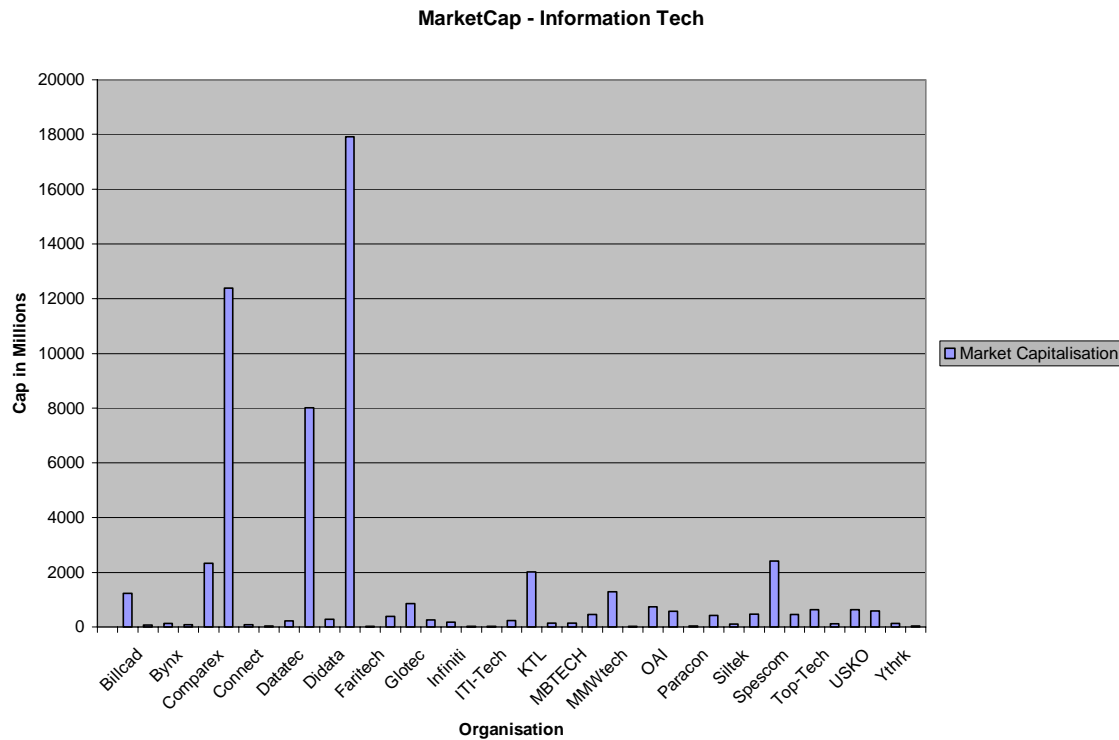
Within these sectors there are companies that only fit uneasily into the categories.

Total Market Capitalisation is thus in excess of R68-billion, excluding the Venture Capital sector, which is fairly unstable but probably contributes an extra R1 billion.

There are currently 69 listed companies in these 3 sectors, and while this would tend to indicate a vibrant and competitive IT sector, there is in fact a strong concentration of market power in the hands of a few companies.

If one consolidates the holdings of conglomerates such as Altech, which have a controlling interest in 7 listed companies in this sector, one finds that over R54-billion is held by nine companies, namely:

Altron and subsidiaries	Computer Configuration Holdings
Comparex	Datatec
Dimension Data	Ixchange
Softline	Reunert Shawcell

Figure 4: Market Capitalisation of the IT sector of the JSE

The listed companies are characterised by a high degree of revenue derived from the importation and distribution of products manufactured overseas; however, factors such as the continuing reduction in hardware prices and the provision of widespread Internet access with a requirement for local news and support may alter this equation.

Almost without exception revenue breakdown into ISIC categories is difficult without explicit input from the company because the companies are often structured vertically e.g. providing both Smartcard software development and hardware manufacturing out of the same Division.

A brief analysis of the main activities of each company follows:

Company	Description	Market Capitalisation
Altron Group	Has shareholding in companies engaged in the cellular industry; power cable manufacturing; energy management and control; telecommunication equipment manufacture, marketing and distribution; systems integration; software development; smart card manufacture and distribution; electronic component distribution; manufacture of Digital Enhanced Cordless Telecommunications (DECT) equipment; inter alia. The listed companies in which Altron has either a controlling interest or a substantial stake include: <ul style="list-style-type: none"> Allied Technologies (Altech) – a variety of Divisions Autopage Holdings (Cellular and Paging Service Provider) Power Technologies (Power electrical) 	Just under R6 billion in September 1999
Computer Configuration Holdings	Involved in the importation, marketing, integration, installation and maintenance of multi-processor computers (highly secure systems) but also manufactures disk array subsystems and provides related services such as disaster recovery services.	R 2.3 billion
Comparex Holdings	This grew out of Persetel who were originally concerned with the manufacture, marketing and distribution of IBM-compatible computers.	R12.4 billion

Company	Description	Market Capitalisation
	Presently Comparex are concerned with the marketing and distribution of hardware, software and network systems to all segments of the IT industry. They also develop and market software solutions and services. Comparex has moved strongly offshore into the UK and German markets.	
Datatec	Value-Added Distributor of high-end networking and data communications equipment, Internet Service Provider, Internet Application solution provider, IT training and software development. Datatec have also recently been involved in expansion into the UK, USA and Australian markets and presently obtains more than 50% of its revenue from these sources. Its mission is to create an International Networking and Services company.	R8 billion
Dimension Data	They describe themselves as " A composite group representative of the Information Technology industry" Having their origin in networking distribution, installation and support in the early 1970's, Didata focuses on the key business areas of Communications, online, systems integration, interactive and outsourcing. Didata also has a strong overseas presence in the UK, Asia, Australia and Africa	R17.9 billion
Ixchange	Founded only in 1997 by Dana Buys, a founder and principal shareholder of Workgroup Systems, Ixchange listed in the same year. It rapidly became a major player in the South African market and also expanded overseas. Focusing on software and related services, it acquired Bendata in the USA, a company dealing in the mid-range help-desk market.	R2 billion
Softline	Operations are concentrated in 3 areas: Software and services, Training and education, hardware and networking distribution. The Group's business is located throughout Southern Africa, as well as in the UK, USA and Australia.	R2.4 billion
Reunert	Main focus on electronics and electrical engineering, Reunert was founded in 1888 and first listed in 1948. With Net Assets well in excess of other companies in the sector and a Turnover of nearly R5 billion per annum, it is nevertheless perceived as an overly conservative company It has interests in the manufacturing of circuit breakers and telephones, electrical cables, distribution of office equipment and cellular phones	R1.5 Billion
Shawcell	(Awaiting information – recently listed)	

Multinationals

Apart from being represented in South Africa by locally-owned companies (e.g. most networking products produced by companies such as Cisco and US Robotics are distributed through local agents), there are a number of large multinationals who operate subsidiaries in this country. They include IBM, Unisys, Microsoft, ICL, Intel, Systems Applications Products (SAP), Dell, Novell and Compaq. Their business models vary widely, from a largely 'facilitation' role (e.g. Microsoft) to the active marketing and support of their products on the ground (e.g. SAP). What is undoubtedly true, however, is that the South African IT industry has been effectively created through foreign multinational support and the industry is very dependent on their continuing participation.

Since multinationals typically are not obliged to report their turnover in a public forum in the manner of listed companies, they are harder to gauge. The Table below describes the major multinationals operating in South Africa.

Company	Description
Arthur Andersen Business Consulting	A multi-disciplinary professional services organisation whose professionals combine considerable technical competence and industry experience with innovative and progressive thought to assist clients in improving business performance
BEA	BEA Systems is a leading provider of cross platform middleware solutions for enterprise applications.
Compaq Computer	Compaq Computer is the second largest computer company in the world and the largest global supplier of personal computers. Compaq develops and markets hardware, software, solutions and services including industry-leading enterprise computing solutions, fault-tolerant business-critical solutions, networking and communications products and consumer PCs
Deloitte and Touche	Provide secure e-business solutions which enable trustworthy e-business. Infrastructure services address building blocks such as secure networking, public key infrastructure, directory services, secure messaging and enterprise security management
Hewlett Packard	HP is a leading global provider of computing, internet and intranet solutions, services, communications products and measurement solutions, all of which are recognised for excellence
IBM South Africa	IBM South Africa is a wholly-owned subsidiary of the world's largest information technology enterprise; it is responsible for IBM technology, products and services in South Africa and in the neighbouring states of Lesotho, Namibia and Swaziland. The company, which supplies and supports the industry's most advanced information products, including computer systems, software, networking systems and storage devices, translates these systems into value for its customers.
ICL South Africa	Designs, builds and operates IT services that enable customers to create, maintain and develop personal relationships with the people who use their products or services.
Lucent Technologies	Lucent Technologies designs, builds and delivers public and private networks, communication systems and software, consumer and business telephone systems and microelectronics components. Bell Laboratories is the research and development engine for the company
Microsoft SA	Microsoft South Africa is the leader in software for personal computers. The company offers a wide range of products and services for business and personal use, each designed with the mission of making it easier and more enjoyable for people to take advantage every day of the full power of personal computing.
Novell	Novell is the world's largest network software company and the leader in directory-enabled network solutions.
SAP Southern Africa	Leading enterprise business solution provider, SAP's vision is to deliver business solutions that help companies hone their competitiveness through a process of continuous improvement
SAS Institute	SAS Institute Inc., the leader in information delivery, provides organisations with integrated end-to-end solutions for converting raw data into meaningful information that can assist in decision making.
SCO Africa	SCO is the world's number one provider of UNIX Server operating systems, and the leading provider of network computing software that enables clients of all kinds – including PCs, graphical terminals and NCs – to have webtop access to business-critical applications running on servers of all kinds.
Symantec SA	Symantec is the world leader in utility software for business and personal computing
Unisys South Africa	Unisys Sa has more than 500 employees helping customers in Africa apply information technology to solve their business problems. Unisys solutions are based on a broad portfolio of global information services including systems integration, outsourcing, repeatable application solutions, consulting, network integration, remote network management and multi-vendor maintenance and support.
Xerox South Africa	The Document company, Xerox, a global document market leader, engineers, manufactures and services the widest range of document processing products

7.3.1.1 *The Telecommunications Industry*

Telkom is the dominant player here.

Table 21: The Telecommunications Market

Sector	Number of Operators	Dominant Operators
Fixed Wire Telephony	1	Telkom
Cellular	2	MTN, Vodacom
Paging	23	Radiospoor, Autopage, Paging Plus
VANS	25	EDS Africa, Firstnet, Trafex
Radio Trunking	3	Fleet Call, Q-Trunk, One-to-One
Satellite	4	Orbicom, Sentech, Telkom, Transtel
Public Enterprises	2	Eskom, Transtel
Internet	60 Plus	The Internet Solution, UUNET Internet Africa, GIA, M-Web, Intekom, SAIX
Wireless Data	2	Swiftnet, WBS

Source: The State of The Telecommunications Industry in South Africa: November 1998

Telkom's exclusivity period began in 1997 and ends in 2002, although it may be extended for a further year. In 1997, a 30% equity stake in Telkom was sold to Thintana Communications, whose shareholders are in turn SBC Communications International (60%) of the USA and Telekom Malaysia Berhad (40%). There were 4 645 065 main telephone lines installed at the end of 1998. Of these, 74% are digitised, with the completion of the digitisation process planned for end 1999.

The Cellular Sector is essentially dominated by the two network providers, MTN and Vodacom, with an estimated revenue of R4-billion pa and a pre-tax income base of more than R2-billion. By the end of 1998 there were about 2.1 million subscribers.

The other sectors are relatively small, although the Internet Service Provider revenue is still growing rapidly.

The turnover of the entire Telecommunications sector of the JSE is less than R1.5 billion, as compared to Telkom's revenue of over R20 billion. If Revenue from the Cellular Operators are included (R4-billion), then it can be seen there is a strong concentration of power in a few companies, all of whom are making profits well in excess of that found in most other parts of the economy. During the 1997/98 Financial Year Telkom showed a profit of R2.427(12%). It is estimated that the pre-tax income base of the Cellular Operators In 1998 was R2 billion on a turnover of R4 billion, a pre-tax return of 50%.). Although the Telecommunication sector does not in fact represent all of the country's service providers on the JSE, let alone unlisted companies, it does nevertheless provide a measure of the dominance of this industry by Telkom.

7.3.2 IT Users

Certain sectors of the South African IT Industry have been at the forefront of the innovative use of technology from the late 1960's to the present day. The Banking Industry established some world firsts in the early 1970's with the introduction of on-line banking (at one stage United Building Society had the world's largest on-line Banking network using the IBM 3600 system) and (probably) the first country-wide rollout of an integrated inter-bank switching system (originally two disparate groups, MULTINET and SASWITCH, then linked). In fact, South Africa was considerably in advance of both the United States (with its local and regional banking system) and Europe (who were slower to adopt the technology). Similarly, large state-owned enterprises such as South African Airways and ESKOM were progressive and early installers of large centrally-managed data base systems.

During the early-to-mid 1980's the South African computer industry began to lose some of its 'edge', mainly due to the increasing isolation of the country and to a lesser extent, business. This coincided with the profound 'swing' from centrally-managed computer resources to the client/server model, where increasing advantage accrued to those countries with a large pool of educated resources, something that was lacking in South Africa.

There appears to be no very accurate data base of IT Users in South Africa. A commonly used one, the 1999 IT Users Handbook, published by Computing SA after a gap of 4 years, does attempt to capture baseline data on the more prominent IT Users in the country. However, an examination of the resulting data shows that it has not been carefully edited, and inconsistencies such as those below can be detected:

- Reporting, while generally at the enterprise level, is not always so
- There seems to be confusion amongst respondents as to which budget is required (e.g. Springs Municipality claims an IT Budget of R209-million !)
- Reporting in the various categories (e.g. IT Server Architecture) indicates confusion between architecture and the hardware platform. This category has been simplified to indicate the software platform used
- Many large supplier companies, who are themselves large users of the technology, are not mentioned

Nevertheless, the Installation Guide in the Handbook has been used as a basis for generating the following Table of large IT users (those with a budget of over R20-million pa), with suitable additions/alterations as appropriate.

Table 22: Large IT Users

Company	IT Server Architecture	Workstation Architecture	No Of Users
ABSA	Unix/OS2/NT/MVS	NT	36000
Anglo American	Unix/NT	NT/Windows 95	1500
Bank of Lisbon	NT	Windows 95	800
Cable Technologies	NT	Windows 95	150
Cape Metro Rail	NT	Windows 95	250
Clicks	Unix	Windows 98	400
Commercial Union	NT/OS2	OS2/Windows	1200
Databuild	Unix/NT	NT	1000
De Beers	Unix/NT/IBM	NT/Office 97	5400
Delta Motor Corp	Unix	NT	650
Durban Metro Council	NT/MVSC 300	NT/Windows 95	2000
Eskom	IBM	NT/Windows 95	15000
Firststrand	IBM/NT	Windows 95	3550

Company	IT Server Architecture	Workstation Architecture	No Of Users
Guardian National	OS 390	Windows 95	1500
Iscor	MVS/Unix	Windows 95	10 000
McCarthy Info Systems	Unix/NT	Windows 95	3500
Mercedes Benz	NT	Windows 95	1200
Metro Cash and Carry	IBM/Unix	Windows 95	80
Momentum Life	IBM	OS2	500
Premier Milling	NT	NT	1000
Reliant	NT		6500
Robertsons	NT	Windows 95	500
SA Eagle Insurance	NT	Windows 95	1300
SA Post Office	Unix	Windows 95	3000
Spoornet	NT	Windows 95	
Standard Bank	IBM/NT	Windows 95	8600
Sun International		Windows 95	2500
Swiss SA Re	NT	NT	300
Transnet	IBM/NT	IBM/NT	10000
Truworths	Unix/Risc 6000	NT/Windows 95	1500
Unilever	NT	NT	2000
Volkswagen	NT	Windows 95	1500

State-owned enterprises

Telkom is the dominant player. If one considers that Telkom maintains an equity stake of 50% in Vodacom and that the contribution of Telkom to the country's GDP is in excess of 2% of GDP (ITU: African Telecommunication Indicators), then the powerful position of Telkom within the Communications sector is apparent.

7.3.3 IT Bodies and Associations

Many bodies and associations address different aspects of the IT industry:

Individual IT professionals are represented by the **Computer Society of South Africa (CSSA)** (www.cssa.org.za), in existence since 1957 and the oldest and largest representative body for the profession with a membership of several thousand IT people. Although the CSSA does not classify its members on racial lines, in the nature of the IT industry, it is believed that only a small percentage of its members are black. Recently the **Black IT Forum (BITF)** launched with specific objectives related to black IT professionals. Talks are now underway between the CSSA and the BITF about joint projects and other areas of collaboration.

The **IT Association (ITA)** represents IT suppliers in South Africa and has been in existence for many years. It has approximately 250 members from the community of large and small suppliers of IT equipment and services.

The **Electronics Industries Federation (EIF)** is an umbrella body representing private firms, public-sector corporations (state-owned enterprises) and industry associations. It has about 30 members, generally the largest manufacturers and suppliers of information and communications technology products in the country.

The **IT Users Council (ITUC)** represents 50 or more organisations that are major employers of IT professionals, such as banks and building societies, as well as 100 or more smaller firms and IT training organisations.

The **National IT Forum (NITF)** was founded in 1995 as a representative body for all stakeholders in IT. It comprises members from the public and private sectors, academia, community-based organisations and labour. The NITF played an important role in formulating this country's stance at the international Information Society and Development Conference (ISAD) held in South Africa in 1996. Since then it has continued to play a prominent role in the IT Policy debate.

The **IT Industrial Training Board (ITITB)**, is a statutory body responsible for furthering training in IT. The ITITB, along with all other Industrial Training Boards will cease to exist by the end of 1999. In their place and because of the recently promulgated Skills Development Act, will be Sector Education and Training Authorities (SETAs). It is expected that the ITITB will become the core of the Information Systems, Electronics and Telecommunications Technologies (ISETT) SETA. Under the Act the SA Revenue Service will deduct initially 0,5% and eventually 1% from gross payrolls to go towards training. The ISETT SETA will identify training needs in the sector and coordinate rebates to employers who invest in approved training schemes.

Through the CSSA, South Africa has for a long time been a member of **the International Federation of Information Processors (IFIP)**. Traditionally IFIP has had a computer science/research/academic flavour, being most prominent in organising congresses and conferences around the world and publishing refereed research papers. More recently, there has been a shift in emphasis, particularly in areas such as IT in developing countries. South Africa has hosted several conferences and technical committee meetings over the years, and is especially prominent in IFIP Technical Committee 13 (Security) as well as Working Group 9.4 (the Social Impacts of IT in Developing Countries).

There are several other bodies prominent in the IT arena, including **ECASA (Electronic Commerce Association of South Africa)**, **SAVA (South African Value-added Network Association)**, **NTUG (National Telecommunications User Group)**, and **SACAC (SA Council for Control and Automation)**. Indeed, it is now commonly accepted that the proliferation of bodies with sectoral interests may be a problem in itself. This is particularly so, given the rapidly escalating focus on IT in the country and the government-led initiative to form a policy-level advisory group known as CIT (Centre for IT). As a result most if not all of the bodies described above have come together and jointly proposed an umbrella body to represent this sector in South Africa. The proposed name is **Information Industries South Africa (IISA)** and the formal launch of the umbrella body is scheduled for October 5, 1999.

Chapter 8

OVERVIEW OF THE STATUS OF IT INDUSTRY

8.1 Profitability

Table 23: Electronics and Electrical

Company	Short Name	Turnover (thousands)	Consolidated Profit (Before Tax) (Thousands)	Profit as % of Turnover	Comments
Allied Technologies Limited	Altech	2,055,815	250,716	12.2	
Allied Electronics Corporation Ltd	Altron	5,216,473	566,221	10.9	
BICC Cafca Ltd	Bicaf	286,996	4,234	1.5	
Control Instruments Group Limited	Control	242,452	8,971	3.7	
Delta Electrical Industries Ltd	Delta	685,489	91,148	13.3	
Digicore Holdings Ltd	Digicor				First listed 1998. Results unavailable
Femco Technology Holdings	Fmcotek	88,718	-7,640	-8.6	
Grintek Ltd	Grintek	2,153,622	88,775	4.1	
1ST Group Ltd	IST				First Listed 1998. Results Unavailable
Log-Tek Holdings Ltd	Logtek	277,559	20,880	7.5	16 months
NEI Africa Holdings Ltd	Neihold	603,821	15,737	2.6	
Power Technologies Ltd	Powtech	1,948,901	199,387	10.2	
Reunert Ltd	Reunert	4,919,500	269,600	5.5	
Seartec Ltd	Seartec	241,924	21,756	9.0	
Set Point Technology Holdings	Sethold	186,456	29,619	15.9	
Stantronic Group Holdings Ltd	Stantronic	102,029	16,390	16.1	
Unihold Ltd	Unihold	750,452	36,035	4.8	18 months
Voltex Holdings Ltd	Voltex	1,440,873	558,597	38.8	Extraordinary Profit
Ventron Corporation Ltd	Ventron	5,216,473	566,930	10.9	Sole Investment is in Altron
Total		26,417,553	2,737,356		
				17	Number of Companies
				10.4	Average Profit %

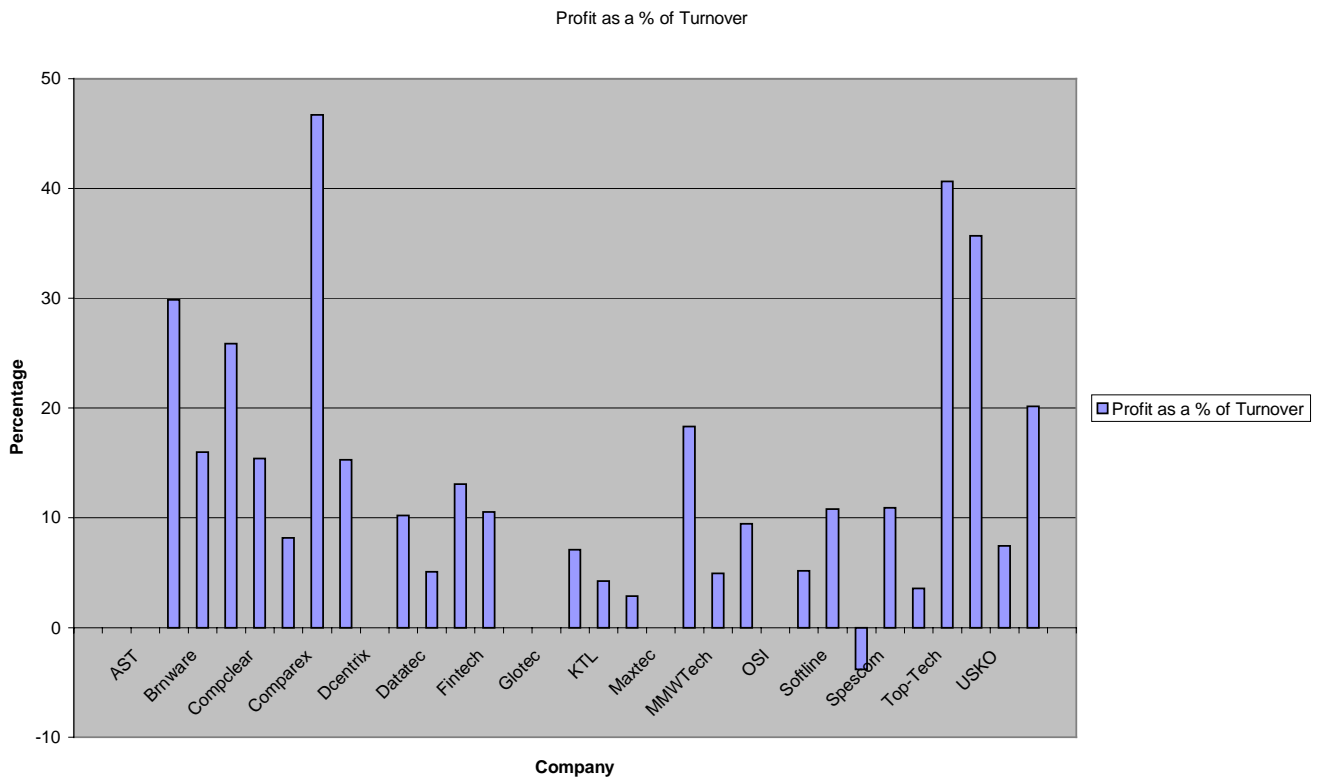
Table 24: Information Technology

Company	Short Name	Turnover (thousands)	Consolidated Profit (Before Tax) (Thousands)	Profit as % of Turnover	Comments
Advanced Software Technologies	AST				First Listed 1998. Results unavailable
Billcad Holdings Ltd	Billcad	5,848	1,747	29.9	
Brainware Ltd	Brnware	166,970	26,710	16.0	
Computer Configuration Holdings Ltd	CCHold	110,114	28,473	25.9	
Compu-Clearing Outsourcing Ltd	Compclear	16,839	2,593	15.4	
Connection Group Holdings Ltd	Connect	186,926	15,284	8.2	
Comparex Holdings Ltd	Comparex	4,251,914	1,986,952	46.7	Extraordinary Profit
Crux Technologies Ltd	Crux	69,430	10,604	15.3	First Listed 1998. Results unavailable
DataCentrix Holdings	Dcentrix				First Listed 1998. Results unavailable
Dimension Data Holdings Ltd	Didata	4,711,459	481,992	10.2	
Datatec Ltd	Datatec	1,373,593	69,594	5.1	
Elixir Technology Holdings Ltd	Elixir	73,444	9,580	13.0	
Fintech Ltd	Fintech	1,211,711	127,491	10.5	
Faritec Holdings Ltd	Faritec				First Listed 1998. Results unavailable
Global Technology Ltd	Glotec				First Listed 1998. Results unavailable
Infiniti Technologies Ltd	Infiniti	447,332	31,658	7.1	
Kunene Technology Ltd	KTL	2,330,247	98,657	4.2	1997 Results. Restructured in 1998
MB Technologies Ltd	MBTech	847,827	24,530	2.9	
Maxtec Ltd	Maxtec				First Listed 1998. Results unavailable
MGX Holdings Ltd	MGX	193,278	35,409	18.3	
MMW Technology Holdings Ltd	MMWTech	132,639	6,511	4.9	
Mustek Ltd	Mustek	1,101,099	104,229	9.5	
OSI Holdings Ltd	OSI				First Listed 1998. Results unavailable
Rectron Holdings Ltd	Rectron	193,664	9,981	5.2	
Softline Ltd	Softline	499,055	53,743	10.8	
Spicer Holdings Ltd	Spicer	209,845	-7,991	-3.8	
Spescom Electronics Ltd	Spescom	346,139	37,753	10.9	
Siltek Ltd	Siltek	1,936,161	68,564	3.5	
Top Info Technology Holdings	Top-Tech	8,446	3,433	40.6	
UCS Group Ltd	UCS	45,370	16,184	35.7	
USKO Ltd	USKO	497,389	37,102	7.5	
Vesta Technology Holdings Ltd	Vesta	5,556	1,120	20.2	
Total		20,972,295	3,281,903		
				26	Number of Companies
				15.6	Average Profit %

Table 25: Telecommunications

Company	Short Name	Turnover (thousands)	Consolidated Profit (Before Tax) (Thousands)	Profit as % of Turnover	Comments
Accord Technologies Ltd	Accord	107,493	11,447	10.6	
Autopage Holdings Ltd	Autopage	306,116	2,506	0.8	
Jasco Electronics Holdings Ltd	Jasco	173,726	22,548	13.0	
Paradigm Interactive Media Ltd	Paradigm	256,051	59,430	23.2	
Radiospoor Technology Holdings Ltd	Radiospoor	515,113	19,173	3.7	
Teljoy Holdings Ltd	Teljoy	783,200	40,901	5.2	
Total		2,141,699	156,005		
					6 Number of Companies
					7.3 Average Profit %

Figure 5: IT Profit



8.2 IT Spend

Table 26: IT Spend in the South African IT industry (\$ '000s)

	1992	1993	1994	1995	1996	1997
IT Spend (US \$ M)						
IT Hardware	1 227	1 321	1 558	1 525	1 631	1 717
IT Software	287	330	386	456	633	669
IT Services	876	938	1 100	997	1 202	1 472
Office Equipment	131	138	170	158	148	155
Internal	1 212	1 295	1 328	1 446	1 485	1 526
Telecomms	2666	2 847	3 023	4 068	4 185	4 149
Total IT Spend	6 400	6 869	7 564	8 649	9 283	9 690

Source: WITSA / ITU/ World Bank / IDC (1998)

Table 27: ICT / GDP ratios

	1992	1993	1994	1995	1996	1997
IT/GDP	5.4%	5,9%	6.2%	6.5%	7.3%	6.9%

Note: These figures include telecommunications and internal IT spend, and are based on the EITO (European IT Observatory) definition.

8.3 Investment Flows

Total Foreign Direct Investment (FDI) into South Africa declined in 1998, leading to an associated decline of the FDI flowing into Africa. South Africa received R2.226 billion (\$371 million), as opposed to R10.2 billion (\$1.7 billion) in 1997. The African continent as a whole received R49.8 billion (\$8.3 billion) out of a total of R996 billion (\$166 billion) for developing countries as a whole.

South Africa was the largest recipient of FDI in 1997 but fell to 7th position in 1998. According to the UN Conference on Trade and Development (UNCTAD) world investment report, on which these figures are based, the reasons were due to a decrease in privatisation-related investment and reduced investment by Asian companies.

Investment figures for the IT industry were not available, but the report states that the main industries to benefit from the investment flows were energy and oil, mining and quarrying, construction and materials, motor vehicles and components, as well as food and beverages. From this it must be construed that investments into IT companies was not large, although over the period 1996-1998 taken as a whole, telecommunications was given as one of the leading industries attracting foreign investment.

The UNCTAD report stated that prospects for FDI into South Africa were good in 1999, but particularly in mining through the raising of capital abroad, and manufacturing, where massive investments such as the R876 million (\$ 146 million) plant by Daimler/Chrysler in East London was mentioned.

The five African countries rated most attractive to foreign investment were South Africa, Nigeria, Botswana, Ivory Coast and Tunisia.

8.4 Revenue Earned by the IT Industry

8.3.1 National and International Revenues

The South African IT market has been on a high growth path for the past five years, with real growth rates of 10% or more a year. The growth spurt mirrors an international trend, as well as local restructuring and revival following the 1994 elections. According to BMI-TechKnowledge, the combined market for IT hardware, software and services is set to exceed R40 billion in 2003, up from just under R20 billion in 1998.

Of interest are the generally low figures quoted for government IT procurement. According to BMI-T, this can be ascribed to lower government IT spend due to pressure to fund priority areas such as health, education and housing. In addition, IT spend by state-owned enterprises such as the Post Office, Telkom and Eskom are not included in this category.

Despite poor economic growth in most regions (with the notable exclusion of the United States), other factors sustained IT market growth worldwide. Most notably in the past two years has been the move to network architecture, fixing the Year 2000 problem, and Internet and convergence technologies. The Internet is part of a longer term technology wave that will create a huge swell over the next ten years. The most important opportunities in the immediate future are those driven by the convergence between IT and telecommunications. IT companies are set to be major beneficiaries in this regard, as categories of products and services traditionally reserved for telephony equipment manufacturers become digital and hence available to traditional IT players.

Sales by Sector

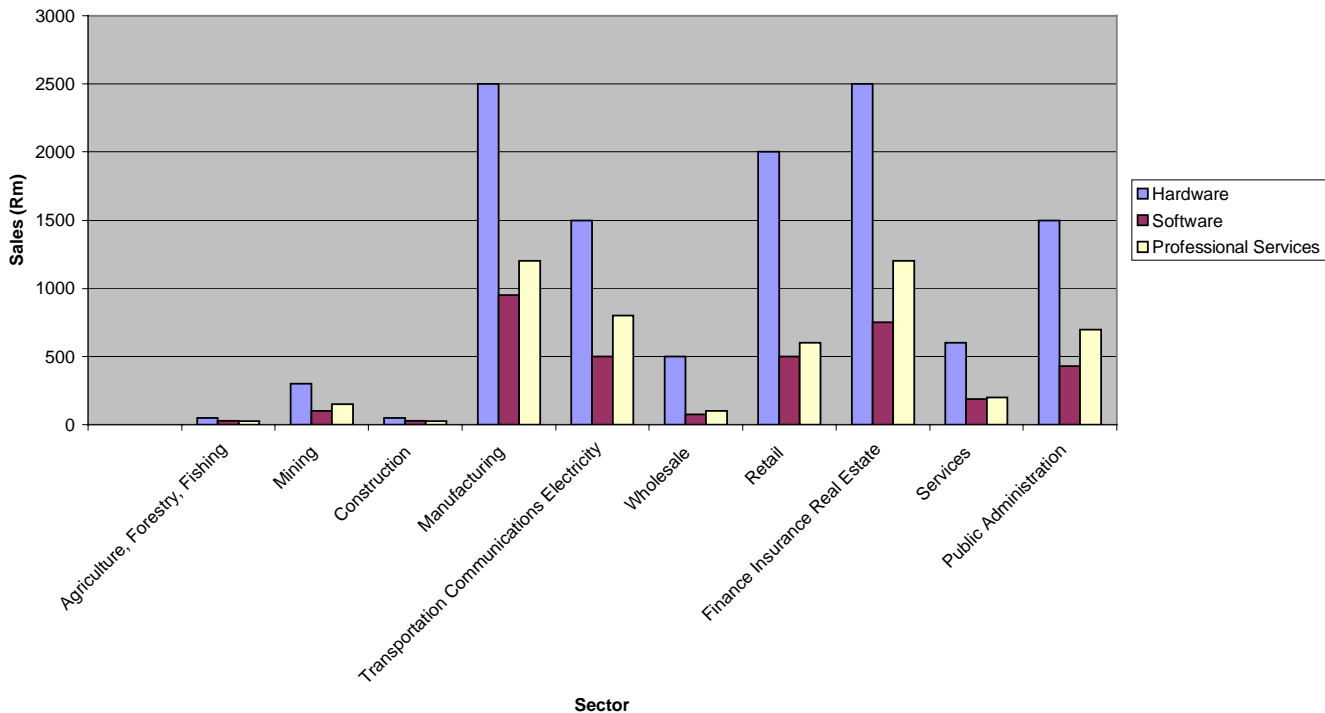
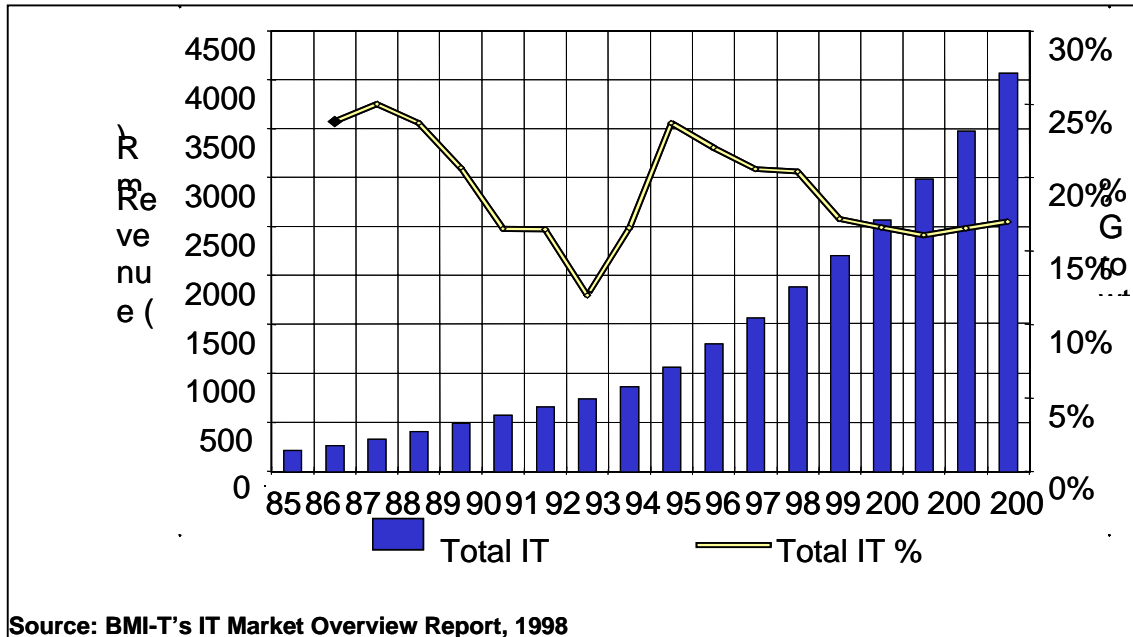


Figure 6: Growth in Overall SA IT Vendor Revenues, 1985 – 2002(F)



Source: BMI-T's IT Market Overview Report, 1998

The table below shows key categories of the South African IT market and vendor revenue growth in each major category. Hardware categories such as networking have taken off dramatically as a result of the aforementioned trends towards network architecture and Internet technology.

Table 28: Growth in Major Segments of the IT Market SA IT Growth Rates by Sector

	1997	1998E	1999F	2000F	2001F
Computer Hardware	20%	14%	14%	12%	12%
Software Products	20%	19%	20%	19%	20%
IT Services	26%	23%	22%	23%	23%
Overall IT Market Growth	21%	17%	17%	16%	17%

Source : BMI-TechKnowledge, Overview of the South African IT Market, July 1998

Software and services markets continue to exhibit high growth rates of close to 20% per annum. Part of this growth is fuelled by a trend towards companies outsourcing more of their IT functions than before. Other stimulants are network implementation, (including Internet and intranets), solving the Year 2000 bug problem, and growth in applications such as enterprise resource planning (ERP). The next generation of applications that will fuel growth include Electronic Commerce, Supply Chain Management, Customer Relationship Management (CRM), and Knowledge Management.

Professional skills are in short supply, especially in South Africa, creating a continued high growth in demand for IT services. Competitors in this market are really competing in the market for skills, since those who can recruit, train and retain the right staff will always be able to find a market for them.

8.5 Manufacturing

Table 29: IT Industry Revenues (1998)

SICC Code	Description	Total IT Industry Revenues 1998 (RM)
Manufacturing		
3000	Manufacture of office, accounting and computer machinery	-
3130	Manufacture of insulated wire and cable	1 100
3210	Manufacture of electronic valves, tubes and other electronic components	300
3220	Manufacture of television and radio transmitters and apparatus for line and telephony telegraphy	1 500
3230	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus, and associated goods	1 500
3312	Manufacture of instruments and appliances for measuring, checking, testing, navigating, and other purposes, except industrial process control equipment	-
3313	Manufacture of industrial process control equipment	100
Services - goods related		
5150	Wholesale of machinery, equipment and supplies	10 000
7123	Renting of office machinery and equipment (including computers)	5 000
Services – intangible		
6420	Telecommunications	35 000
7200	Computer and related activities	7 000
	TOTAL	61500

Notes:

- Local Manufacture of the sectors is limited to wire and cable, electronic components, transmission and line telephony equipment, television and radio receivers, and some process control equipment only.
- The majority of goods is manufactured overseas and imported into SA where it is resold via distributors, agents or resellers into the local market or into other international markets
- Office, accounting and computer is limited to assembly of imported kits which is not counted as pure manufacture.
- Growth rates vary widely per category when translated to 1999 estimations.
- Code 7200 – computer and related services, includes both professional and support service revenues for the period.
- All telecommunications services are included in this estimate, i.e. includes operator revenues.
- Strict compliance to SICC codes has not been exercised.

8.6 Hardware

8.6.1 Mainframe, Midrange and PC Installed Base

Table 30: Notional Installed Base by Vertical Sector – December 1998

Sector	Mainframe	Midrange	PCs
Agriculture Forestry Fishing	1	200	100 000
Mining	5	600	100 000
Construction	1	500	50 000
Manufacturing	10	6 000	300 000
Transportation Communications Electricity	20	2 500	150 000
Wholesale	1	200	50 000
Retail	10	2 500	300 000
Finance Insurance Real estate	30	4 000	350 000
Services	2	1 000	400 000
Public Administration	20	2 500	200 000
Total	100	20 000	2 000 000

Notes:

- Units are defined as operational computer assemblies capable of processing and rendering data.
- Installed base refers to current number of active units in use within each sector – scrapped units are not included.
- Units deployed in areas or functionalities other than those for which they were originally purchased are included under the currently deployed sector.
- Excludes PCs bought by consumers (households that are not home offices)

The low figures for some of the categories, such as finance and public administration can be explained by the migration to client-server environments. An additional influence is the change in emphasis by corporate users from a centralised in-house IT ability (mainframe) to an outsourced network-centric (distributed) IT business and application model. This however should not be seen as the death of the mainframe - it still remains the optimal solution in selected environments that are batch-processing oriented or are better served by a "bureau" type of operation - specific financial and medical applications come to mind that bear this out. A 4% CAGR from 98-01 is being seen in the mainframe area, but revenues here are very cyclical due to the large value and infrequent nature of the sales cycle.

In the transport sector only one highly significant mainframe player exists - Datavia with SAA. This significantly skews the perspective. Most of the larger commercial transport operations favour a distributed data architecture.

Finance, which includes the four major banks and the large insurance operations, is the largest mainframe player in the SA environment. Again, the application and cost is increasingly driving the choice of technology and this does reduce the likelihood of choice of expensive mainframe when a server will do the same job. The financial sector is also far more cost-conscious than was previously observed and also more technology literate - this make for more informed purchase decisions when evaluating pure mainframe versus client server architectures. Interestingly,

although client-server hardware architecture is used, many organisations are adopting a more "centralised" approach to the data management aspect. This could be related to the growth of "knowledge management" as an industry sub-discipline. However it is still too early to ascribe this directly.

8.6.2 Computer Hardware Sales

Table 31: Revenues Derived from Sales of Computer Hardware

Sector	Notional 1998 Hardware Spend (Rm)
Agriculture Forestry Fishing	50
Mining	300
Construction	50
Manufacturing	2 500
Transportation Communications Electricity	1 500
Wholesale	500
Retail	2 000
Finance Insurance Real estate	2 500
Services	600
Public Administration	1 500
Total	11 500

Notes:

- Hardware category includes mainframe, midrange, all servers, PCs, and workstations.
- All peripheral and industry specific hardware such as printers and Automatic Teller Machines (ATMs) are excluded from this category.
- Sales of PCs, printers and PC upgrades to consumer households are excluded.

8.6 Software

8.6.1 Software Sales by Software Type

Table 32: Revenues Derived from Sales of Computer Software

Sector	Notional 1998 Spending (Rm)				
	Operating Systems	Networking Software	Application Development Tools	Packaged Application Software	Software Total
Agriculture Forestry Fishing	5	5	5	15	30
Mining	20	10	20	50	100
Construction	5	5	5	15	30
Manufacturing	100	75	175	600	950
Transportation, Communications, Electricity	130	50	100	220	500
Wholesale	10	5	10	50	75
Retail	70	50	80	300	500
Finance Insurance Real estate	200	100	150	300	750
Services	30	20	40	100	190
Public Administration	130	50	100	150	430
Total	700	370	685	1800	3555

Notes:

- Includes all software sold and distributed in South Africa – excludes exports from South Africa
- International and locally developed software revenues are combined in this analysis.

Accurate data on export revenues is not available. A good notional estimate would be around an additional 5 percent (R175m) of the total value which is going offshore. This is derived largely from exports of financial and supply chain management packaged application software. Additional revenues would be derived from proprietary software and further development of existing international or local software which is then exported.

8.6.2 Sales of Locally Developed Packaged Software

Table 33: Revenues Derived from Sales of Locally Developed Packaged Software

Sector	Notional 1998 Spending (Rm)				
	Operating Systems	Networking Software	Application Development Tools	Packaged Application Software	Total
Agriculture Forestry Fishing	-	0	-	0	0
Mining	-	0	-	5	5
Construction	-	0	-	5	5
Manufacturing	-	5	-	100	105
Transportation Communications Electricity	-	5	-	20	25
Wholesale	-	5	-	10	15
Retail	-	5	-	30	35
Finance Insurance Real estate	-	10	-	25	35
Services	-	0	-	30	30
Public Administration	-	5	-	25	30
Total	-	35	-	250	285

Notes

- Revenue values are notional and based on secondary sources and anecdotal information only.
- Local software revenues are a subset of, and therefore included in, the revenues of the total software market as described in the previous table.

South Africa, like most developing nations, is a better user than designer of complex technology products. This is also borne out in the software industry. While greenfield success stories are observed (iXchange, Softline) in local software development, most development is limited to reworking or local integration of internationally designed packages. This accounts for the generally low values in this sector. As can be seen most of the reworking and localisation of imported packages is done to integrate these to South African specific conditions within large organisations. Typically development changes reflect adaptations made to allow for unique legislative or operational needs felt by local organisations.

8.7 Telecommunications

According to a recent report issued by the US Department of Commerce, the value of US telecommunications equipment exports to sub-Saharan Africa for 1998 was US\$206 million, an increase of 39%. US telecommunication export to the region have increased for 3 consecutive years. South Africa is the largest market in the region and exports have more than doubled from \$64 million in 1997 to \$133 million in 1998. During 1997, 6 SADC countries ranked in the region's top 10 equipment importers, representing approximately US\$95 million in exports. The following list illustrates the 10 largest export markets for US telecommunication equipment and services and the values of telecommunication exports during 1997:

1. South Africa	US\$ 64,105,560
2. Nigeria	US\$ 12,506,158
3. Mauritius	US\$ 8,298,928
4. Ghana	US\$ 7,528,395
5. Tanzania	US\$ 6,902,912
6. Angola	US\$ 5,965,202
7. Zimbabwe	US\$ 4,627,942
8. Sudan	US\$ 4,075,075
9. Guinea	US\$ 3,846,671
10. DRC	US\$ 3,97,526

The great majority of the information that follows has been extracted from the BMI-Technologies Communication Technologies Handbook for 1999.

8.7.1 Infrastructure

South Africa's telecommunications sector is the largest in Africa by probably all important measures, including number of fixed lines, number of cellular subscribers, data services users, financial revenues and investment, technological capability and local equipment design and manufacturing capabilities. However, liberalisation is a comparatively recent phenomenon and a few major players still dominate the Telkom market. The table below shows some important measures of the industry.

Table 34: Measures of the Telecommunication Industry

Description	Measure
Connected Telephone Lines	4,768,000
Cellular Subscribers	2,540,000
Internet Subscribers	370,000
Internet Users	905,000
Telephone Lines per 100 people	11.2 (1997)
Rural Telephone Lines per 100 people	2.2 (1997)
Largest consumers of telecom services	ABSA, Standard Bank, Nedcor, FirstRand

However, while existing arrangements might reflect the past, the South African Telecommunications sector is experiencing the beginning of a period of fundamental transition. It is expected that a second national operator will be licensed as soon as 2000 or at latest 2001. this will give the operator time to roll out infrastructure, so that it can come online as soon as Telkom's period of exclusivity ends.

8.7.1.1 *Telkom*

In May 1997, 30% of Telkom was sold to Thintana Communications for R5.58 billion (\$1.2 billion);at the time this represented the largest ever inflow of capital into South Africa. The government has plans to sell an additional 10% stake in Telkom to a black empowerment group, reducing its stake to 60%.

Three licenses were issued to Telkom in May 1997. The licenses are valid for 25 years and are for PSTS, transmission of radio frequencies , and VANS. There are performance obligations under the licenses, and all permit competition, the PSTS licence in 5 or 6 years and the others immediately.

Some key measures of Telkom's infrastructure is contained in the table below:

Table 35: Measures of Telkom's Infrastructure

Installed Plant	Description	Measure
Transmission	Transmission circuits ('000 km)	156,000
	Optical Fibre ('000 km)	343
Switches	Total Automatic Exchange Units	3,019
	Digital Exchange Units	2,662
	Analogue Exchange Units	357

Services and Tariffs

Telkom provides a variety of services. It has a 50% stake in Vodacom, the cellular network operator, and is involved in public radio-trunking through a subsidiary, Q-trunk. Telkom has also launched SAIX, an internet access network platform, and Intekom, an internet service provider. The table below shows a selection of Telkom's Services which are of particular interest for the marketplace of tomorrow.

Table 36: Telkom Services

Category	Description
Public Phones	Coin Phones
	Card Phones
Small Business Products	Phones and Small PABX's
Large Business Products	Call Management packages
	Various PABX's
	Music on hold
Non-Voice/ Data	Diginet – various
	Frame Relay, ATM ,X.25
	International Private Leased Circuits
Voice and Transmission Services	Digital Exchanges (International and Trunk)
	Basic and Primary Rate ISDN
	Intelligent Networks
International Networks	Spacestream- VSAT
	SAT-2 Undersea Cable

Telkom Tariffs

Table 37: Telkom Tariffs

Type	Description	Rate
PSTN Connection Charge (single line)		207.77
PSTN Rental per month	Automatic Exchanges	
	Business	72.62
	Residential	55.60
PSTN Calls/Minute (per second billing)	0 – 50 Km	
	Peak	0.16
	Off-Peak	0.05
	50 – 100 Km	
	Peak	0.60
	Off-Peak	0.30
Cellular 3-minute call	Weekdays 07h00 to 18h00	4.45
	Lowest	2.23
320 km long-distance call	Peak	1.24
	Off-Peak	0.62
International Call to USA per minute	Peak	4.58
	Off-Peak	3.53

Finance and Infrastructure

About R4.5 billion from the proceeds of a sale of 30% in Telkom to Thintana have been allocated to Telkom to help fund its infrastructure and modernisation programs.

Telkom plans to spend R40 to R50 billion from 1997 to 2001 on new capital expenditure, in preparation for the competition it will face when its period of exclusivity ends.

Telkom Group Financial Statistics

Table 38: Telkom Group Financial Statistics

	1993/94	1994/5	1995/6	1996/7	1997/8	1998/9
Revenue	9.2	10.9	13.3	16.3	20.2	
Fixed Assets and Investments (R billion)	14.0	15.4	16.3	18.0	22.3	
Capital Expenditure (R billion)	2.4	3.0	3.2	3.7	7.0	9.8

Telkom's Vision 2000 Program

Over the five year period to 2002, Telkom will be enhancing many of its services as part of the Vision 2000 program. The main elements of this program are described below:

- Public fixed line network expansion

The objective is to have a fully digital, world-class network with up to 3-million lines added and 1-million lines replaced. About 2-million of the projected high-growth 3-million lines are targeted for rural or underserved areas.

Telkom is using modern technologies to build the network, including:

- *Wireless Local Loop*
This will use the Digital Enhanced Cordless Telephone (DECT) system, which has the advantages of faster service rollout, less infrastructural costs and the ability to tailor the system to different penetration levels. It also is less disruptive, not requiring the physical disruption of roads etc or the attendant risks of theft. In 1997 Telkom awarded a R2-billion contract for the supply, planning and installation of standalone DECT systems to a consortium including Altech.
- *Synchronous Digital Hierarchy (SDH)*
In order to unify various transmission protocols over fibre, a family of ITU-T standards called Synchronous Digital Hierarchy were developed for transmission rates above 155Mbps. Telkom began installation of SDH 5 years ago; it provides improved network resilience and reduces maintenance
- *Fibre-optic cabling*
During 1997/98 Telkom laid 71,000 kilometres of fibre-optic cable. Telkom has moved rapidly from the previous 12-fibre cable to 48-, 96- and 144-fibre.
- *Network Management and Support*
Improvements here will result in a network with self-healing capability, greater reliability and improved response times through alternative routing and end-to-end network management
- **Public Fixed line network modernisation**
Telkom replaced 234,387 non-digital lines in 1997/98, bringing network digitisation up to 86.2%. Telkom has different networks to carry different types of traffic, but these often overlap. Once the network is fully digital, Telkom intends to rationalise these network into a single broadband managed network, capable of adjusting automatically to the nature of the content and the class of service selected.
- **Satellite**
Telkom was awarded a contract to build a satellite access node (SAN) on behalf of ICO Global Communications. This node is located at Hartebeeshoek near Pretoria and will be one of 12 similar nodes around the world. As part of what is called Global Mobile Personal Communication Services (GMPCS), the ICO Commercial service, scheduled for launch in 2000, will provide telephone, data and fax services on a global basis using multi-mode hand-held pocket-sized handsets.

With the advent of Very Small Aperture terminals (VSAT), Telkom has been awarded VSAT landing rights in a number of African countries, enabling Telkom to offer public VSAT services. A VSAT system consists essentially of a hub Earth station of high power and large antenna size connected via satellite to a network of small-antenna low-power terminals. The small terminals support high bandwidth on reception but not on transmission. Telkom is endeavouring to roll out an African VSAT network and began testing in 13 countries in 1998.

- **Undersea Fibre-optic Cables**
South Africa wants to position itself as the preferred communication link between East and West. Telkom's SAT-3 and SAFE cable projects will provide an alternate international route between Europe and Asia-Japan, competing with the existing route from Western Europe to Asia. It is felt that an entirely undersea route around the Cape would offer greater reliability than alternative routes which cross either the American or Europe/Asia landmasses. The

South Africa-Far East (SAFE) cable segment is planned to route from South Africa to Malaysia, and is receiving support from Telekom Malaysia, France Telecom, Cable and Wireless, Mauritius Telecom apart from Telkom. The entire project to link Europe with Asia will cost in the order of R3500 million and is scheduled for completion in mid 2000. The capacity of the system is envisaged to be between 20Gbps and 40 Gbps.

8.7.1.2 Private Network Operators

Both Transtel and Eskom are two significant private network operators in South Africa. At this stage they are not allowed to compete with Telkom. Transtel provides Transnet's complete network infrastructure, while Eskom has over 30,000 lines installed, confined to the power routes. The table below illustrates some of the salient features of the two networks.

Table 39: Features of Transtel and Eskom

Description	Eskom	Transtel
Transmission Media		
Aerial openwire routes	-	4,148 km
Underground Trunk Cable	-	8,523 km
Microwave Radio	16,000 km	12,744 km
Optical Fibre	1,200 km	450 km
Satellite (PAS4 C bands)		54 Mhz
Satellite (1-704 Ku bands)		36 Mhz
Transmission Systems		
Analogue (FDM) –Channel km	0.3 million	1.6 million
Digital (TDM) – Channel km	10.5 million	5.0 million
Radio Systems		
Walkie Talkies	2,500 terminals	1,400 terminals
Mobile Radio	10,000 terminals	12,000 terminals
Pagers	1,500 terminals	3,000 terminals
Trunked Radio (private)	-	48 stations, 2,500 terminals

8.7.1.3 Cellular Network Operators

Vodacom and MTN (Mobile Telephone Network) are the two cellular operators in South Africa, both employing GSM 900 technology. They both are obliged to use Telkom for their fixed line transmission requirements. After commercial switch-on in July 1994, the networks have grown very quickly, to over 2 million subscribers. The advent of a pre-paid service has proved very popular and by mid-1998 about 35% of subscribers were pre-paid. The demand for cell-phone handsets has been particularly strong and accounted for 85% of demand for non-PABX telephones in 1997, to a value of R1.3 billion. Almost 45% of this expenditure is estimated to be for replacement phones (i.e. upgrading to new technology when contracts expire). Both Vodacom and MTN have invested over R3 billion each in their current network infrastructure, and have plans to aggressively increase their network infrastructure during the next few years.

The shareholders of MTN are:

M-Cell	72.1%
Transtel	23.0%
Black empowerment grouping	4.9%

The shareholders of Vodacom are:

Telkom	50.0%
Vodafone (UK)	31.5%
Rembrandt	13.5%
Consolidated Investments	5.0%

8.8 Professional Services

Table 40: Revenues Derived from Sales of IT Professional Services

Sector	Notional 1998 IT Professional Services Spend (Rm)
Agriculture Forestry Fishing	25
Mining	150
Construction	25
Manufacturing	1200
Transportation Communications Electricity	800
Wholesale	100
Retail	600
Finance Insurance Real estate	1200
Services	200
Public Administration	700
Total	5000

Notes:

1. Professional services included in this category include Consulting, Design, System Integration, Business and Process Outsourcing.
2. This category excludes services such as training and education, technical service and technical support functions.

Chapter 9

ISSUES FACING THE IT INDUSTRY

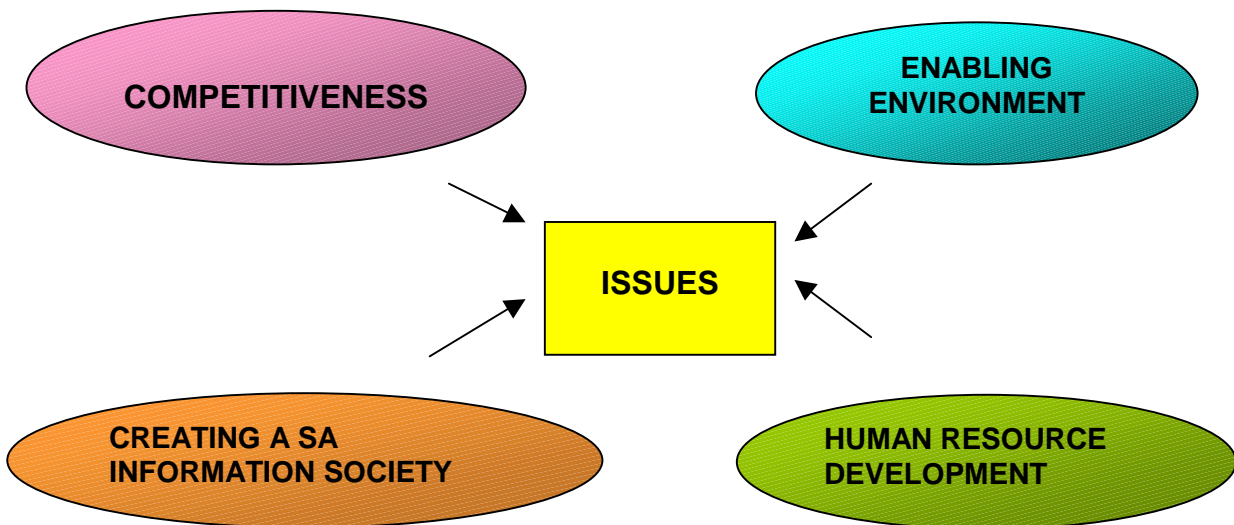
9.1 Overview

Chapter 9 provides an overview of the outcomes of about forty interviews and four workshops, three of which were conducted in Johannesburg and one in Cape Town. A list of the persons consulted is included in Appendix 1.

There was a high level of consistency in identification of barriers, challenges and constraints which face the IT industry in South Africa. Several priority issues were identified during the discussions and these were developed more extensively during the workshops. The major priority areas, which emerged, were:

- The need to **develop an appropriate skills base for the IT sector** which will require major emphasis on developing a more appropriate education and training system. A broad range of mechanisms is required, with greater levels of coordinated effort by government, the private sector and training institutions. This was repeatedly emphasised (and corroborates findings from the Foresight process), particularly to overcome the legacy of an inequitable education system, and general lack of awareness of the requirements needed to move from a manufacturing to an information economy.
- The need to **liberalise the telecommunications industry**, while also ensuring that a strong regulator with clear mandates is in place.
- The need to **develop a stronger entrepreneurial base in the IT industry**. Issues which emerged throughout the study include better access to venture capital, increased incentives to make the IT sector more attractive to local and foreign investors, entrepreneurial training at various levels, and a friendly regulatory and policy environment to support such development.

Four broad themes emerged:



9.2 Competitiveness

Of interest overall is that the issue of global competitiveness was hardly raised by stakeholders. It appears that key stakeholders in the IT industry are inwardly focussed, and that South Africa's internal problems are receiving most of the attention. Crime and security are seen as major inhibitors to attract investment.

Innovation and the need for a strong R&D culture was seldom mentioned as a factor worth considering. This may reflect the low levels of R&D currently in existence in the country. The questionnaire survey, which is still being conducted, addresses the internal R&D spend, and will hopefully produce some useful insights for the SAITIS project. Also, the forthcoming report of the Foresight IT Working Group will help assess the extent to which the views of the interviewees are representative of the broader IT professional community.

It was acknowledged that South Africa has to play in the international arena, and will have to become a global player if it is to participate in a meaningful way. Globalisation should be seen as a positive factor, and IT as an enabler to access technology and world-class solutions. The solutions will however have to be determined by South Africans.

A national strategic vision needs to be developed for South Africa, which includes aspects of competitiveness, growth, democracy and job creation. This plan of action will identify human resource development and key infrastructure challenges. South Africa also has no clearly defined industrial strategy and the perception is that "industries are being thrown to the wolves", for example the textile industry. Government is seen as not helping previously protected industries adapt to the effects of global competition.

The need to create jobs was raised during the study, but the perception was that the loss of jobs in the short-term is inevitable, but that new jobs will be created, particularly in the services sector.

Several specific aspects were mentioned which impact directly on the country's ability to be competitive in the IT arena:

Niche markets

- E-commerce is seen as the driver of the future. The widespread introduction and application of e-commerce will be critical for South Africa to become globally competitive. It may provide opportunities for creating and expanding an African economy.

E-commerce is seen overall as a positive development, although it is acknowledged that it increase will widen the gap between rich and poor. There needs to be a structured attempt to uplift disadvantaged communities.

The general perception is that the Department of Communication's e-commerce process is a good one, and the perceived urgency from Government's side is seen as positive.

The widespread use of e-commerce will await affordability of connectivity (i.e. lowered costs of equipment, phone calls, Internet access)

- South Africa has the ability to produce for global appeal. In particular, it can be globally competitive in the banking and financial services sector. It should move away from manufacturing (high costs), and high-tech electronics, and compete in systems development.
- South Africa is seen as the 'agent' of the West. Very little innovation is found in the IT industry, with an emphasis on the distribution of existing products. In the software industry,

this is not the case. South Africa has not exploited a niche market to provide services in the same way that India has, or as it did in the software industry about 20 years ago. There should be large incentives for the export of software.

- South Africa could be seen as the interface between the developed and developing world, a position it has not exploited.
- There is a far greater need to focus on the development of sector applications and the need to educate potential IT users in the services on the benefits of ITs e.g. Tourism.
- On the provincial level, the Gauteng SDI was quoted as an example in which there will be a focus on the services industry, particularly finances. A coherent vision has been developed for infrastructure development which includes:
 - Intelligent processes e.g. the manufacture of automatic information management systems
 - Good governance e.g. intelligent applications for city councils and the Provincial Government
 - The consolidation of smaller computer centres into a bigger IT centre to improve service delivery
 - Tracking and monitoring systems for service delivery
 - An Integrated Management system to support corporate governance
 - Internal and external communication structures

This initiative could be seen as a role model for South Africa.

Innovation

- A major concern is the lack of innovation within government as well as in the private sector. Although alternative technologies exist, the tendency is to stay with the old, despite newer technologies allowing more efficient and cost-effective solutions. Large corporations and the government should play a far more visible role in the application of innovative technologies.
- There is little investment in R&D – more should be done to develop for the local market and in infrastructure development. The recent attention to developing expertise in satellite communications technology was quoted as an example of what could be locally developed.
- Strengthening the research capabilities within institutions such as the CSIR and Denel are key in developing and expanding the system of innovation.

SMMEs – can we grow them?

- South Africa lacks a vibrant SMME sector, with few support structures in place. Most SMMEs in the IT sector are effectively distributors or agents, and their ability to initiate new businesses is limited. SMMEs need to be assisted to change their focus from functioning in a survival mode to becoming highly skilled, specialised businesses.
- Emphasis should be placed on changing from a culture of dependence to one of independence. In South Africa, too few people with appropriate skills are prepared to start their own businesses. This relates to the perception that there is more 'status' attached to being employed by a large organisation, and to the difficulty of obtaining venture capital at reasonable rates.
- The affirmative procurement policy of the State is not working effectively, and State tenders still rely largely on contracts with known and trusted suppliers. It is difficult for new emerging entrepreneurs to penetrate the State procurement process, despite government intentions to

encourage black economic empowerment. The above may be alleviated by setting aside a proportion of budget which has to be allocated to SMMEs

- Large business does not understand how to outsource and procure from small business. This limits the possibilities for developing SMME development in the private sector.
- Co-operation at SMME level should be facilitated, but there is no agreement on whether this should be undertaken by Government or associations.
- Lack of entrepreneurial training is a major constraint which has only recently been addressed, and which is still not regarded as sufficient to stimulate enough SMME development. Aggressive training programmes need to be instituted in Technikons and Universities.

In the present environment, skills development in the IT industry is more expensive than most SMMEs can afford. 'Seed' money should be made available to allow SMMEs to get themselves up to speed. An orientation towards business should also be introduced at an earlier age, at secondary school level if not earlier.

Economic growth

Short-term economic growth and successes need to be found, particularly ones which illustrate the move to the information age. Opinions varied on the scale of economic growth which could be expected. Some see flat (0-1%) growth over the next few years with the negative effects of industrial action, GEAR as a brake on growth. GEAR is seen as too export-oriented and does not look adequately at domestic growth. Infrastructure spending should not be part of the deficit.

COSATU expressed the view that the stringent deficit targets constrain expenditure in the important areas of infrastructure, service delivery, and the social deficit. On the opposite side of the scale, some see 2-3% growth mainly due to global companies who intend doing business in Africa.

- Promote Black Economic Empowerment. This should be stimulated through high-level interventions and more investment. The need to develop partnerships with a small range of players is preferable to having a large range of partners. More should be invested in these selective relationships, with higher levels of commitment from the partners.

9.3 The Enabling Environment

A wide range of 'enablers' were mentioned, which included aspects such as the regulatory and policy environment, introduction of incentive schemes, access to finance, and infrastructural challenges. Specific issues relating to these are indicated below.

Requirements for a Growing IT Industry

- More incentives should be provided through, for example, tax holidays or the creation of incentives which require the submission of annual business plans.
- Government should focus on creating an enabling environment, and not one in which control is the main objective. For example, the market success of Internet Service Providers is largely because it is unregulated.
- More appropriate baseline indicators need to be developed. The current definitions, and related statistics gathering processes e.g. SIC are more appropriate to a manufacturing-based economy, and will not allow monitoring of activities based on an information economy.

Regulatory and Policy Environment

- The gap between policy implementation and formulation stages is problematic. The lack of uniformity was mentioned as a constraint which creates uncertainty for the industry.
- The Telecommunications Act of 1996 provides inadequate legislation to address the changing pace of technology change, and disputes arising out of those changes. It is also seen as 'too democratic' and can be stalled in court. Possible improvements/actions were suggested:
 - "First step is to implement rules and regulations transparently". For example, disputes between SATRA and Telkom are to establish a clear set of procedures, open to the public, outlining the steps to be taken. Guidelines and regulations for the operation of SATRA either do not exist, or where they do exist are not implemented transparently.
 - SATRA should be allocated stronger powers (and greater capacity) so that ability to dispute rulings in court are reduced. The example of the FCC in the United States was quoted as an example, where disputes are seldom heard in court.
 - SATRA cannot at present formulate policy, but only enforce it. The suggestion was that it should be allowed some policy-making capacity.
 - "Extension to the Telkom monopoly should not be allowed". The Telecommunications Act of 1996 should be amended to preclude this, and compensation can be paid to the Telkom equity partners for any loss of income. The compensation can be funded through, for example, allowing equity stakes in Eskom, Transnet, who could compete as network operators.

Access to finance

- Access to finance is a major constraint for, particularly, the SMME sector. More funding should be provided by government through institutions such as the Industrial Development Corporation (IDC). Where funding does exist, it appears that SMMEs are not aware of it. Knowledge on who to approach for funding is limited and government initiatives, through DTI, are perceived as not working
- Venture capital availability seen as key to the growth of the IT industry, but it is still very hard to obtain unless businesses have a substantial track record. Potential financing institutions also have a low propensity to taking risks. The funding mechanism in the United States was quoted as an example as it is more risk oriented (prepared to accept failure and encourage startups).

There is a perceived lack of venture capital, particularly for smaller businesses without an existing track record. Ways of making venture capital available need to improve. Some suggestions made are that the Professional Associations should lobby Government and business to provide adequate resources, and secondly that traditional sources of funds (Banks, and the Small Business Development Corporation) are too conservative for the South African market. A structure is needed where funds are administered more flexibly.

- Business partnerships were seen as essential. These could be direct, where a (larger) business takes a stake in an SMME, or indirectly, through an aggressive outsourcing strategy.

Infrastructure-related issues, including universal access

- Greater bandwidth availability is required to allow rollout of an extensive range of applications, such as distance learning and telemedicine. These are essential as they underpin education and health, which are priority developmental focus areas for the South African government.

- Not enough use is made of existing available bandwidth e.g. ESKOM, TRANSTEL and Denel. For example, Transtel could pull communication lines from train stations, Denel has capacity available from former defence activities.
- Fibre-optic and copper cables are stolen; alternative wireless technologies should be more widely applied, particularly in rural areas.
- GSM is expensive – increased distribution will result from pre-paid cards and from the current innovative pay structures for incoming and outgoing call-cards
- More competition is required in the telecommunications industry. The introduction of the 2nd or 3rd fixed land line licences will help to increase competition and improve service levels.
- The Telkom monopoly is seen by most of those consulted, as a major constraint to the development of the communications industry. It is acknowledged that this has resulted in phone service in remote areas, which is unlikely to have happened without protection of the industry. As universal access is regarded as a basic right, this should reside with the State. A feeling was expressed that the market place has changed since the initial decision to allow a monopoly and that to persist would be counter-productive.

Negative aspects were frequently quoted and included:

- Telkom is incentivised towards inefficiency (protects their revenue base; no real motivation for efficiency)
 - “Not delivering on targets for repairs, implementation or access to information”
 - The Minister of Posts, Broadcasting and Telecommunications has Telkom, DOC and SATRA reporting to her. This is seen as problematic - as an example, the recent application for a GMPCS Licence by Iridium was granted as an interim measure and then withdrawn unilaterally by the Minister. There needs to be greater coordination.
 - Distorted pricing mechanisms (“In spite of repeated requests, Telkom still has to produce a plausible account of what its local costs are”)
- South Africa lags behind more developed countries in terms of liberalised access to telecommunications. Arguments were raised that developed countries had originally made use of a monopolistic telecommunications structure, and a slow pace of liberalisation. The playing field has however changed and increasing competitiveness needs faster responses.
 - Accessibility is a key infrastructure challenge but relative to other African countries, South Africa has relatively well-developed infrastructure which could be better exploited.

The Role of Associations

- Opinions differed on the need for a multiplicity of associations. This was seen by some as necessary, but companies with a global view believe they achieve little for the industry. Some of the large global corporations do not have membership of South African associations.
- The industry/government interface needs improvement where common issues exist. The suggestions for addressing this vary, from the opinion that an umbrella body is needed e.g. the Information Industries of South Africa (IISA). An alternative suggestion was the use of short-term task teams.

9.4 Human Resource Development

The serious shortage of an appropriate skills base was raised by those interviewed, and was identified as a priority area by all the workshop participants. The skills shortages were viewed in the broadest sense, and there was no particular emphasis on technical or management skills. The need to create a 'pipeline' of potential talent for the skills pool indicated a greater need for coordination between industry, various government departments (Labour; Education; Communications; Trade and Industry; and Arts, Culture Science and Technology).

The issue of general information and computer literacy was raised, and detailed feedback is included in Section 9.5. below.

Some feedback from key stakeholders:

Education and Training

- Education at all levels is crucial. IT-literacy should be introduced from primary school level, as well as at secondary and tertiary institutions. It will not be possible to provide individual (home) access to computers for the majority of South Africans, but the principle of shared access should be encouraged through the roll-out of telecentres and school networks. There are several ways of achieving this:
 - Ensure that all teachers are computer literate, either through upgrade programmes, or through IT-literacy courses as part of the curriculum for newly-qualifying teachers.
 - Ensure that training programmes are instituted at business schools and through short courses such as management development programmes
- A comment was made that
 "Most South Africans are two generations away from being knowledge workers"
- The major constraint identified throughout the study was the lack of an appropriate skills base. Not enough emphasis has been placed on mathematics, science and technology at school level, the result being that too few students pursue study directions which support possible deployment in the IT sector. This also makes South Africa a less attractive country for attracting foreign investment.
- "Short-circuit" training should be considered, with a shorter study period, to produce a more focused skills base.
- The private sector should collaborate with training institutions to ensure relevance of curricula to the IT sector. Some institutions are doing more than others in this environment, but a broader base of support is required. This should include closer relationships with a broad base of institutions.
- There needs to be more investment in training to prepare people for using the new technology. In addition, training should involve multi-skilling to provide exposure to difference application areas. India was quoted as an example of a developing country which has focused on providing a stream of well-educated, computer-literate people, many of whom are entering the growing software market.
- There needs to be a change in paradigm so that matriculants and technikons are not excluded from the job market.
- Constraints in the education sector include:
 - Lack of computer facilities at secondary education level
 - Ignorance on how each one can teach one (in classroom, community and informal setting)
 - Teachers who are untrained and fearful of technology
 - Illiteracy
 - Skills shortage and misorientation of available skills
 - Shortage of multiskills – the gap between IT industry and users is too great

- Major deficiencies in school curricula so that information and computer literacy are not adequately addressed
 - Failure of professionals to cope with the rate of IT change and challenges.
 - Need for a stronger emphasis on entrepreneurial skills. Lack project managers and people with a grasp of the business implications of IT. One suggestion was for an IT-specific MBA.
- More experienced skills are required in systems analysis and design, and total systems integration - systems programmers. The training of technical labour also needs to cover an understanding of the sector in which they are employed. Specific technical skills currently in demand are Oracle, database management systems, middleware and geographical information systems (GIS) .

Brain Drain

- The migration of skills for socioeconomic reasons and better opportunities, is resulting in movement out of the country. It is not only financial reward that is leading to emigration but also job-hopping for short-term financial benefits.
- Certain developed countries have specifically targeted South African graduates – these are headhunted before they have even completed their undergraduate studies.
- There is disagreement about the extent of job losses. The VANS industry believes that most of the current job losses are within the country, but that job-hopping between organisations is the major factor in perceived job losses. None of those interviewed could quote exact figures. Heavy losses in particular categories, as identified by an executive headhunter, include accountants, doctors and dentists, actuaries, finance specialists and IT skills related to each of these areas.
- The absence of an aggressive IT skills import programme to South Africa is problematic. In addition, current migration policies are rather prohibitive to attract skills.

9.5 Creating the Information Society in South Africa

The need to address Information Society issues was raised as a major issue throughout this study. The general consensus was that South Africa was not likely to play a role in the global information economy if it did not develop a national vision for ensuring that all the people in South Africa understood the significance of global issues relating to IT.

Many comments from key stakeholders dealt with the need to raise levels of awareness and to address universal access in a more significant, and more visible manner.

Of significance was the lack of awareness of broader IT-related activities which are currently being undertaken by bilateral and multilateral donors. The private sector has little awareness (or interest) in these activities, yet better coordination with the private sector may result in better leveraging of donor funds to realise the creation of an Information Society.

Universal Access

- Government should play a key role in infrastructure rollout. For example, the Universal Service Agency (USA) can do so through funding and the encouragement of entrepreneurship through job creation in the IT sector. Universal Access requires:
 - Affordable, simpler devices
 - Free Internet access
 - Free/very cheap local calls

- Good management plus stakeholder support.

The Universal Service Agency has been on a steep learning curve, with the rollout driven from a political perspective – this is viewed as problematic for effective rollout and has therefore had limited success in achieving universal access objectives. The structure needs to be based on private enterprise/franchising once initial investment completed

Information and Computer Literacy

- Greater emphasis needs to be placed on increasing the visibility and accessibility of ITs. Many in South Africa still view the IT industry (and computers) as elitist and far too complex for the average person to understand and use. This stereotyping is a major constraint in developing the information society in South Africa. Fear and insecurity is a problem inhibiting the adoption of IT. The underlying principle which should therefore drive this awareness, is the reduction of stereotypes and perceived elitism, the integration of IT into everyday life, and IT training that is affordable.

Creating general awareness of the Information Society

- There is a need for a broader range of players to assume responsibility for disseminating information on the role of ITs. These include:
 - Vendors, who drive demand but fail to stimulate broad awareness, and have over the past years decreased their role in educating users. There should be much stronger linkages between vendors and the organisations that are their clients.
 - Associations, who should play a greater role in spreading IT-awareness to their members as well as to the broader user community. An example of note is the Computer Society of South Africa's adoption and introduction of the International Computer Driver's Licence.
 - ITs need to be visible. This can be achieved through focussed implementation initiatives:
 - the rollout of IT usage by government e.g. the introduction of the PITs (public information terminals) in post offices. A similar initiative could be planned for all clinics.
 - Schoolnet SA is already doing this through the rollout of Internet access to schools.
 - Financial services and the provision of ATMs, which could be expanded to include Internet access
 - An agency should be created, similar to the HIV agencies, which raises the level of awareness on ITs. These should be easily accessible.
- Promotion of IT-literacy should be undertaken through various mechanisms such as the use of TV and street advertisements. The introduction of information inserts on IT and computers in newspapers (national and local), similar to the Read Right inserts in local papers, could be used.

Chapter 10

RECOMMENDATIONS AND ACTIONS

10.1 Competitiveness

- Labour legislation is unattractive for the foreign investor. **Incentives to attract foreign investment have to be improved.** Once
- **Create incentives for the private sector to invest in retraining of staff** (tax breaks for providing training, PCs to staff, support to universities and technikons). The skills levy is about to be introduced, but innovative alternatives should be considered.
- **Establish coordinated structures to support SMME development specifically in the IT sector.** This requires establishing what the specific requirements of the SMME sector are, the barriers and constraints to developing business in the sector, and devising solutions which will encourage growth in this part of the sector.

Implied in this recommendation is the need to understand more clearly what is happening in this sector. Current data collection structures make it extremely difficult to assess reliably the nature and size of the SMME sector in South Africa. This is exacerbated by the explosion in small software development companies who are not listed and whose data cannot be easily accessed through the SIC system used by the SSA.

- **Investigate the development of more appropriate IT-related indicators** which will reflect the realities of the industry. The fact that research and monitoring activities undertaken by the private sector do not use the current SIC classification, but rather categorisations more easily recognised by the sector, is significant.

10.2 Enabling environment

- **National objectives should be set to develop the IT industry as a key industry** and should be given strategic priority by government. The current situation does not recognise that the stimulation of the IT industry creates a major national opportunity to grow the economy.
- In line with the above recommendation, **stronger coordination is required between the industry, government, IT-related associations and other key stakeholders**, to develop a national vision for the IT industry. The SAITIS project is seen as a possible mechanism to do so and there was general support for this as one possible mechanism.
- **Investigate the development of a coordinating mechanism for IT-related associations.** There is presently no body which fully represents the IT sector to government. The IISA may go some way to meeting this objective.

A better option may be to create a task team, with a limited lifetime and clear brief regarding outcomes, which will examine the creation of an investor-friendly regulatory and policy environment to ensure growth of the IT industry.

- **Guidelines and regulations for SATRA should be re-examined.** Since a monopoly currently exists in this country, it is necessary to strengthen SATRA's ability to regulate and monitor the dominant players. Closer examination of the British Regulatory Authority is recommended as a possible solution. Since the telecommunications industry is one of the largest growth areas in South Africa, It is imperative that this be addressed.

The reporting lines within government are not optimal and should be re-evaluated, particularly where the Department of Communications, SATRA, and the SABC report to the same Minister

- The monopolistic nature of the telecommunications industry was regarded as one of the major stumbling blocks to growth of the IT industry. **The Telecommunications Act should be reviewed to prevent an extension of the Telkom monopoly beyond 2002.**
- **Investigate mechanisms to improve access to venture capital.** This should include initiatives to match venture capital with prospective entrepreneurs.

10.3 Human Resource Development

This has been identified as the major constraint throughout the study, as well as in the Foresight process. The general population is uneducated in terms of how IT can impact on their lives, and on the economy. Likewise the industry does not have enough skilled people to grow the industry, not is there any mechanism in place to grow the skills base at all levels.

- Establish a strategy to actively **encourage foreign nationals to work in the IT industry** in South Africa. This will require collaboration with the Department of Home Affairs as this Department is mandated to deal with migration.

Investigate opportunities to **import IT skills into the country.** Identify potential sources of skilled labour. This will require action to address the current restrictions on importing staff from other countries. Attract South African exiles. Work with the donor community to investigate the establishment of skills development programmes in IT. Make use of experienced volunteers on sabbatical, as a short-term solution.

- There is a need to create mechanisms which **will ensure stronger linkages between industry, government and educational institutions** so that the right skills mix is developed in South Africa. A possible solution may be the formation of an IT Skills Task Team comprising these parties, similar to that recently formed in Australia to address the skills shortage problems.
- **Entrepreneurial development training** is required at secondary and tertiary levels of education. There are too few skilled staff who understand business and who can apply their IT skills into the business. This relates to the need to integrate business training with technical training. There is also too little emphasis on training IT management, and current experience indicates that a good technical person does not necessarily make a good manager.
- **Training programmes should be addressed as part of a national IT strategy and not as a separate initiative.**

10.4 Creating an Information Society in South Africa

The IT industry strategy is not likely to address the broader creation of a South African Society. It will however have to take cognisance of the need to do so, and realise that this in itself may create business opportunities within the country but also in other developing countries.

The emphasis on infrastructure rollout, public Internet access points such as the PITs and Telecentres will increase the demand for IT-related services. The need for innovative solutions to increase visibility of Its may also create an opportunity for technology-enhanced learning technologies.

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COMESA	www.comesa.int
Gauteng Provincial Government (Gauteng SDI)	www.gpg.gov.za
International Monetary Fund (IMF)	http://dsbb.imf.org/country/zafcats.htm
International Telecommunications Union (ITU)	www.itu.int
JobNavigator	www.jobs.co.za
ITWeb Survey	www.itweb.co.za

PWC Telecommunications Information	www.knowledgedirect.net/telco.html
Regional Telecommunications Restructuring Program (RTR)	http:// rtr.worldweb.int
SADC	www.sadc.int
SA Dept of Trade and Industry (DTI)	wwwdti.pwv.gov.za
SA Government Information	www.polity.org.za
SA Reserve Bank	www.resbank.co.za
SA Y2k Centre	www.y2k.org.za
SIC/NAICS codes	www.census.gov
Statistics SA	www.statssa.gov.za
Unit Standards (CSSA)	www.cssa.org.za/publ/ProfSTds.html

APPENDIX 1: INDIVIDUALS AND ORGANIZATIONS CONSULTED

State-owned enterprises

Ariel Technologies	Zeth Malele	Chief Executive Officer
CSIR	Bob Day	Manager, Mikomtek
Eskom	Gerrie Almon	Senior Executive - IT
Sentech	Dr Stephen Mncube	Chairperson of the Board
Sentech	Dr Sebileto Mokone-Matabane	Executive Director
Telkom SA	Letsile Mphachoe	Manager
Transnet	F C Nunnally	Senior Executive, Technology Infrastructure

Large-sized companies

Altech	KC Van Straaten	Director
Computer Alliance SA	Dale Murphy	SAP Business Development, Executive Director, Solutions Division
Dimension Data	Neil Harding	Business Development Manager
Hewlett Packard	Phindi Maseko	Executive Director
IBM (Cape Town)	Zamile Mazantsana	IT Director
Internet Solutions/ Dimension Data	David Frankel	IT Strategic Planning Manager
Murray & Roberts Gillis Mason	Uneal Pillay	Chief Information Officer
Old Mutual	Dennis Stevenson	
Oracle SA	Kgopi Mathibedi	
Sanlam	Hannes van Rensburg	

Small / Medium-sized companies

Afrozone Telecommunications	Majakathata Mokoena	Managing Director
Badisa Technologies	Tumi Magasa	Chief Executive Officer
BCNK Consulting	Khaya Ntshinka	Managing Director
CEQRUX Technologies	Chris Pinkham	
Corporate Defense Solutions	Dharmesh Mohan Dullabh	Managing Director
Everest Systems Solutions	Solomon Ngubane	Managing Director
OSI Holdings	Pule Ganyane	Director
Khulisa Solutions	Ntlai Mosia	Managing Director
Motswedi Technologies	Joe Tsotetsi	Chairperson
NIIT	Sunil Singh	Managing Director
NIIT	Tahzier Isaacs	Manager
Smartway Services cc	Mlungisi Mthembu	Managing Director
Thusano IT Solutions	Ntuakuseni Nevhuthalu	Managing Director
Union Alliance Holdings	Steven Zintl	Chief Executive Officer

Unions

COSATU NALEDI	Charley Lewis Claire Horton	IT Director Researcher
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Government

Dept of Arts, Culture, Science And Technology Dept of Communications	Phil Mjwara Dante Mashile Andile Ngcaba	Director (Coordinator: Foresight) Assistant Director: Marketing Director-General
Dept of Education	Vis Naidoo	Director: Educational Technology
Dept of Public Service Administration Gauteng Prov Government SATRA State IT Agency (SITA)	Theo Nkone Mohammed Bhayat Donna Roberts Kgabo Badimo Mohammed Cassooge	Chief Director, IT Chief Director, IT Attorney (USAID) Head Office Co-ordinator Director
Western Cape Dept of Economic Affairs	Nigel Gwynne-Evans	

Associations

African Telecommunications Forum Black IT Forum (BITF) E-commerce Association of South Africa Internet Service Providers Association (ISPA) IT Association (ITA) IT Association (ITA) C Town VANS Association of SA	Charles Letlako Simon White Mike Lamb Ant Brooks Toni Quattrocicere Steven Louw Mike van den Bergh	Executive Director Managing Director Chairman Director Executive Director Director
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Academia / Education

Cape College De Montfort University SA Soweto Technology Project	Ryan Smith Prof Johan Smith Tom Baloyi	Head: Management Managing Director Development Programme Manager Link Centre
Wits Bus School P&DM Wits Bus School P & DM	Ashraf Patel Francis Malema	

Recruitment Agencies

Redelinghuys and Partners Vertex Commercial Services	Johan Redelinghuys Lee-Anne Thompson	Senior Partner Managing Director
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Other

Board of Executors	Kevin Johnston	IT Manager
Board of Executors	Andrew Morris	
Legilink, CITI Board	Chris Newton	Director
Independent Consultant/CSSA	Christopher Guy	
Independent consultant	Gwynn Prickett	
Independent Consultant	Arthur Williamson	
Intelligence Magazine	Michael Herman	
ITNQF / SGB	Jim Yeomans	Consultant
SANGONET	Njenga E. Njuguna	Marketing Officer
Trade and Industrial Policy Secretariat (TIPS)	Rashad Cassim	Executive Director

APPENDIX 2: SIC AND NAICS

This appendix provides the SIC division structure as well as the broad SIC/NAICS correspondence tables.

SIC Division Structure

- A. Division A: Agriculture, Forestry, And Fishing
 - Major Group 01: Agricultural Production Crops
 - Major Group 02: Agricultural Production Livestock And Animal Specialties
 - Major Group 07: Agricultural Services
 - Major Group 08: Forestry
 - Major Group 09: Fishing, Hunting, And Trapping

- B. Division B: Mining
 - Major Group 10: Metal Mining
 - Major Group 12: Coal Mining
 - Major Group 13: Oil And Gas Extraction
 - Major Group 14: Mining And Quarrying Of Nonmetallic Minerals, Except Fuels

- C. Division C: Construction
 - Major Group 15: Building Construction General Contractors And Operative Builders
 - Major Group 16: Heavy Construction Other Than Building Construction Contractors
 - Major Group 17: Construction Special Trade Contractors

- D. Division D: Manufacturing
 - Major Group 20: Food And Kindred Products
 - Major Group 21: Tobacco Products
 - Major Group 22: Textile Mill Products
 - Major Group 23: Apparel And Other Finished Products Made From Fabrics And Similar Materials
 - Major Group 24: Lumber And Wood Products, Except Furniture
 - Major Group 25: Furniture And Fixtures
 - Major Group 26: Paper And Allied Products
 - Major Group 27: Printing, Publishing, And Allied Industries
 - Major Group 28: Chemicals And Allied Products
 - Major Group 29: Petroleum Refining And Related Industries
 - Major Group 30: Rubber And Miscellaneous Plastics Products
 - Major Group 31: Leather And Leather Products
 - Major Group 32: Stone, Clay, Glass, And Concrete Products
 - Major Group 33: Primary Metal Industries
 - Major Group 34: Fabricated Metal Products, Except Machinery And Transportation Equipment
 - Major Group 35: Industrial And Commercial Machinery And Computer Equipment
 - Major Group 36: Electronic And Other Electrical Equipment And Components, Except Computer Equipment
 - Major Group 37: Transportation Equipment
 - Major Group 38: Measuring, Analyzing, And Controlling Instruments; Photographic, Medical And Optical Goods; Watches And Clocks
 - Major Group 39: Miscellaneous Manufacturing Industries

- E. Division E: Transportation, Communications, Electric, Gas, And Sanitary Services

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- Major Group 40: Railroad Transportation
 - Major Group 41: Local And Suburban Transit And Interurban Highway Passenger Transportation
 - Major Group 42: Motor Freight Transportation And Warehousing
 - Major Group 43: United States Postal Service
 - Major Group 44: Water Transportation
 - Major Group 45: Transportation By Air
 - Major Group 46: Pipelines, Except Natural Gas
 - Major Group 47: Transportation Services
 - Major Group 48: Communications
 - Major Group 49: Electric, Gas, And Sanitary Services
- F. Division F: Wholesale Trade
- Major Group 50: Wholesale Trade-durable Goods
 - Major Group 51: Wholesale Trade-non-durable Goods
- G. Division G: Retail Trade
- Major Group 52: Building Materials, Hardware, Garden Supply, And Mobile Home Dealers
 - Major Group 53: General Merchandise Stores
 - Major Group 54: Food Stores
 - Major Group 55: Automotive Dealers And Gasoline Service Stations
 - Major Group 56: Apparel And Accessory Stores
 - Major Group 57: Home Furniture, Furnishings, And Equipment Stores
 - Major Group 58: Eating And Drinking Places
 - Major Group 59: Miscellaneous Retail
- H. Division H: Finance, Insurance, And Real Estate
- Major Group 60: Depository Institutions
 - Major Group 61: Non-depository Credit Institutions
 - Major Group 62: Security And Commodity Brokers, Dealers, Exchanges, And Services
 - Major Group 63: Insurance Carriers
 - Major Group 64: Insurance Agents, Brokers, And Service
 - Major Group 65: Real Estate
 - Major Group 67: Holding And Other Investment Offices
- I. Division I: Services
- Major Group 70: Hotels, Rooming Houses, Camps, And Other Lodging Places
 - Major Group 72: Personal Services
 - Major Group 73: Business Services
 - Major Group 75: Automotive Repair, Services, And Parking
 - Major Group 76: Miscellaneous Repair Services
 - Major Group 78: Motion Pictures
 - Major Group 79: Amusement And Recreation Services
 - Major Group 80: Health Services
 - Major Group 81: Legal Services
 - Major Group 82: Educational Services
 - Major Group 83: Social Services
 - Major Group 84: Museums, Art Galleries, And Botanical And Zoological Gardens
 - Major Group 86: Membership Organizations
 - Major Group 87: Engineering, Accounting, Research, Management, And Related Services
 - Major Group 88: Private Households
- J. Division J: Public Administration
- Major Group 91: Executive, Legislative, And General Government, Except Finance
 - Major Group 92: Justice, Public Order, And Safety
 - Major Group 93: Public Finance, Taxation, And Monetary Policy

Major Group 94: Administration Of Human Resource Programs
Major Group 95: Administration Of Environmental Quality And Housing Programs
Major Group 96: Administration Of Economic Programs
Major Group 97: National Security And International Affairs
Major Group 99: Nonclassifiable Establishments

SIC/NAICS Correspondence Tables

[refer to www.census.gov for detailed tables]

APPENDIX 3: SWOT ANALYSIS

EMERGING FROM THE SOUTH AFRICAN FORESIGHT PROCESS

Strengths:

A combination of national commitment and licence obligations imposed by government are driving an accelerated roll-out of telecommunications infrastructure. This is complemented by a competent (though far too small) existing skills base, and the enthusiasm and desire amongst the youth of the country to acquire IT knowledge. South Africa enjoys a culture of rapid IT uptake. Having English as the country's common language of communication is a distinct advantage in the international IT field.

Since 1994, the government has followed a path of consultation and accountability, culminating in a Freedom of Information Bill with IT as the enabling technology. Several initiatives are underway to leverage public service delivery through IT.

The existing IT infrastructure in the country is effective; SA is amongst the world's top twenty countries for Internet connectivity. Telkom's backbone, and the IT capacity in financial institutions, the tertiary education sector, the CSIR, and other former statutory organisations, is very good on the whole, particularly in relation to the rest of Africa.

South Africa is the African leader for IT vision, skills, and facilities. International IT links are continually strengthening, and many multinationals see South Africa as the springboard into Africa.

The move towards improving the IT infrastructure and providing universal access is having a positive impact on the economy.

Weaknesses:

Large areas of the country still have minimal IT infrastructure, and, even with the falling cost of infrastructure, many people cannot afford to participate in the information society. Telkom's temporary monopoly excludes competitors from speeding up service delivery. No national strategy is in place for IT, and there is a proliferation of uncoordinated projects.

The literacy and educational base in the country is very weak and skewed, and has a direct impact on the production of scientists, engineers and IT workers. The result is an extreme skills shortage in the IT sector, exacerbated by the brain drain to foreign countries. IT has created elite communities within the already skewed South African society.

The government suffers from many problems which manifest themselves in poor service delivery, and this also extends to public service IT roll-out. Historical baggage in many forms (management, bureaucracy, policy) hampers the rapid establishment of information-based businesses.

The local IT market is small, and has to operate without economies of scale. South Africa has a poor record of technology transfer from multinationals to local operations, and from universities to industry.

South Africa is weak internationally in influencing global IT policy and international standards, and is not competitive in translating international trends into “on-the-ground” roll-out.

Inadequate incentives for international investors, lack of local skills, and crime limit the finances available for IT ventures, which result in less local development and poorer local economies of scale.

ITs provide new opportunities for antisocial behaviour.

Opportunities:

There is growing evidence of a possible emerging Information Society in South Africa: accelerated roll-out of ITs as a result of falling cost, licence obligations of carriers, the availability of new technologies, and a realisation from the developed world that the future IT markets are in the developing countries. The development and implementation of appropriate policies, and the local propensity to become rapid adopters of technology, will accelerate the development of an Information Society.

Through access to the information society, many new methods of education and training become possible.

Government policies and legislation should provide a stimulus for the development of ITs in the country. The Vice-President’s office set an example for this in the years 1994 to 1999, under Mbeki’s leadership.

Access to IT will speed up public service delivery and enhance quality. The use of ITs could transform government. Deregulation provides an opportunity for improvement through competition, and the outsourcing of public sector contracts is an opportunity for the private sector.

The reasonably strong local IT industry, and the local grasp of the problems of developing nations, provides an opportunity for niche software development. The needs of smaller communities, sensitivity to multilingualism, new human-computer interfaces, and translation software, are examples. The Internet affords the opportunity of promoting indigenous knowledge globally. There is less investment in and reliance on older legacy systems compared to developed countries.

Regional and global IT manufacturing hubs will provide the economies of scale that are needed, by exporting to African and global markets. South Africa’s image as the IT leader in Africa affords various opportunities for attracting international partnerships, influencing global IT policy, attracting foreign investment, and promoting skills pools that transcend national boundaries.

Various opportunities exist for financing IT development in South Africa: the creation of an investor-friendly environment, the falling cost of IT, the purchasing clout of the government requiring collateral investment from contract winners, a well developed banking sector. SMMEs are the future of the IT industry, and many opportunities exist for their formation. Greater work environment flexibility can be created as people adopt teleworking, and virtual teams are able to work around the clock.

ITs can help to bring down levels of crime and enhance security and safety.

Threats:

The gap between the information haves and the unwired have-nots is exacerbated by the accelerated adoption of IT.

The labour force is small, and generally inappropriately skilled to benefit from the knowledge era. Retraining is essential, but difficult to implement in reality. The cost of education is escalating,

whilst government is faced with severe budget constraints. Current distance education methodologies are largely untested in mass markets, and there is a lack of feedback from learners.

The government is generally inefficient, and the slow rate at which policies are implemented is inappropriate for the fast-moving IT sector. The levels of IT literacy in the Public Sector is far too low. The effects of government downsizing and privatization will be a worsened redundancy problem for inappropriately skilled workers.

Globalisation could easily lead to the world information society being skewed to the needs and character of the developed world. The high rate of IT technology redundancy and globalisation exposes South Africa to the threat of technology dumping by developed countries.

The declining value of our currency and a local culture of non-payment of services and taxes are major threats to economic growth in a global information society

New forms of social threats arise out of an untrammelled information age: invasion of privacy, increased marginalisation of parts of society, new forms of social control, new forms of crime.

APPENDIX 4: THE PROJECT TEAM

INTERNATIONAL DEVELOPMENT RESEARCH CENTRE (IDRC)

Tina James	Project Leader / Editor Senior Advisor to the Acacia Initiative
Claire Sibthorpe	Project Researcher
Dominic Schofield	Partnerships
Brenda Ngcaba	Research Intern

The International Development Research Centre (IDRC) is a public corporation created by the Parliament of Canada to help researchers and communities in the developing world find solutions to their social, economic and environmental problems.

The Acacia initiative of the IDRC is an international effort to empower sub-Saharan African communities with the ability to apply ICTs to their own social and economic development. The initiative is designed as an integrated program of demonstration projects and research and development to address issues of applications, technology, infrastructure and policy. Further information can be obtained from www.idrc.ca.

The project team is based in the Regional Office Southern Africa in Johannesburg.

The IDRC was commissioned by the Department of Arts, Culture, Science and Technology to produce the international scan of the IT sector for the South African Foresight study.

The Acacia programme is also involved in a collaborative effort with other donor agencies to develop ICT-Scans for several African countries in an attempt to understand more fully the various activities which are underway at country level in Africa.

Tina James has been involved in the ICT environment for the past 17 years, and was employed in various levels of management within the CSIR's Division of Information Services, and then the Division of Information and Communications Technology. She pioneered the Information for Development Programme during this period. Since 1997 she has been associated on a part-time basis with the IDRC's Acacia programme as Consultant, Senior Program Officer and Senior Advisor to Acacia. She started her own consulting business in 1997 and has been involved in various IT-related consultancies during this period. Her previous experience includes project management in both IT and environmental management projects.

Claire Sibthorpe was previously involved with a similar IT Industrial Strategy project in Vietnam, before joining the IDRC in 1999 as a researcher.

MILLER ESSELAAR AND ASSOCIATES (MEA)

Philip Esselaar	Lead Researcher Partner, MEA
Jonathan Miller	Member of SAITIS Project Steering Committee Partner, MEA

Miller, Esselaar and Associates is a Management Consultancy providing consulting, education and research services to clients. The company is based in South Africa with offices in Johannesburg and Cape Town.

The services provided by MEA may be divided into four categories:

- Evaluating the Effective use of ICT within companies
This highly successful approach, based on a combination of interviews plus a survey, has been implemented in a large number of South African and overseas companies. It is concise and yet comprehensive, maximises the result/effort ratio, can be completed in under four weeks and is continuously being updated to incorporate current thinking.
- Strategic Management Workshops.
These workshops have been run for a number of blue-chip South African companies. Strategic Planning is more dependent on technology than ever. The major technology changes that are occurring are examined from the perspective of expected impact on particular industries and companies.
- Structured group techniques are then used to assist in deriving effective strategies.
- Management Training and Education.

MEA specialise in the fields of

- Electronic Commerce training in a broad sense, covering strategic and operational aspects such as positioning, marketing, security considerations and the regulatory environment in place both now and in future.
- Management Training at different levels and from a variety of perspectives
- Knowledge Management (KM) Briefings, where KM is defined as the identification, optimal use and active management of intellectual assets. The briefings cover, inter alia, KM concepts, the management and measurement of intellectual capital, Best practices, technological foundations and tools as well as implementation strategies
- Research into the use of ICT and involvement in civil society initiatives. MEA has been heavily involved in the FORESIGHT process in South Africa through the participation of Jonathan Miller as Chairman of ICT Working Group, DACST Foresight, as well as involvement in the local ICT industry as a member of the Board of the Cape IT initiative (CITI) and immediate past President of the Computer Society of South Africa (CSSA).
- Business simulations
Developed over many years, hundreds of managers and dozens of firms have benefited from this proprietary offering. It simulates a competitive environment and covers manufacturing, distribution, sales, marketing, labour and financial planning.

The MEA principals have had a long and distinguished association with the South African ICT industry through holding senior management/executive positions in leading companies (IBM/ISM, Vodac, UUNET Internet Africa, Caltex), Universities (UCT), and Jonathan Miller in particular has been a frequent speaker at both national and international conferences.

INFORMATION RESOURCES GROUP (IRG)

Angus Bowmaker-Falconer	Lead Researcher/ Director of IRG / Saratoga SA
Yokow Quansah	Project Researcher

The Information Resources Group (Pty) Ltd (IRG) is a specialist Human Resource (HR) research and information technology company. The company is based in South Africa, with offices in Cape Town and Johannesburg and an international research partnership through the Saratoga World-wide HR benchmarking programme. Joint research projects have been undertaken with leading universities and experts in Europe, North America and South Africa. IRG has three interrelated business focus areas: HR Research, HR Information Systems and Strategic HR Consulting. Its client base consists of more than 200 leading corporations in South Africa, and extensive research and consulting work has been done for the South African Government. During 1998/9 IRG project managed Global HR studies in the Cellular Communications and Retail sectors.

Some of IRG's key research activities include:

- The Breakwater Monitor Project at the UCT Graduate School of Business. The Breakwater Monitor is South Africa's leading employment equity research and information service. This research has gathered more than seven years of employment equity data under a voluntary system in South Africa, prior to the introduction of employment equity legislation. This is unprecedented world-wide, and the changes during these seven years provide unique baseline benchmarks for measuring future achievements in employment equity in South Africa.
- Involvement in the South African Employment Equity Project, a USAID funded initiative aimed at providing technical assistance to the SA Department of Labour.
- Employment Equity Index of International Best Practice
- Saratoga World-wide - international human resources research and benchmarking in 25 countries. IRG holds the franchise for Africa and works closely with the European operation, both in research applications development and commissioned industry sector benchmarking studies (international)
- Research submissions to the 1995/6 Presidential Commission into Labour Market Policy and the 1996 Green Paper on Employment and Occupational Equity.
- The 1996 NEDLAC counterpart group and National Training Board study into the Finance and Governance of Training and Education in the Private and Public Enterprise Sectors.
- 1995/1997 South African HR Information Systems Survey.
- 1996-8 Black Management Forum (BMF) Progressive Company Awards.
- 1997 Canadian/South African Employment Equity Practices Survey.
- 1997 ILO International Case Study Research into Social Investment.

IRG's involvement in HR Information Systems has focused on research based database applications for a wide range of customer needs. Some examples of these systems are:

- BenchmarX – an application used by the Breakwater Monitor client base for the capturing of data and for national benchmarking.
- Nampak Monitor – a HR monitoring and executive reporting system used by more than a 100 factories in Southern Africa.
- Saratoga Europe and Africa - data management and statistical analysis system used to automate the research process.
- HR simulation and modelling – we are currently developing a simulation support system for business expansion and resource planning.

FORGE-AHEAD BMI-T/ BMI-TECHKNOWLEDGE GROUP (NOW QUORUS)

Jane Mosebi	Lead Researcher/ Director of Forge Ahead / BMI-T
Teboho Mokoena	Research Analyst

Forge Ahead BMI-T is the first black majority controlled market research Company in South Africa, with an in-depth focus on the Information and Communications Technology (IT) sector. Forge Ahead-BMI-T is a joint venture between Thokoza (51%) and BMI-TechKnowledge (49%) respectively. Apart from its research and consulting activities, Forge Ahead BMI-T arranges conferences on behalf of clients, manages events and provides strategic information to business and stakeholders.

Some of its key activities include:

- Formation of the Hlanganani strategic networking forum
- Landmark research into the black IT business sector and government IT procurement (Gear-Up study)
- IT Capacity Building Handbook in 1998
- Two key reports covering groundbreaking industry research have been produced to date:
 - Black IT and Telecommunications Profile Monitor - Structure of Black Business in the IT and Telecommunications market.
 - Black Investment Consortia and their Activity in the IT Sector in South Africa
- Market surveys on:
 - Black IT Achievers
 - IT Usage Professional Survey.
 - Opportunity Assessment report – public sector spending on IT and Telecommunications
- Supplier Scorecard Monitor – tracking supplier performance towards the goals
- Business Partner Identification and Facilitation Consulting

BMI-TechKnowledge (BMI-T) is South Africa's premier technology-focused market research consultancy company with a ten-year track record in the South African information technology and telecommunications markets.

BMI-T represents International Data Corporation (IDC) in Southern Africa. IDC is the foremost global IT research consultancy, boasting resources of over 400 analysts with offices in 40 countries. IDC has delivered reliable and insightful market data and strategic guidance to IT vendors since 1964 and currently serves more than 3800 corporate clients. IDC is a division of the \$1.2 billion International Data Group.

Through the application of IDC research methodologies, South African analysts are able to ensure that a high level of accuracy and completeness is maintained in sizing markets and forecasting trends in the region. Apart from regular published reports, BMI-TechKnowledge frequently conducts consulting assignments on behalf of clients. Forge Ahead-BMI-T allows the two companies to synergise through complementary expertise, and pool together a wealth of information and experience in the field of telecommunications, information technology, and the empowerment of black business in the IT and telecom markets.

APPENDIX 5: REGULATORY AND POLICY ENVIRONMENT RELATING TO E-COMMERCE

Due to the increasing attention in South Africa to e-commerce as a major driver of the economy, the baseline study on the IT industry includes this section on legislative aspects thereof. This section draws extensively on the Department of Communications' discussion paper on e-commerce and particularly the Due Diligence Report which was produced by Edward Nathan and Friedland (<http://www.ecomm-debate.co.za>).

A5.1 What is electronic commerce?

Electronic commerce (or e-commerce) encompasses all business conducted by means of computer networks. It reflects a paradigm shift driven by two primary factors - a wide range of converging technological developments and the emergence of the so-called "knowledge economy". This knowledge economy is in turn characterised by:

- an emphasis on the human mind, rather than merely physical automation;
- being information- rather than energy intensive;
- sustainability through networks, not single organisations;
- supporting distributed rather than centralised intelligence;
- requiring multiple skills and continuous learning;
- replacing lifetime employment with labour market flexibility;
- customised rather than standardised products; and
- being enabled by information and communications technologies (ICTs), whilst simultaneously driving the development of new ICTs.

Among the principal activities that can be identified as contributing to global e-commerce are:

- government services and information;
- business-to-business wholesale and retail services and sales;
- business-to consumer (and consumer-to-consumer) retail sales and transactions;
- financial services and transactions;
- subscription and usage-based telephony, online and Internet access services;
- subscription or transaction-based information services and software sales;
- advertising and marketing services; and
- ancillary functions contributing to business/commercial activities.

The vast majority of these transactions to date have been taking place in countries with advanced economies and infrastructure, such as the members of the Organisation for Economic Co-operation and Development (OECD). For developing countries like South Africa, e-commerce presents important new opportunities to achieve a more level playing field vis-à-vis larger, more developed economies: it diminishes existing advantages of cost, communication, and information, and can create huge new markets for indigenous products and services. While many companies and communities in South Africa are beginning to take advantage of the potential of e-commerce,

critical challenges remain to be overcome before its potential can be fully realised for the benefit of all citizens.

A5.2 Regulatory framework for e-commerce

It can be argued that the Internet is in a class of its own or *sui generis*. Comparisons in law between other industries are spurious and ultimately misleading. The Internet must be considered in its own context since it marries so many formerly unrelated aspects of law together in an undistinguishable mesh, or more appropriately, web. There is merit in considering that a separate body be established to regulate the Internet which incorporates all the necessary aspects within the one body. This ensures that the law can be, if not pro-active, definitely re-active to changes in this industry. Although it has been pointed out by various authors (DOC discussion document; Hofman *et al*, 1999) that a pro-active approach to the Internet may be misguided it seems that in various areas, particularly in the area of electronic payment a pro-active (“top-down”) stance should be adopted. This body would then incorporate parts of the government in the same way that the Internet incorporates parts of the commercial world. This body could be set up to mirror the functioning of the Internet exactly. To illustrate the concept, a representative from the Departments of Finance, Trade and Industry and others, should collaborate to form this body.

The Telecommunications Act of 1996 chapter 2 state that SATRA’s functions include instituting/defending/opposing legal proceedings, purchasing/alienating movable and immovable property, and entering into contracts generally. This does not, for example, include legislation specific to implementation of smart cards. It is further submitted that the South African Telecommunications Regulatory Authority (SATRA), although forming part of the proposed body, is ultimately ill-equipped to deal with all the aspects of the industry since that was not their purpose in the first place.

A separate court formed to regulate Internet disputes would have merit for three reasons:

- The speed of the Internet has already surpassed the speed of the law. This is evidenced ironically by the fact that there are no cases dealing with the subject, since the public are (understandably) unwilling to incur the costs and more importantly delay of the legal system to settle their disputes. Hofman *et al* (1999) states that the ancient concept of Law Merchants could be incorporated into the Internet. Perhaps today we would be able to term them arbitrators instead of Law Merchants, and so allow a party contracting over the Internet to access their services over the Internet. Later in this document it is suggested that the Certification Authorities (CA) be liable so as to allow the public easy access to justice and in a way sub-contract the CA to obtain justice for them.
- The second reason for a separate court is that this will allow for “bottom-up” or reactive legislation on the part of the courts. It will also allow the presently overloaded judicial system to focus on other aspects of law (such as Family law), and also ensures that the magistrates/judges involved have the necessary expertise in the area of the Internet.
- Finally the growth of the use of the Internet in commerce, and in other areas, is expected to increase massively. Past statistics which are easily available support this contention. South Africa can only be part of this increase by (amongst other things) developing a rapid response to legal issues as they arise. Thus whatever the problem may be as regards the law of the IT industry now, it will be exacerbated in the future.

A5.3 Trust

Trust is probably the best catch-all term to be used when referring to the combination of the following:

- Security
- Privacy

- Digital Signatures
- Certification by Certification Authorities (CA)
- Interpretation of Legislation Affecting Digital Signatures and Electronic Data
- Contracts on the Internet
- Delictual Liability
- Jurisdiction and Enforcement.

The more important topics are dealt with in more detail below:

Privacy

Bearing in mind the constitutional guarantee of privacy afforded by Section 14 of the South African Constitution, the concept of privacy must be addressed by legislation as regards the Internet, in order to afford potential Internet users a sense of privacy. This factor should not be underestimated in its importance to the man on the street. Protection of privacy is vital to the success of e-commerce. There are four major ways that privacy can be protected (Hoffman et al, 1999):

- Legislation by the government to force database owners to conform to various standards
- Self-regulation within the industry
- Informed explicit consent to the use of private information
- Technological filters to limit access to certain sites, and prevent unauthorised access to personal data

While the United States of America (USA) has favoured a self-regulatory approach, the European Union (EU) has in contrast favoured a strong regulatory approach. In particular the German Act has clamped down securely on access and use of private information. This approach, as contained in article 2 of the German Act, specifically ensures that consent or at least knowledge of the collection of personal data is obtained. Moreover the user, unless he expressly waives his right, may access his own information as held by the “provider of teleservices” at any time.

It is probably advisable that, as regards privacy, a conservative approach should be adopted in South Africa not unlike that of Germany’s in order to promote consumer confidence. It is likely that self-regulation in the area of privacy is optimistic, and furthermore hinders the commercial transactions with the EU who ensure that no data can be transmitted to countries (such as the USA) who do not have an adequate level of protection.

As informed consent is part of our own Interception and Monitoring Prohibition Act, it appears to be probable that explicit consent will also form part of our law.

Finally effective technological filters (including firewalls) would definitely increase the confidence of the general public as regards the personal maintenance of privacy over the Internet.

Digital Signatures

If digital signatures were accepted over the Internet, this would provide much needed legal certainty. It would also lead to an even greater explosion of growth in the Internet, and in Internet users. At present, South Africa has no legislation allowing for the use of digital signatures. More importantly an analysis of the existing legislation makes it clear that the present legislation has no provisions for the implementation of a digital signature system, and in many cases the legislation was clearly made well before the concept of digital signatures was invented.

The United Nations Commission on International Trade Law (UNITRAL) as well as the American Bar Association and the International Chamber of Commerce, have drafted model laws that they propose should be considered when drafting legislation affecting the question of digital signatures. It is submitted that the South African Law Commission would be the appropriate body to investigate the potential implementation of Digital signatures within South African Law. This

investigation should be conducted with haste in order to allow an informed decision to be made, while at the same time keeping up with the pace imposed by other nations, many of whom have already incorporated the use of digital signatures within their law.

Certification by Certification Authorities

A Certification Authority (CA) is necessary in the Public Key Infrastructure (PKI) model, using a public key/private key combination for security. The CA would issue the private key to individuals, and allow the public key to be obtained by the public. A description of the operation of the PKI structure is beyond the scope of this article, but has been the subject of numerous analyses.

The following models are some of the possible ways the PKI could function.

The first three options refer to licensing, the second three to government participation in the PKI structure:

- CA's would not be required to be licensed, commercial enterprises would simply set themselves up as a CA and the public would decide whether the CA would survive.
- There could be voluntary licensing, which would afford the licensed CA some legal protection against the consumer (and vice versa).
- Licensing would be mandatory if a company wished to be a CA. Thus the industry standards would be set and regulated by the government.
- The government would be the only CA
- The government would be the primary CA, and would cross-certify all the CA's.
- The CA's would cross-certify each other.

The next issue is what the functions of a CA should be. Being placed at the hub of commercial transactions, CA's would have the ability to provide many services, not just a public key certification function. For instance, a CA would be in the position to provide a degree of liability for commercial transactions, should the identity of the secret key holder turn out to be incorrect. Moreover a CA could hold itself to be liable, to a certain amount for breach of contract, where the CA itself was in no way responsible for the said breach. The incentive for doing so would be firstly a greater degree of trust by the public. This is because it is in the CA's best interests to protect against any breach, and it allows the public easier access to judicial process and enforcement (see [Jurisdiction and Enforcement](#) below).

A greater use of the CA would be made by commercial enterprises (who would pay a subscription) in order to access this increased consumer base. It is submitted that the industry will naturally gravitate towards this approach as a means of inducing more customers to use the Internet to conduct business.

Some of the requirements necessary to be a CA, should licensing be found to be desirable are:

- The CA must be reliable
- It must employ adequately skilled people
- It must use trustworthy systems - hardware and software
- It must have sufficient financial resources
- To publish all relevant information, including procedures for complaints and dispute settlements

Policy decisions regarding mandatory functions of a CA need to be considered and implemented. The e-commerce discussion paper has listed some of the potential policy decisions, as follows:

- Relative (mandatory) liability of the CA
- Legal responsibilities of the CA
- Public reporting requirements

- Organisational and personnel standards
- Range of activities and expertise they may provide

Since international participation is vital when forming an effective web of trust it is fundamental that the technological and legal standards of the CA be in line with international norms. The market as regards encryption is becoming clearer with SET (secure electronic transactions) starting to emerge as the leader.

The regulatory body that would police the CA's could be either the JCSC (Joint Communications Security Council) or the SACSA (South African Communications Security Agency).

Contracts over the Internet

Contract developed from the need of society to have a legally enforceable agreement. This contract in turn allowed business to thrive by providing a means by which the aggrieved party might redress the wrong done to him by the other party (ies), and so providing a degree of certainty in agreements. To this end certain requirements have been developed over many years in order to clarify the law of contract, and indicate the manner in which the law will go about enforcing the contract. The South African law of contract in particular has a long history, dating back to Roman times, from which to draw precedent.

The advent of the Internet poses some specific problems which should ideally be explicitly codified before being tested in court. These include questions such as:

Acceptance

If the offeree communicates his acceptance of an offer by means of e-mail or Internet contract, and because of some technical problem the offeror does not receive it, will there be a contract?

- The answer is not necessarily straightforward since it could be argued that e-mail is not real-time or instantaneous communication in the way that a telephone conversation is. Generally in this situation the offeror sends an answering e-mail indicating that acceptance has been communicated to him. If this e-mail is not received by the offeree, there is still a contract even though the offeree may not know this. If the offeree needs to know whether the contract has been accepted then he may indicate that the contract will only be valid on confirmation of the receipt of his acceptance. Once again this is a suspensive condition, and clearly indicates how the law of contract can be adapted to ensure that a party is protected. Werksmans submits that e-mail and Internet communications will be governed by the information theory, i.e. only on receipt of the acceptance will there be a contract.

If the ISP (Internet Service Provider) is responsible for the failure of communications can it be held responsible for the financial loss to the parties?

-The answer to this is at present in the negative since every ISP to the writer's knowledge includes a clause that removes liability in terms of such communications. There is however a move afoot by the Law Commission to revise the law as regards provisions in disclaimers that are morally reprehensible. This would bring South African law more in line with British law. This could also have an effect on the disclaimers as set out by various web-sites and ISP's.

Cyber-Contracts

As previously mentioned, the law of contract has a wealth of precedent to rely upon. However this precedent cannot be extended to the Internet, particularly with regard to EDI (Electronic Data Interchange) and Intelligent Agents with any degree of certainty. This degree of certainty is vital

for businesses whose liability can be immense if they are mistaken about the attitude the law will adopt. Consequently commercial enterprises are forced to be over-cautious in guarding against potential liability. This in turn results in extra costs for business.

EDI is a system whereby two or more parties use a VAN (Value Added Network) or (more recently) the Internet to communicate. The system is based on a prior agreement whereby the parties involved draw up a complex contract that deals with the various aspects of the parties' relationships. Each contract is adapted to the parties needs. Once this has been done orders can be placed and received by the networks involved and processed by the computer itself. Obviously there must be some human input, but often contracts are concluded by the computers themselves! Since there is a contract which inevitably makes the parties liable for their own system (or not depending on the contract), there is a degree of legal certainty involved. However as EDI evolves it is anticipated (Hofman *et al* 1999, p.112) that EDI contracts will become less extensive, and the courts will have to step in where the contract does not apply to the situation at hand. At present the courts are ill equipped to do this, which is a potential problem inhibiting the growth of EDI.

International Contracts

The question of Jurisdiction and Enforcement is the major factor here, which is dealt with in more detail later in this section. In the case of the Law of Contract it is possible to contract that the laws as regards a particular country will apply, and that a specific courts jurisdiction will be valid, should there be a dispute between the parties. However, in South Africa "the parties should agree to the jurisdiction of a specific country's courts, subject to the caveat that a court may refuse to hear a matter if it does not have inherent jurisdiction because jurisdiction may not be imposed by consent of the parties upon a court" (my emphasis).

In other words an agreement to allow a certain court to have jurisdiction does not mean that the court will agree that it has jurisdiction. If enforcement of the judicial order is uncertain or impractical the court may refuse to hear the matter, and the parties involved will be forced to find another court willing to claim jurisdiction, or even worse the aggrieved party (ies) will not have an action at all.

Thus jurisdiction and enforcement of the law should be researched thoroughly before a contract is concluded.

In South Africa we would be wise to follow the international community and in particular UNITRAL's (the United Nations Commission on International Trade Law) lead so as to keep up with the international community as regards their standards when dealing with foreign jurisdiction.

Jurisdiction and Enforcement

Jurisdiction is the ability of the court to have the legal authority to begin to consider the dispute at hand. Thus before any mention of the merits of each case is made there must be some reason that the court can use to found jurisdiction. If another court has better reasons for hearing the matter then the court can still refuse to hear the case, even if it could also have jurisdiction. Things such as the particular legal issues involved (e.g. breach of contract), specific facts (the breach occurred in Saudi Arabia), and the parties involved, are the most important issues. The domicile of the parties (especially the defendant, since the plaintiff normally follows the defendant to his domicile, should he not be able to adduce enough reasons for another court to claim jurisdiction) is an especially important factor.

These are also considerations as far as domestic jurisdictions concerned, however the situation becomes more complicated when there is the situation where two different countries can claim

jurisdiction by means of their law. Thus there is a conflict. Who should hear the case? Should it be both countries or just one, and which one? If that court makes a decision will it be enforced in the other country? All of these questions are (fortunately) not new, and so procedures have been made to deal with these situations. There are four main issues when it comes to foreign jurisdiction.

- 1) *Territorial Sovereignty* – states have sovereign authority in their borders but no authority outside of them.
This is immediately in conflict with the concept of an IT industry which is borderless. More importantly does any court have jurisdiction over a web page that (it could be argued) was present in its territorial jurisdiction at some point? It is submitted that jurisdiction should only lie where the web page is hosted. If this were not to be accepted there could be multiple decisions regarding the same web-site by different courts, all of whom claim jurisdiction.
- 2) *Comity* – States should, out of respect for another countries' legal system, be prepared to accept some of their judgements. In South Africa we have various treaties that provide for reciprocity in various matters.
- 3) *Close Connection* – How close the connection is between the act, the parties, and the contract. If the other country has a closer connection to the factors of the case that court should hear the case.
- 4) *Reciprocity* – If we recognise other countries' judicial decisions, they will in turn recognise ours.

To repeat three factors are especially important, to wit:

Particular legal issues involved

Parties to the dispute

Specific facts

These will determine jurisdiction. The leading concept in South Africa is close connection (using these three factors). In other words which country has the closest connection to the dispute. In addition the courts also consider whether or not the court in which the judgement was made will be able to enforce the decision, and if it were to be obliged to have the judgement enforced by a foreign country, whether that country will respect the judgement. The court could refuse to accept the judgement should it be that their law was substantially different from the country where the decision was made. (A good example could be defamation).

Identity of the person to be sued

This may not be easy, especially if the person is deliberately re-routing defamatory comments (for example) through an anonymous remailer. The person could also have a false e-mail identity, or possibly have a false IP address (this is called spoofing). If the information were to be held on a web page where the host computer is a university or commercial host, it may be very difficult to follow up the identity of the infringer.

This returns to the question whether the host (e.g. the commercial site) will be held by South African law to be liable for publication. If not it may be appropriate for the courts to force disclosure of the identity of the infringer. In the United Kingdom an adaption of the *Norwich Pharmacal* order allows the courts to force the host computer to disclose the identity of the infringer (if the host is itself not liable), although the plaintiff will pay for the legal costs of the host.

Transportability of sites

The ability of sites to pop up in differing jurisdictions and to subsequently disappear before the identity of the perpetrator can be identified is a significant problem, as regards both jurisdiction and enforcement.

The method that South Africa uses to combat this could be by means of bilateral and multi-lateral treaties many of which are already in place (the Berne Convention). However this only affects intellectual property, and does not extend to other areas of law, such as contract, where separate treaties will need to be formulated. Sanctions, in the form of complete disconnection of communication facilities (and other less extreme methods) could also be considered as a means of restricting another countries abuse of intellectual property rights. It should be noted that the more technologically advanced nations (such as the USA) have already had problems as regards intellectual property (e.g. China) and will be vigilant in an attempt to reduce the theft/unauthorised reproduction that occurs. Nonetheless the fact that it has become so easy to reproduce copyrighted works, and so hard to restrict such practice has lead to a few writers suggesting that intellectual property should be the domain of the multitudes, and not subject to copyright.

Legislation affecting business is as follows:

- The Business Names Act No.27 of 1960 which effects all businesses. It is submitted by Edward Nathan and Freidland that this Act (designed to ensure transparency of business in correspondence) includes electronic correspondence. Consequently it appears that it could use this Act to found jurisdiction with foreign “businesses” who carry on “business” in South Africa.
- The Imprint Act No.43 of 1993 is similar to the Business Names Act in that the purpose is to ensure that the printer is mentioned in the document if distributed in South Africa. This could also be used to found jurisdiction over foreign companies.
- The Protection of Businesses Act No.99 of 1978 gives overwhelming power to the Minister of Economic affairs to give or refuse permission to enforce a foreign judgement in South Africa. This Act introduces uncertainty about enforceability of foreign judgements and is a major barrier in the current Internet climate.
- Finally the Armaments Development and Production Act No.57 of 1968 makes it is an offence to export/import/convey in transit/develop/market and manufacture armaments. This too could be used as a tool to found jurisdiction as regards marketing armaments over the Internet.

It can be seen that Jurisdiction is a difficult area of law that, in spite of its history, will be placed under increasing pressure as Internet commerce grows. The potential of CA's to be liable for various contracts (and so act essentially as an insurance company) is a potential means of bypassing both the jurisdictional and enforcement problem. All potential solutions, such as Internet Courts, Law Merchants/arbitrators and so forth should be examined to see what would be the best solution. It is submitted that South Africa would do well to emphasise accessibility to justice before quality of judicial process. In short some justice is better than none.

A5.4 Taxation

Taxation of electronic data is fundamentally difficult to enforce. In order for data to be taxed, there must be a distinction between taxable and non-taxable data (and there isn't). Moreover any software that is developed to try to filter out such data will inevitably be bypassed by programs designed specifically to confound such a filter. “Bit taxes” are not an option since this amounts to a restriction of the availability of the Internet, and an ultimate frustration of the whole concept of an information superhighway.

In the light of the difficulties involved in taxing electronic data a one-year moratorium has been imposed by the WTO; since South Africa is a member this has effectively been implemented here and may be made permanent.

Taxation is intimately connected with similar jurisdictional problems as faced by a large part of the law relating to the IT industry, particularly the law of contract, delict, and Intellectual law. Thus no mention is made of it here, aside from a reference to the appropriate section.

Once again similar problems exist when dealing with the definition of “goods” as was alluded to previously in the law of contract. This should be remedied in line with the recommendations of the WTO. Ultimately it is reassuring to know that South Africa is only one of many nations that have exactly the same problems when considering taxing electronic data. South Africa can conceivably simply follow the developments of taxation internationally instead of making a specific concerted effort to pioneer a taxation system.

Customs duties and tariffs of physical goods should logically be unaffected by the use of the Internet to conclude the contract. Indeed the method of contracting is largely immaterial to the amount of duty paid. However one of the potential spin-offs of contracting over the Internet will be the delivery of low-cost international goods which of course have to be taxed as they enter the country. Where this will become a problem is when an individual wishes to buy a low-cost item such as a baseball cap from an overseas retailer, and thereby bypass the middleman in South Africa. The individual then has to deal with customs directly. This could result in a large amount of relatively trivial items having to be processed on an individual basis by customs. The time and effort involved and the taxes levied could amount to an off-setting of the advantage of avoiding the mark-up imposed by the middleman. However, rather than simply allow the South African industrial sector to be protected by default rather than by intention, it is submitted that a more active approach should be adopted where the South African Industry is either intentionally protected, or not. For instance there will be classes of goods that are only available from an international retailer. If this is the case it would appear that it would be beneficial to allow for a speedy and easily imposed tariff process to be implemented over the Internet. Would it be possible (and desirable) for goods to enter the country and simply be taxed as they entered without reference to the owner? More importantly a service whereby the tariff that would be imposed can be ascertained by the ordinary individual would be beneficial to the man on the street. This is necessary for the individual to be able to ascertain whether or not it would be cost effective to use the international retailer, or more cost effective to simply go to the South African middleman. This so-called “banality of transactions” is a potential administrative problem rather than an existing one. However after the recent disaster in the ports during the conversion of software to be Y2K compliant by the Department of Transport, it might be advisable to consider the problem well in advance so that if this does become an issue and the ports/areas of entry do become more congested, it will have been foreseen, and allowances will have been made for this.

Another reason for tariffs to be easily available is for the international market to be able to ascertain what the tariff will be without recourse to a customs specialist. For example an e-mail system whereby an individual who wishes to buy a baseball cap could contact the necessary official would be hugely beneficial to all parties. As the Internet becomes more secure, more sensitive imports could also be done in this way. It is envisioned that this should decrease the delay and time and energy expended when importing goods. More importantly it would allow for a streamlining of the existing system.

A5.5 Intellectual Property

Intellectual Property Law is the law of intangible assets, particularly Copyright and Trademarks. Intellectual Property is a universal concept which is regarded as a natural right by many countries (excluding South Africa¹) and is heavily influenced by the Trade-Related Aspects of Intellectual

Property Rights (TRIPS), a WTO brokered agreement which has been in operation since 1 January 1995. South Africa is a party to this agreement. South Africa is also party to the Berne Convention and its revisions.

In the area of Intellectual Property the “free-for-all” attitude of the Internet has given way to legislation and litigation in what was once a vast ungoverned area. South Africa unfortunately has very few cases dealing with these aspects. Most of the domain name disputes, for example, have been settled out of court. However it is anticipated that precedent will emerge shortly, and so the issues need to be examined.

The future development of e-commerce rests heavily on two major intellectual property rights (IPR) issues, viz. the protection of copyrights and related rights, and the protection and equitable allocation of trademarks and domain names. These concerns have been a primary focus of international deliberations in recent years. For example, the WTO has negotiated an Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), making intellectual property an integral part of the multilateral trading system since 1 January 1995.

Because so much of the consumer and business trade that occurs over the Internet involves selling or licensing of information, cultural products and technology protected by holders of intellectual property rights, this medium is especially susceptible to risks of theft or misuse of protected works. The TRIPS Agreement covers copyright and related rights (of performers, producers of sound recordings and broadcasting organisations), trademarks including service marks, geographical indicators, industrial designs, layout designs of integrated circuits, and undisclosed information such as trade secrets and test data. It aims to ensure the adequate protection and effective enforcement of intellectual property rights and the impartial resolution of disputes between WTO members.

Both the TRIPS Agreement and the copyright treaties of the World Intellectual Property Organisation (WIPO) recognise that copyright protection covers compilations of data or other material the contents of which constitute intellectual creations. It has been informally agreed that the impact of digital technology on copyright and related rights has to a large extent been to enable production and distribution of pirated sound recordings, films, software, CD-ROMs, etc. Despite the legal protections offered by these international agreements, the use of trademarks on the Internet continues to raise important questions, with regard to jurisdictional authority.

This can be important for South Africa in at least two ways. First, South Africa's membership and participation in the WTO and WIPO make it vital for the country's laws to be in conformance with those treaties, and for law enforcement and customs authorities to help enforce intellectual property right protections, to ensure uninhibited fair trade. Secondly, the interests of South African creators of intellectual products, including software, recordings, and technical designs, need to be protected both domestically and internationally from illegal pirating of their works, and from unfair use of South African trademarks.

The relationship between trademarks and Internet domain names is also receiving considerable attention. Under each top-level domain (.com, .org, .net, etc.), second-level domain names have to be unique (at least within each country) and have typically been allocated on a first-come, first-served basis within each top-level domain. Trademarks, however, may co-exist in different categories of products and services, and in different territories.

Another controversial question concerns the use of a domain name that is identical or similar to a trademark: under which jurisdiction(s) would it constitute a trademark infringement, and what remedies should be available for the trademark holder? It is not clear how best to develop the governance of the domain name system, and there is a pressing need for a widely acceptable resolution. Conflicts over principles exist between the USA and several other countries. This issue may have added significance for developing countries such as South Africa if the domain

naming system, by default, tends to favour websites in the US, where the system originated and the majority of sites are still hosted.

The Internet Corporation for Assigned Names and Numbers (ICANN), recently established in the USA but under the wing of the Internet Society, will aim to appropriately administer policy for the development of competition in Internet names and addresses. There is resistance to a US-based initiative because a number of countries are seeking to adopt their own domain name systems. Such a view is expressed in a resolution adopted by the ITU (International Telecommunication Union) Plenipotentiary Conference, which stressed "the need for the future system of registration, allocation and governance of Internet domain names to equitably balance the interests of all stakeholders, in particular businesses and consumers, and not to privilege any country or region of the world to the detriment of others". ICANN is currently developing its mandate and looking to appoint non-US directors to ensure international buy-in, but there is still some debate as to the exact way in which various countries might respond to this development.

Current policy and initiatives in South Africa

According to the Edward Nathan & Friedland report, there are several laws currently on the books in South Africa concerning trademarks, copyright and similar intellectual property issues that may need to be updated in the light of e-commerce. For example, the *Merchandise Marks Act of 1941* is primarily aimed at preventing fraudulent marketing of products or goods, and does not apply to services. To the extent that software and other media sold over the Internet are generally classified as services, the law's provisions would not apply, and there is no other established legal precedent to ensure protection of companies' trademarks in the virtual environment in South Africa.

The recent *Counterfeit Goods Act of 1997* goes somewhat further but retains some ambiguities. The purpose of this Act is to prevent the sale and possession of counterfeit goods, but again this does not clearly extend to virtual goods such as software and multimedia transmissions. The Act does define "documents" to include magnetic media and other electronic forms, but this is principally in relation to evidence of counterfeiting, rather than to actual goods that could be considered counterfeit.

There may be similar questions concerning the *Business Names Act of 1960*, the *Trade Marks Act of 1993*, and the *Copyright Act of 1978*. In January 1998, the legislature did pass the *Intellectual Property Laws Amendments Act*, which sought to revise and update some of these and other laws dealing with intellectual property rights in South Africa. This was done in part to bring the country more into line with the TRIPS Agreement and the Patent Co-operation Treaty.

One important set of amendments affecting e-commerce involved the *Copyright Act* and the treatment of copyright in computer programs. Specifically, the amendments apply copyright protection to the reproduction, publishing, broadcasting or transmitting of computer programs in any manner, and any adaptation or use of such programs. These changes should be further reviewed in light of the other distinctions in current law mentioned above, but they appear to set a precedent for preventing improper use of intellectual property in the digital environment.

South Africa has been an active participant in international deliberations on intellectual property rights issues before the WTO and the WIPO. South Africa also hosted a regional consultation of the WIPO in October 1998, with participation by the Patent and Trademark Office among others, along with representatives of several other African countries. The consultation focused on the domain name issue, with an emphasis on understanding the concerns of developing countries in this area.

Questions for policy consideration

The DoC e-commerce policy document poses several questions which are reflected here:

In present and potential South African law, what activities in a digital, virtual environment should constitute an infringement on a registered trademark or copyright? If the use is considered to constitute an infringement under South African law, what remedies should be available, in particular if the transmission originates in another country? What specific legislative changes should be considered?

Are the recent amendments to the national intellectual property laws sufficient to comply with international treaties and the demands of e-commerce? What further amendments and improvements should be considered?

Are the provisions of the TRIPS and WIPO treaties adequate to protect and promote the interests of South African intellectual property rights holders? How in particular does this prevent the exploitation of indigenous knowledge? What should be South Africa's position on further participation in and revisions to these treaties?

What are the particular concerns of South Africa with respect to domain names? Should a domestic domain name policy and authority be established? (See also Section 6.3.) How can the brand names of South African companies and products be protected in an international environment, particularly in the establishment of a new domain name system?

APPENDIX 6: QUESTIONNAIRE