# FORESIGHT YOUTH REPORT

# Foreword

A nation with young people has a future. Any foresight planning exercise that has not included the youth in its scope would have demonstrated a lack of futuristic outlook. As Chairperson of the Youth Sector Working Group of the National Research and Technology Foresight Project, I salute the Department of Arts, Culture, Science and Technology for this initiative. It is the youth that will feel the impact, whether good or bad, of the decisions taken today.

The future growth of this country will continue to be closely linked to the development and empowerment of its youth. The Foresight process carried out by this Sector Working Group resulted in a response that emphasised quality of life for all our youth. Quality of life is important and is related to such issues as health, safety, sports and entertainment. It is much influenced by the economy of the country. The negative consequences of a poor quality of life may be revealed by young people occupying themselves with drugs, crime, and generally bad social tendencies.

According to Bruno Latour, "Research is warm, involving and risky". It creates "controversies" and opens new possibilities. Technology is about the application of the knowledge generated. Research and technology have the potential to be the vehicles that young persons could use to realise their aspirations. However, there is always the perception that human and financial resources in this country are limited. The Youth Sector Working Group believes that, with proper prioritisation and management, a lot can be achieved for this country. We must use what we have wisely to achieve our goals. The Working Group, through this report, has gone ahead and put a vision in place. It is up to the communities, educational institutions, industry, and non-governmental organisations to carry it further.

I would like to acknowledge members of the Youth Sector Working Group for their dedication, creativity, and comradeship. Sipho Zikode carried the responsibility of coordinating the sector activities. We have exceeded many expectations by producing this report. Phil Mjwara, thank you for your support and belief in our potential. The task of compiling this report rested upon Sipho, Greg Ker-Fox, and myself. Foresight is about a strategic plan for a long journey, a journey towards the betterment of life for all who live and work in this beautiful country. The success or failure of the plan will only be known when we actually embark on the journey. Are we willing to take the risk?

# Contents

# Abbreviations and Acronyms

DACST ..... Department of Arts, Culture, Science and Technology
EC ..... European Commission
FTE ..... Full Time Enrolments
GDP ..... Gross Domestic Product
HSRC ..... Human Sciences Research Council
HWU ..... Historically White University
ICT ..... Information Communication Technology
NGO ..... Non-governmental Organisation
NIC ..... Newly-industrialised Country
NQF ..... National Qualifications Framework
NRTF ..... National Research and Technology Foresight
NYSP ..... National Youth Support Programme
OECD ..... Organisation for Economic Cooperation and Development
PUSET ..... Public Understanding of Science, Engineering and Technology
SADC ..... South African Development Community
S&T ..... Science and Technology
SET ..... Science, Engineering and Technology
SMME ..... Small, Medium and Micro-enterprises
STEEP ..... Social, Technological, Environmental, Economic and Political
SWOTa ..... Strengths, Weaknesses, Opportunities and Threats
US ..... United States
WHO ..... World Health Organisation
WWW World Wide Web

# Executive Summary

Foresight is a family of processes intended to capture the dynamics of change by placing today's reality within the context of tomorrow's possibilities. It systematically identifies research and technology areas and market opportunities that are likely to generate socio-economic benefits for South Africa in the long term.

The project has been divided into three phases:

1. The pre-Foresight stage
2. The main Foresight stage
3. The post-Foresight stage.

One of the crucial activities of the pre-Foresight stage was sector selection. The Foresight Advisory Board, the Department of Arts, Culture, Science and Technology and the Foresight Management Team decided on the 12 final sectors to be run in this Foresight exercise, and the Youth Sector was one of them.

The Youth Sector's mandate was to create a vision to link research and technology to the needs and aspirations of the youth. This will empower and develop them to make a positive and meaningful contribution to society.

The project was conducted through a series of workshops involving young and mature people from a variety of backgrounds. Participants identified through the co-nomination process were asked to discuss and develop their thoughts and ideas about the future research and technology areas that are likely to have a major impact on youth.

The first workshop identified areas of the greatest concern to the young people of South Africa, and these focal areas formed the basis of all the sectors that had to follow. The focal areas were:

- Education and training
- Health, welfare and community development
- Economic participation
- Safety and security
- Arts, culture, recreation and sports
- Information and communications
- Moral renewal
- Environment and tourism
- Infrastructure development
- Community development and welfare
- Empowerment.

The strengths and weaknesses of youth were analysed on the basis of the above focal areas. The opportunities and threats facing youth were analysed in the second workshop. The development of the sector-specific scenarios, which are plausible future pictures aimed at investigating key uncertainties that could affect research and technology, also started in the second workshop.

The third workshop was for the purpose of designing the methodology for developing the survey statements and discussing the format of the questionnaire. The sector-specific scenarios were finalised in this workshop. Three regional task teams, formed out of the Sector Working Group members living in the same region, developed the survey statements.

The fourth workshop was, firstly, for the purpose of analysing the survey results and secondly, developing technology themes and recommendations. This activity seeks to identify key technologies that youth will directly interface with. It intends to ensure that youth are placed in the centre of technology discussions in South Africa.

Similar technologies were grouped so as to capture technology themes (areas). This was followed by a closer analysis of these with regard to their attractiveness and feasibility. This allowed the identification and prioritisation of implementation.

The recommendations of the Sector Working Group were as follows:

### Broadcast technologies

Noting that broadcasting technologies have the potential to be used by youth for their own development, and that South Africa has an above-average technology infrastructure, we recommend that —

- government create favourable policies aimed at stimulating involvement by small business in broadcasting and encouraging local content. The local content should also emphasise youth programming.

### Information systems

Noting that information systems are feasible and attractive, we recommend —

- greater government coordination so as to ensure that information is disaggregated in such a way that young people can access information on careers and growing economic sectors. Statistics SA should have a better information dissemination programme, particularly for youth, who need to address their own special issues.

### Internet working technologies and multimedia technologies

Noting that Internet working technologies are highly attractive while multimedia technologies are moderately attractive, that the infrastructure is alreadyin place, providing a good platform from which to work, and that there is potential for further development in tertiary institutions, we recommend that —

- a human-resource base be developed in schools and teacher-training colleges (government must provide incentives to encourage skilled individuals to train teachers on intelligent use of these technologies); and
- rural and outlying schools be linked with tertiary institutions and local municipalities (one school should have at least one computer linked to the Internet).

### Medical technologies

Noting that medical technologies have the potential to improve the quality of life of young people, we recommend that —

- youth have easier access to telemedicine (government should create the necessary infrastructure in youth centres, schools, and related areas).

### Mobile facilities

Noting that mobile facilities are not widespread, we recommend that —

- government create policies in support of the expansion of mobile facilities;
- more effective coordination and incentive schemes be encouraged to stimulate private-sector investment through subsidies for small business to develop mobile facilities; and
- the use of mobile facilities in rural areas be promoted and emphasised (quality-control measures should be introduced to monitor and evaluate the content of mobile facility programmes).

### Satellite technologies

Noting that there is a growing need for better infrastructure and that greater use of this technology should be encouraged, we recommend that —

- government invest in satellite technologies that will increase the number of radio and TV channels;
- government encourage the development of youth channels; and
- the use of this technology for crime prevention should be encouraged.

## Sports technologies

Noting that sports technologies have the potential to enhance the performance of young athletes, we recommend that —

- small companies become more involved in the development of new technologies to improve sports performance;
- government develop enabling policy to promote and systematise early detection and development of sports talent; and
- government develop more sports facilities that will advance the participation of women in sport.

## Virtual reality

Noting that virtual reality has a low feasibility and attractiveness we recommend that —

- a favourable policy framework be put in place to encourage the development of virtual reality technologies.

# Chapter 1

## 1.1 Background

The National Research and Technology Foresight (NRTF) Project is an initiative of the Department of Arts, Culture, Science and Technology (DACST). It aims to systematically identify research and technology areas and market opportunities that are likely to generate socio-economic benefits for South Africa in the longer term (10 to 20 years). In particular, it seeks to —

- identify those technologies and latent market opportunities that are mostly likely to generate benefits for South Africa;
- develop consensus on future priorities among different stakeholders in the selected sectors;
- coordinate the research efforts between different players within the selected sectors;
- reach agreement on those actions that are needed in different sectors to take full advantage of existing and future technologies.

The project has been divided into three phases:

- The pre-Foresight stage, a pre-Working Group phase, which was aimed mainly at refining the design of the project, consultation with various stakeholders, and selection of Foresight sectors.
- The main Foresight stage, during which a group of about 25 individuals (the Sector Working Group) analysed a given sector, decided on future priorities and reached agreement on those actions that are needed in different sectors to take full advantage of existing and future technologies.
- The post-Foresight stage, which will see the implementation of the Foresight outputs.

## 1.2 The Foresight Methodology

The Youth Sector operated according to an overall foresight methodology. The Foresight Mission (see 1.5) was based on the Vision articulated in the White Paper on Science and Technology and served as a basis for each Foresight Sector's mission and particular focus. Once constituted, the Sector Working Groups were responsible for finalising the boundary conditions and terms of reference within the overall Foresight framework (Figure 1.1). Specific steps were required to ensure the consistency of the process across sectors.

These steps consisted of —

- surveys of relevant studies and initiatives in the field, both nationally and internationally, to produce what are referred to as the Local and International Scans;
- a SWOT analysis of the sector (Strengths, Weaknesses, Opportunities and Threats);
- a STEEP analysis (consideration of all major factors pertaining to Social, Technological, , Environmental, Economic and Political issues as they impacted on the sector);
- application of the Logic Chain Methodology to check consistency and context;
- an iterative process to compile a situational assessment — including the survey described in Chapter 4;
- a strategic analysis and the available choices in the context of possible future scenarios;

- setting long-term objectives and identifying key technologies; and
- implementation and incorporation of the products into the programmes driven by the Foresight process.

## 1.3 Foresight Sector Selection

One of the crucial activities of the pre-Foresight phase was the sector selection. The sector is the core operational component of the entire Foresight process. Therefore it was decided that sector selection would be conducted in an inclusive and transparent manner with a strong focus on participation and empowerment.

A strong driver behind this approach was the recognition that an important determinant of the success of the Foresight initiative was the level of 'buy-in' and ownership of the process by the various stakeholders. Another driver was the possibility of using the sector selection as an opportunity to set up a database of expertise to draw on for the running of the project.

In order to achieve these objectives, the instrument decided upon for Foresight sector selection was a series of countrywide workshops for organisations and institutions that have a stake in research and technology. Care was taken to ensure that the participation in each workshop was as diverse as possible with the workshop delegates drawn from a wide range of stakeholders. Eight such workshops were conducted. Three workshops were held in Gauteng and one each in KwaZulu-Natal, the Western Cape, the Eastern Cape, the North-West and the Northern Province.

In total, delegates from 21 academic and research institutions, 34 businesses or industries (including business and trade associations), 10 national government departments or policy NGOs, as well as many provincial government departments and all eightmajor science councils participated in this workshop process. In addition,

meetings with a sector selection focus were held with representatives from an umbrella civic organisation, a provincial trade union confederation and a youth organisation.

The outputs of these workshops were analysed and a profile of each sector was compiled using the available data. This included current and projected employment figures, GDP contributions, export and other significant statistics. In addition, some local and international trends in each sector were traced and current policy initiatives noted. Finally, some key drivers and constraints for sectoral development were identified. These analyses were presented to the Advisory Board and DACST who, together with the Foresight Management Team, decided on the 12 final sectors to be run in this Foresight exercise.

## 1.4 Foresight Sectors

- Agriculture and agroprocessing
- Biodiversity
- Business and financial services
- Energy
- Health
- Information and communications technologies
- Manufacturing and materials
- Mining and metallurgy
- Crime prevention, criminal justice and defence
- Tourism
- Youth
- Cross-cutters:
  - Education/HRD/skills development
  - Beneficiation
  - Business development

## 1.5 Foresight Mission

*'To promote technological innovation and deployment by identifying opportunities for economic and social development through a national researchand technology foresight project.'*

## 1.6 Youth Sector Mission Statement

*'To create a vision to link research and technology to the needs and aspirations of the youth so that it will reach, develop and empower them to make a positive and meaningful contribution to society.'*

## 1.7 Adopted Definition of Technology

Technology is the use of knowledge, skills and resources to meet human needs and wants, and to recognise and solve problems by investigating, designing, developing and evaluating products, processes and systems.

## 1.8 Sector Foci

**Education and Training**

- Career guidance
- Lifeskills
- Literacy/numeracy
- Business skills
- Creativity/innovation
- Educators
- Facilities

**Health, welfare and community development**

- AIDS/HIV
- Substance abuse
- Primary health care
- Mental health
- Awareness programmes
- Life skills
- Indigenous (traditional) healing

**Economic participation**

- Entrepreneurship
- Job creation/SMME development
- Access to finance
- Income generating programmes (community)
- Tourism (education and business)
- Links between schools and industry

**Crime prevention, criminal justice and defence**

- Crime prevention
- Legislation
- Justice system
- Military technology

**Arts, culture, recreation and sports**

- Leisure
- Entertainment

- Personal development
- Facilities
- Exporting culture
- Links between arts, culture and technology

**Information and communications**

**Moral renewal**
- Values
- Religion/beliefs

**Environment and tourism**
- Sustainable environmental development
- Environment/technology interaction
- Positive and negative environmental justice
- Wealth creation
- Awareness of globalisation's impact on the environment
- Tourism/environment interaction

**Infrastructure development**
- Access
- Transport

**Community development and welfare**
- National Youth Support Programmes (NYSP) — voluntary
- Team work
- Human/cultural barriers to interaction with technology
- Information society
- Creativity development
- Equity — gender/ disability/race/rural

**Empowerment**
- Creativity — barriers to access technology
- Critical thinking — culture
- Problem solving — language

## 1.9 Terms of Reference

The Youth Sector Working Group's responsibility was to achieve amongst other things the following tasks:
- Develop sector mission statement.
- Agree on proposed sector foci.
- Analyse the current status of the sector.

- Identify future research and technology challenges and market opportunities over the next 10-20 years.
- Make recommendations on the identified cross-cutting issues/areas.
- Compile a prioritised list of research and technology topics.
- Make recommendations on implementation strategies.
- Compile the Foresight.
- Help with the identification of research and technology themes towards designing appropriate research programmes.

In addition to the above, the Youth Sector Working Group committed itself to the following:

- Connecting youth to research and technology;
- looking at S&T implications in the short and long term;
- focusing more on education and training;
- considering cross-cutting issues; and
- monitoring what other sectors are doing in terms of their response to youth issues.

## 1.10 Workshops

The project was conducted through a series of four two-day workshops involving young people and adults from a variety of backgrounds. The workshops were complemented by mini-workshops for three regional task teams.

The workshops gave the participants a chance to think about South Africa's future. Participants were asked to discuss and develop their thoughts and ideas about future research and technology areas that are likely to have a major impact on youth. The workshops were held between early November and the end of July 1999. Two were held in Gauteng and one each in the Western Cape and KwaZulu-Natal. The three task teams' mini-workshops were held in Gauteng, the Eastern Cape and KwaZulu-Natal respectively (see Appendix 1).

## 1.11 Co-nomination Process

Co-nomination is a survey-based technique that allows the major stakeholders and the broad community to participate fully in an open exercise to identify individuals who are to participate in the Sector Working Groups. For the NRFT project, DACST suggested that a combination of methods be used. They were:

- Co-nomination, adapted to our situation to identify members of the Youth Sector Working Group; and
- direct appointment by DACST in consultation with the Advisory Board and Project Management Team.

The co-nomination objectives of the Youth Sector were to —

- identify key individuals who would serve as members of the Working Group; and
- build a database of experts who would participate in the Delphi survey.

A database of about 300 people involved in youth issues was developed through the co-nomination process. The people whose names were nominated most by their peers were selected for the Sector Working Group. Of the original list of 30 Working Group members, 50% were identified through the co-nomination process. The rest were nominated by the Department of Arts, Culture, Science and Technology (see Appendix 2).

# Chapter 2

## 2.1 Introduction

This chapter provides background information related to young people's problems, aspirations and expectations and the research and technologies revolving around them internationally. It helps us to compare and benchmark our local youth development against that of other countries of the world.

## 2.2 The International Scan

South African youth will face significant challenges in the foreseeable future. The difference in the age structure between industrialised and developing countries will have particular repercussions for both industrial and developing world. The rich countries will be relatively old, the poor will be relatively young. The technologically advanced societies will be old, the technologically developing ones will be young. The direction of technological progress and the utility of research will be determined by these demographic changes and will have adverse effects on and offer few opportunities for young people internationally.

In many countries, educational opportunities still remain elusive to many young people. Primary schools are often overcrowded, with overburdened educators and insufficient facilities, and secondary education too may be either restrictive or expensive or both.

Forces, both within and outside their control, affect the health of young people around the world. Accidental death and violence are high among youth. Experimentation with tobacco, alcohol and drugs causes addictions and negative behaviour. Unprotected sexual activity results in unwanted pregnancies and the spread of sexually transmitted diseases, conditions such as including HIV/AIDS. A lack of information and affordable health care has further adverse repercussions on the health of the youth.

Policies at national and multilateral levels aimed at addressing the problems surrounding youth face a multitude of problems. Youth policy formulation is still a recent phenomenon in the history of most developing countries, and therefore these countries have little experience in implementing their newly formulated policies.

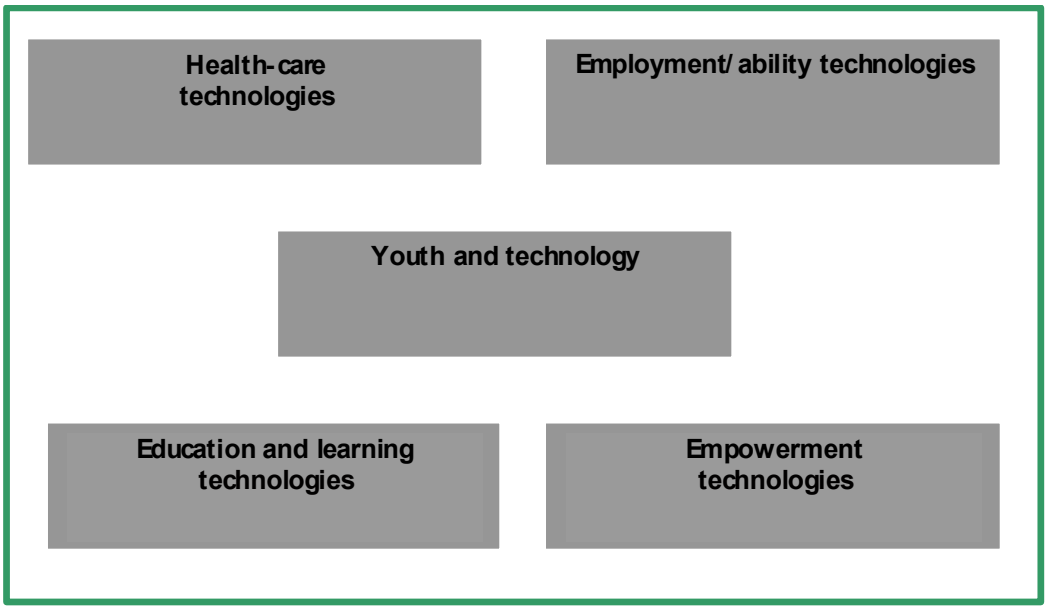
Industrialised and developing countries have not found a way to coordinate youth policies, which usually span the jurisdiction of a large number of ministries, and when

dedicated ministries are established they lack the authority and resources to accomplish their objectives.

In a number of countries, youth policies are sidetracked and service providers are becoming conveyor belts for political organisations rather than bodies who are directly in touch with local problems, obvious needs and local traditions and organised social action.

Research and technology have the potential to alleviate the problems and contribute towards the youth's aspirations and expectations. To this end, the domain 'Youth and technology' is defined as 'the multidisciplinary field that addresses technological research and development intertwined with research into social, educational and medial aspects of youth'. The following figure presents graphically the major components of the domain.

**Figure 2.1: Map of main technologies constituting the domain Youth and technology**




The identified four components address the main concerns of youth internationally. They are —

- Empowerment technologies;
- Education and learning technologies;
- Employment/ability technologies; and
- Health-care technologies.

Traditional modes of learning are starting to be challenged by the opportunities created by new technological development. These challenges not only will inevitably influence the future development of this market, but will also create opportunities for new ways of learning. The major education trends are:

- All learners, and particularly home and non-formal learners, receive enhanced access to knowledge resources.
- Rapid progress is being made in Europe towards the development of 'virtual campuses' or 'electronic universities'
- Technologies are having a dramatic and rapid effect on learning activities and are fuelling new paradigms for learning. Collaborative learning through computer-mediated conferencing tools exemplifies this and is leading the way to new forms of learning involving learning from peers rather than from tutors alone.

The technology trends underpinning education are identified in the report. They are:

- The rapid growth of the Internet. It is estimated that the Internet is currently used by more than 60 million people worldwide, and it has become a dominant infrastructure technology for learning.
- The growing impact of new telematics-based learning tools.
- The convergence, integration and standardisation of educational tools and technologies. Facilities like audio- and video-broadcasting over the Internet, digital broadcasting and access to the World Wide Web (WWW) via a normal TV set are resulting in the convergence of technologies.

The importance of the youth sector coupled with its peculiarities has given rise to a number of related technology assessments and social technology foresight. Technology assessments aim at exploring the consequences of deploying new technologies including secondary effects in anticipation of the future. Social technology foresight refers to a foresight strategy that actively involves all potentially affected social actors.

The Australian Social Technology Foresight exercise was aimed at identifying how young Australians view the future and the role of science and technology. More specifically, the objectives of the exercise were:

- To identify the key issues to the year 2010 from the perspective of young people; and
- To analyse how S&T can best be used to meet young people's needs and wishes.

The initiative found that the major concerns of young Australians include pollution and environmental destruction, the impact of growing populations, the gap between

rich and poor, high unemployment, including the effects of automation and immigration, conflict, crime and violence, family problems and breakdown, discrimination and prejudice and economic difficulties, including the level of foreign debt.

Science and technology are identified as important for the future. Young Australians recognise the value of S&T in solving problems that confront society but they do not see it as a universal panacea.

The investigation concluded with a number of policy recommendations, including proposals for government to consider young people's views in the formation of activities in key areas, including S&T, education, taxation, health and the environment, to provide opportunities for youth to experience ways in which foresight can encourage the development ofpositive and engaging visions of the future, to promote awareness of how S&T contributes to solving real problems, and so on.

Technology assessments in the domain of youth and technology have been undertaken in the areas of education, employment and health. The efforts to advise the US Congress/Executive, the European Commission (EC)/Parliament and OECD member countries are the most prominent internationally and they are outlined and summarised in this document.

Education and training are probably the most important issues of concern and preoccupation to youth and have been investigated extensively. Dynamic trends in both education and technology development have been shaping research in the area in recent years. The most important ones are the ever-growing World Wide Web, the increasing prevalence of networked multimedia tools and technologies and the establishment of national and global networks and standards in technologies.

The new technologies not only have educational impacts but also affect the balance of the knowledge market. Global commercial operators, including IT and telecommunications companies, are entering the educational field. They buy the educational content from an educational establishment and they offer a one-stop service to their customers. This trend, it is argued, will lead to 'knowledge branding' with reputable education providers dominating the international scene.

The EC, whilst reviewing the scene, concluded that 'it is clear that online multimedia tools and technologies for learning will extend their domination of the new learning environments, but this is still contingent on the provision of more options for Internet access, improved pricing systems and, importantly, more speed in accessing applications, courseware and learning tools'.

Issues that have been identified as constraining or facilitating the progress of the new technologies at national level are the following:

- Telecommunications policy;
- Infrastructure for distance learning; and
- Research on distance education.

The field of employment is the second issue of concern to youth and is predicted to be headed for changes of unimagined proportions. The youth will have to face and survive these changes.

The international assessment in the field identifies that —

- technological developments have been neutral in their quantitative effects on employment; and
- sectors in which employment rises with the accelerated introduction of technologies are engineering, office machinery/data processing, data transmission and cellulose and paper manufacturing sectors.

As far as qualitative effects are concerned, the consensus is that 'low-skilled workers are clearly disadvantaged' and the new employment opportunities are only likely in the knowledge-based sector which is made up of a small elite of entrepreneurs, scientists, technicians, computer programmers, professionals, educators and consultants.

It is predicted that the labour market will be polarised into two irreconcilable warring forces. One force is a new cosmopolitan élite of symbolic analysts who control the technologies and the forces of production. The other is made up of permanently displaced workers without any prospect of meaningful employment.

Efforts by governments to address the youth unemployment and skills problems are found to be ineffective. The reasons for their ineffectiveness are attributed to:

- Lack of knowledge on how to increase employment;
- Lack of experimental design to evaluate programmes and policies; and
- Fragmentation of efforts.

Health is the third technological issue constituting the domain of youth and technology. Youth are commonly regarded as among the healthiest of people and the health of the youth has rarely been identified as a national priority.

Efforts to improve public understanding and appreciation of science and technology among young people concentrate in two points: efforts to promote interest in science

and technology within the educational system and efforts beyond the educational system.

Effort within the educational system concentrate on issues of curriculum (how to teach these subjects so as to awaken the interest of young students) and how to motivate teachers to motivate students.

Efforts beyond the educational system utilise different instruments to make both the general public and young people in particular more aware of and more competent in science, technology and related policy issues.

Utilising the media — television, radio, newspapers, magazines and, more recently, the Internet — for promoting public understanding of science appears to be a principal policy instrument.

Opinion surveys internationally indicate that the media are the primary source of information about science and technology to the general public and a number of efforts are concentrated in this area.

The second most popular approach in the field is the development of infrastructure dedicated to this effort. Traditional museums, botanical gardens, zoological parks, planetariums, science centres and so on constitute the individual units of the new infrastructure.

National efforts are further complemented through the production of public understanding of science, engineering and technology (PUSET) indicators and the establishment of parliament-related offices of S&T aiming to inform and gain the support and understanding of the legislature.

The character of problems of youth internationally, the interplay of technology and policy and the identified efforts of technologies on the issues of concern to youth are profound and can contribute to the national efforts.

## 2.3 The Local Scan

The local scan starts by analysing the demographic profile of young women and men in South Africa — that is, it discusses how many young people there are in South Africa and how they are distributed across South Africa by race, sex, province and so on.

Young women and men aged between 14 and 35 comprise 39% of the total South African population. In other words, four out of ten of all South Africans will be affected by national youth development policies produced by government.

The South African population is an overwhelmingly young one. The overall trend is that young women and men comprise the bulk of the total population, with the lower age group comprising a greater proportion of the youth than the higher age group. Those aged between 14 and 21 comprise 43% of all youth in the country, and those aged 30 and 35 comprise just over a fifth (23%) of youth.

The report divides young women and men into smaller age groups, called 'cohorts'. This is done where the data show that different age cohorts are living under different circumstances, which is to be expected when we compare a 14-year-old with a 35-year-old. If we divide young women and men into age cohorts, we find the following:

| Age cohort | % of youth | Numbers |
|---|---|---|
| 14-17 | 22 | 3 575 679 |
| 18-21 | 21 | 3 341 189 |
| 22-25 | 19 | 3 054 025 |
| 26-29 | 16 | 2 556 478 |
| 30-35 | 23 | 3 657 664 |

**Table 2.1 Breakdown of youth into age cohorts**

The extent of underdevelopment that the African population of South Africa endured under apartheid is clear when we look at the age distribution of the South African population by race and gender. A large proportion of people is made up of infants and young children, while among those aged 15 years or older, the proportion of people in each age category steadily decreases.

Among coloureds and Indians, a transitional profile of age distribution is emerging. The situation is somewhere between that of developing and developed countries.

Among whites, the profile is typical of industrialised countries. There are proportionately fewer infants, pre-school children and children of school-going age, than in the other population groups, while the proportion of older people is increasing.

In other words, South Africa has a relatively young and expanding African population, compared with the coloured and Indian population and an ageing, shrinking white population.

### 2.3.1 Living conditions of youth in South Africa

#### 2.3.1.1 Types of dwellings in which households live

There are approximately 8,8 million households in South Africa, containing 41,5 million people. Almost three-quarters of the youth (73%) are found in formal brick structures, such as a house, a flat or a backyard room, while 14% are found in

traditional dwellings, 7% in shacks and 5% in hostels, compounds or single rooms in a building.

This distribution of dwellings among households varies by race. Among Africans, 61% of the youth live in formal brick structures, while 21% live in traditional dwellings, 10% in shacks, and 8% in hostels, compounds and single room in a building. Among Coloureds, 91% of households live in formal brick structures. This percentage increases to 99% among Indians and whites.

#### 2.3.1.2 Water

Almost two-thirds of youth (64%) can access water either in their homes or on the site where they live. Only 33% of African households, compared with 72% of coloured households, and 97% of both Indian and white households have the use of running tap water inside the dwelling for drinking purposes.

#### 2.3.1.3 Access to electricity

Electricity for lighting is unevenly distributed by race. Just over half (51%) of all Africans households with youth use electricity as their main energy source for lighting, as against 84% of coloured and 99% of Indian and white households.

#### 2.3.1.4 Access to sanitation

Two-thirds of the youth (66%) do not have sanitation in their dwellings or on the site of their dwellings. Looked at in real numbers, some 10,6 million young South Africans do not have sanitationon the site of their dwellings. Of all youth, 22% have pit latrines on the site and 14% have flush toilets on the site. Sanitation is characterised by a communal arrangement shared by multiple households. Among those who do not have sanitation on their dwelling sites, 36% have to go more than 25 metres to find sanitation.

#### 2.3.1.5 Crime and security

Forty-nine per cent African youth feel safe in their neighbourhoods and inside their own homes as compared to 47% of coloured, 24% of Indian and 26% of white youth. Youth are just as likely to feel unsafe and to be victims of crime as anyone else in the population. Youth living in informal settlements and in informal backyard dwellings commonly express feelings of being very unsafe.

### 2.3.2 Poverty

Almost half (49%) of African youth live in households that at some point in time are unable to feed their children. The same is true of 35% of coloured, 11% of Indian and 6% of white youth. The phenomenon of being unable to feed the children in a household was most common among youth living in households in traditional rural dwellings (57%), informal dwellings in backyards (54%), and informal settlements 53%).

### 2.3.3 Policy goals and objectives

The goals of the National Youth Policy are to —

- instill in all young women and men an awareness of, respect for and active commitment to the principles and values enshrined in the Constitution and a clear sense of national identity;
- recognise and promote the participation and contribution of young women and men in the reconstruction and development of South Africa;
- enable young men and women to initiate actions that promote their own development and that of their communities and the broader society;
- develop an effective, coordinated and holistic response to the major issues facing young men and women; and
- develop families and communities that are supportive of young women and men, pressing positive role models while promoting social justice and national pride.

### 2.3.4 Key strategic areas

#### 2.3.4.1 Education and training

The legacy of apartheid and the effects of Bantu Education have left this sector with an urgent need for transformation. The new National Qualifications Framework (NQF) sets the environment in which education and training are designed and delivered.

#### 2.3.4.2 Health

Young women and men face a wide range of experiences with regard to their health. The major concerns for the health and well-being of young women and men can be addressed through one primary objective: to develop action plans that address the promotion and maintenance of youth people's health, common threats to the young people's health, and the access young people have to health services

#### 2.3.4.3 Economic participation

The term 'economic participation' is used with reference to strategies which can address the issues of the involvement of young women and men in employment and enterprise. The National Youth Policy proposes three specific areas of action to enhance young people's participation in the labour market. They are:

- School-based career guidance;
- Youth career-guidance centres; and
- A national youth employment strategy.

The Department of Labour is currently involved in initiatives that build the skills of unemployed youth as well as the out-of-school youth. The promotion of youth enterprise is an important and significantstrategy for fostering economic participation.

The National Small Business Strategy and the National Small Business Enabling Act (1996) provide a national framework for the promotion of small business. Ntsika Enterprise Promotion Agency supports two programmes that focus on young entrepreneurs.

#### 2.3.4.4 Safety, security and justice

The issues of crime and justice directly affect many young women and men. However, some young women and men also participate in crime. Therefore there are safety and security issues for young victims of crime, as well as justice and rehabilitation issues for the perpetrators.

#### 2.3.4.5 Welfare and community development

The Department of Welfare has identified the following target groups of young people as those who deserve particular attention: out-of-school and unemployed young people, pregnant and teenage mothers, young people in dysfunctional families, young victims of crime, young people with disabilities, young people involved in substance abuse, young offenders, homeless young people and those who live on the street, young HIV-positive and AIDS patients, young sex workers and young people in gangs.

#### 2.3.4.6 Sport and recreation

From the perspective of youth development, the National Youth Policy has one central objective with regard to sport and recreation, that is, to broaden the participation of young people in a wide range of sporting and recreational pursuits.

#### 2.3.4.7 Arts and culture

When we addressed the issue of arts and culture amongst young women and men the following objectives were formulated:

- to promote the participation of young women and men in all forms of art and culture; and
- to ensure that young women and men have a sound understanding of the national culture and heritage.

#### 2.3.4.8 Environment and tourism

The National Youth Policy has adopted one primary objective to deal with environmental concerns and young people, that is, to increase awareness amongst young women and men of the issues associated with the environment and actions that can be taken to improve local environments.

#### 2.3.4.9 Science and technology

Key objectives of the National Youth Policy in addressing the issues concerning science and technology are:

- to raise awareness among young women and men of the opportunities in science and technology; and
- to enable young women and men and youth development agencies to use new and appropriate technologies which enhance their development opportunities.

### 2.3.5 Current status and economic scan

#### 2.3.5.1 Educational achievement

| Education | African | Coloured | Indian | White | Total |
|---|---|---|---|---|---|
| No formal education | 5% | 3% | 1% | - | 4% |
| Primary | 28% | 28% | 5% | 3% | 24% |
| Junior secondary | 35% | 39% | 27% | 24% | 34% |
| Senior secondary | 27% | 24% | 56% | 50% | 30% |
| More | 6% | 6% | 11% | 23% | 8% |

Table 2.2 Educational achievement by race

This graph shows the effects of Bantu Education on our youth. More than 73% of white youth have reached secondary school. While over 28% of all youth in South Africa have achieved only some level of primary-school education or less, the corresponding figure for Africans stands at 33% compared with 3% for whites.

#### 2.3.5.2 Educational involvement

Almost 59% of all youth are not currently attending school, college, university, technikon or any other educational institution. Two-fifths claim to be attending one of these educational institutions full-time while the remaining 2% are attending such institutions on a part-time basis.

### 2.3.6 Science and technology education

#### 2.3.6.1 Enrolment in mathematics, science and biology

Up to standard 7, general science and mathematics are compulsory subjects at South African schools. From standard 8 upwards, however, students make their own subject choices, and only about 60% of African standard 8 pupils opt for mathematics. About 33% of pupils in standard 10 enrol for mathematics. The decision to discontinue mathematics may be influenced by several factors, including negative attitudes towards mathematics and science and the lack of qualified teachers.

### 2.3.6.2 Mathematics and science results

On average, about 24% of African candidates pass the standard 10 mathematics examination and 45% pass physical science. The relatively higher pass rate in physical science is probably due to the fact that mathematics is the prerequisite subject for physical science, and consequently a smaller and more select number of pupils enrol for physical science.

| | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|
| | % | % | % | % |
| Mathematics | 18.4 | 28.3 | 25.2 | 23.8 |
| Physical science | 42.0 | 49.0 | 49.9 | 41.3 |
| Biology | 40.7 | 42.0 | 34.5 | 52.4 |
| English | 95.0 | 87.0 | 90.6 | 96.7 |

**Table 2.3: Passes in mathematics, physical science, biology and English (2nd language) as a percentage of total African Std 10 enrolments**

### 2.3.6.3 Technical colleges

Technical colleges offer vocational education. The 129 colleges in South Africa have students generally studying from the equivalent of standard 8 (N1) to the equivalent of the third year after standard 10 (N6). Total enrolments of FTE students at technical colleges in South Africa have increased from 36 816 in 1988 to 65 477 in 1994. Most of the historically black technical colleges appear to offer courses in business, commerce, and arts and trades rather than engineering.

### 2.3.6.4 Total students enrolment at HWUs by population

Universities have made considerable progress in their move towards racial equity, enrolling much larger percentages of black students than in the past. There has been an increase in enrolment of Africans at historically white universities (HWUs), from 4% of the student bodies in 1987 to 23% in 1995, with a major shift occurring the most recently between 1993 and 1995. The predominantly English-medium HWUs had higher percentages of black students in 1995 than did the Afrikaans-medium HWUs.

### 2.3.6.5 Employment status of youth

Fifty two per cent of potentially employable young people of all races are unemployed. This represents almost 3 000 000 people between 16 and 30 years old. Unemployment among African youth at 57%, and to a lesser extent among coloured

youth at 46%, make up the majority of the 52% total of youth unemployment. Asian unemployment stands at 17% and white unemployment at 4%.

#### 2.3.6.6 Occupations of employed youth

The most common occupation for young women is unskilled or elementary labour, with over a third (34%) of young women involved in this activity. Similarly, almost 29% of young men are involved in this kind of occupation. As expected, men occupythe bulk of positions (17%) in the craft and trade industry (only 4% are females) as well as in the manufacturing/engineering industry (14%) compared to 4% of females.

### 2.3.7 The health condition of youth

#### 2.3.7.1 Medical consultation

Whites (15%) and Indians (14%) were twice as likely to have consulted a medical facility than African and coloured youth (7%) for both groups). This again reflects the easy access white and Indian youth have to medical facilities — almost all white (95%) and Indian (93%) youth are able to reach a medical facility within half an hour, while only two-thirds (61%) of African youth and four-fifths (84%) of coloured youth are able to do the same.

#### 2.3.7.2 Access to medical aid

Medical aid can have a profound effect on the type of health facility that youth are able to access as well as on the regularity of access. Almost one in five youth (18%) were found to have access to medical aid fund. This varied sharply depending on the province in which they lived.

#### 2.3.7.3 Reproductive health

The percentage of young women said to have given birth increases from under 1% of 14-year-olds to 85% of 35-year olds. The percentage that has given birth increases sharply in the late teens and early twenties. By age 24 over half of women have given birth at least once.

### 2.3.8 Research, development and technological scan

#### 2.3.8.1 Goals and trends affecting the demand for SET human resources

##### (a) Economic factors

Entry into the regional groupings of the Southern African Development Community and Preferential Trade Area for East and Southern Africa (PTA) may increase the demands on South African research capacity in the fields of common interest, such as basic geology, agriculture, forestry, environmental protection, subtropical medicine and construction.

### (b) Governmental factors

- New laws redressing past racial discrimination in SET human resources practices.
- Affirmative-action policy and its success in achieving its goals as opposed to its potential for undermining standards, for instance in the civil service and in tertiary education.
- New education and training policy and the extent to which it succeeds in developing crucial skills in mathematics, science and English.
- Legislation enacted to encourage greater levels of investment by South African industry in R&D.
- Review by government of the activities, funding and priorities of government-funded science councils, laboratories and research agencies.
- New legislation regarding environmental impacts assessment and protection and occupational safety and health, particularly in industries such as mining and chemicals.
- The new framework of political administration, involving nine districts under provincial governments with broad powers, and having extremely uneven levels of development in terms of technology-intensive industries, universities with SET faculties and departments, and research facilities.

### (c) Social factors

The comprehensive social changes attending the end of apartheid and the rise of a new democratic government will not leave the development of science and technology untouched.

### (d) Demographic factors

- The dearth of blacks educated in science and technology at all levels and in all fields, the consequences of which will probably affect a full generation of South Africans.
- The possibility of an accelerated brain drain through emigration of either experienced or newly trained (at considerable state expense) white scientists, engineers and technologists.
- The possibility of brain gain, namely attracting back to the country South African scientists and engineers who found opportunities for work abroad.

### (e) Geographic factors

- The established tradition of capitalising on South Africa's diverse, natural climatic and geological conditions in fields such as mining and infrastructure can be expected to continue.
- The maintenance of South Africa's extensive body of research and techniques for protecting indigenous African wildlife is considered a cornerstone in the development of a future ecotourism industry.
- The combination of manufacturing design based on similar ecological and cultural conditions, plus value-added packaging of delivery and service systems based on

geographical proximity, could South Africa considerable competitive edge in exporting to other African countries.

- New policies may emphasise the regionalisation of industrial development.
- Greater beneficiation of South Africa's still extensive — though in some cases gradually declining — mineral resources should gradually redirect both SET research and training in pertinent applied and theoretically fields such as metallurgy, geology and chemistry.

**(f) Technological factors**

The main technological trends expected to impact on science and technology, and in particular on the way SET professionals are trained and operate, will be:

- A continuation of the trend towards greater technology and information intensiveness in some of the firms on the leading edge of South African manufacturing.
- More stringent requirements for environmentally-safe equipment and processes, and the choice of 'clean technology' in new facilities, necessitating changes in manufacturing techniques, products and management which must then be reflected in the training development of environmental engineers and other technologists.
- Changes in industrial production (and management) practices to comply with ISO-9000 quality standards, as South Africa aims for more manufactured exports to OECD countries.

### 2.3.9 Management structure and culture

- The accelerated placement of blacks and women in the managerial ranks of science councils, research laboratories, SET professional bodies and industries.

- Acceleration of the push led by the trade unions to more participative management in many industries, leading to new practices in technological innovation which combine the cognitive skills and creativity not only of engineers, but also of supervisors and the workforce.

### 2.3.10 Public understanding of science and technology

In general, the survey on the public understanding of science and technology revealed some significant differences between various demographic groups. Coloureds and Africans consistently achieved lower scores than Indians and whites. Males also scored higher than females on almost all scales.

Critical minds, innovative spirits, high-level skills and creative solutions — these are what a reconstructed South Africa will expect its universities, technikons and technical colleges offering courses in science, engineering and technology to provide. Yet it is

fairly common knowledge that South Africa has a crisis in science and technology education at all levels.

# Chapter 3:
# SWOT Analysis

## 3.1 Definition of SWOT Analysis

A SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis is a useful environmental analysis tool that takes a holistic view of an organisation's strategic position. Internal (strengths and weaknesses) factors are balanced against the external (opportunities and threats) factors.

Insight developed from the SWOT analysis is used to develop a strategy to capitalise on the organisation's strengths and rectify the weaknesses. These weaknesses make the organisation vulnerable to competitors and prevent it from taking advantage of the opportunities. The opportunities will give an indication as to the potential courses of action available for the organisation to pursue in order to achieve growth. The potential threats will have to be managed and can be defended as part of the strategy formulation.

## 3.2 SWOT Analysis Methodology used by the Foresight Youth Sector

The Working Group conducted a SWOT analysis for nine of the Youth Sector foci. These sector foci, as discussed in Chapter 1, are as follows:

- Arts, culture, recreation and sport
- Environment and tourism
- Education and training
- Safety and security
- Health and welfare
- Community development
- Morals and ethics
- Information and communication technologies and infrastructure
- Economic participation.

For each of these sector foci, the internal strengths and weaknesses were considered against the external opportunities and threats. This exercise was conducted as part of Workshop 1 (strengths and weaknesses) and Workshop 2 (opportunities and threats). The Working Group was subdivided into four smaller groups. Each of these subgroups was allocated four or five of the sector foci. This duplication ensured that each focal area was dealt with thoroughly.

## 3.3 Results of the SWOT Analysis

The discussion of the first SWOT analysis conducted for the nine Youth Sector foci is documented below. A summary of the SWOT analysis is tabulated at the end of the chapter (for more information, see Appendix 3).

### 3.3.1 Strengths

South African youth demonstrate a strong affinity for and natural interest in sport, which provides them with a positive, constructive pastime. Television and radio provide widespread exposure to role models participating in competitive sporting events at regional, national and international level. Youth also demonstrate creative potential, which is manifested in a strong diverse culture of music.

South Africans enjoy a rich natural heritage. This diverse, aesthetically appealing environment attracts tourists, creating employment opportunities for youth and an influx of foreign capital. South Africans have a strong, diverse culture, with morality and ethical values as a common base.

The public and private sectors actively support education in mathematics, science and technology by funding Non-governmental Organisations (NGOs), which run programmes to promote public understanding of science, engineering and technology (SET). The National Qualifications Framework (NQF) is intended to align education with the needs of the country, particularly in terms of the economy and life skills required by youth and their future employers. Various organisations are developing and implementing education technologies aimed at overcoming many of the obstacles experienced in the current education system. Universities and technikons provide good infrastructure and core competencies for further education, with bursaries available from industry for tertiary education, particularly in SET-related fields.

The high profile of safety and security has resulted in an increase in available technologies and resources to help with the enforcement of peace and the apprehension of criminals. The police and military also provide youths with career opportunities.

The government has put in place strong national policies with regard to primary healthcare, HIV/AIDS and the tobacco industry. The South African medical fraternities produce high-quality medical practitioners, who are now required to perform one year of community service. In addition, many NGOs offer well-developed support programmes for youth in the fields of health and welfare. Many companies budget annually for community development and provide funding for NGOs active in this field. These activities in turn provide employment opportunities.

Information and communication technologies (ICT) have resulted in many desirable changes, particularly with regard to improved information exchange and increasing process effectiveness and efficiency. The youth are receptive to innovations in the ICT industry, and the resultant formation of a 'global village' has provided access to vast sources of information.

### 3.3.2 Weaknesses

The youth demonstrate a cultural preference for different forms of art, culture, recreation and sport, which is further intensified by the skewed demographic representivity amongst national sporting teams. They also have a poor understanding of and tolerance for different cultures in the country. A strong influence of American culture, by way of cinema and television programming, has eroded natural domestic culture.

Youth in urban areas lack interest in and knowledge of the environment. Environmental centres, such as natural history museums, are underutilised and inaccessible to many sectors of the population. A conflict of interest exists between survival and environmental protection, and a lack of education and awareness leads to environmental abuse.

The majority of South African schools have insufficient facilities and resources, particularly in rural areas. In addition, many teachers and management bodies are not committed to making the most of the resources they already have. Many teachers, particularly in mathematics and physical science, are poorly qualified, with limited in-service training taking place. Large classes and high learner-teacher ratios inhibit high-quality education. Youth demonstrate poor analytical and creative problem-solving abilities relative to international standards. Very little practical work is performed in physical and natural science subjects at school. As a result, theoretical principles are not contextualised or validated, and misconceptions develop. Science councils and industry have limited input into the school curriculum. A severe shortage of accessible vocational information exists, with the majority of learners unaware of tertiary institutions' entry requirements when making subject choices in Grade 10. As a result, many school leavers do not qualify for SET-related studies. Youth also have insufficient access to finance for further education.

A very high incidence of domestic violence, rape and physical abuse has a severely negative effect on the youth. Exposure to negative media and programming contributes to this culture of violence. Moral degradation has led to a justification of criminal activities for personal gain, with gang members being seen as role models in poverty-stricken urban areas.

Youths, especially young men, are commonly associated with criminality. Furthermore, the criminal justice system is ineffective in rehabilitating young people who break the law.

Alarming numbers of youth are being diagnosed as HIV positive. Many communities lack basic domestic infrastructure such as running water and sanitation, which leads to contamination and disease. Welfare services are inaccessible and ineffective in curbing widespread substance abuse and the high incidence of teenage pregnancy.

The degradation of the family unit has a negative effect on the formation of core value systems for young people. This, combined with a high level of unemployment among parents and peers, has led to the development of a low work ethic.

The ICT industry undeniably holds much potential for the youth sector. However, many logistical problems exist which will present obstacles to the implementation of this technology on a large scale in South Africa. As an example, many communities lack basic infrastructure, such as electricity, which is currently necessary for utilising ICT. Furthermore, ICT has a financial value on the black market, which will create security risks and impede access to the technology. Limited funding is available for developing infrastructure and human resource competencies required to successfully implement this technology. A multilingual society and computer illiteracy create problems for technology transfer. There is a lack of commitment from parents, teachers and learners to successfully implement this technology.

A low entrepreneurial spirit coupled with unemployment inhibits youth participation in the country's economy. Furthermore, the current education system is not focused on developing skills that can be applied as part of vocational activities.

### 3.3.3 Opportunities

Radio, television and the print media give the youth access art, culture, sport and recreation. Technology can facilitate the development of psychomotor skills and improve South Africa's performance in international arenas. Furthermore, sport and cultural activities even create a stimulus for youth to re-engage in education and personal development exercises.

Tourism creates opportunities for young entrepreneurs as well as potential for wealth creation through international investment. This in turn may motivate environmental preservation and even re-generation. The planned environmental component in Curriculum 2005 will help to raise awareness.

A significant opportunity for the youth sector is the willingness of the private and public sectors to invest in initiatives that encourage and enable youth to enter

technological careers. ICT provides avenues for teachers and learners to access good-quality education and vocational material through the Internet. Tailor-made education technology, including software, hardware and teaching material, has the potential to overcome some of the many obstacles experienced in the country's current education system. Innovative applications of emerging technologies are increasing the feasibility of distance education, which will give youth access to qualified, accomplished educators. The education multiplier effect can be achieved by targeting the enhancement of teachers' core competencies.

Advancing police and military technology may help to achieve internal security. Community policing forums and victim empowerment programmes give youth an opportunity to participate in crime prevention.

Much global attention and research funding have been focused on discovering a vaccine and cure for HIV/AIDS. The world community stands to benefit if a solution is found through these efforts. Indigenous medicine may well provide many South Africans with accredited and affordable remedies for their ailments. Life-skills development, as part of Curriculum 2005, will contribute towards dignity and mental health.

The development of youth centres will improve access to essential and beneficial facilities. Community development has the potential for job creation as well as skills development by way of emerging contractor development, apprenticeships and on-site training.

Fast-track implementation schemes may prove effective in bringing the ICT competency of South African youth on par with that of youth in the rest of the world. ICT applications also have the potential to provide youth with decision-support systems, a vehicle for international exposure and opportunities for self-employment and global marketing. Exploitation of these opportunities will be encouraged by the increasing attention entrepeneurship is receiving at secondary and tertiary education level.

### 3.3.4 Threats

Language barriers and the perceived exclusion of sectors of the population from sporting and cultural events may result in further alienation of these groups. The perception that international products and performances are superior, combined with low-impact exposure of local programme content, can lead to the erosion of indigenous arts and culture.

A high crime rate and xenophobia are damaging South Africa's attractiveness as an international tourist destination. Biological diversity and the depletion of natural

resources create a real risk of extinction for certain species. Furthermore, South Africa has insufficient funds to reverse environmental degradation. These factors threaten the world the next generation will inhabit.

Competing budgetary priorities will affect the availability of funds for education and training, particularly schooling, which forms the foundation for SET-related further education and training. This limited government funding for ICT will widen the gap between youth with or without access to this competency-enhancing technology. Technology has the potential downside of leading to the underdevelopment of analytical skills, numeracy and spelling proficiency.

Failure to curb sexual and physical abuse and domestic violence can lead to the incapacitation of the victims and a degradation of the family unit. Ineffectiveness of government policy and the justice system is leading to the formation of vigilante groups and a general breakdown of law and order. The resultant stress may cause young people to demonstrate dangerous levels of anger and aggression. Gang members seen benefiting from criminal activities with little fear of prosecution may justify this lifestyle in the eyes of young people. An increase in drug trafficking in South Africa will lead to further degradation of communities.

A catastrophic death rate among youths is a real threat as HIV-positive people increasingly develop AIDS, which will remove a large portion of the country's current and future economically active population.

Community development initiatives require qualified human resources to support the implementation and maintenance of facilities. Limited competence may lead to inappropriate usage, resulting in a negative impact on the community and environment. Unmonitored exposure to global information sources, such as websites displaying violence and pornography, can lead to the erosion of the youth's value system.

Skewed access to ICT may result in a widening of the gap between established and developing communities. This technology may also cause a loss of job opportunities through the automation and simplification of processes and services. A threat, particularly to young people with unlimited access to ITC, will be the development of antisocial tendencies and a loss of interpersonal skills.

### 3.3.5 Synopsis

A synopsis of the Youth Sector Working Group's SWOT analysis performed for the nine Youth Sector foci is tabulated below.

| Strengths | Weaknesses |
|---|---|
| Positive attitude towards sport and music. | Demographic preference for sport and culture. |
| SA's appealing environment attracts tourists. | American influence on domestic culture. |
| Public and private sectors actively support SET-related education. | Conflict of interest between survival and environmental preservation. |
| NQF intended to align education with the country's needs. | Poorly resourced schools. |
| Universities and technikons provide good infrastructure and core competencies for further education. | Underqualified teachers. |
| | High learner-teacher ratios. |
| | Shortage of vocational information. |

## 3.4 Conclusion

South Africa has a good television and radio infrastructure but access in some areas is still poor because of a lack of basic infrastructure. Young people of South Africa have access to art, culture, sport and recreation through use of these technologies. The rich cultural and natural heritage creates employment opportunities for youth in the tourism sector. The ever-increasing collaboration between public and private sectors provide funding for SET programmes intended to increase the participation of youth in these fields. The overall welfare of youth is improving as result of the

national government's strong national policies with regard to primary health care, HIV/AIDS and tobacco smoking.

The major weaknesses in the world of youth include poorly-resourced schools and the poorly-trained teachers. A lack of environmental education is leading to the depletion of resources. The youth of South Africa grow up in a culture of violence. Moral degradation and the ineffective criminal justice system lead to high incidences of criminal activities.

# Chapter 4

## 4.1 Introduction

The NRTF project has identified as one of its activities the need to develop macroscenarios. These are diverse, plausible pictures aimed at investigating the key uncertainties, including socio-economic and political environments, that could affect the South African research and technology system in the longer term.

The aim is not to predict future events, but to understand the key factors that are likely to have the most impact on future science and technology. Macroscenarios can be viewed as an open-minded, systems-based approach to futures planning, which provided a basis for building sector-specific scenarios. The idea is to stimulate debates about how the South African research and technology system could serve each sector 20 years from now. These scenarios were useful in two way, namely to identify the key concerns of major opinion makers and to improve the quality of strategic conversation (i.e. create a common language about the future) and discussion.

Four scenarios were developed as potentially characterising the road to 2020. The scenario called **The Frozen Revolution** highlights the effect of the non-implementation of government policy intended for socio-economic upliftment that leaves the masses dissatisfied and key players fragmented and individually focused. The next scenario, **The Innovation Hub**, describes how South Africa's comparatively developed infrastructure creates opportunities for strategic regional development.

The third scenario, called **The Global Home**, is about government embracing global liberalisation and facilitating private sector empowerment to respond to global market forces in line with global trends and opportunities. The final scenario, called **Our Way is *the* Way**, depicts South Africa's perceived ability to challenge the conventional route to globalisation by rallying developing countries' support for the development of the significant South-South economic bloc. This approach results in isolation by the developed world.

These stories about the future have been used in the NRTF project to develop sector-specific scenarios. The usefulness of these scenarios in sector work has been remarkable. They enabled Sector Working Group members firstly to generate strategies for their respective sectors and secondly to test the robustness of the developed strategies.

Scenarios had to be —

- *relevant*, that is, they had to illuminate current circumstances and concerns and fit into current mental models;
- *emergent*, that is, make the invisible visible, and challenge current thinking;
- *plausible*, that is, fact-based and logical, and improve systematic understanding; and
- *clear*, that is, provide distinct alternative hypotheses/models that are accessible and memorable.

## 4.2 Development of Youth Sector-specific Scenarios

The Foresight Youth Sector scenarios incorporated all the sectoral foci that were identified from the first workshops. The technique involved creating alternative future worlds of youth, which could be used to test the resilience of current thinking. The process of developing the Youth Sector scenarios was similar to that used in developing the macroscenarios. The point of the whole exercise was to use the macroscenarios as a guide for developing sector-specific scenarios. The sector-specific scenarios had to be within the context and incorporate the characteristics of each corresponding macroscenario.

From the Youth Sector focal areas, a number of key uncertainties were identified. The information was presented in the form of a matrix table (see **Appendix 4**). These key uncertainties formed the basis for developing both scenario descriptions and narratives. Four future worlds depicting the route to 2020 were developed and the descriptions of the stories are as follows:

## 4.3 The Frozen Revolution

Most youth in South Africa are involved in criminal activities because of a lack of political will. Inappropriate infrastructure stifles the overall development of young people. This leads to the decline of the youth's commitment to education. Those who have access to resources leave South Africa for better opportunities elsewhere but many are ignorant of the existence of stable environments in other countries.

The youth's access to development funding is hampered by the prevailing non-strategic, crisis-management approach to funding. This, coupled with unfocused investment results in very little job creation. The level of unemployment among the youth decreases as a result, and most youth are trapped in a vicious poverty cycle. The privileged few are fully integrated into the global markets. The status quo, in terms of the rich/poor divide, is indirectly perpetuated through the over-commercialisation of arts and sports.

The HIV/AIDS epidemic increases owing to a lack of appropriate and strategic campaigns and programmes. This leads to the overall decline of the quality of life of

young people. Family units continue to fragment because of a lack of focused youth development, but spirituality increases.

The all-important science and technology education programme is a shambles and continues to decline owing to a lack of relevance.

## 4.4 The Innovation Hub

Crime increases initially, then decreases owing to regional cooperation and the unwavering political will of the government of the day. There is universal access to appropriately developed regional infrastructure. This leads to the widespread availability of development funding in the region. South African youth benefit from the regional transfer of skills. Because of this and the secure future it brings, the commitment of youth to education increases. Science and technology education increases because of innovative regional strategies.

International and local stability increases. There are selective regional trade privileges, with a gradual increase in global trade agreements. Self-employment levels among the youth increase, more especially in areas of information and communications. This results in further job creation within the region. The over-commercialisation of arts and sports is regulated by acts of parliament and by the unbundling of large corporations.

HIV/AIDS and related diseases decrease as a result of focused campaigns and education through information and communication technologies. Overall quality of life of most youth in the region increases. Because of focused youth development, the family unit strengthens, but spirituality declines.

## 4.4 The Global Home

Youth are deeply involved in economic and cross-border crime. This leads to the development of sophisticated, international crime-prevention methods. Infrastructure development increases but its appropriateness decreases. Most young people are marginalised and unable to meet the cost of living. Access to funding is skewed in favour of an élite few and there is a decrease in philanthropy. The commitment of youth to education decreases because many young people are marginalised. Science andtechnology education increases for those who can afford it. There is less emphasis on indigenous knowledge.

There is a general increase in international stability and, with time, decreasing local stability. Global competition is determined by developed countries, and because borders are more open, South Africa experiences an abated brain drain to these countries. Unemployment decreases, especially among technically-skilled youth, as a

result of global job opportunities. Over-commercialisation of arts and sports flourishes and global competition reduces the number of local players.

HIV/AIDS epidemic increases initially owing to the 'it's *their* problem' syndrome, but decreases later thanks to global advancements in respect of health issues. Generally, quality of life improves but there is a disintegration of family unit and a decrease in spirituality owing to globalisation.

## 4.5 Our Way is the Way

Youth involvement in crime decreases thanks to increased counteractive measures. Infrastructure is more appropriate to the needs of youth. Funding mechanisms are biased towards the rural and urban needy. The commitment of youth to education increases in certain areas. This and a focus on social development lead to an increase in science and technology education.

Young people are involved in the production of world-class products and services. Local youth cooperate on equal terms with other young people from other countries. This leads to a reduction in the brain drain as the emphasis is on the development of local expertise. Investment in strategic areas creates many job opportunities and drastically decreases the levels of unemployment among youth. Commercialisation of arts and sports is controlled for the purpose of achieving equity.

The HIV/AIDS epidemic decreases as a result of an 'it's *our* problem' attitude, and because of strategically focused social programmes, quality of life improves. The family unit strengthens because of the restoration of traditional values and there is an increase in African spirituality.

## 4.6 Conclusion

The Sector Working Group believes that the Youth Sector-specific scenarios will help youth policy makers, government and the science and technology community to develop a common understanding and vision of science, research and technology and improve the debate on science and technology initiatives that have the greatest impact on youth. It is also hoped that the scenarios will promote public understanding of science and technology in South Africa.

# Chapter 5:
# The Foresight Youth Sector Survey

## 5.1 Introduction

The questionnaire-based survey is a core part of the Foresight process. It is a consultative process designed to assess and evaluate the various issues that have been identified by the Sector Working Group. It is a process to test the thinking of the future by the sector stakeholders. These stakeholders are knowledgeable people or experts in the sector, who have been identified by a co-nomination and consultation process supplemented by people identified by members of the Sector Working Group. All the people to whom the survey was sent, and who then returned completed questionnaires, are regarded as the 'Stakeholder Group'.

The responses to the survey questionnaire are expected to make a major contribution to the identification of science and technology topics or issues in the youth sector. These topics or issues are considered likely to support an improvement in the economic growth and the quality of life of many of the people of South Africa over the next twenty years.

## 5.2 Survey Methodology

The fundamental concept of the survey was based on similar work that has been done in countries such as Germany, Japan and the United Kingdom. In this process, a number of topics or issues are tested against a number of variables. The variables selected are the same for all sectors in the Foresight project and hence are not necessarily optimal for this sector.

The respondents were asked to give their views on the range of topics selected by the Sector Working Group. This was followed by a second survey questionnaire in which the respondents were given an opportunity to review their responses in light of the collective opinions expressed in the first-round survey questionnaire. This enables greater significance to be attached to those statements that were given a high level of confidence by the respondents. This method has been in use for over 30 years and is the basis of successful foreign foresight programmes and other similar studies.

## 5.3 Survey Process

### 5.3.1 Survey format

The Foresight project team, during the course of a number of workshops, developed the format of the survey and the variables to be used. The difficulty was to develop a standard list of variables that would have meaning in all 12 sectors involved in the project. The basis of the variables was an attempt to include questions that would provide a snapshot of where the youth sector in South Africa stood at present and, at the same time, indicate how important it was for the country in respect of **wealth creation** and **quality of life**, and also through the development of strategies and timescales for addressing issues relevant to youth.

The survey format made allowance for the respondents to add comments or even to formulate an alternative statement in a box at the end of each topic row. In addition, the respondents were invited to propose new topics at the end of the questionnaire.

### 5.3.2 Development of relevant statements

The Sector Working Group developed the statements by working in four groups, one group for every two of the identified eight foci of the Sector. The groups went through the list of foci generatedfrom the first workshop and for each made a sublist of the drivers, trends and relevant issues. For each topic identified on the sublist, possible opportunities, innovative solutions, products/processes, services and technologies, and research breakthroughs were identified. From the foregoing, the groups developed statements to test the relevant research and technology topics listed. These statements were subjected to further refinement before being incorporated into the survey document.

The statements were required to meet the following criteria:

- Each should test only one idea.
- They should have a futuristic element.
- They should be closed statements.
- Seventy per cent of them should focus on research and technology.
- About 30% of them should deal with generic and policy issues.
- They should answer questions like 'Why?' and 'Is it possible?'
- They should each have three components:
  - An idea (i.e. technology/research/market, etc.).
  - A specific issue/objective/use application to be addressed.
  - An indication of the 'state of development' of the particular research, technology, application or market, i.e. they should be made with the following 'lead words':
    - **Elucidation**:to scientifically and theoretically identify principles or phenomena;

— **Development**:the attainment of a specific technological goal for a completed prototype;
— **Practical use**:the first practical use of an innovative product or service;
— **Widespread use**:significant market penetration to a level where a product or service is in common use.

## 5.4 Importance to South Africa

The overall performance of each of the statements was ranked on the basis of a joint index. This joint index was calculated as the average of the wealth creation and quality of life indices. It is important to note that the joint index weights a statement's importance with regard to its potential to create wealth equally with its potential to improve quality of life.

Based on recommendations from the Foresight team, the top 20 and bottom 10 ranked statements were extracted for further analysis. These statements were selected separately on the basis of the joint indices for all respondents and the joint indices for respondents with high confidence in a particular topic statement. Tables 5.1 and 5.2 below contain the top 20 and bottom 10 statements respectively. These statements were ranked according to the joint index extracted from respondents with high confidence in the topic.

Table 5.1: Top 20 statements (high confidence)

| No. | Statement | Joint Index | Wealth creation index | Quality of life Index |
|---|---|---|---|---|
| 61 | Widespread use of multimedia networks to sell indigenous products/ services directly on global markets. | 88,24 | 88,24 | 88,24 |
| 43 | Development of a cure or a vaccine for HIV/ AIDS. | 88 | 80 | 96 |
| 53 | Widespread use of broadband technologies to ensure connectivity for all. | 84,21 | 84,21 | 84,21 |
| 55 | Widespread use of multimedia (Discovery TV channel, websites, etc.) to promote science, technology and economic participation. | 83,77 | 84,21 | 83,33 |
| 27 | Practical use of edutainment in multi-purpose community centres in order to reduce crime among youth (including gangsterism). | 83,33 | 76,19 | 90,48 |
| 7 | Development of computer games (hand-held and computer-based) that award points for fair play among youth. | 82,35 | 76,47 | 88,24 |
| 59 | Development of low-cost/ free-information database (e.g. business plans, staffing, business site) to provide access to information for young entrepreneurs. | 81,97 | 78,95 | 85 |
| 63 | Development of entrepreneurial mentorships through incentives schemes for role models. | 80,95 | 80,95 | 80,95 |
| 48 | Fifty per cent of schools adopt scientific environmental education as part of their mainstream curriculum. | 80 | 76 | 84 |
| 17 | Development of an agricultural-enhancement product aimed at making non-arable land arable to provide more farming opportunities for youth. | 79,55 | 77,27 | 81,82 |
| 36 | Development of computer games/ programs/ simulations relating to both macro- and microeconomics to promote understanding of economic issues. | 78,95 | 68,42 | 89,47 |
| 22 | Sixty per cent of youth have access to hi-tech education in science, engineering and technology. | 77,11 | 70 | 84,21 |
| 66 | Development of "smart buildings" that offer real-time information about energy usage and costs. | 76,43 | 92,86 | 60 |
| 39 | Widespread use of self-assessment technologies to increase access to health-care services. | 76,32 | 73,68 | 78,95 |
| 28 | Development of multimedia information booths providing communication facilities for counselling, crime reporting (e.g. domestic abuse), etc. | 73,33 | 66,67 | 80 |
| 26 | Practical use of multimedia to collect, document and disseminate indigenous knowledge. | 73,16 | 58,82 | 87,5 |
| 21 | Development of virtual-education programmes (using the Internet) for distance education. | 71,59 | 68,18 | 75 |
| 52 | Widespread dissemination of outcomes of multimedia education impact on morals and ethics as a guide to society. | 71,43 | 64,29 | 78,57 |
| 5 | Development of better performance-enhancing-drug detection system to promote fair play among South African athletes. | 70,59 | 64,71 | 76,47 |
| 41 | Practical application of knowledge trees for self-diagnosis. | 70,45 | 68,18 | 72,73 |

A high degree of commonality was found between the statements contained in the lists for all respondents and the lists for high-confidence responses, for both the top 20 and bottom 10 ranked statements. This recurrence added credibility to the significance of these statements. The Working Group focused particular attention on those statements to which people responded with high confidence, as these stakeholders would be capable of greater insight in their particular fields of expertise. The top 20 and bottom 10 high-confidence statements, ranked according to their respective joint indices, are illustrated graphically in Figures 5.1 and 5.2 respectively. The proportional contributions of the wealth creation indices and quality of life indices to the joint index are indicated on the graphs.

It is noteworthy that the potential to create wealth and to improve quality of life is perceived to be reasonably balanced for all of the statements falling within the top 20 (high-confidence) group, although a consistent tendency towards emphasising improved quality of life is recognised. However, the bottom 10 statements (high confidence) have an unbalanced contribution to the joint index, with the potential to improve quality of life perceived to be more significant than wealth creation for most of the statements. These characteristics are evident from Figures 5.1 and 5.2 respectively.

Table 5.2: Bottom 10 statements (high confidence)

| No. | Statement | Joint index | Wealth creation index | Quality of life index |
|---|---|---|---|---|
| 51 | Practical use of pervasive computing (household appliances connected and programmed to execute specific functions at specific times) so as to free time to spend with the family. | 41,45 | 25 | 57,89 |
| 3 | Development of software (flash cards, spellcheckers) to promote and enhance the use of South African indigenous languages. | 41,36 | 60 | 22,73 |
| 19 | Widespread use of satellite technology to trace "bad tourists" (i.e. poachers, sex tourists, etc.) | 40,97 | 44,44 | 37,5 |
| 9 | Development of virtual-sport computer games for girls to promote their participation in sport. | 31,13 | 30,43 | 31,82 |
| 42 | Development of an integrated Management Information System that can be accessed with a personal smart card for relevant and accurate information. | 30 | 20 | 40 |
| 10 | Better coverage of women sports in the media to eradicate negative attitudes towards women's participation in sport. | 26 | 8 | 44 |
| 40 | Practical application of neutral networks for self-diagnosis. | 25 | 0 | 50 |
| 37 | Development of medicinal dispensing machines for self-treatment. | 15,39 | 0 | 30,77 |
| 30 | Development of "safe drugs" that produce the same "high" as unsafe ones. | 14,29 | 28,57 | 0 |
| 31 | Development of virtual "cocaine trip" as an alternative to addictive drugs. | -57,14 | -42,86 | -71,43 |

**Fig. 5.1 Characteristics of the top 20 statements from respondents with high confidence**

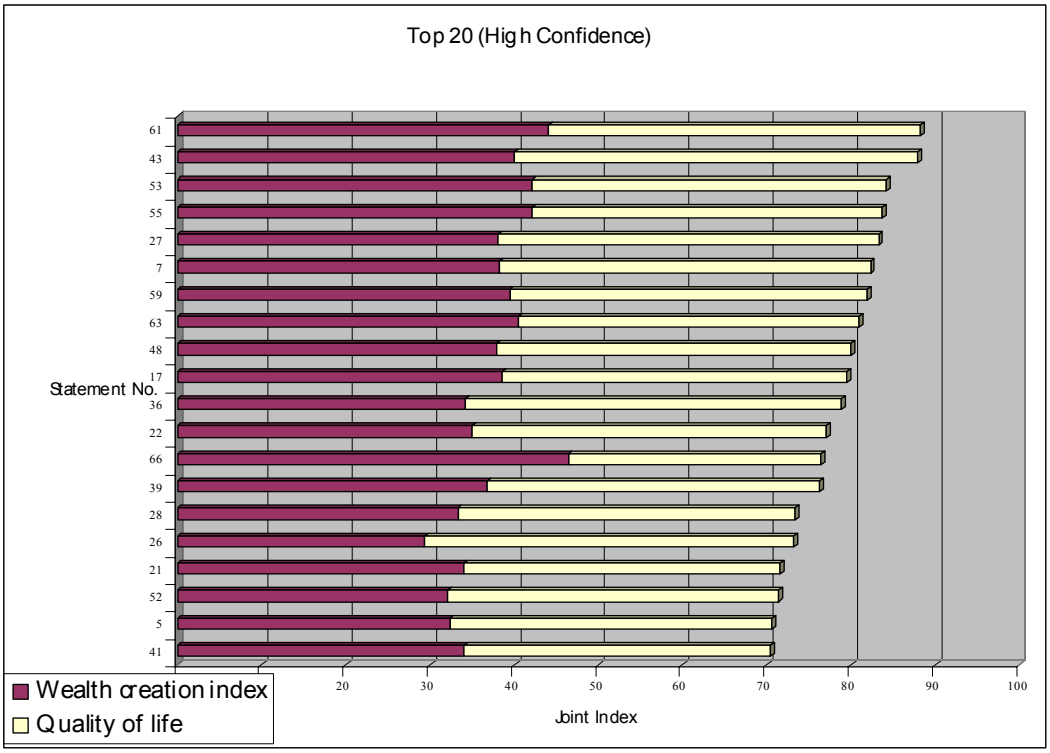
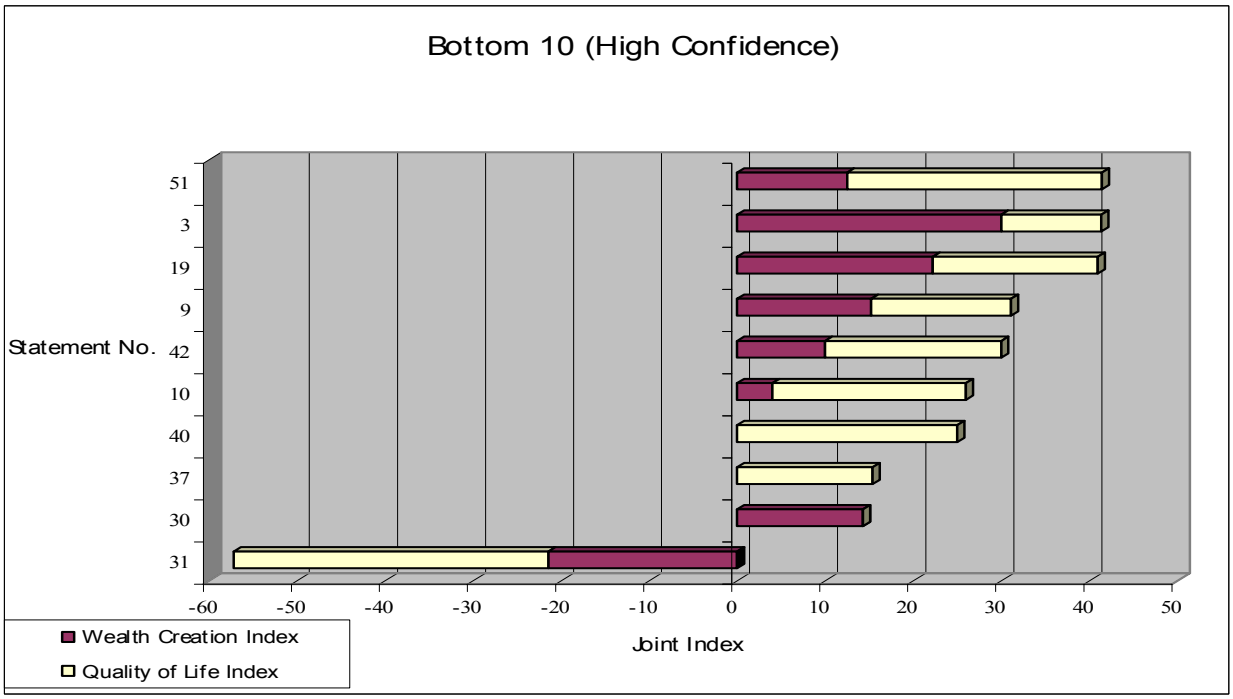



**Fig. 5.2 Characteristics of the bottom 10 statements from respondents with high confidence**



The top 20 and bottom 10 statements with the highest rank were categorised according to their respective sector foci. This categorisation of the number of significant statements per sector foci is given in Table 5.3 below.

These statements were intended to reflect the focal areas. However, it was found that the stakeholders were responding to the potential multifaceted benefit that each individual statement held for South Africa. Some of these benefits could have fallen within different sector foci, or even a different sector. The categorisation of the top twenty and bottom 10 statements lists did, however, indicate the popularity or perceived importance of the statement, as grouped under the various sector foci.

From these groupings it can be deduced that the greatest number of statements for the top 20 high-confidence statements fell within the economic participation foci, with safety and security, health and welfare and education and training falling within the next most popular group. Health and welfare together with arts, culture, sport and recreation formed the most popular sector foci in the bottom 10 ranked statements.

**Table 5.3 Sector foci categorisation of significant statements**

| Sector foci | No. of statements | |
|---|---|---|
| | Top 20 | Bottom 10 |
| **Economic participation** | **4** | **0** |
| **Safety and security** | **3** | **2** |
| **Health and welfare** | **3** | **3** |
| **Education and training** | **3** | **0** |
| **Arts, culture, recreation and sport** | **2** | **3** |
| **Information and communication technologies, and infrastructure** | **2** | **0** |
| **Community development** | **1** | **0** |
| **Environment and tourism** | **1** | **1** |
| **Morals and ethics** | **1** | **1** |
| **Total** | **20** | **10** |

## 5.5 South Africa's Comparative Standing

The vast majority of respondents perceive South Africa to be equal to or ahead of Southern African countries in respect of almost all the statements. A similar perception exists concerning South Africa's standing relative to other developing countries. However, it is clear that the respondents perceive South Africa to be behind developed countries in respect of all but one of the statements.

## 5.6 Likely Time Frame to Realisation

A significant spread exists concerning the likely time frame for realising the different statements, with no single time category being totally dominant. However, the period six to 10 years returns the highest averages for statements within most of the different sector foci. Statements falling under morals and ethics, ICT and economic participation are likely to be realised within the next six to 15 years.

## 5.7 Most Likely or Preferred Method of Acquiring Technology

The popularity of the suggested methods for acquiring the technologies required to realise each statement is represented graphically in Figure 5.3 below.

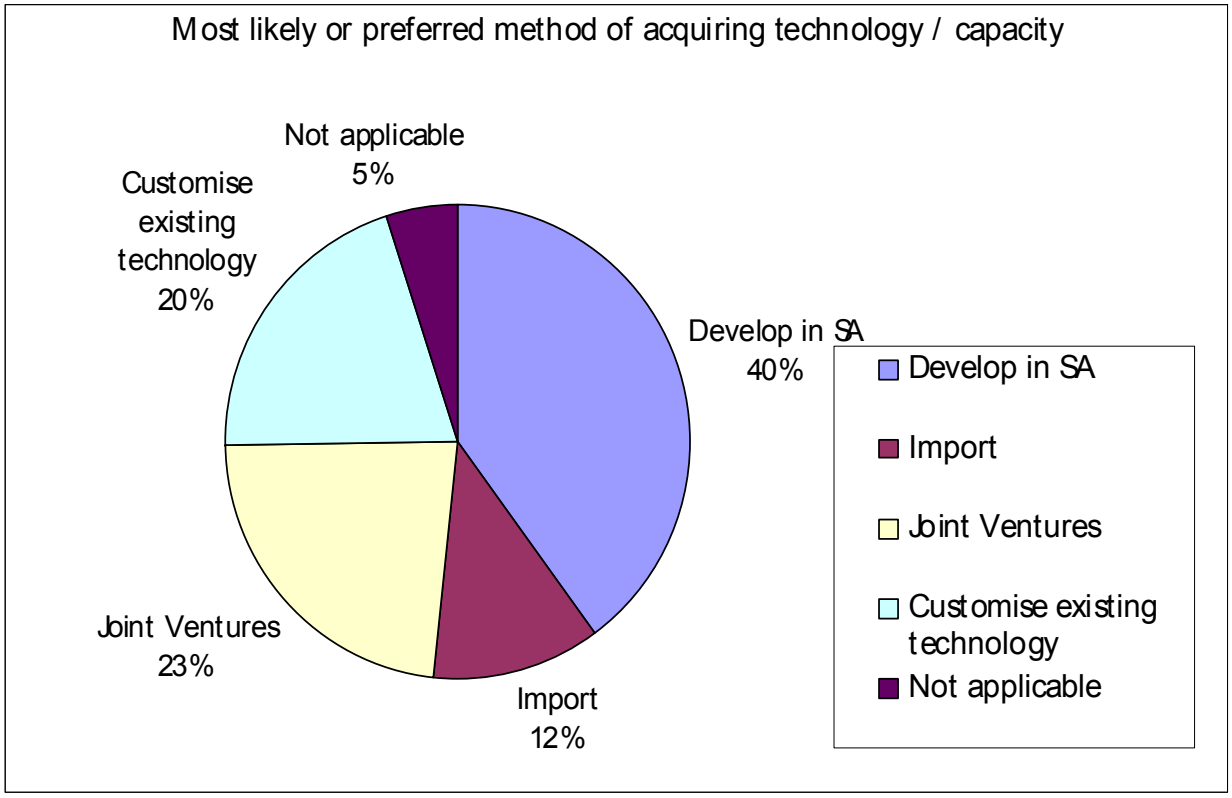



**Figure 5.3 Likely methods of acquiring technology or capacity**

From Figure 5.3 it is clear that developing the technology or capacity locally was the most likely or preferred method to realise the majority of statements. This was followed by engaging in joint ventures with other countries and then customising existing technology. A similar analysis conducted using input from the top 20 (high-confidence) statements, returned the same results.

## 5.8 Key Constraints

The overall performance of each of the seven key constraints was established by taking the constraint frequency as a percentage of the total number of constraint responses. To clarify interpretation of these results, consider that if all respondents for each of the statements marked three constraints, then the maximum possible percentage for a constraint would be 33,3%.

Financial constraints were perceived to be the overriding obstacle in all of the top 20 (high-confidence) statements and returned a very high frequency percentage of 29% (see Fig. 5.3). This was followed by the constraint relating to the risk or feasibility of developing the technology. Levels of human resource competency and social and cultural acceptance were also regularly indicated as potential obstacles to realising the statement.

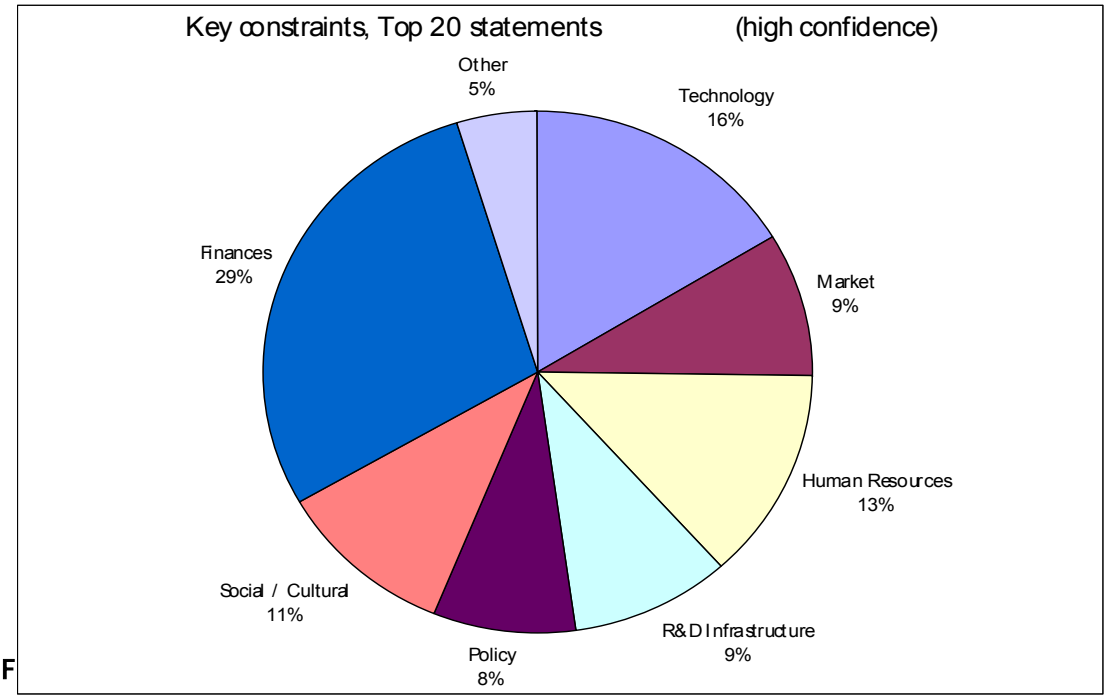
On reviewing the survey results, the Sector Working Group agreed that the financial obstacle was a critical factor in the successful development of technology and capacity. However, it was felt strongly that unless funds were applied correctly, these funds would not achieve the desired outcome. The mechanisms for this application, such as a constructive regulatory framework, sufficient qualified human resources and the necessary research development infrastructure, including institutional structures, equipment and capacity, would be critical in ensuring that the required technology was developed effectively and economically.

A very similar response was received for the bottom 10 (high-confidence) statements, with the availability of funding being identified as the most significant constraint, followed by the risk of developing the technology (see Fig. 5.4).

It is interesting to note that the constraint 'other', intended to indicate whether any constraints had been excluded from the list, was not frequently selected for the top 20 and bottom 10 statements. This seemed to indicate that the list of generic constraints provided in the questionnaire was reasonably inclusive.

The results for the key constraints for the top 20 and bottom 10 statements are illustrated graphically in Figures 5.3 and 5.4 respectively.

**Fig. 5.4 Relative importance of constraints (Top 20, high confidence)**

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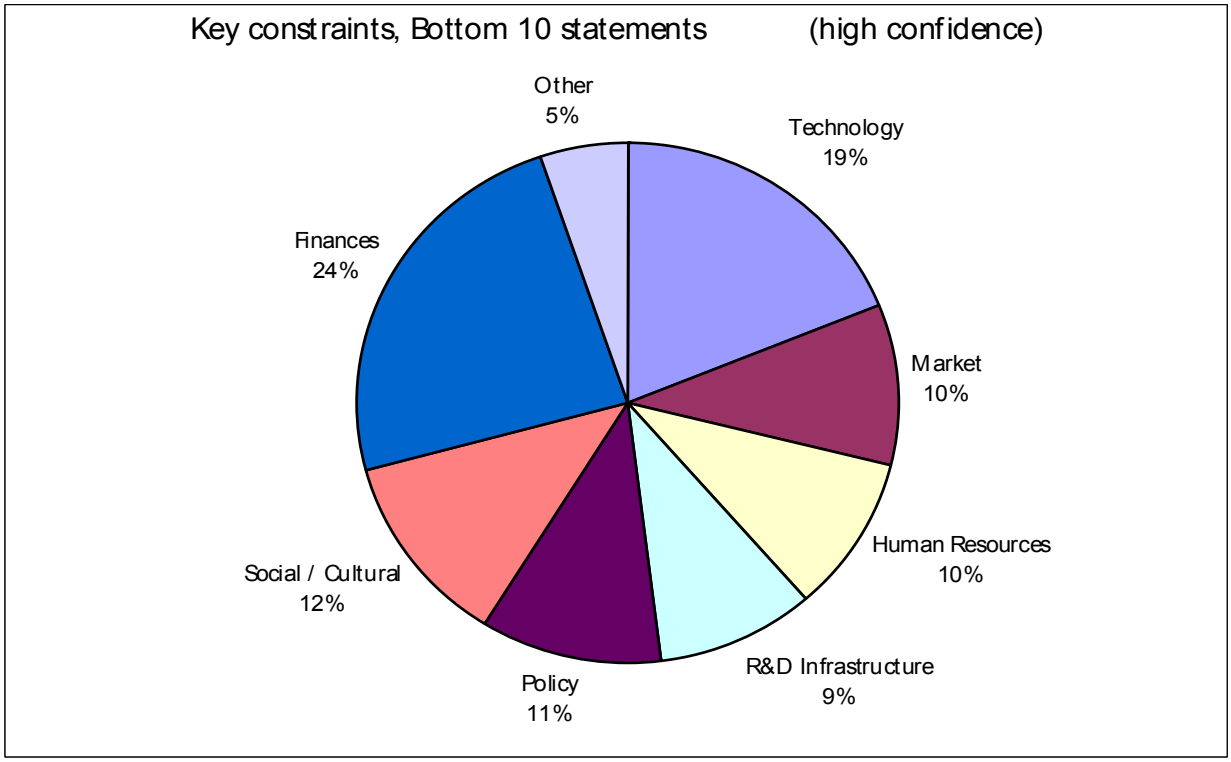


## 5.9 Conclusion

The high degree of commonality found between statements falling in the all-respondents group and the high-confidence responses add credibility to the significance of these statements. On examining the top twenty statements it was found that the proportional contributions of the wealth creation and quality of life

indices to the joint index were reasonably balanced, with a tendency towards improved quality of life. The bottom 10 statements were unbalanced, however, with the improved quality of life index contributing the greatest proportion of the joint index for most statements.

Four of the statements in the top 20 high-confidence group fell within the economic participation sector foci. Education and training, health and welfare and safety and security each had three statements in the top 20 high-confidence list. However, it was recognised that this did not indicate the relative importance of the sector foci, since many of the statements have multifaceted benefits, falling within other Youth Sector foci and even other sectors.

South Africa was perceived by respondents to be equal to or ahead of Southern African and developing countries but behind developed countries for most of the statements.

Although a range of response were received, the six- to ten-year period was favoured as the most likely time required for realising most of the statements.

Developing the technologies or capacity locally was the most popular method of acquiring the technology needed for realising the statement, followed by joint ventures with other countries and customising existing technology.

Stakeholders perceived the financial constraint to be the most significant obstacle standing in the way of realising the statements. The Working Group agreed that sufficient financial support was a critical success factor. However, funding required a structure within which it could be applied in order to achieve its intended purpose. This structure included policy, research development, institutional and equipment infrastructure and skilled human resources. The risk or feasibility of developing the technology was also an important constraint, followed by human resource competency.

# Chapter 6:
# Key Technologies and Research Topics

## 6.1 Introduction

This section seeks to identify key technologies with which youth will directly interface. It is not aimed at empowering adults at the expense of young persons. It intends to ensure that youth are placed in the centre of technology discussions in South Africa. The negative consequences of a lack of access for young people to meaningful technology are detrimental to themselves and the nation as a whole.

Technology has the potential to prepare and be one of the vehicles that young persons could use to reach for their aspirations. However, the majority of South African youth have no access to technology that would meaningfully empower and equip them. The major concerns of young people of this country include employment, good education, skills development, sports and entertainment. Thus, any recommendations on technology must meet this bottom line. In other words, technology must make it possible for young people to access better education, health care (including sports) and security.

To achieve this the following approach was used: Statements developed and used in the survey (Chapter 5) contain a technology and an application. Similar technologies involved were grouped so as to capture technology themes (areas). These are summed up in Table 6.1. This was followed by a closer analysis of these technology themes with regard to their attractiveness (Table 6.2) or feasibility (Table 6.3). This would allow the identification and prioritisation of implementation.

Table 6.2 examines the attractiveness of a particular theme. The measure of attractiveness is defined by three broad variables, viz. international competitiveness, government policy and the exploitation capability. International competitiveness examines how competitive South Africa is on the relevant theme, government policy examines whether there is policy promoting the development of a theme, and exploitation capability examines whether the existing industry base has the ability to exploit the opportunity.

Table 6.3 examines how feasible it is to implement a particular theme. It looks at the size of the technology base in South Africa, the cost of developing technologies under a theme, and the knowledge required to develop a theme.

## 6.2 Technology analysis

### 6.2.1 Broadcasting technology

There was general consensus that the broadcast infrastructure, i.e. television and radio, in South Africa is very good. As a result of this discussion, computer-based technology was separated from broadcast technology. South Africa is the leading player in Africa with regard to radio and television. But access in some areas to broadcasts is still poor because of basic infrastructure. Also, programme content is weak. South Africa has been good in the application of broadcast technology that has been developed elsewhere. Technology transfer has been achieved in this area, as evidenced by the fact that the majority of people are used to this technology and are using it.

There was general consensus that there are many alliances in the broadcast field. The M-Group is going into other parts of Africa and forming alliances in order to spread its network. While SA has developed its own wind-up radio, everything else in the broadcast area has been imported. Many felt strongly that the Independent Broadcasting Authority (IBA) washindering the implementation of broadcast policies. Some felt it was too interventionist. The policy framework is also not facilitative of quick implementation. Others felt that the policy might be good but the implementation was bad.

The Working Group agreed that the infrastructure was good, but perhaps there was a need for infrastructure that is more enabling of rapid implementation of policy. It was felt that big companies are active in this area but there is not much room for competition. Small companies still have difficulty in entering this market and while one can apply for limited licences, the sustainability issue is a problem, i.e. it is difficult for community radio stations to remain viable.

Table 6.1: List of technology themes, technologies and areas of application

| Technology theme | Technologies | Application(s) |
|---|---|---|
| Broadcast technologies | Radio<br>Video | Promotion of cultural diversity<br>Enhancing indigenous knowledge<br>Health promotion |
| Information systems | Smart cards | Resource management<br>Crime prevention<br>Rehabilitation<br>Access to information<br>Community development<br>Family values<br>Information security<br>Commerce and industry |
| Internet working technologies | Vocational guidance websites<br>Central websites for school projects | Career opportunities for youth<br>Contextualise education curriculum (creating collaboration/ links between industry and education system |
| Medical technologies | Telemedicine<br>Biotechnology | Health promotion<br>Sports drug detection<br>Self-diagnosis facilities |
| Mobile technologies | | Open access<br>Access to SET<br>Crime prevention<br>Access to welfare services<br>Early detection of exceptional talent |
| Multimedia technologies | Real-time graphing<br>Virtual teacher<br>Technology design and simulation software<br>Technology projects | To validate physical and chemical principles<br>To circumvent the poor qualifications of teachers<br>To teach the technology and design process |

The potential impact on the quality of life in this area is high and the financial returns are also high. However, better programming content could lead to a much better quality of life. It is worth noting that the programme content is weak and research into its effectiveness is required. It is not an easy technology area to establish clusters that would benefit young people directly. Community radio stations struggle to sustain themselves and there is not much synergy between big business and small or non-governmental initiatives. The potential is great but the current practice is weak. Because radio and television infrastructure and the production of local programme content are very expensive, large capital expenditure is required to set up a station. Estimates indicate that producing local content is five times more expensive than importing programming from overseas. Everyone felt that there was a good technology base.

Table 6.2: Attractiveness matrix summarised

| Technology theme | International competitiveness * | Government policy/ Implementation ** | New industries * | Total |
|---|---|---|---|---|
| Broadcast technologies | 10 | 9 | 6 | 25 |
| Information systems | 9 | 9 | 10 | 28 |
| Internet working technologies | 8 | 14 | 13 | 35 |
| Medical technologies | 10 | 13 | 10 | 33 |
| Mobile facilities | 8 | 9 | 6 | 23 |
| Multimedia technologies | 6 | 9 | 10 | 25 |
| Satellite technologies | 9 | 11 | 8 | 28 |
| Sports technologies | 7 | 8 | 9 | 24 |
| Virtual reality | 4 | 5 | 7 | 16 |

Key:
1-2 poor
3-4 below average
5-6 average
7-8 above average
9-10 good

### 6.2.2 Information systems

These exist but they are not widespread. There are even people exporting information systems developed in South Africa, so we do have the capacity, and the innovation in this area is centred around universities and science councils. There are

bilateral agreements with several countries and institutions but we should encourage more so that there can be shared cost and shared benefit. There is not much supportive policy. It's happening in pockets. There needs to be more effective coordination. Right now the movement in this area is very slow. There is a database, i.e. an inventory, of expertise being developed at the Human Sciences Research Council. There also needs to be a tracking system for university graduates. But there are many projects of this nature that are not being pursued. There was a suggestion that Statistics SA is applying a lot of information system technology but their dissemination of information to young people is not very good.

Table 6.3: Feasibility matrix

| Technology theme | Size of existing technology base | Cost (Capital) | Knowledge | Total |
|---|---|---|---|---|
| Broadcast technologies | 2 | 4 | 4 | 10 |
| Information systems | 4 | 4 | 4 | 12 |
| Internet working technologies | 4 | 3 | 3 | 10 |
| Medical technologies | 2 | 3 | 3 | 8 |
| Mobile facilities | 2 | 1 | 3 | 6 |
| Multimedia technologies | 4 | 2 | 2 | 8 |
| Satellite technologies | 2 | 2 | 4 | 8 |
| Sports technologies | 3 | 3 | 3 | 9 |
| Virtual reality | 2 | 1 | 1 | 4 |

* Key
1 poor
2 below average
3 average
4 above average
5 good

### 6.2.3 Internet working technologies and multimedia technologies

Analysis of these technologies leads to similar observations and conclusions as for information systems. These are technologies in which rapid changes are taking place. However, such changes do not mean that old hardware must be discarded. They present several opportunities for young people. For example, when large companies and government institutions like the Independent Electoral Commission upgrade their hard- and software these could be made useful to NGOs, community centres and rural and township schools. It may be possible to set up vocational guidance websites as well as bookmarks of relevant sites for such educational purposes.

### 6.2.4 Medical technologies

Issues of health that pertain to youth today and in the future are always unique to them. They include teenage pregnancies, HIV/AIDS, sports injuries, drug and alcohol abuse, and, increasingly, issues concerning sexual abuse and economic exploitation.

There is capacity in the country to tackle several of these issues with a growing number of alliances formed with international agencies and industries like the WHO and the Welcome initiative. Small companies and NGOs within the country are working with youth at grassroots level, mainly in urban areas. Traditional medical practitioners have not been utilised to the fullest and integrated into the medical stream.

The government has a strong policy focusing on primary health care. It is in this area that young people should benefit. However, there are still problems with regard to implementation. Facilities in remote areas are still lacking and where they exist there are no human resources or medicines available. The HIV/AIDS education does not seem effective in stemming the tide of the epidemic among young people. This needs to be strengthened. Youth require access to self-diagnosis technologies made available in sports halls, clubs and related venues. Counselling is most urgently needed. Opportunities exist for impacting on and improving the quality of life of young persons.

### 6.2.5 Mobile facilities

Mobile facilities are around but they not widespread. The need definitely exists and there is a lot of potential for innovation in this area. However, rural areas still are not benefiting from this technology. Inaccessibility is one of the problems. There currently is input from major companies in the private sector (i.e. NIKE and Telkom). Industry, e.g. Transnet, is quite active in sponsoring mobile social programmes. However, there seems to be a lack of awareness of such programmes and opportunities to forge alliances in this area. There are alliances but not many of them. South Africa has developed some of the technology here. Often it is a case of working with existing technology and customising it to make it mobile. We have knowledge and a technical base, we just have to encourage a dialogue on this issue.

Policy related to this issue is located in different sectors. There should be strong incentive schemes for the private sector to get involved. At the moment it is uncoordinated and not formalised. There is Edu-train, mobile clinics, mobile post offices and libraries. However, road infrastructure needs to be improved, as do rail networks.

Big companies mainly sponsor these kinds of activities but not all are supporting them. We need to explore how we can encourage more companies to do more, i.e. we need to show them how they can contribute to the bottom line. Small companies can also play a big role, e.g. the entrepreneur who has set up his own travelling movie theatre. Mobile technologies have significant potential for business and job creation.

### 6.2.6 Satellite technologies

Satellite technologies are well used, but not widespread. Our own technology is largely centralised in the Western Cape. There is the Innovation Fund that supports research and applications of this nature. However, we do not have centres for the purpose of distance education.

### 6.2.7 Sports technologies

South Africa has centres of excellence in this area but they are not at the same level as those in other countries. For example, we do not have any means by which we can systematically identify potential world-class athletes and then develop them. We need to develop such a 'detect and enhance' system. We have formed good alliances with world-class companies and laboratories but these are not widespread. There is no doubt that we know what is needed; we should not have to send people overseas.

We do have a ministry and it has set up an institute that focuses on drug detection in sport. However, we do not have very much in the way of legitimately enhancing sport performance. We have, however, acknowledged that it is actually big companies that are at the forefront of developing new technologies for improving sports performance and that there is a need for more effective coordination with them in this regard.

### 6.2.8 Virtual reality

The Working Group felt that virtual reality would be attractive to the youth. However, it is too expensive and difficult to implement in this country (for detailed information, see Appendix 5).

## 6.3 Prioritising

Figure 6.1 provides a useful visual mechanism for identifying technologies that could be implemented within the next five, 10 or more years. Technologies that will be useful in the long term do not necessarily mean that work should begin 10 years from now. Rather, it means that work must be initiated now for meaningful benefits to young people to be observed in the longer term.

**Short-term technologies (0-5 years)**

These include information systems, internet-working technologies and broadcasting technologies. Internet technologies are highly attractive to young people.

**Medium-term technologies (6-10 years)**

These include medical, mobile, multimedia, satellite, and sports technologies. Medical technologies are highly attractive.

**Long-term technologies (> 10 years)**

Virtual reality is one technology that will take a longer term to be implemented. Moderately attractive and feasible.

## 6.4 Recommendations

### 6.4.1 Broadcast technologies

Noting that broadcasting technologies have the potential to be used by youth for their own development, and that South Africa has an above-average technology infrastructure, we recommend that government create favourable policies aimed at stimulating the involvement of small business in broadcasting and encouraging local content. The local content should also emphasise youth programming.

### 6.4.2 Information systems

Noting that information systems are feasible and attractive, we recommend —

- greater government coordination so as to ensure that information is disaggregated in such a way that young people can access information on careers and growing economic sectors; and
- that Statistics SA adopt a more effective information dissemination programme, particularly for youth, who need to address their own special issues.

### 6.4.3 Internet working technologies and multimedia technologies

Noting that Internet working technologies are highly attractive while multimedia technologies are only moderately attractive, that the infrastructure is already in place providing a good platform to work from, and that there is a potential for further development in tertiary institutions, we recommend that —

- the human resource base be developed in schools and teacher colleges;
- government provide incentives to encourage skilled individuals to train teachers on the intelligent use of these technologies; and
- rural and outlying schools be linked with tertiary institutions and local municipalities (one school should have at least one computer linked to the Internet).

### 6.4.4 Medical technologies

Noting that medical technologies have the potential to improve the quality of life of young people, we recommend that —

- youth be given easier access to telemedicine; and
- government create the necessary infrastructure in youth centres, schools, and related areas.

### 6.4.5 Mobile facilities

Noting that mobile facilities are not widespread, we recommend that —

- government create policies in support of the expansion of mobile facilities;
- more effective coordination and incentive schemes be encouraged for the purpose of stimulating private-sector investment through subsidies for small businesses to develop mobile facilities;
- the use of mobile facilities in rural areas be promoted and emphasised; and
- quality-control measures be set to monitor and evaluate the content and quality of mobile facility programmes.

### 6.4.6 Satellite technologies

Noting that there is a growing need for better infrastructure and for greater use of this technology, we recommend that —

- government invest in satellite technologies that will increase the number of radio and TV channels and encourage the development of youth channels; and
- use of this technology for crime prevention be encouraged.

### 6.4.7 Sports technologies

Noting that sports technologies have the potential to enhance the performance of young athletes, we recommend that —

- small companies be more involvement in the development of new technologies to improve sports performance;
- government develop enabling policy that will promote and systematise early detection and development of sports talent; and
- more sports facilities be developed that will advance the participation of women in sport.

### 6.4.8 Virtual reality

Noting that virtual reality has a low feasibility and attractiveness we recommend the establishment of a favourable policy framework to encourage the development of virtual-reality technologies.

## 6.5 Conclusion

The youth sector stakeholders, the government of the Republic of South Africa through its Department of Arts, Culture, Science and Technology, and the Youth Sector Working Group believe that the Research and Technology Foresight study was very useful. The outputs of the Youth Sector will provide valuable information for serious consideration of significant research and technology trends and their relationship to youth development, and will help the government and the private sector to prioritise research and technology funding.

The workshops identified a range of focal areas of concern to young people of South Africa. These focal areas formed the basis for the development of the following:

- Youth Sector scenarios — alternative future worlds of youth which could be used to test the resilience of current thinking.
- The survey questionnaire — used to test the issues that had been identified from the workshops.
- The research and technology themes — prioritised technologies with similar applications grouped together to form themes.
- Finally, the recommendations — important actions or activities to be taken by government and other role players in order to create an enabling environment for the acquisition of the research and technologies identified by the Sector Working Group.

The vision to link research and technology to the needs and aspirations of youth has been created. The challenge is on all the stakeholders to work together to achieve it.

# Appendix 1

The workshop schedule was as follows:

| Workshop | Activity |
|---|---|
| 1 | Foresight overview and methodology.<br>Expectations and terms of reference.<br>Sector foci.<br>Introduction to Local Scan.<br>Analysis of strengths and weaknesses. |
| 2 | Analysis of opportunities and threats.<br>Introduction to macroscenarios.<br>Development of sector-specific scenarios. |
| 3 | Finalising the sector-specific scenarios.<br>Presentation of the International Scan.<br>Discussion on the format of the questionnaire.<br>Discuss on the framework of the survey statements.<br>Introduction to the Logic Chain methodology. |
| Three one-day mini workshops (task teams) | Development of survey statements. |
| 4 | Analysis of the survey results.<br>Development of technology themes<br>Recommendations. |

# Appendix 2

Sector Working Group Members

Chairperson: Dr Nceba Gqaleni — University of Natal

Sector Coordinator: Sipho Zikode — National Research and Technology Foresight Project

| NAME | ORGANISATION |
|---|---|
| Ms Priscilla Moodley | Eskom |
| Mrs A Tukulu | Dept of Education |
| Ms Selloane Matoase | Ntsika Enterprise Promotion Agency |
| Ms Johanna Mulaudzi | Community Agency for Social Enquiry |
| Ms Eve Thompson | Joint Center for Political and Economic Studies |
| Mr John Stoker | Rhodes University Mathematics Education Project |
| Ms Jill Cairns | HARTRAO |
| Dr Kopane Taole | Foundation for Research Development. |
| Colleen Hughes | Human Sciences Research Council |
| Ms Kebogile Dilotsotlhe | Department of Arts, Culture, Science and Technology |
| Mr Derick Fish | University of Zululand |
| Mr Greg Ker-Fox | TRAC South Africa: University of Stellenbosch |
| Mr B Nelana | National Youth Commission |
| Ms Tebogo Mampane | National Youth Commission |
| Mr Freddie Pilusa | SA Youth Council |
| Ms Sophie Mkhasibe | Department of Welfare |
| Mrs V Zondi | Sthunzi School Development |
| Mr Magezi Chauke | Giyani Science and Technology Centre |
| Mr Gavin Ehlers | University of Pretoria |
| Ms Thuli Molope | Department of Labour |
| Ms Nobuntu Mbelu | Mzamo Child Guidance Clinic |

# Appendix 3

## A summary of the strengths, weaknesses, opportunities and threats

| ARTS, CULTURE, RECREATION AND SPORTS | |
|---|---|
| **Strengths** | **Weaknesses** |
| Positive attitude of youth towards sport.<br>National centre for sport, with a strong research and technology component.<br>Sporting events broadcast widely by way of television and radio.<br>Creative potential of youth.<br>Strong, diverse culture of music.<br>Television and radio programmers currently promote local content.<br>Participation in international art, culture, recreational and sporting events. | No recognised regional centres responsible for promoting arts, culture, recreation and sport.<br>Youth demonstrate a cultural preference for different forms of art, culture, recreation and sport.<br>Lack of high-profile sporting and cultural events in less affluent regions of the country.<br>Youth unfamiliar with different sporting codes/rules.<br>Absent or underdeveloped sport and recreational facilities in many areas, particularly rural areas.<br>Gender bias, particularly in sport.<br>Skewed demographic representivity among national sporting teams.<br>Strong culture of music not recognised.<br>Strong influence of American culture on youth erodes natural domestic culture.<br>Lack of understanding of other cultures within the country.<br>Lack of financial support for sporting and cultural initiatives.<br>No legal framework to support and encourage philanthropy (private sector and international funding).<br>Underutilisation of existing facilities promoting art and culture (galleries, museums and libraries). |
| **Opportunities** | **Threats** |
| Benefit from exposure to other local cultures.<br>Positive activities for youth to occupy their free time.<br>Broadening of horizons through travel and work abroad.<br>High-profile sporting and performing personalities promote these activities as attractive careers and pastimes.<br>Stimulus to re-engage in education.<br>Job creation in industries related to art, culture, recreation and sport.<br>Create export market for culture.<br>Radio, television, and print media create access for youth to art, culture, sport and recreation.<br>Technology to facilitate the development of psychomotor skills. | Local talent not developed or utilised. As a result, top performers are imported.<br>Language barriers inhibit cultural interaction.<br>Lack of necessary resources and facilities.<br>Perception that international performance and products are superior.<br>Perceived exclusion of sectors of the population, particularly from cultural and sporting activities.<br>Lack of commitment to local culture.<br>Media do not promote development of talent; poor-quality local programme content with low-impact exposure.<br>Perception that excellence is unattainable.<br>Erosion of indigenous arts and culture owing to cultural imperialism.<br>High political ideals with little delivery.<br>Youth demonstrate low work ethic.<br>Over-commercialisation of arts, sport and culture. |

| ENVIRONMENT AND TOURISM | |
|---|---|
| **Strengths** | **Weaknesses** |
| Aesthetically appealing, diverse and unspoilt natural environment in many parts of the country.<br>Job creation in the tourism industry.<br>Environmental issues may be addressed through technological solutions.<br>Youth provide innovative and creative solutions to environmental problems.<br>Biological diversity well represented, which attracts tourists. | Youth in urban areas lack interest in and knowledge of the environment.<br>Little understanding of how technology impacts on environment.<br>Environmental centres, such as museums, inaccessible to large sectors of the population.<br>Different awareness programmes not coordinated.<br>Most energy sources produce pollution.<br>No legislative framework or incentive scheme to encourage innovative solutions to environmental problems.<br>Conflict of interest between survival and environmental protection.<br>Environment often evaluated against the financial benefit derived from development.<br>Environmental abuse owing to lack of education and awareness. |
| **Opportunities** | **Threats** |
| Entrepreneurial opportunities created by tourism.<br>Introduction of Curriculum 2005, includes an environmental awareness component.<br>Wealth creation through international investment.<br>Natural tendency of youth to be involved in preserving their environmental heritage.<br>Programmes to educate people about sustainable utilisation of natural resources.<br>Indigenous technologies may hold solutions to environmental problems that previously have not been formally considered. | A high crime rate and xenophobia harm South Africa's attractiveness as an international tourist destination.<br>Depletion of natural resources.<br>Biological diversity will lead to the extinction of some species.<br>Insufficient funding to reverse environmental degradation. |

| HEALTH AND WELFARE | |
|---|---|
| **Strengths** | **Weaknesses** |
| Free primary health care for mothers and children.<br>Selected medical practitioners have access to advanced medical technologies.<br>SA Medical Faculties produce good-quality medical practitioners.<br>Recently qualified doctors are required to perform one year of community service.<br>Availability of low-cost technology for prevention and treatment of diseases.<br>Many NGOs offer well-developed support programmes for youth in this field, particularly in urban areas.<br>Many good national policies for primary health care, tobacco and HIV/AIDS.<br>Youth information services, such as the AIDS Line. | Many welfare services are not accessible to youth.<br>Ineffective education on issues pertaining to health and welfare.<br>Lack of technology to deal with epidemics (no vaccine against or cure for AIDS).<br>Skewed access to financial resources for research.<br>Available technology not always applied in health care.<br>Many communities lack basic domestic infrastructure such as running water, sanitation and electricity.<br>Widespread substance abuse.<br>High incidence of teenage pregnancy. |
| **Opportunities** | **Threats** |
| National youth support programmes.<br>Private and public sector investment in health and welfare campaigns.<br>Life skills developed as part of Curriculum 2005 contribute to restoration of dignity and mental health.<br>Limited availability of counselling services for youth, especially with regard to AIDS issues.<br>Indigenous remedies are formally recognised as an alternative form of medicine. | Disastrously high death rate among youths as HIV-positive people increasingly develop full-blown AIDS, removing a large section of the working population.<br>Limited state resources allocated to social welfare.<br>Youth excluded from community development planning.<br>Increase in drug trafficking leads to further degradation of communities<br>Public clinics not youth friendly. |

| EDUCATION AND TRAINING | |
|---|---|
| **Strengths** | **Weaknesses** |
| Private and public funding for mathematics, science and technology education.<br>A selection of schools in S.A. are well resourced, well managed and have competent enthusiastic teachers with a high work ethic.<br>Broad range of potential technology-related careers available.<br>National Qualifications Framework intended to align education with the needs of the country.<br>Willingness of youth to be educated.<br>Successful NGO programmes addressing public understanding of science, engineering and technology.<br>Various organisations developing and implementing education technology.<br>Selected educational software is well received in established schools.<br>Variety of educational programmes on television and radio.<br>Good infrastructure and core competencies at tertiary level.<br>Technikons and technical colleges provide practical education and training at a tertiary level.<br>Apprenticeships provide training for young people in industry.<br>Good bursaries offered by industry and government for science-, engineering- and technology-related careers. | Most schools have inadequate facilities and insufficient resources, particularly in rural areas.<br>Lack of capacity and commitment to use of existing education resources.<br>Many teachers, particularly in physical science and mathematics, are poorly qualified.<br>Limited in-service teacher training.<br>General negative attitude of youth towards mathematics and physical science.<br>Youth demonstrate poor analytical and creative problem-solving abilities relative to international standards.<br>Content-based school education, with little emphasis on understanding and real-world context.<br>Very little practical work performed in physical and natural science subjects.<br>High failure rate in science and mathematics.<br>Large classes in schools, with high learner-teacher ratios.<br>Limited financial and human resources inhibit access to information technology.<br>Underdeveloped links between science councils and education system result in limited industry input into school curriculum.<br>Severe shortage of accessible vocational information.<br>The majority of learners are unaware of tertiary institutions' entry requirements when making subject choices in grade 10.<br>Many learners do not achieve tertiary institutions' minimum entry requirements for science-, engineering- and technology-related studies.<br>Low status of technical education.<br>Insufficient access to finance for students.<br>Undocumented indigenous technologies. |
| **Opportunities** | **Threats** |
| Private and public sector funding, both local and international, for youth to pursue careers in science, engineering and technology.<br>Adult literacy and numeracy programmes provide basic education opportunities for more mature youth.<br>Technological facilities provide access for youth to quality education and training.<br>Internet facilities provide youth with access to vast sources of information.<br>The Department of Arts, Culture, Science and Technology increases awareness of and access to science and technology.<br>Investigation of the impact of science and technology on education and training.<br>Development of policies to facilitate education and training pertaining to indigenous knowledge, particularly in rural areas.<br>Technology increases feasibility of distance education. | Competing priorities affect availability of funds for SET education and training.<br>Limited funds can affect access to technology and information.<br>Technological advancements will widen the gap between young people with or without access to these facilities.<br>Technology can lead to under-development of analytical skills, numeracy, spelling proficiency, etc.<br>Students have limited access to financial aid. |

| SAFETY AND SECURITY | |
|---|---|
| **Strengths** | **Weaknesses** |
| Safety and security are high-profile issues in South Africa.<br>Youth participation in police forums.<br>Youth involved in providing security for families.<br>Increase in the availability of technology and resources to help with the apprehension of criminals.<br>International observation and pressure reduce the likelihood of governmental oppression.<br>Good government policies in place.<br>Attractive military careers. | Ineffective gun control gives youth easy access to dangerous weapons.<br>Public transport systems are unsafe.<br>Unsafe conditions, especially for girls and young women, in educational institutions.<br>Very high incidence of rape and physical abuse.<br>Very high incidence of domestic violence.<br>Criminal justice system ineffective in rehabilitating convicted young people.<br>Youth associated with criminality, especially young men.<br>Children and youths used by crime syndicates.<br>Ineffective law enforcement.<br>Exposure to negative media and programming contributes to a culture of violence.<br>Moral degradation leading to justification of criminal activities for personal gain.<br>Safety from environmental hazards at home and in the workplace. |
| Opportunities | Threats |
| Criminals can be tracked via interpol.<br>Advancing police and military technology help to achieve internal security.<br>Community policing forums.<br>NGOs and other community organisations make youth aware of and discuss relevant safety and security issues.<br>Government programmes such as victim empowerment and crime prevention being implemented. | Failure to curb sexual and physical abuse as well as violent crime leads to incapacitation of victims.<br>Failure to curb domestic violence leads to a degradation of the family unit.<br>Violent images, particularly in mass media, influence young people to commit crime.<br>Ineffectiveness of government policy and the justice system leads to vigilante groups and a general breakdown in law and order.<br>Development of counter-technologies to reduce the effectiveness of technologies designed to maintain safety and security.<br>Information technology increases the incidence and magnitude of white-collar crime, particularly among youth.<br>Alienation of convicted youth by criminal justice system.<br>Unwillingness of youth to take responsibility for their own actions.<br>Stress results in young people demonstrating dangerous levels of anger and aggression. |

| COMMUNITY DEVELOPMENT | |
|---|---|
| **Strengths** | **Weaknesses** |
| Many non-government organisations currently focused on community development.<br>Many companies budget annually for social and community development.<br>Availability of indigenous technology for community development.<br>Community-based development programmes create employment.<br>Community development activities enhanced by the availability of technologies. | Limited skills for community development.<br>Insufficient use and unequal distribution of technology for community development.<br>Indigenous technologies are not well accepted as being relevant for community development.<br>Limited funding for community development. |
| **Opportunities** | **Threats** |
| Job creation.<br>Education and training.<br>The development of youth centres improves access of communities to essential and beneficial facilities.<br>Skills development. | Inappropriate usage of facilities.<br>Negative impact on environment.<br>Lack of infrastructure.<br>Limited sufficiently qualified human resources.<br>Limited funding |

| MORALS AND ETHICS | |
|---|---|
| **Strengths** | **Weaknesses** |
| Strong, diverse cultural heritage, with morality and ethics as a common base.<br>Constitution places emphasis on dignity and basic human rights for all.<br>High potential to improve quality of life. | Not all technology has a positive impact.<br>Degradation of the family unit will have a negative effect on the formation of these core principles in youth.<br>Many young people do not possess a high work ethic.<br>Gang members benefiting from criminal activities, with little prosecution. This may justify this lifestyle for many young people. |
| **Opportunities** | **Threats** |
| One year of community service for all young people. | Loss of common morals and ethics will remove the ability to reason from young people.<br>Racial tension will contribute to a breakdown of morality.<br>Unmonitored exposure to global information sources, such as websites displaying violence and pornography, can lead to erosion of national value system. |

| INFORMATION AND COMMUNICATIONS TECHNOLOGIES AND INFRASTRUCTURE | |
|---|---|
| **Strengths** | **Weaknesses** |
| Youth are adaptable to new technologies and conscious of information and communications technology.<br>Technology has resulted in many desired changes, particularly with regard to an increase in process effectiveness and efficiency.<br>Proliferation of religious and other groups.<br>The formation of a "global village" gives youth access to vast sources of information.<br>Job creation in the information and communications industry.<br>Create entrepreneurial opportunities for young people to set up small and medium-sized businesses, and work from home. | Limited funding for developing the required infrastructure and human resources competencies.<br>Many communities lack basic infrastructure, such as electricity.<br>Majority of schools and colleges do not have information technology facilities.<br>Demographically skewed access to information technology.<br>Multilingual society and computer illiteracy creates obstacles for technology transfer.<br>Lack of commitment from parents, teachers and learners to successfully implement this technology.<br>Difficult to keep abreast of technological change.<br>Narrow focus of interest groups excludes less informed individuals.<br>Difficult to control and secure information.<br>Information and communication technologies may lead to redundancy and retrenchments. |
| **Opportunities** | **Threats** |
| Fast-track implementation to bring competency of South African youth on par with youth in the rest of the world.<br>Self-employment opportunities.<br>Distance education becomes more feasible.<br>Education multiplier effect through the enhancement of teachers' core competencies.<br>Computer games used for education and recreational purposes, and to stimulate creativity.<br>Easy access to current information.<br>Convenience through the automation of menial tasks.<br>Tools to support informed decision making.<br>Vehicle for international exposure.<br>The quality and efficiency of communication and information exchange enhanced. | Widening gap between young people with and those without access to this technology.<br>Loss of job opportunities through automation of processes and services.<br>Personal information becomes less secure.<br>Development of antisocial tendencies.<br>Creativity and imagination stifled.<br>Global domination by individual organisations.<br>Inability to utilise technology owing to a lack of qualified human resources.<br>Rural areas excluded from these technological developments. |

| ECONOMIC PARTICIPATION | |
|---|---|
| **Strengths** | **Weaknesses** |
| Youth motivated by financial gain.<br>Youths are open-minded towards technological developments in the workplace.<br>Participation in the global market economy. | Limited access to financial resources, particularly with regard to venture capital.<br>Unemployment poses a major threat to youth participation in the country's economy.<br>Lack of access to technology used for business development.<br>Current education system not focused on development of life skills.<br>Poor culture of entrepreneurship among youth. |
| **Opportunities** | **Threats** |
| Government policy and initiatives to create an enabling environment for youth to participate more in the economy.<br>Increased opportunities for self-employment.<br>Strengthening of international trade relations.<br>Strategy for industrialisation creates employment opportunities.<br>Information technologies present global marketing opportunities.<br>Empowerment of women to participate in decisions | First-world countries demonstrate low investment confidence in South Africa.<br>Demographically skewed ownership of capital and assets.<br>Credit facilities limited for the youth, leading to exploitation.<br>Crime significantly reduces enterprise profitability.<br>Inadequate education and training.<br>Poverty and unemployment contribute negatively to a culture of innovation.<br>Limited "exploitation" of secondary rural industries |

# Appendix 4

## YOUTH SECTOR SCENARIOS MATRIX

| | INNOVATION HUB | GLOBAL HOM E | FROZEN REVOLUTION | OUR WAY IS THE WAY |
|---|---|---|---|---|
| **Crime** | Crime will increase initially, then decrease owing to regional cooperation and stability. | Cross-border crime<br>Economic crime increases<br>International crime-prevention standards. | Crime will flourish owing to a lack of political will. | Crime will decrease thanks to increased counteractive measures. |
| **Access to finance** | Access to development funding within the region. | Access to finance difficult for the poor<br>Decrease in philanthropy<br>Emphasis on global competition. | " Crisis management approach to funding. | Funding biased towards rural and urban needy |
| **Over-commercial-isation** | Commercialisation will be regulated, e.g. Monopolies Act, unbundling of large corporations. | Over-commercialisation will flourish.<br>Global competition will reduce number of players. | Status quo will remain in terms of the rich/ poor divide. | Commercialisation will be controlled to achieve equity. |
| **Brain drain** | Regional transfer of expertise with SA benefiting. | One-way flow to developed countries. | Brain drain to continue.<br>Capacity to develop expertise will decrease. | Emphasis on development of local expertise. |
| **Compete in global market** | Selective regional trade privileges.<br>Increased trade agreements. | Dependent on developed nations.<br>Prices of produce determined externally. | Increased poverty, increased importation for the privileged few. | World-class products and services<br>Effective cooperation |
| **Unemploy-ment** | Decrease (broad-band).<br>ICT:<br>-Jobs (self)<br>-Information. | Decreases (but skilled/tech. orientated). | Increases. | Decreases (possibly limited and confined environment) |
| **International and local stability** | Increases. | International: Increases.<br>Local: Increases for a time, then decreases. | International: Unaware, not relevant.<br>Local: Decrease. | International: Correlated<br>Local: Increases |
| **HIV/ AIDS** | Decrease<br>ICT: Education. | Increases initially owing to an " its their problem" attitude, but decreases thanks to global advancement with regard to health issues (decreases – indirect cure?) | Increases. | Decrease (cure?) it's our problem. |
| **Job creation** | Many opportunities (not necessarily aligned with unemployment). | Job creation, but on whose terms?<br>Sustainability?<br>Supporting industry | Job creation limited, unfocused. | Job creation, many opportunities (broad-band) |
| **Quality of life** | Beneficial to all, direct. | Improves, no focus to differentiate, indirect, inconsistent. | Declines | Improves, specific, directed and focused |
| **Commitment of youth to education** | Increased to secure SA youth future. | Decreased – youth will be marginalised. | Decreased – no national plan/action. | Increase in selective areas. |
| **Appropriate-ness of infrastructure** | More appropriate – regional identity strong. | Decreased – youth will be marginalised and unable to afford. | Decreased – Youth development will be stifled. | More appropriate – adaptation to our own needs. |
| **S&T education and training** | Increase owing to innovative methods. | Those who have will have more and less emphasis on indigenous knowledge. | Decline owing to a lack of relevance. | Increase thanks to focus on social development. |
| **Nature of family unit** | Strengthening | Disintegration of family units. | Continued fragmentation of family unit. | Family unit strengthened because of traditional values come-back. |

# Appendix 5

Table indicating the full attractiveness/feasibility matrix as completed from the Working Group analysis

| Technology theme | Factor advantage | Alliances | Own technology | Supportive policies | Implementation infrastructure | Big corp's | Small corp's | Single/ Multiple | Margins | Cluster | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Broadcast technologies | 4 | 4 | 2 | 2 | 3 | 3 | 1 | 1 | 3 | 2 | 25 |
| Information systems | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 4 | 3 | 28 |
| Internet working technologies | 3 | 4 | 1 | 4 | 2 | 4 | 4 | 4 | 5 | 4 | 35 |
| Medical technologies | 3 | 4 | 3 | 4 | 3 | 4 | 2 | 2 | 5 | 3 | 33 |
| Mobile facilities | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 23 |
| Multimedia technologies | 2 | 3 | 1 | 1 | 1 | 4 | 3 | 4 | 4 | 2 | 25 |
| Satellite technologies | 3 | 3 | 3 | 4 | 2 | 4 | 1 | 1 | 4 | 3 | 28 |
| Sports technologies | 2 | 3 | 2 | 2 | 1 | 4 | 1 | 1 | 4 | 4 | 24 |
| Virtual reality | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 3 | 3 | 16 |

* Key
1 poor
2 below average
3 average
4 above average
5 good