



C S I R T E C H N O L O G Y
I M P A C T 2 0 0 1

Our Mandate - The CSIR, the largest scientific and technological research, development and implementation organisation in Africa, celebrates its 56th anniversary this year. Constituted as a Science Council by an Act of Parliament, our organisation operates under the following mandate: "In the national interest, the CSIR, through directed and multi-disciplinary research and technological innovation, should foster industrial and scientific development, either by itself, or in partnership with public and private sector institutions, to contribute to the improvement of the quality of life of the people in South Africa".

Our Vision - To be the best in technology, leadership and partnering, and - through our people - fight poverty, build global competitiveness and make an enduring difference in people's lives.

Our Mission - As a uniquely South African organisation, the CSIR is committed to innovation. We exist to support sustainable development and economic growth in the context of national priorities and global challenges. We create value for our clients, partners and stakeholders by providing technology solutions and information, establishing ventures and licensing intellectual property.

Our Values - CSIR people • have a passion for **Excellence** • live **Service**, striving to anticipate, meet and exceed the needs of our clients and stakeholders • recognise that it is **People** who make things happen - and work towards others' growth and development • strive always for **Relevance** - finding solutions to real needs, making a difference - national priorities are our priorities • are committed to **Innovation** - our lifeblood: from idea generation to practical implementation •...always with unshakeable **inTegrity**

ESPRIT - The spirit of the CSIR

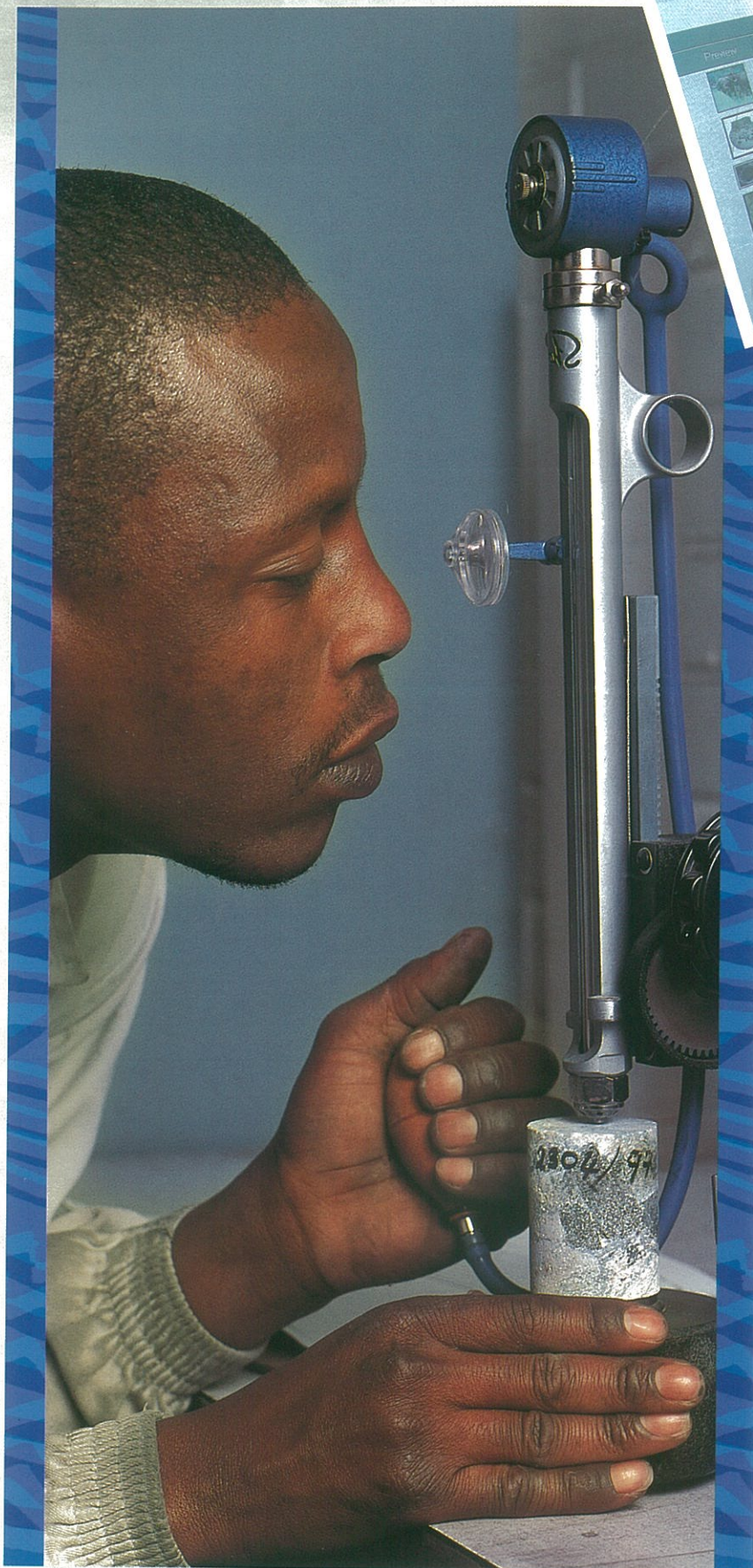
**PEOPLE WITH VISION,
PARTNERSHIPS WITH PURPOSE,
TECHNOLOGY WITH IMPACT**

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Introduction

As a uniquely South African organisation, we have tailored our research and technology endeavours to retain and enhance our world-class status. At the same time, we have increased our efforts to support National Imperatives. For South Africans, as well as the people of Africa and beyond, the CSIR is a technology partner linking people to the best expertise the world has to offer.

Our strategic vision is driven by the objectives of the National System of Innovation. We report on a number of initiatives of the Department of Arts, Culture, Science and Technology (DACST), Innovation Fund projects in which we have participated and our work with a wide range of local, provincial and national government stakeholders.

Our performance regarding the National Imperatives of crime prevention, HIV/AIDS, human resource development, job creation, regional integration, rural development and urban renewal continues to grow and develop as we work with our partners in Science Councils and other agencies. In crime prevention, where the CSIR acts as convener, there have been remarkable achievements in ensuring a more secure, safer life for all.

In this issue of Technology Impact, we are proud to present a rich canvas portraying technology solutions and information which have touched the lives of people both within and beyond South Africa's borders.

Innovation is much more than having a good idea - it's about putting that idea into the market in a sustainable enterprise. It is our hope that Technology Impact will be of value to you in sharing in the spirit of innovation in South Africa today.

Competitiveness and job creation

Significant technological innovation is required to boost South Africa's international competitiveness and create new jobs. Innovation does not happen by chance, which explains why all leading companies manage innovation. The CSIR is a partner in this process, assisting clients to produce new products and services, which give them an edge in the marketplace.

Quality of life

We are determined to make a positive and enduring impact on the quality of life of all South Africans. In striving towards building a better, safer and more secure future for the citizens of our country, we are contributing to the creation of a more humane and people-centred society.

Crime prevention

As convener of the Science Council Working Group on Crime Prevention, the CSIR is playing a key role in creating a safer, more secure South Africa. We mobilise science and technology (S & T) in the fight to reduce crime and create a more robust justice system. The CSIR has been active in crime prevention projects

since 1997. We work with other Science Councils, the SAPS, Scorpions, DACST and the Justice Department to produce effective solutions.

Human resource development

Human resource development is critical to the knowledge economy that South Africa is committed to develop. At the CSIR, we know that people make things happen. In the choice and implementation of our organisational and management approaches, we are playing a key role in improving the skills of our workforce and creating a new generation of scientists, engineers and technologists.

Sustainable environment

The CSIR is developing and strengthening our track record as a relevant contributor to the effective conservation and use of the country's natural resources. Environmental issues have increasingly come to the fore in global trade. The CSIR assists South African companies and government in achieving internationally acceptable environmental practices.

Information Society

We develop and leverage our intellectual capital and knowledge resources by harnessing the power of information and communications technology (ICT). We utilise the best approaches to knowledge management to develop our offerings in and through ICT. We seek to be a fast follower in the global context and leader in the Information Society in South Africa, the SADC and the continent.

ZOOMING IN ON NEW
IMAGING TECHNOLOGIES:
THE CSIR PANORAMIC
CAMERA



Competitiveness and job creation

Giving our clients a competitive edge

Fabrics that "breathe"

The military, medical, sports and leisurewear markets require durable and cost-effective fabrics for garments. This often demands high-quality breathability, waterproofing, windproofing and resistance to wear and abrasion. BreatheTex Corporation (Pty) Ltd, established as a result of the commercialisation of a CSIR lamination technology, manufactures high-performance breathable fabrics. The company uses the latest screen-print technology to laminate lightweight, breathable films to textile fabrics.

BreatheTex fabrics meet international quality standards. The company has signed agreements with international membrane suppliers and garment manufacturers, and has won contracts in Western Europe and Turkey.



360° view

The CSIR has developed a robust, weatherproof panoramic camera, which has demonstrated potential for virtual tourism, fire detection and security applications. The high-resolution digital camera forms a 360° panoramic image three times a minute. The "viewer" seldom detects this continuous upgrade as it happens "line-by-line" with digital technology.

Three local demonstrator sites - one in Pretoria at the CSIR and two in KwaZulu-Natal - have been established. The camera was launched internationally in the UK at the IFSEC Security Show, held in Birmingham, and at the Internet World Show, held in London.

Pan-a-cam (Pty) Ltd has been formed with joint-venture partner, Intervid (a listed security and IT company), to exploit the technology globally.





Taking the construction industry into the 21st century

The newly formed Construction Industry Development Board (CIDB), formally established in April 2001, is the culmination of an extensive process, started by the Department of Public Works in November 1997, to address the challenges of growth, productivity improvement, delivery and transformation in the construction industry. Throughout this process, the CSIR played a significant role in formulating strategy and developing policies.

The CIDB's mandate is to promote and coordinate an integrated industry development strategy and provide leadership in the national interest. These initiatives will enable the South African construction industry to grow local and global emerging markets, and to compete effectively against international companies. The CSIR will be a key player in this new structure - thereby making a contribution to this critical sector of our economy.

Taking metrology to industry

Efforts by the CSIR National Metrology Laboratory (NML) to "live close to the needs of the South African industry" were boosted by the establishment of technical advisory forums. These monthly forums cater for different fields of metrology. Open to all sectors of business and industry, they have proven successful in ensuring that the services offered by the CSIR NML are in line with the real needs of industry.

CSIR acquires Mechem's R&D

The CSIR acquired the Research and Development Division of Denel Mechem in early 2001. This merger strengthens the CSIR's capacity as one of a number of global Defence Evaluation Research Institutes which have come into being since the end of the cold war.

The CSIR is actively engaged in establishing a coordinated and integrated defence technology capability for the benefit of the South African National Defence Force.

The acquisition of the R & D business of Denel's Mechem Division will enable the CSIR to develop and expand its landwards defence technology capability through research and development for the army and special forces. Research into humanitarian mine clearing and the development of land-mine protection for vehicles are part of this activity. The acquisition highlights the CSIR's global and local role as a knowledge intensive technology organisation.

Centre of Excellence for fluidised bed processing

Adding value to minerals creates wealth and jobs. A high degree of mixing and the ability to accurately control the bed temperature at the required set point, make fluidised bed (FB) technology ideal for minerals treatment. The CSIR and Kumba Resources, formerly Iscor's mining division, formed the Fluidised Bed Centre of Excellence (FBCoE) to exploit FB technology as the technology of choice for the treatment of various minerals. Being unique to Africa, the FBCoE offers competitive services to both local and international clients.

Projects include pre-reduction of manganese, chromite, vanadium, iron and other ores; roasting of titaniferous materials, zinc, nickel, iron and platinum group metals ores; calcination of magnesium chloride, marine shell, limestone, diatomaceous earth and fine coal; and fine coal drying and fluorspar drying. Through its licensees, the Centre has supplied a number of industrial-scale FB plants throughout South Africa and in Zimbabwe.

Cost-effective research: T56 Series III gas turbine engines

After a gas turbine engine supplier recently revised their turbine component life estimates, the air force faced unexpected expenditure as the revision would entail critical changes to the turbines. The CSIR's established expertise in gas turbine aerothermal analysis and life assessment made it the ideal partner to analyse the problem in an attempt to validate the engine manufacturer's amended life predictions.

Within a year, the CSIR developed and validated a model. This required reverse engineering the entire turbine section from used components and modelling the flow, heat transfer and stress in the assembly using advanced computational methods.

The results were presented at an engine-user conference. The CSIR's quality of work has led to international collaboration with Rolls Royce Corporation and the National Research Council of Canada on similar problems.

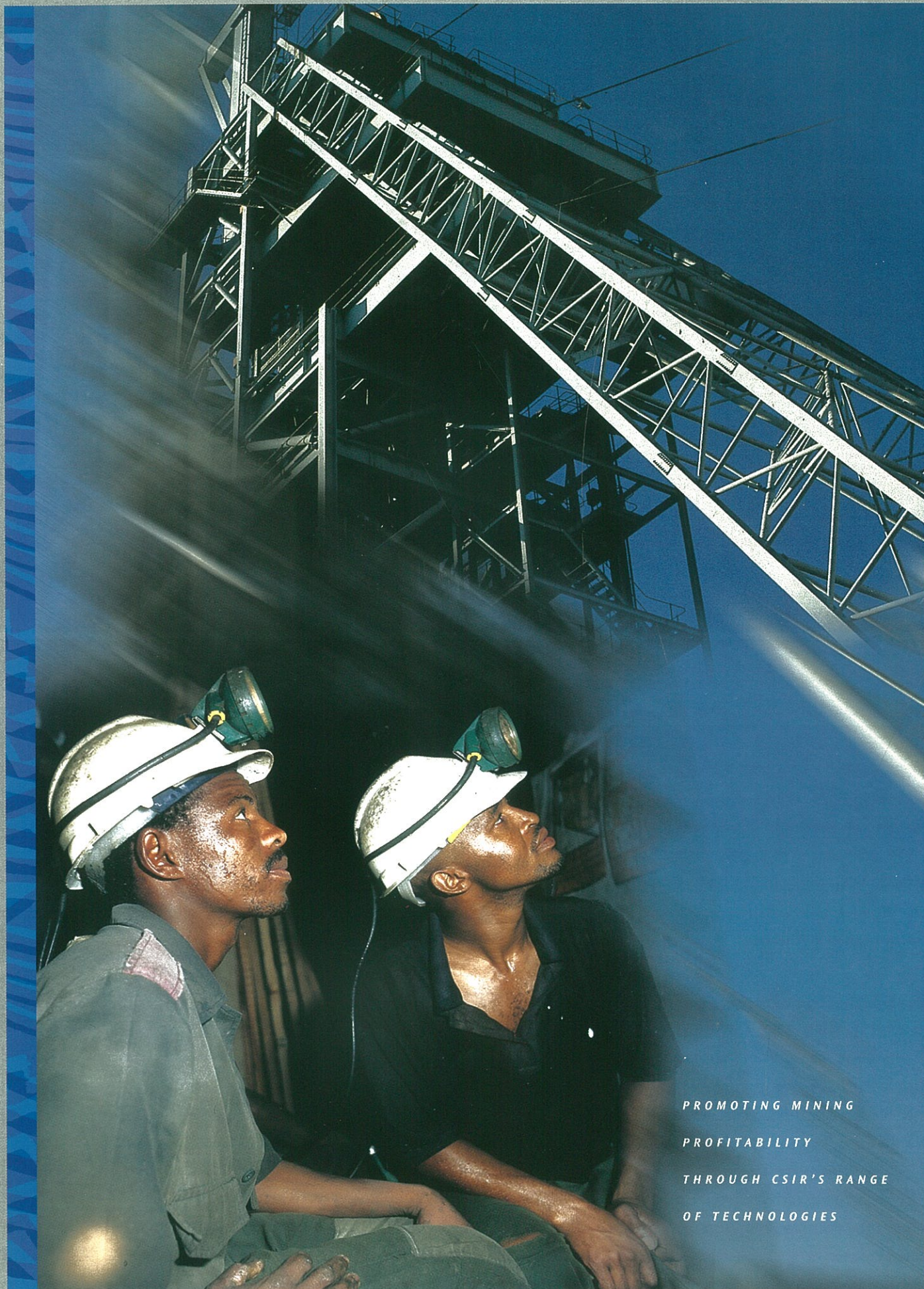
Partnership makes laser technologies accessible to industry

Laser technologies are increasingly used in health and medicine, telecommunications and manufacturing. The National Laser Centre (NLC) was established as an independent organisation in April 2000. It incorporates laser technology expertise from the CSIR and the Nuclear Energy Corporation of South Africa and focuses on the development of laser application technology. Transfer of information and knowledge of this technology locally is aimed at improving the global competitiveness of the South African industry. The creation of a Laser Rental Pool allows universities and technicians access to NLC laser equipment and expertise to stimulate a laser-based research culture in South Africa.

The NLC consulting services incorporate its expertise and experience in advanced laser-based technologies (such as joining, cladding and surface modification). These technologies assist industry in developing laser-based services. The technology areas in which the NLC is currently active include laser-based materials processing, medical applications of laser technology, and laser-based systems and instrumentation.

Mining at ultra depths

Most of South Africa's gold is now found at ultra depths below 3 000 m where rock surface temperatures are as high as 70°C, and rockfalls and seismic events are more likely to occur.



PROMOTING MINING
 PROFITABILITY
 THROUGH CSIR'S RANGE
 OF TECHNOLOGIES



The DEEPMINE collaborative programme has yielded invaluable knowledge and technologies, which will facilitate the mining of gold, safely and profitably at depths of 3 000 m to 5 000 m. The CSIR has coordinated the production of a summary and guidelines to provide designers and operators of ultra-deep mines with best practice methods and improved selection and application of technology. The reports and CDs are intended to assist in the effective transfer of knowledge.

DEEPMINE commenced in 1997 as a collaborative programme between companies, Science Councils, tertiary institutions, labour and government. Its aim was to research the technological and human resources platform that will make it possible to mine gold at ultra depths.

Key to mechanisation of mining operations

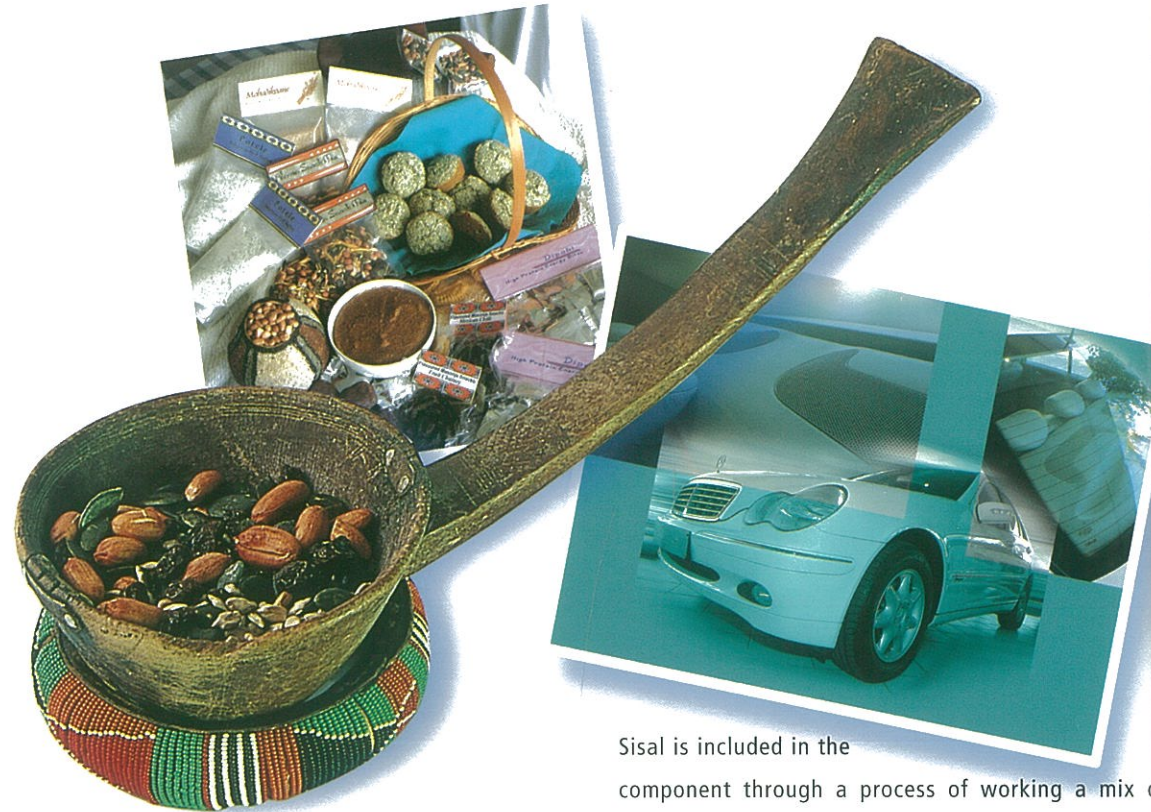
The development of a viable means of non-explosive mining provides the key to effective mechanisation of mining operations and, in turn, to a quantum leap in productivity and safety levels.

In underground and laboratory tests, activated cutting has shown increasing promise for non-explosive rock-breaking. The CSIR is currently involved with a major platinum producer in the first full-scale prototype application of an activated cutting system. The system, which is based on undercutting roller cutters, is being applied in narrow reef stopes.

Activated cutting involves the superimposition of vibrating forces on the cutting action. It substantially reduces operating forces, increases tool life and permits economic cutting of harder rock than previously possible.

Access to rock engineering expertise for smaller mines

Rock hazards are responsible for a high proportion of mine accidents. An easy-to-use handbook to address rock engineering and related hazards associated with mining steeply dipping tabular or vein deposits in South Africa has been published for technical personnel on mines. Steeply dipping vein or tabular deposits,



which dip in excess of 40° and have a width of less than 8 m, occur widely in smaller mines in South Africa. Many share common stability problems with stope backs and crown or sill pillars, with little access to rock engineering expertise to address these.

The handbook, "Stability and Support for Stope Backs in the Shallow Depth Mining of Steeply Dipping Vein/Tabular Deposits", integrates internationally accepted "best practices" with locally observed problems. It also provides appropriate methodologies to assist mines in mining method selection, stope back and sidewall support and crown pillar design.

Sisal incorporated into automotive components

South African sisal fibre was identified by international motor manufacturer DaimlerChrysler as having the best potential for use in automotive components. A collaborative effort between the CSIR, the Northern Province government, DaimlerChrysler and several entrepreneurs has resulted in the successful use of autograde sisal fibre in the right-hand drive C-Class Mercedes Benz vehicles, manufactured in East London for local and export markets.

Sisal is included in the component through a process of working a mix of sisal and cotton into fleece mats, together with phenolic resin, to bind the material. In collaboration with DaimlerChrysler and the CSIR, Brits Textiles of Pinetown has invested in a carding machine to produce the required 20t/month of fleece locally. DaimlerChrysler has extended the technology application into the rear-window shelf with a component producer, NCI, of East London.

Wide-reaching benefits of the value-addition process include the establishment of agricultural and industrial linkages, rural empowerment and wealth creation, as well as job creation.

Indigenous foods in the spotlight

South Africa's indigenous foods have considerable potential for the alleviation of poverty in rural areas through the stimulation of sustainable small and medium business enterprises.

Current projects are aimed at the promotion and commercialisation of the country's indigenous foods. The full chain of activities required to bring new products to market are encompassed: the identification of commercially attractive dishes, the provision of technical expertise in the packaging, processing the

product for the urban markets, and setting-up support centres to ensure that a viable supply chain is in place.

The identification of suitable dishes in districts leads to regional-level competitions. One provincial fair has already been held. The best dishes selected from the various regions were served to introduce indigenous foods to the urban population.

Commercialising the farm-based essential oils business

Essential oils are high-value extracts from plants, which are used, for instance, in perfumes and health products. These have been produced in commercial-scale, farm-based processing plants developed by the CSIR. The chemical and sensory characteristics of various South African essential oils have been evaluated both locally and by international companies. The quality has been found to compare favourably with oils from leading suppliers globally.

In the past, a lack of technical and market knowledge of the essential oils industry has restricted develop-

ment. Export of these oils currently reaches levels of hundreds of kilogrammes per annum from individual farms.

The CSIR's essential oils service to farmers includes conducting technical and financial viability studies to produce essential oils on a particular farm. This service is based on several years of experimentation, commissioning commercial-scale processing equipment and facilitating access to the international flavour fragrance, personal hygiene and aromatherapy markets.

CSIR NML contributes both to SADC and internationally

Traceable measurement standards are vital to underpin the activities of the SADC Free Trading Block. The CSIR NML has been instrumental in attracting donor support for and investment in metrology projects in the SADC region. Projects focus on the establishment of basic metrology facilities in at least three SADC countries; metrology training initiatives; measurement inter-comparisons and regular consultations with regional metrology organisations in other trading blocks.





WORLD-CLASS TECHNOLOGY:
 THE CSIR MEDIUM-SPEED WIND
 TUNNEL, ONE OF THE BEST-
 EQUIPPED AND MOST
 SOPHISTICATED FACILITIES FOR
 EXPERIMENTAL AERODYNAMICS

Reliable technical data on the performance of National Metrology Institutes (NMIs) worldwide provide a sound basis for wider agreements related to international trade, commerce and regulatory affairs.

The Memorandum of Agreement (MOA) signed by NMIs in October 1999 resulted in the establishment of an international comparison and calibration database. As a signatory of the MOA, the CSIR NML successfully submitted a large percentage of its calibration and measurement capabilities into this database.

The CSIR NML has membership on all Metre Convention technical consultative committees. The CSIR NML has established an international profile among its peers to ensure an African input into world metrology matters.

CSIR North America services oil and gas industry

CSIR North America, Inc specialises in solving pipeline integrity problems using a multi-disciplinary approach in a cost-effective, practical, impartial and unbiased manner. The company focuses on corrosion consulting and field-testing services to the North American oil and gas industry.

New contracts boost CSIR Satellite Applications Centre track record as reliable ground support partner

During the year under review, the CSIR continued its sound relationship with long-term business partners, US-based Boeing Satellite Systems (BSS) and the French National Space Agency (CNES). Several telemetry, tracking and command-related contracts were secured with new clients.

The CSIR out-rivalled international contenders for the BSS contract for support of the Spaceway satellite constellation. This contract has resulted in the start of

construction of the world's first commercial Ka-band satellite-tracking facility in South Africa. It followed the successful completion of an earlier BSS contract in which challenging radio-frequency engineering was undertaken to adapt an existing antenna to render support during the launches of the XM Rock and XM Roll satellites.

The Ku-band antenna system completed in the previous financial year resulted in a new contract with CNES. The CSIR has become one of the primary Ku-band stations in the CNES global ground stations network. During the launch of the Nilesat 101 satellite, the CSIR qualified for this role and subsequently officially supported the Eutelsat W1 satellite in Ku-band for CNES in September.

Successful transfer orbit support for the Europe*Star satellite qualified the CSIR as a validated ground station for new business associate, Space Systems Loral. A variety of projects involving building of new antenna facilities were undertaken for other international players, including Intelsat, the European Space Agency, IGN and EuropeStar.

International contract in defence aeronautics

The CSIR's 30 years of experience in wind tunnel services has been key in international projects undertaken by Kentron, for French aeronautics company, SAGEM.

Results of a series of wind tunnel tests in this project contributed to conceptual design and characteristics of the airframe.

The CSIR operates the only commercial wind tunnel services in South Africa. In addition to foreign income generated, the CSIR's work has contributed to the establishment of South Africa's reputation in the field of defence aeronautics.

GENETIC MODIFICATION OF CEREALS:
SUSTAINABLE AND RESISTANT FOOD
CROPS IN SOUTH AFRICA



Quality of Life

Contributing to a better life for all South Africans

Ensuring the future of Africa's food supply

Pearl millet and maize are cereals forming the basis of many peoples' diet in Africa. Crop failures due to fungal and insect attack or drought can be catastrophic.

The genetic modification of cereal crops offers massive benefits, as cereals are the most important group of food plants worldwide. They provide more than 50% of the food consumed by humans, and represent the largest segment of South African agriculture.

The CSIR has achieved a world first in the development of techniques to genetically engineer pearl millet.

The technology is being applied as the first stage in a process to introduce downy mildew resistance to millet. The CSIR is also working with an international consortium on projects to improve food safety in maize and to raise the nutritional value of sorghum.

The right to adequate shelter

"Housing is not about Houses" is the title of a CSIR publication aimed at supporting the basic right to adequate shelter - a constitutional right for South Africans.

The book tracks the successes, failures and lessons learnt in the housing industry since 1987. Readers can



contextualise current housing scenarios and find reference material containing guidance and insights on shelter in South Africa.

The book is aimed at policy-makers and implementers, practitioners and representatives of community-based structures and organisations operating in the current housing milieu.

Housing policies in South Africa have undergone a paradigm shift from an ideologically based approach to a people-centred approach. This book details the effect this revolutionary change has had on research strategy and philosophy, leading to a focus on goal-directed research to promote technology development.

Monitoring of foetal development improved by MRC/CSIR device

Traditional techniques for the assessment of placental function and foetal health result in up to 9 out of 10 unnecessary patient referrals. The perinatal mortality rate (intra-uterine deaths after 28 weeks gestation) in South African rural areas is estimated at 30 out of 1 000. A stand-alone device has been developed by the CSIR and the MRC as a low-cost, easy-to-use screening tool to diagnose placental function.

Widespread application of the technology could improve the chances of survival for impaired fetuses from 48% to 80%. The locally developed system has completed a first round of trials at Tygerberg Hospital. The results of this study were well received at the International Perinatal Doppler Conference in April 2001. A second prototype system is now being tested and will soon be ready for commercial release.

Transport(s) of delight

Public transport can be a joy or a frustration. In our complex modern urban environment, quality of transport directly impacts quality of life. The Public Transport Structuring Model has been developed by the CSIR to review the operations and structure of

public transport networks in South Africa. The model is a planning tool intended to assist public transport planners in defining more efficient public transport systems. It provides the planner with more fundamental network-restructuring options.

The model can be applied as a preliminary step in the re-planning of urban public transport networks. Using the model, transport planners will be able to evaluate the improvements associated with changes in the route structure, and undertake detailed planning of optimum transport networks.

Reducing dust levels in mines

Dust presents a serious health and safety hazard to mine workers. The debilitating sickness, pneumoconiosis, is a long-term hazard and the risk of dust explosions can be catastrophic.

A handbook has been produced to assist in the successful management of dust in mines. It summarises the sources of dust and the health risks associated with exposure to dust. The steps that need to be taken to overcome the dust problems, incorporating both scientific and engineering measures, are described. While the handbook deals mostly with coal dust, in many cases similar principles of control apply to other mining sectors.

The aim of the handbook is to help educate and train people in the prevention and control of dust in the workplace. It also strives to motivate employers and workers to collaborate with one another, in tandem with occupational health professionals.

Improving mine safety and productivity

Advance knowledge of ore body conditions is urgently required in the mining industry to improve productivity, through enhanced strategic planning, and safety levels. Mining through faults in the rock mass not only disrupts production, but

leads to an increased risk of rock bursts and rock-falls in mines. These remain a major cause of fatalities and injuries in the mining industry.

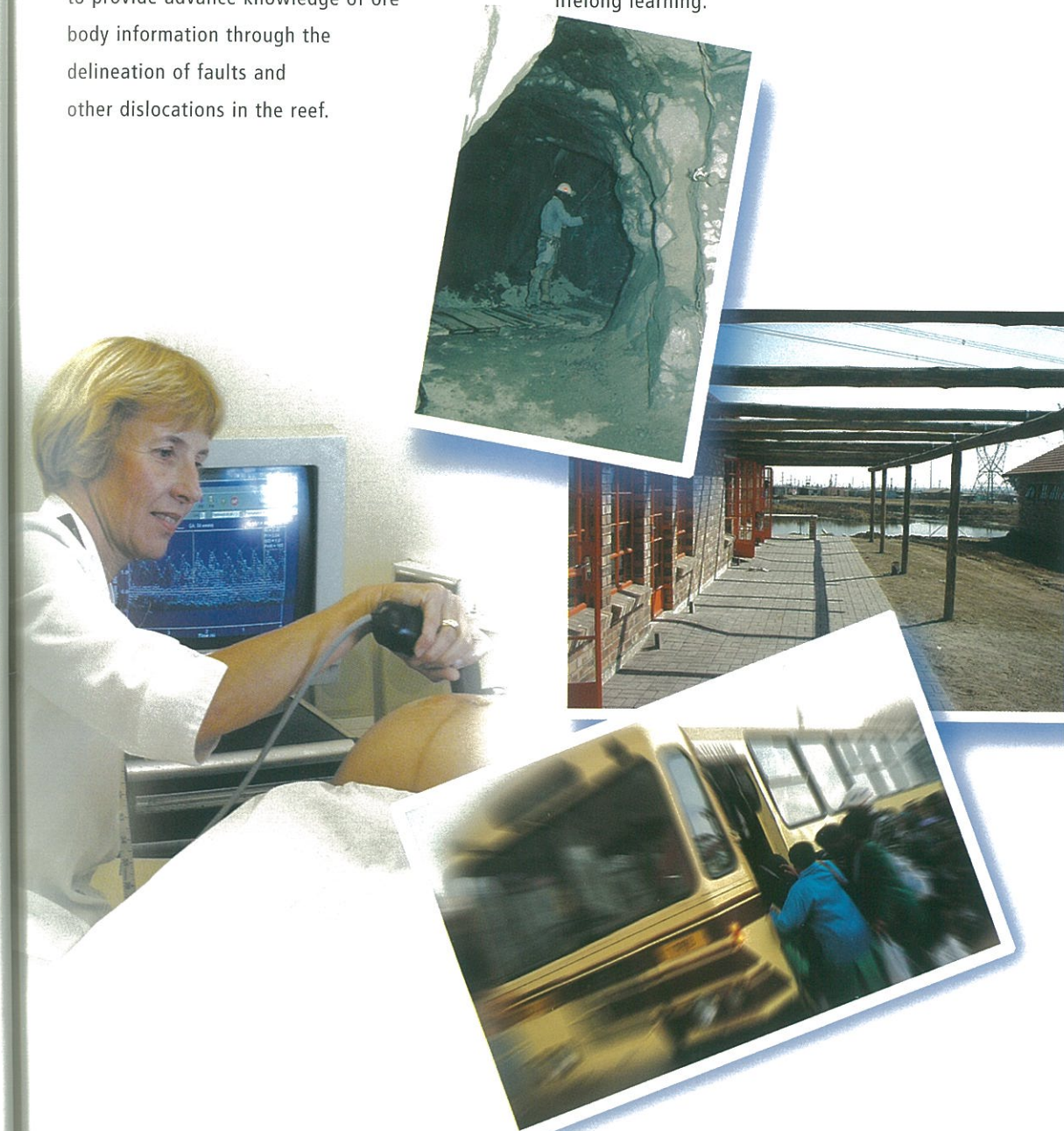
The CSIR is developing a borehole radar system specifically suited to the South African mining industry. This development followed extensive research that identified radar to be the most immediately applicable electromagnetic technique for detecting and delineating disruptions to the gold reef in South African deep level mines.

Borehole radar is one of a suite of geophysical techniques currently being developed by the CSIR to provide advance knowledge of ore body information through the delineation of faults and other dislocations in the reef.

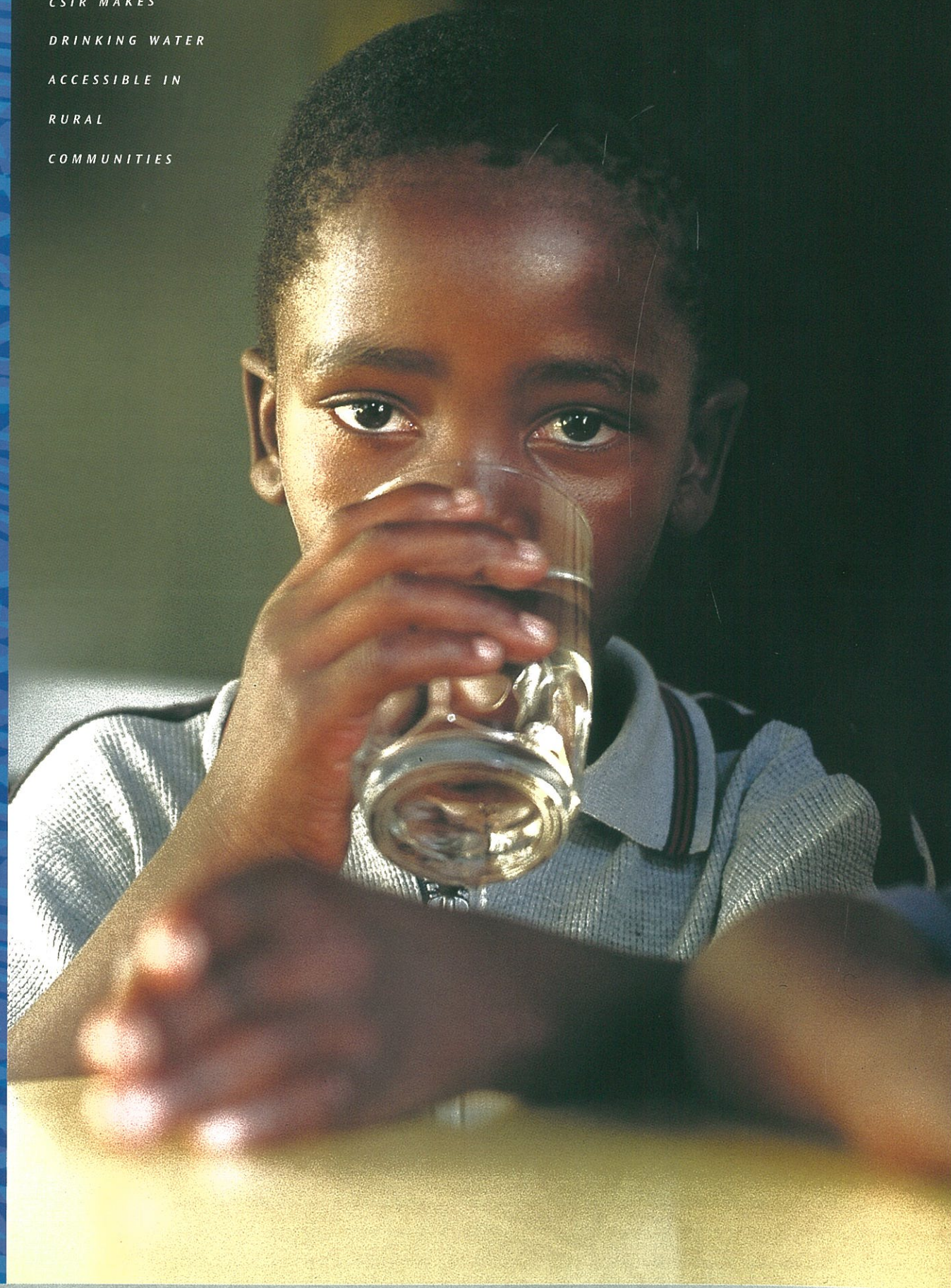
School design challenges conventional approach

In a departure from the conventional approach to school design, construction and management, a consortium led by the CSIR designed the new Maphala Gulube Primary School in eMbalenhle, an informal settlement near Secunda.

In its design approach, the consortium considered the new outcomes-based education curriculum, Information and Communications Technology, class sizes (40+ in many schools), limited resources and the increasing emphasis on community involvement and lifelong learning.



LIQUID GOLD:
CSIR MAKES
DRINKING WATER
ACCESSIBLE IN
RURAL
COMMUNITIES



The project also impacts positively on the local economy through the employment and skills development of emerging contractors.

This creative approach to design included a number of innovative aspects. A large disused pond was rehabilitated and incorporated into the school grounds to support a range of wildlife and provide an environmental learning resource. The sports fields were placed outside the school grounds to facilitate sharing of the use and costs of the fields with local sports clubs and nearby schools.

Innovative approach to rural drinking water

Water-related disease is responsible for an estimated 43 000 deaths per annum in South Africa. Inadequate water treatment is compounded by the lack of procedures to assess and manage drinking-water quality. The CSIR, in conjunction with consulting engineers De Villiers and Hulme, has assisted the small town of Suurbraak in the Western Cape to address the problem of potable and sustainable supply of drinking water by developing an effective, robust, semi-automated treatment process.

Supporting HIV vaccine development

The CSIR has established a collaborative research programme to stimulate molecular and structural biology to support the development of a vaccine against HIV.

A multinational multi-disciplinary research programme, focusing on the molecular structures that occur during viral-cell membrane fusion, will grow out of this research. This programme will also assist in creating an environment that will support the development of an effective vaccine.

Another joint project is the development of functional foods for immuno-compromised (HIV)

patients. This project, in alliance with the University of Pretoria, is developing nutritional food additives to boost the immune system.

Minimising the hazard of industrial fine dust

Fine particles of dust in air in certain concentrations can explode, with devastating effect. The CSIR plays a valuable role in advising on and assisting industry in minimising the hazard of fine dust suspensions. Testing of dust is conducted under controlled conditions in an internationally recognised test vessel to determine the minimum ignition temperature, lower explosible limit, explosion index and explosibility. Results from these tests are internationally accepted and enable the CSIR to advise clients on identified risks and how to minimise the danger of dust explosions.

In addition to these services, the CSIR strives to raise awareness in industry on potential dangers associated with dust explosions. Dust Explosion Summit 2000 addressed this industrial hazard by covering topics such as detection of and protection against ignition sources, interpretation of explosion parameters and explosion protection.

New tool for rapid assessment of raw materials used in fermentation

Casein hydrolysate is a major constituent in the fermentation medium used to produce tetanus toxin for the manufacture of the anti-tetanus vaccine and other biotechnology products. Due to batch-to-batch variation in the quality of the casein hydrolysate, a pre-purchase assessment on each new batch has been required in order to ensure reliable toxin production. Previously, this has involved running several week-long fermentations at laboratory-scale for screening.

The CSIR has now established that near infra-red spectroscopy can be used to characterise batches of

casein hydrolysate within minutes. This permits the prediction of the likely yield of toxin in fermentation. The robustness of the prediction can be strengthened on an ongoing basis, as new data becomes available.

Making public transport accessible to disabled people

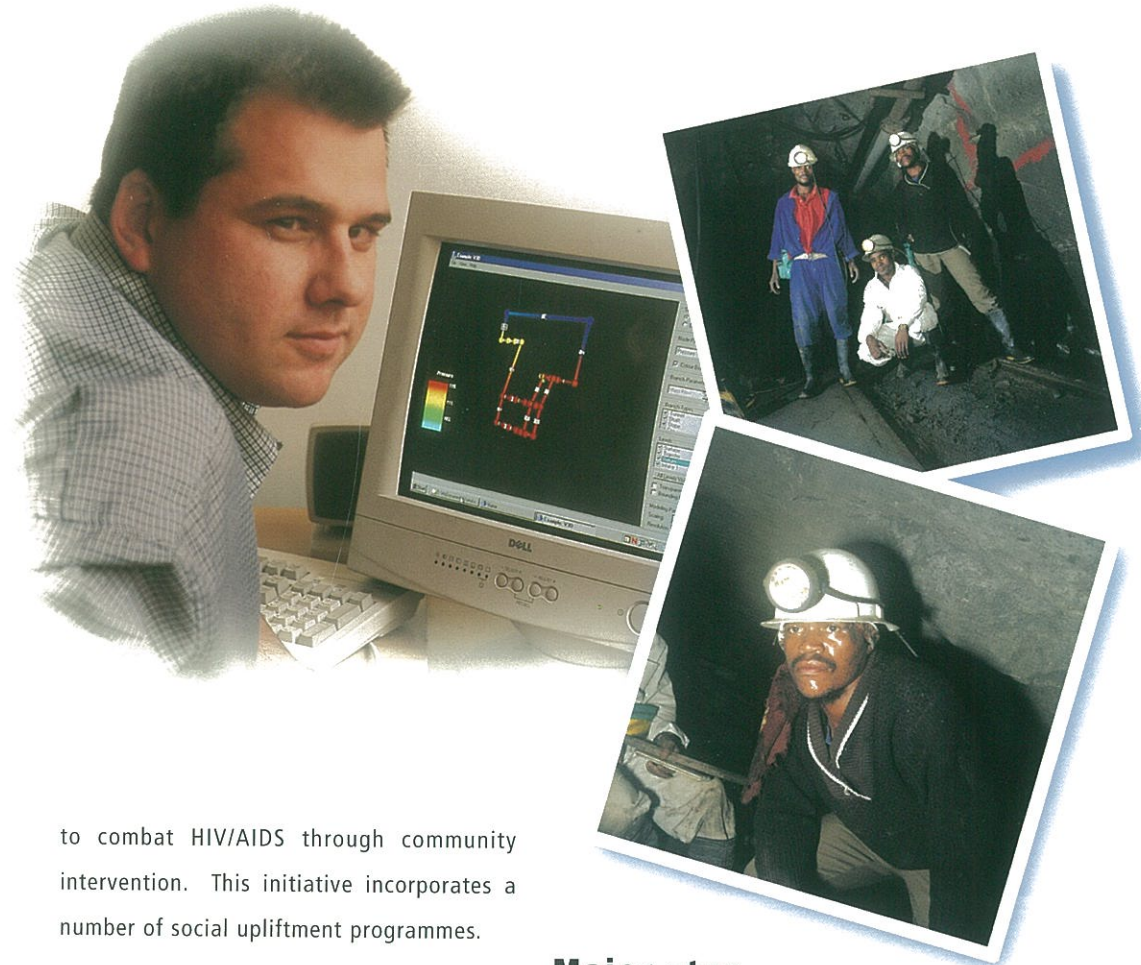
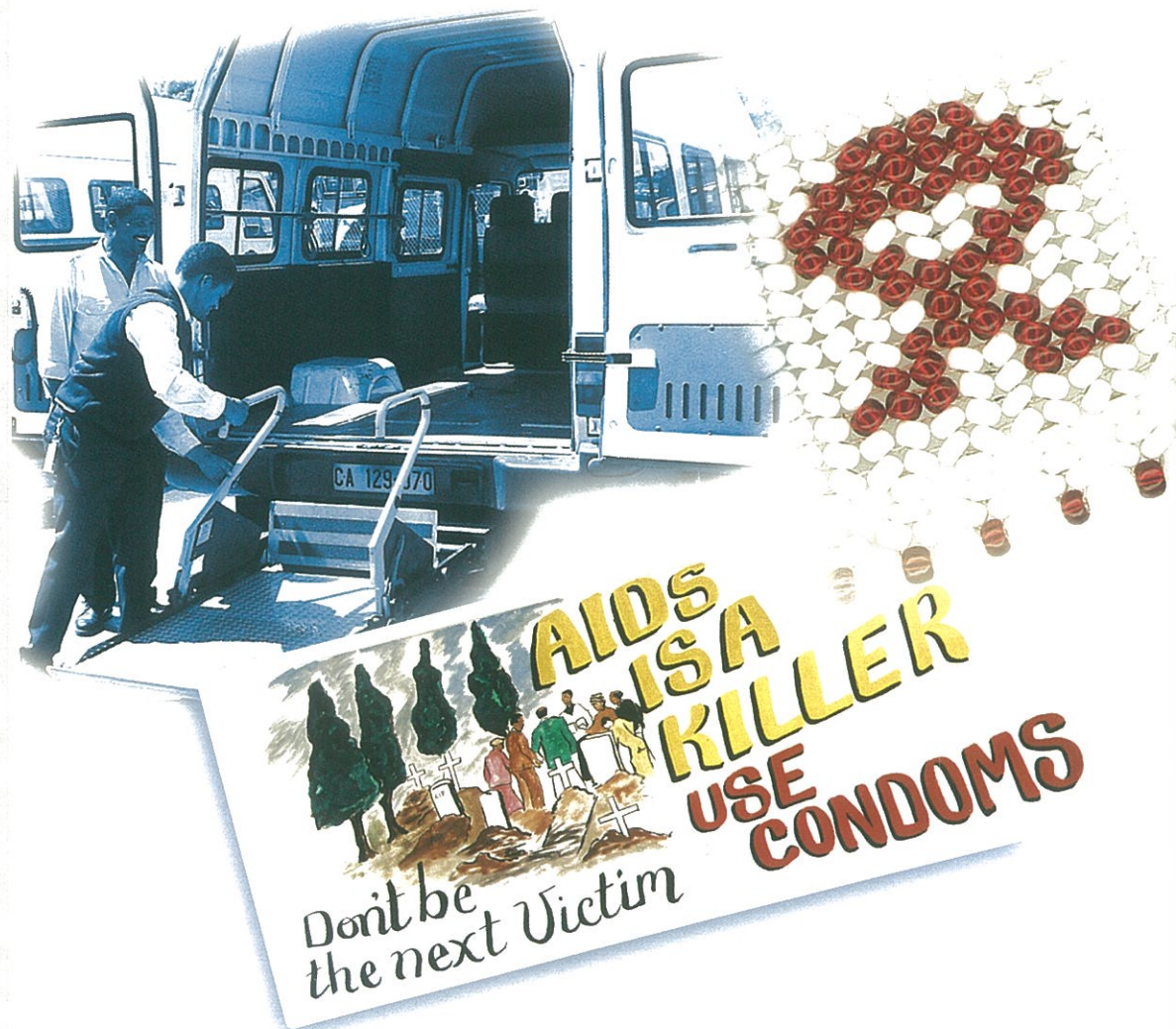
Approximately 2,1 million disabled people are excluded from mainstream transport in South Africa. The National Department of Transport (NDT) appointed the CSIR to investigate strategic responses to integrate special-needs users into society more effectively. A comprehensive analysis was undertaken of three NDT-sponsored demonstration projects: demand-responsive (Dial-a-Ride) systems in Cape Town and Johannesburg, and a fixed-route system in Durban that is dedicated to disabled users.

The study included an overview of the problems currently experienced by disabled people in accessing the regular public transport system, and identified numerous barriers. These range from inaccessible vehicle and infrastructure design, to discriminatory operational practices, safety and security.

The CSIR's assessment and recommendations helped to inform national policy on supporting accessible transport initiatives at local government level.

Industry and government join forces to fight AIDS

The CSIR is participating in a collaborative initiative between South Africa's coal industry and the Departments of Health, and Minerals and Energy



to combat HIV/AIDS through community intervention. This initiative incorporates a number of social upliftment programmes.

The project was initiated following findings of a social and geographic assessment, which showed that by involving the workforce and communities, significant changes to high-risk behaviour could be achieved.

The social upliftment component of the project is focusing on the creation of formal and informal job opportunities within the region. Community needs, such as the provision of the basic services of water, sanitation, refuse and electricity, are also addressed.

Dubbed the Powerbelt HIV/AIDS project, the initiative presently encompasses 32 collieries in eastern Mpumalanga, extending from Witbank through Secunda to Standerton, and has a planned duration of 10 years.

Major step forward in underground ventilation

Providing adequate ventilation and cooling underground is a major cost component in mining operations. To optimise these systems, a new software package, VUMA, has been launched. VUMA simulates atmospheric and environmental conditions in underground mines. This tool represents a major step forward in software for the mining industry in technical performance and user-friendliness.

VUMA was developed jointly by the CSIR and Bluhm Burton Engineering, utilising algorithms that have been verified over two decades.

The VUMA software includes a library facility with built-in catalogues as well as tables and graphics, which are linked to input and solver elements. VUMA rating categories have been developed to describe inputs that are difficult to quantify in the mining environment.

COLLECTIVELY TACKLING CRIME:
SCIENCE COUNCILS AND LAW
ENFORCEMENT AGENCIES
COLLABORATE IN THE FIGHT
AGAINST CRIME



Crime prevention

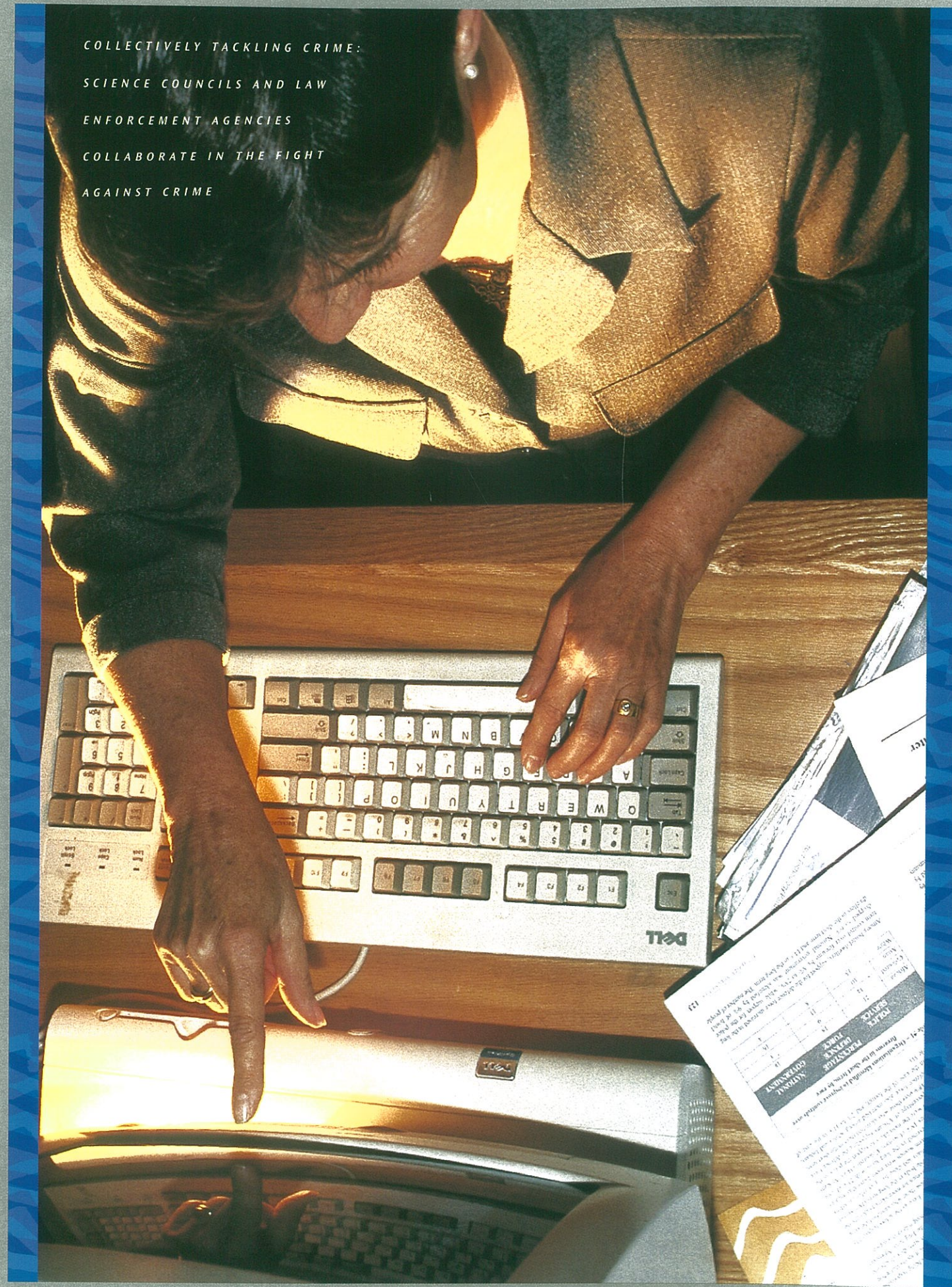
Mobilising S & T for safety, security and justice

Science Councils in the fight against crime

South African Science Councils have been working together in the fight against crime since 1997. Heeding calls from government, the CSIR acts as convener of a Crime Prevention Working Group comprising the CSIR, Agriculture Research Council,

Medical Research Council, Mintek, Human Sciences Research Council and the South African Bureau of Standards.

The combined efforts of the Science Councils centre around supporting continued efforts to improve and integrate the Criminal Justice System; assisting in the prevention and combating of priority crimes; aiding in



the collection and analysis of crime information and supporting the implementation of integrated solutions to the priority crime challenges of the country. Furthermore, it aids multi-agency local crime prevention strategies and supports the reduction and prevention of crime in commerce and industry.

Outputs include a prototype system to foil cash-in-transit incidents. The system comprises rapidly expanding foam that hardens quickly, making access to the cash nearly impossible. Further outputs include an improved court management system, the use of laser technology to apply identification markings to multiple vehicle parts and an early warning system, the Home Information Security Systems, which alerts farmers to danger.

First national centre for research information on crime prevention

A National Crime Prevention Research Resources Centre (RRC), funded by DACST and managed by the CSIR, has been established to enhance scientific and technological research in the reduction and prevention of crime.

In line with national priorities, the RRC obtains expert knowledge in social crime prevention, law enforcement, and local crime prevention.

The Centre sources innovative effective interventions worldwide, backed by sound and reliable research. As a repository for research and information on community crime prevention programmes and interventions, it makes successes visible and replicable.

Spotlight on crime on board public transport

A research study, headed by the CSIR and funded by DACST, studied crime on board public transport. Conducted in partnership with the Human Sciences Research Council and the Centre for the Study of Violence and Reconciliation, the study focused on facilities mainly associated with mass public transport. Modal Interchanges in Pretoria (Marabastad), Cape Town (Wynberg) and Durban (Berea Road) were chosen as case studies. It was found that the

modus operandi of criminals depends on economic opportunities and that all users of public transport are potential victims.

The study recommended that stakeholders and communities be empowered to prevent crime through information sharing, skills training and development opportunities.

Moving through our border posts

Border control and crime management are closely linked. The CSIR endeavours to improve operations at the country's border posts and has been working closely with the National Inter-departmental Structure for Border Control since its inception in 1997. The CSIR provides technical and business process mapping support. Present projects include Codes of Practice documents for multi-departmental operations at ports of entry, assessing information flows and analysing vehicle information.

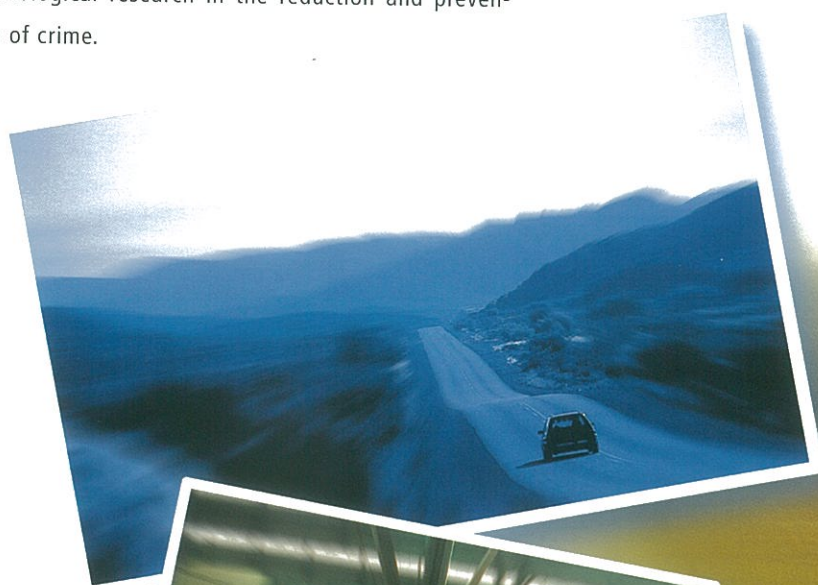
The CSIR's role responds to the need to improve operations at border posts, which will culminate in improved revenue collection, immigration control and crime prevention capability.

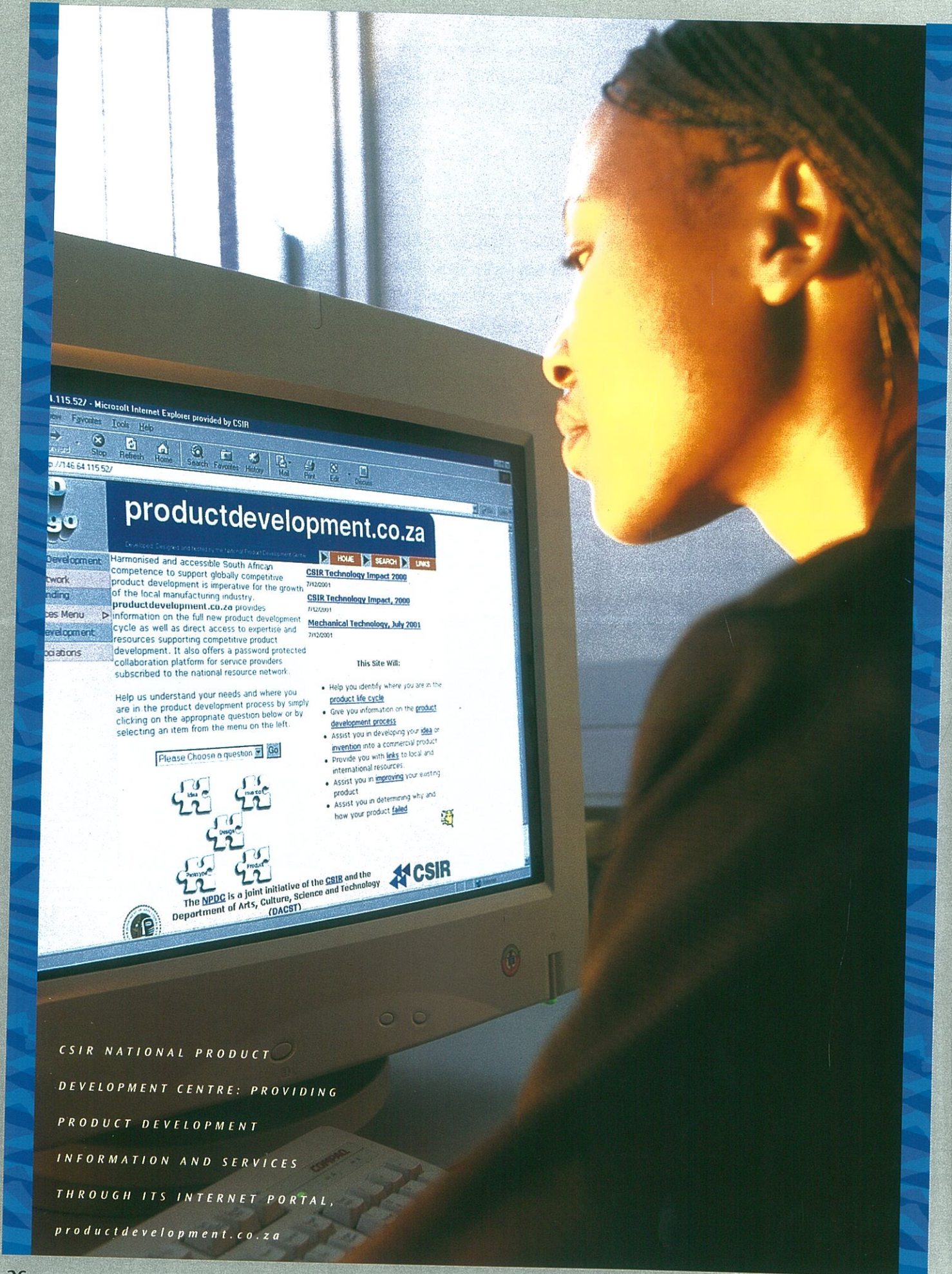
New focus on organised crime

Organised crime threatens the safety and security of South Africa and its citizens. The CSIR is building new capacity in this area with a view to combating organised crime. This will add considerable resources to the local law enforcement agencies.

The CSIR's technical capabilities to combat organised crime were utilised in the initial strategic and technical support provided to the Directorate Special Operations (DSO), referred to as the Scorpions, during the formative phase of this organisation. The CSIR is also a technology partner to the DSO with respect to operational support, including investigative and prosecutorial technologies and presentation of cases in court.

Consistent with the core competencies of the CSIR, the focus in combating organised crime has been on technical support issues related to this highly complex domain.





CSIR NATIONAL PRODUCT
DEVELOPMENT CENTRE: PROVIDING
PRODUCT DEVELOPMENT
INFORMATION AND SERVICES
THROUGH ITS INTERNET PORTAL,
productdevelopment.co.za



Human resource development

Improving the skills of the SA workforce

Lubisi grows its business skills

The Lubisi Dam Development Forum is instrumental in the local economic development of the adjacent communities in rural Transkei, about 150 km from Umtata. The CSIR has had long-term involvement in these communities. Most recently, it has set up Internet and computer connections to enhance local learning and educational activities.

The project is co-funded by the Canadian IDRC and the CSIR. To ensure an integrated approach to development, a consortium consisting of the CSIR, Human Science Research Council (HSRC), Agricultural Research Council (ARC), Naledi ya Africa and Renewable Energies Africa (REA) has been established.

In addition to providing Internet access, the CSIR has trained a group of six women and men in computer

and business skills. A further 50 educators have been trained by the Lubisi Multi-purpose Community Centre (MPCC) members.

With the help of the CSIR team, Lubisi participants have drawn up business plans for three business opportunities: the Lubisi MPCC, the on-site accommodation facility for tourism, and an innovative sewing project called "Lubisi Legends". The MPCC aims to provide a telecentre facility, desktop publishing and copying, training and business support for entrepreneurs to the Lubisi community.

The HSRC's project monitoring and evaluation provide crucial inputs to the final replication model. Other consortium members provide appropriate agricultural content (ARC), training and business skills (Naledi) and advice on renewable energies (REA).

Leading and harmonising product development in South Africa

South Africa's international standing as a source of distinctive products known for excellence in cultural, industrial and engineering design is the target of a DACST/CSIR initiative. The CSIR's National Product Development Centre (NPDC) leverages the South African manufacturing industry, design community and educational sector.

The CSIR NPDC is the hub of a national network of distributed resource units at tertiary education institutions and in industry. It provides product development support to the manufacturing industry. This network of technology and skills is expanding through the establishment of centres in the Eastern Cape and KwaZulu-Natal. The CSIR NPDC operates in synergy with the network of Manufacturing Advisory Centres throughout South Africa.

The CSIR and other key players in the CSIR NPDC network contributed to the establishment of the Rapid Product Development Association of South Africa during 2000.

International standards capability in environmental analysis

Volatile Organic Compounds (VOCs) and other organic contaminants are a growing problem for South Africa's chemical and water supply industries, due to inadequate disposal methods for organic waste over many years.

A capability for state-of-the-art analysis of organics in soil, sludge, sediment, plant and water samples has been established by the CSIR. This was done in response to market demand for high-quality analytical services for local remediation and site-characterisation projects.

Examples of this expertise include the SANAS-accredited analysis of VOCs in water samples using Purge &

Trap Gas Chromatography - Mass Spectrometry (GC-MS). Routine analysis of other organic contaminants such as semi-volatile organic compounds and petroleum hydrocarbons, using techniques based on US Environmental Protection Agency (EPA) methodology, is an established service.

Establishment of world-class resources to serve a viable South African automotive industry

The local South African automotive industry has moved from a background of protected markets and trade barriers to the point where it must become globally integrated. The Automotive Industry Development Centre (AIDC) supports this industry in its transformation into a globally competitive player. It fulfils a vital role in the establishment of world-class resources in competitiveness improvement, automotive engineering design, testing, research and development, and human resource development. Its agreement with four Gauteng-based tertiary education institutions - Soshanguve College, Technikon Northern Gauteng, Technikon Pretoria and the University of Pretoria - aims to improve capacity in technical skills training, automotive engineering and managerial skills.

The AIDC is a partnership between the CSIR and the Gauteng Province's Blue IQ initiative. It is a driving force behind the Gauteng Automotive Cluster, a unique concentration of automotive assemblers, component manufacturers and raw-material suppliers.

Major turning point for local fine chemicals industry

The absence of a local toll manufacturing facility in South Africa has meant that potential local manufacturers of fine chemicals have been forced to contact overseas toll producers to obtain quantities of trial products for market testing and regulatory approval. This expensive and time-consuming process has been a major stumbling block for the development of our fine chemicals industry.



trust in government and increase capacity to eradicate poverty. The CSIR project was selected from more than 180 applicants as one of the top ten government and public-private partnership projects in South Africa tackling poverty in creative and effective ways.

The CSIR's acquisition of the Novartis Multi-purpose Fine Chemicals Plant is a major turning point for the South African fine chemicals industry. It is being used for technology transfer, and provides a training facility for chemical engineering and industrial chemistry students in fine chemical manufacture and Good Manufacturing Practice (GMP) techniques and GMP and FDA accreditation systems.

The facility is used by the CSIR and industry-wide associations for the development and transfer of technologies to make specific fine chemicals, generic pharmaceuticals and advanced pharmaceutical intermediates.

Training project creates employment in the construction industry

In November 2000, a unique CSIR project in high-quality labour-intensive road building received top honours when it won the Impumelelo 2000 Award. The Impumelelo Awards Programme was initiated by the Institute for Democracy in South Africa to build

In an effort to facilitate the participation of small, medium and micro enterprises in the local service construction industry, the Lekoa Vaal Metropolitan Council contracted the CSIR to initiate a training project for members of road-building units.

Three road-building units comprising locally unemployed people were equipped with skills to create additional employment in the close vicinity of the project. The units operated as small contractors and employed eight local people for labour-intensive tasks.

The emerging contractor road-building units were equipped at a relatively low cost with customised tools and equipment to ensure a high quality and consistent product. The CSIR also documented training modules with detailed drawings of the tailor-made equipment for application in various regions of South Africa.

Sustainable environment

Improving the skills of the SA workforce

Fishing industry cleans up

The CSIR has completed a project to encourage cleaner production technology in the fishing industry in order to support sound, sustainable and cost-effective environmental practices. It is often not recognised that the use of these technologies can result in savings in water, electricity and raw materials, as well as increased production yields.

The aim of the project was to introduce measures in white-fish factories and canneries to save water, utilise products more efficiently and reduce the effluent load of the factory. These measures were implemented as a direct result of training factory staff. In some factories, a 20% to 25% reduction

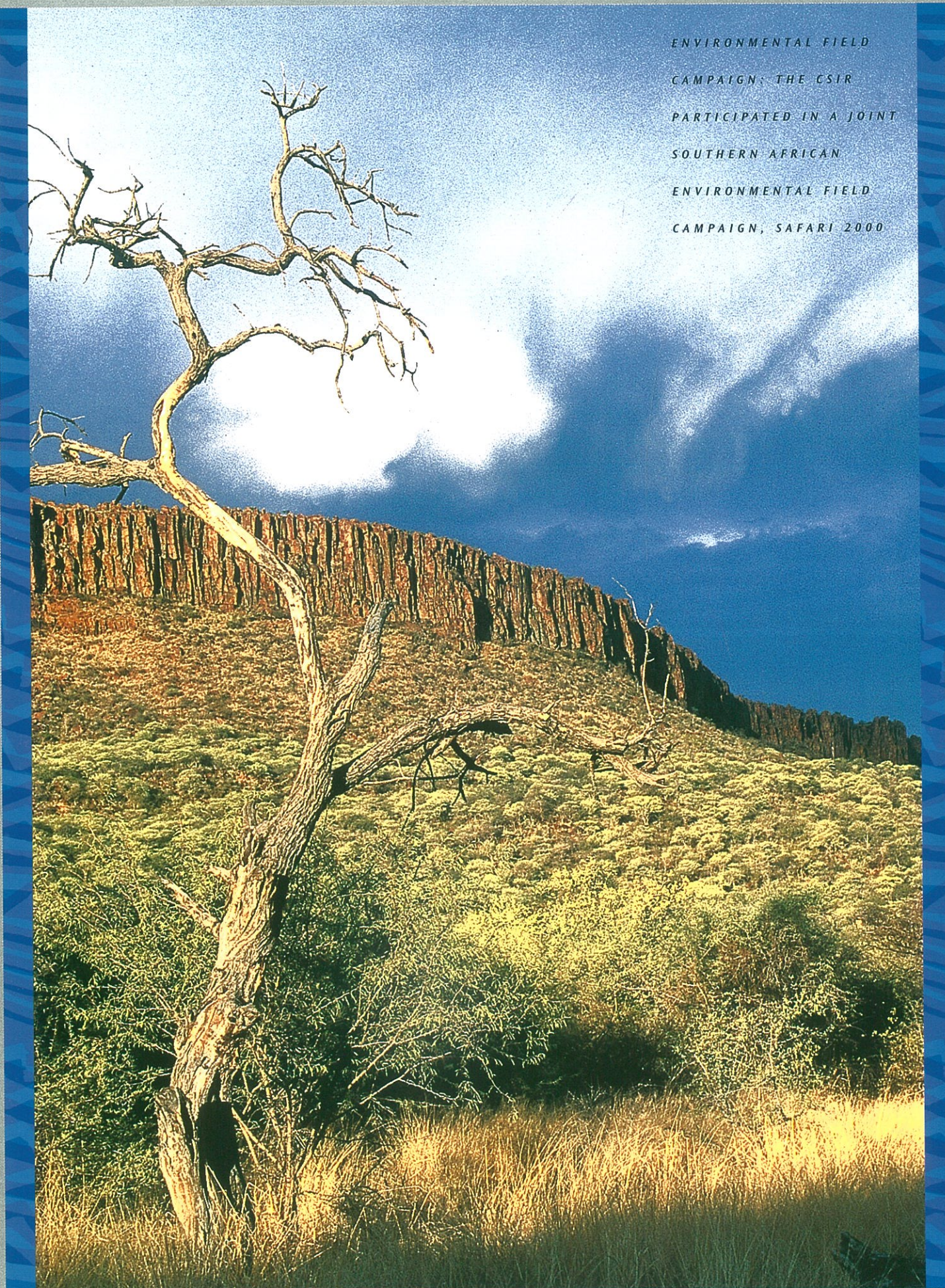
has been achieved on water consumption. There have been considerable improvements in the empowerment of factory workers to support cleaner production and sustainable productivity improvement.

Climate change: NASA, Wits and CSIR working together

Findings from SAFARI 2000, a comprehensive southern African three-year environmental field campaign headed by the CSIR and the University of the Witwatersrand, in partnership with the National Aeronautical and Space Administration and the



ENVIRONMENTAL FIELD
CAMPAIGN: THE CSIR
PARTICIPATED IN A JOINT
SOUTHERN AFRICAN
ENVIRONMENTAL FIELD
CAMPAIGN, SAFARI 2000



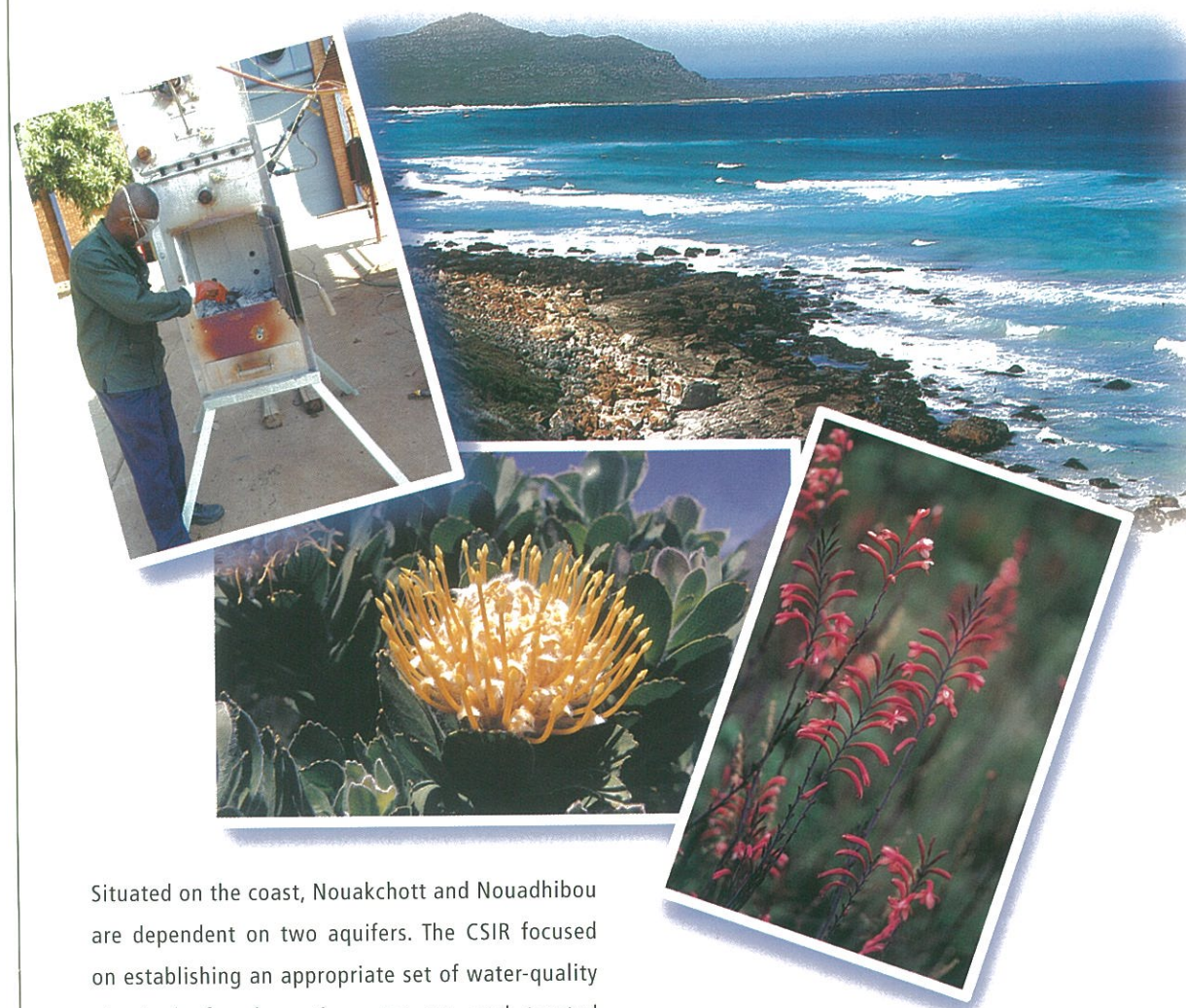
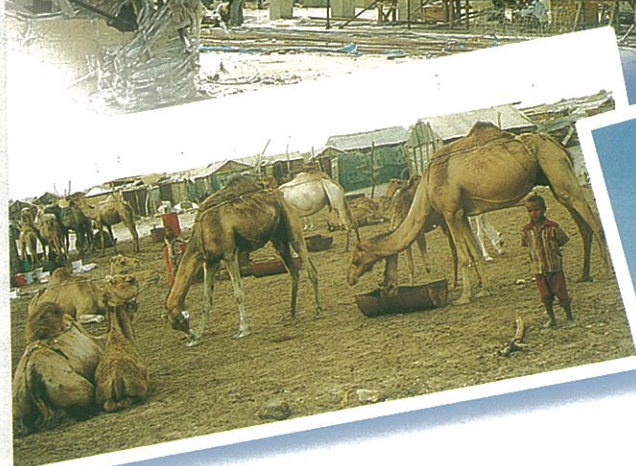
University of Virginia, will help to explain and predict climate changes. Focused on southern Africa's ecosystems, air quality and land use during the period 1999 - 2001, these findings are also set to assist in the management of regional trans-boundary pollution.

This regional initiative brought together nearly 200 African, U.S. and international scientists in a multi-disciplinary research effort to understand the sustainability of the region's sensitive and pressured ecosystems. Extensive ground-based and airborne campaigns in South Africa, Zambia, Botswana, Namibia, Lesotho, Malawi, Mozambique, Swaziland and Zimbabwe studied the complex interaction of air pollution and ecosystems across the southern half of the African continent. SAFARI 2000 is the most comprehensive study ever conducted of the continent's land/atmosphere system.

CSIR assists with environmental regulations for the Mauritanian government

Environmental performance guidelines developed by the CSIR will serve as supporting instruments to the new Mauritanian Global Environmental Law, which was recently published. The CSIR was commissioned by the World Bank to develop these guidelines for the Mauritanian electricity, water supply and sewage sectors, which are in the process of being privatised.

The CSIR study proposes emission guidelines for the current technology used for electricity generation at Nouakchott and Nouadhibou, which are the country's most populous centres, and recommends ambient air-quality guidelines for key pollutants linked to electricity generation.



Situated on the coast, Nouakchott and Nouadhibou are dependent on two aquifers. The CSIR focused on establishing an appropriate set of water-quality standards for domestic water use and treated effluent intended for re-use for irrigation and industry. The study outlines several appropriate technologies, with an emphasis on low-cost, simple approaches to effluent treatment to ensure effective, sustainable treatment standards.

Small-scale medical waste incinerators

Unsafe medical waste disposal practices pose a risk to healthcare workers and surrounding communities. Safe and effective disposal of medical waste is an important element of primary healthcare waste management systems. The CSIR has developed and is optimising a small-scale medical waste incinerator for use in rural clinics to reduce infection risks and improve waste management.

Incinerator production will be licensed to a joint venture between a metalworking company and black-owned SMMEs, located close to areas of use.

Local and international marketing will be undertaken by black-owned businesses. Spin-offs in terms of economic empowerment include job creation and skills training for metalworkers, and ongoing contracts with service providers in the SMME sector for site preparation and maintenance.

An international first: Cape Action Plan for the Environment (CAPE)

The world's most remarkable plant treasury, the Cape Floral Kingdom, is unrivalled in global terms for its extraordinary diversity of species located in a unique ecological niche. Some 8 600 species of plants occur here, of which 5 800 are endemic. The CSIR has been closely involved in the development of the long-term strategy and implementation programme for the Cape Floral Kingdom and the adjoining marine environment.

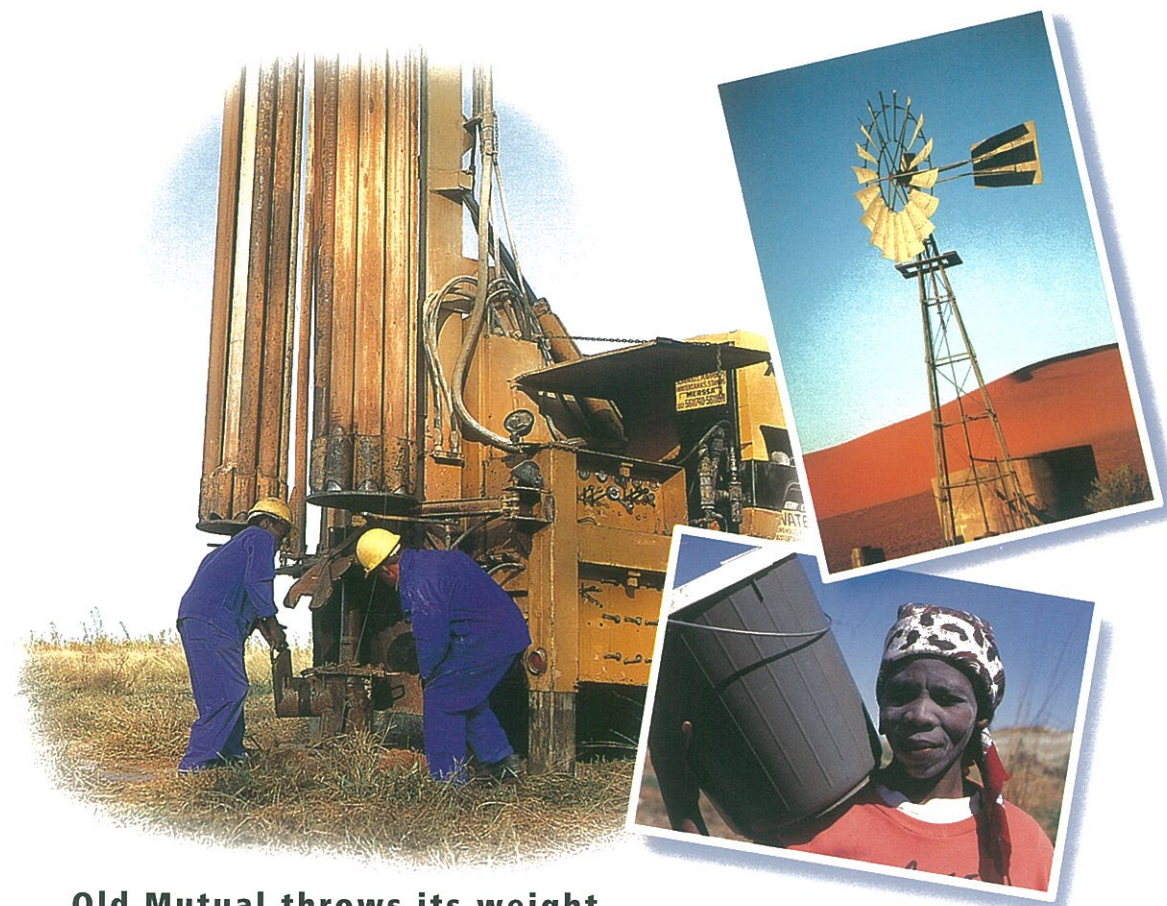
CAPE is the first international conservation plan for an entire floral kingdom. The project involves a wide range of institutional role-players, supported by a team of over 100 consultants. The CSIR facilitated the development of a strategy and a comprehensive, integrated and practical 20-year action programme. The implementation programme addresses both the conservation of priority areas and sustainable use of resources within the context of institutional implementation frameworks. The importance of collaborative decision-making, informed by sound scientific understanding and local public participation in the management of resources, is emphasised. A crucial component of CAPE has been the strong involvement of stakeholders.

CAPE has been welcomed by the Department of Environmental Affairs and Tourism and the international community as a model for conservation planning for other biodiversity hotspots.

First State-of-Rivers report for South Africa

A collaborative venture between the CSIR, the Department of Water Affairs and Forestry, the Department of Environmental Affairs and Tourism and the Water Research Commission has developed a comprehensive State-of-Rivers framework. This format was used for the first of a series of State-of-River reports for South Africa. The first report presents the findings of ecological surveys of the three major Mpumalanga river systems: the Crocodile, Sabie-Sand and Olifants Rivers, and some of their tributaries. A product of the National River Health Programme, this report was released as part of the National Water Week Campaign in March 2001.

A key objective of State-of-Rivers reporting is to collate, interpret and disseminate information on river health. This information facilitates ecologically sound management of rivers and can be used to inform and educate South Africans on river health.



Old Mutual throws its weight behind Green Buildings for Africa

Mutual Park in Cape Town - a premier Old Mutual development - became the first subscription member in the Showcase Partner Programme run by CSIR Green Buildings for Africa. More recently, the head office properties of Anglo American and Rand Water entered the programme.

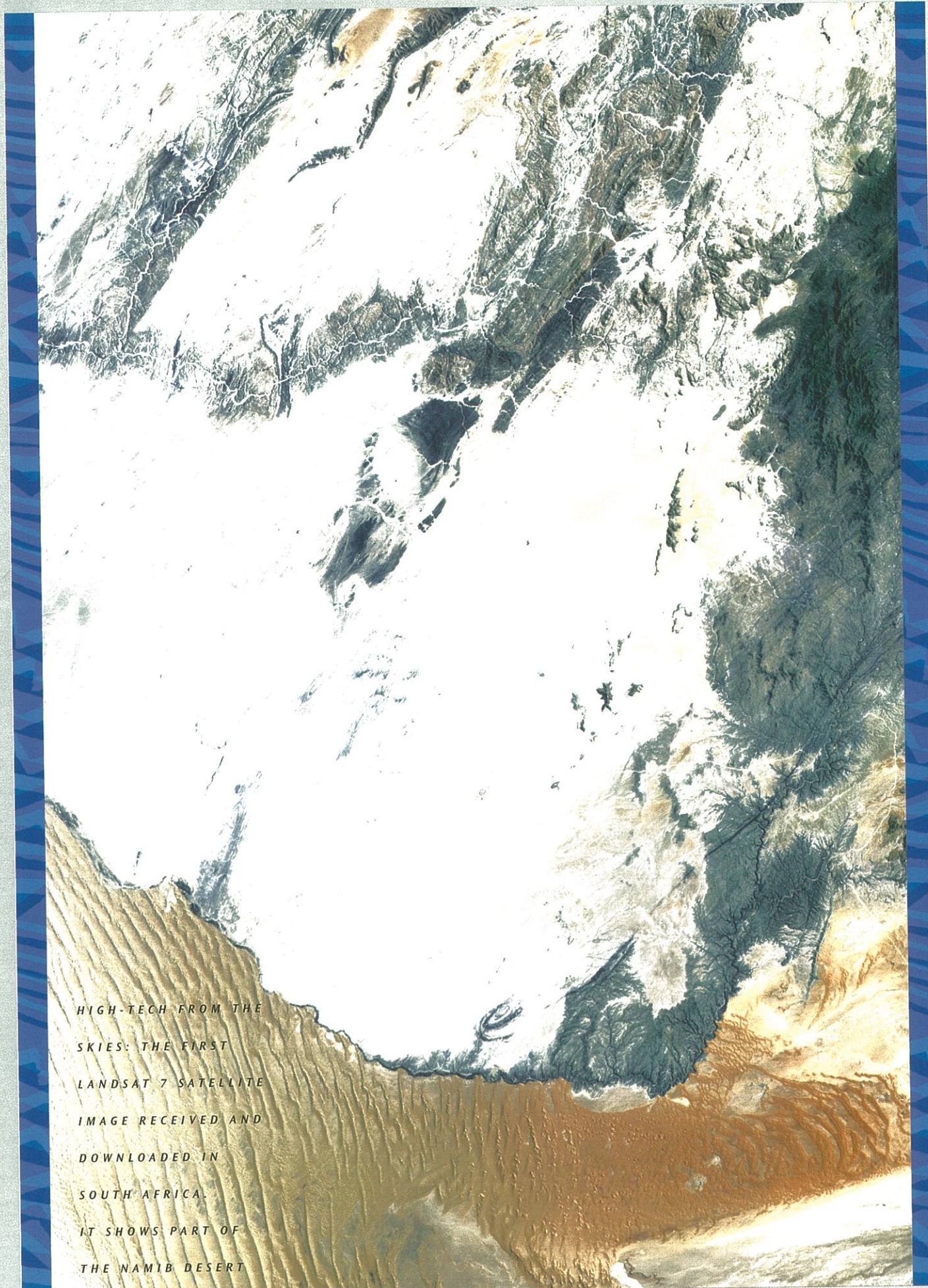
Subscribers to the Showcase Partner Programme commit their facilities to a continuous improvement cycle, which includes energy and waste management, water efficiency, indoor working environment, pollution control and ISO 14000 compliance.

The Green Buildings Showcase Partner Programme is structured to quantify and showcase the benefits of green building conversions, demonstrating the cost-effectiveness of building upgrades and sustainable design considerations. It also provides participating companies with an opportunity to publicise their commitment to the responsible management of the environment.

Artificial groundwater recharge benefits drought-prone areas

Results from four CSIR pilot projects indicate that artificial groundwater recharge could provide a reliable and cost-effective solution for drought-prone countries, such as South Africa. One of the most important benefits of artificial groundwater recharge is that it uses existing, natural storage. More elaborate storage facilities, such as dams, are environmentally problematic.

The pilot projects focused on artificial recharge to hard-rock aquifers, which make up 90% of South Africa's aquifers. The studies ranged from a large-scale scheme, started in 1996 in Windhoek, to a small-scale rural water supply scheme in Kharkams in Namaqualand.



HIGH-TECH FROM THE SKIES: THE FIRST LANDSAT 7 SATELLITE IMAGE RECEIVED AND DOWNLOADED IN SOUTH AFRICA. IT SHOWS PART OF THE NAMIB DESERT



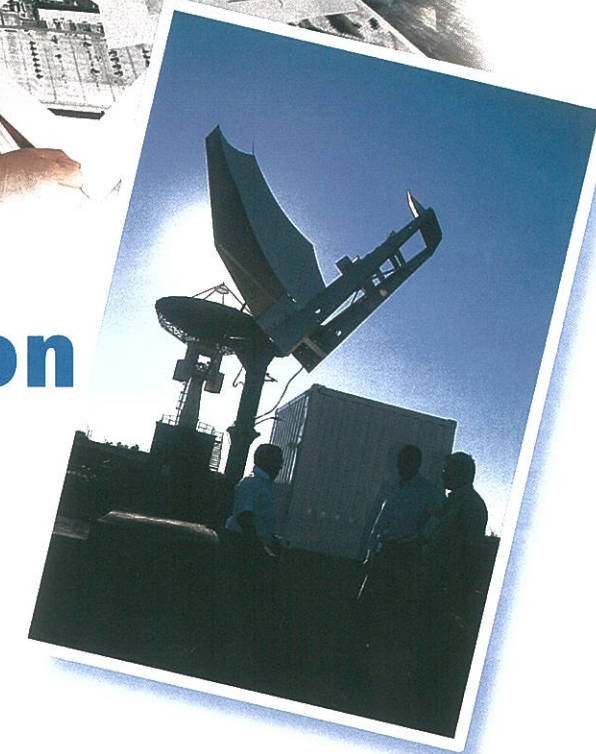
Information Society

Leveraging our knowledge resources through ICT

Putting satellite imagery to work for SA

Landsat 7 imagery is particularly suited to agricultural applications (such as crop yield), geo-exploration, land cover and land-use assessment. The availability and regular acquisition of Landsat imagery is of key importance. Following investment by the Department of Agriculture to upgrade from Landsat 5 to Landsat 7, the CSIR received its first directly acquired Landsat 7 satellite image on 20 February 2001.

Landsat satellites have been imaging the earth's surface for more than a quarter of a century, with ever-increasing capabilities in capturing detail.



The uses of satellite imagery in the South African context have been illustrated with projects such as the provision of digital satellite imagery for use in the national population census. The creation of 3-D views has depicted the effect that land-cover use changes would have in the Pongola catchments area. Satellite imagery was also used in the evaluation of Digital Elevation Models for cellular operator MTN.

Enabling digital culture

Turning physical items of cultural heritage into digital formats, creating digital exhibitions, documentaries and interactive stories offer a powerful new way to explore our cultural heritage and realise its full potential. The CSIR and its consortium partners are in the final stage of the Cultureware project that uses cutting-edge technology to bring culture into the digital age.

The Cultureware project aims to empower South Africans, in particular historically disadvantaged cultural groups, through access to technology and processes to create new media productions. The consortium consists of a unique combination of SA Tourism, WESGRO, the University of Fort Hare and the CSIR. This DACST innovation fund project addresses commercial, legal, authenticity and technological issues in bringing culture into the mainstream of social and economic activities. The methodology, which incorporates guidelines, templates and check-lists, is available through a digital facility for ease of use.

Accurate election prediction earns accolades

Working in cooperation with South Africa's Independent Electoral Commission, accurate predictions were made of voting results in last year's municipal elections. CSIR's prediction tool is able to counter a bias resulting from unrepresentative early results. It has the additional benefit of highlighting unexpected results.



The CSIR predicted the ANC's final result of 60% to within 1% when only 10% of the votes had come in. The same accuracy was reached for predictions on the Democratic Alliance performance after 20% of the votes were in.

The methodology is based on the establishment of a number of voting profiles, linked to certain segments of the population. While census data were used in 1999, this time around analysts opted to use data from the previous election.

Value-added information for the textile supply chain in southern Africa

Access to the right information at the right time is a critical success factor for organisations. The need for a one-stop information portal for the southern African textile value chain was identified by the CSIR, in consultation with stakeholders from government, business and labour.

The information portal provides access to information for companies in the SADC region and for potential international trading partners.



Public site TexWeb (www.texweb.org) gives a range of information on key issues facing the southern African industry. The online database TIMSSA (www.timssa.co.za) offers an analysis of textile production, trade and demand in all fourteen SADC countries.

Benefits of the TexWeb/TIMSSA project are facilitation of international and regional trade, provision of investment decision support, and promotion of information exchange between the SADC region and the rest of the world.

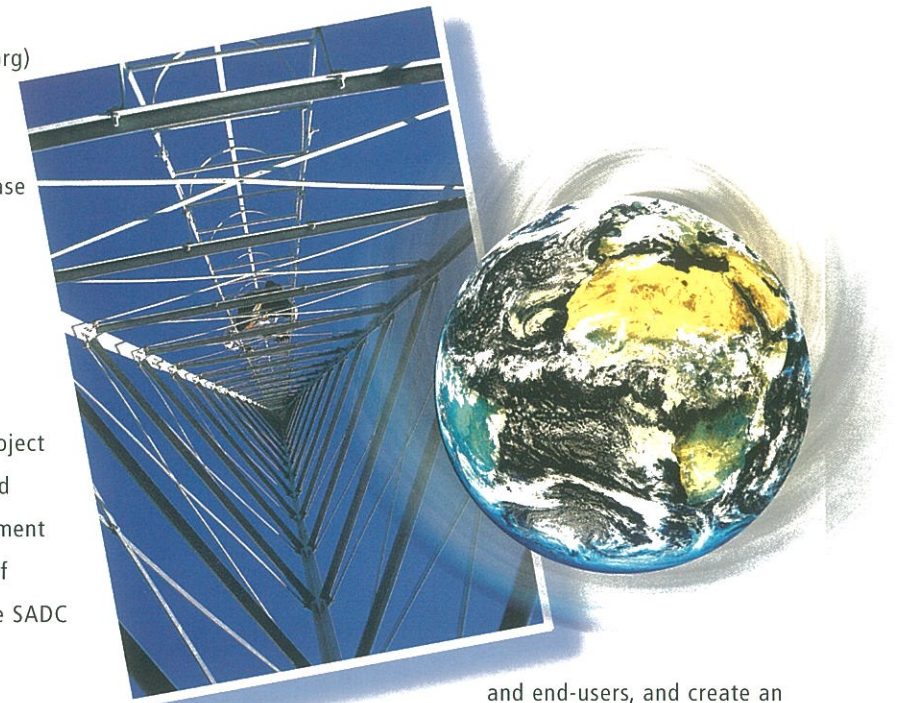
The CSIR developed the information portal in partnership with the Department of Trade and Industry (DTI) and MPCS (a private company specialising in textile market research).

Third generation communications systems for Department of Communications

Government and industry have recognised the success of GSM and the even greater potential third-generation (3G)-type services for South Africa. The Department of Communications (DoC) contracted the CSIR for assistance in the formulation of a national policy aimed at facilitating the introduction of 3G communication systems.

The first phase of the contract was devoted to consultation with key role-players. Issues relevant to the implementation of IMT-2000 in SA were identified. These issues span five broad categories: policy and regulatory implications; market considerations; technology considerations; services and applications, and standardisation issues.

The inputs received have been collated into a discussion paper used as input to the draft telecommunications policy published by the DoC. This policy aims to eliminate barriers to entry by potential operators



and end-users, and create an enabling environment for 3G implementation.

Visi-Edge – helping cricket umpires to make the right decisions

The modern cricket umpire needs technology to make good decisions. The "third" umpire generally uses video technology. Visi-Edge uses video and audio technologies.

The access to quick and accurate analysis performance in real-time is becoming increasingly important in modern sport. Contact between ball and bat (and the glove) makes a catch. Due to the speed of the game and other physical constraints, it is often difficult for the umpire to determine with certainty whether or not the ball has made contact with the bat, pads or body.

The CSIR has developed an integrative contact recognition software system - Visi-Edge, which eliminates the shortcomings of existing technology. It provides the technology to discern whether a ball made contact with a bat within 30 seconds. The novel approach to visualise the contact uses a dual video frame display on the screen (viz. the immediate frames preceding and following the moment of contact). The audio signals that "joins" the two frames is analysed to detect any contact between the video frames.

Manoeuvring virtual ships in Coega

A ship-manoeuving simulator, the Danish model SimFlex, has been used successfully in evaluating the harbour layout of the new commercial port of Ngqura (Coega) near Port Elizabeth.

The Port Authority Division of Transnet appointed the CSIR as custodian of this facility. This computer-based ship manoeuvring simulator is an advanced technology component used in the design of harbour layouts. A key port design component in a good harbour is the appropriate size and layout of the harbour area, which must allow for safe manoeuvring of ships while entering or leaving the port. SimFlex simulates the actual behaviour and bridge view of a ship in the water under control of a helmsman, offering a realistic view of the bridge instrumentation and outside environment.

Tsilitwa crosses the digital divide

Tsilitwa, a rural community between Umtata and Kokstad near Qumbu in the Eastern Cape, is under-served with communications,



power and water. A CSIR project is allowing the community access to information via the Internet and facilitating the development of appropriate information for SMME support. The power sources are off-grid renewable energy.

This partnership project involves the Tsilitwa community and a consortium consisting of the CSIR, Agriculture Research Council, Naledi ya Afrika and Renewable Energies Africa.

In the interests of sustainable economic development, a thorough needs analysis was workshopped with community leaders. This ensures deliverables in line with identified community needs.

Biometric verification: your unique Bio™

The use of biometrics for identification and verification have highlighted applications in various markets as well as in the context of e-commerce and m-commerce environments.

Biometrics is the measurement of distinct individual biological and behavioural attributes for use in identification processes. It offers a potentially powerful deterrent to fraud. Likewise, biometrics could benefit

the burgeoning m-commerce trend by providing secure authentication of mobile device users. Its use as a payment "token" has also been examined.

The CSIR's investigation focused on the legal and social issues in the South African context. It specifically focused on the potential of biometric technology to compromise the right of privacy of individuals, and social issues regarding the use of biometrics.

GIS-based decision-support system makes traffic management more efficient

The CSIR has developed an Integrated Corridor Management System (ICMS) to assist road authorities in South Africa in managing traffic along specific corridors more efficiently. This includes improved management of shorter sections over a limited time frame, such as specific routes during Easter weekends.

The ICMS offers Internet-based GIS decision support, making the system easily accessible and eliminating the need for expensive GIS software. The system is password-protected and can provide different information for various levels of management.

The models included in the ICMS are:

- ▶ Traffic policing and adjudication
- ▶ Traffic engineering
- ▶ Overloading control management
- ▶ Incident management
- ▶ Community education
- ▶ Data collection, evaluation and interpretation
- ▶ Vehicle testing, driver education, training and testing.

iport revolutionises transport information

iport, a unique transportation support product developed by the CSIR, integrates leading-edge technology and functionality with a focused, well-researched database. The product creates an effective information-sharing platform for officials within all spheres of government.

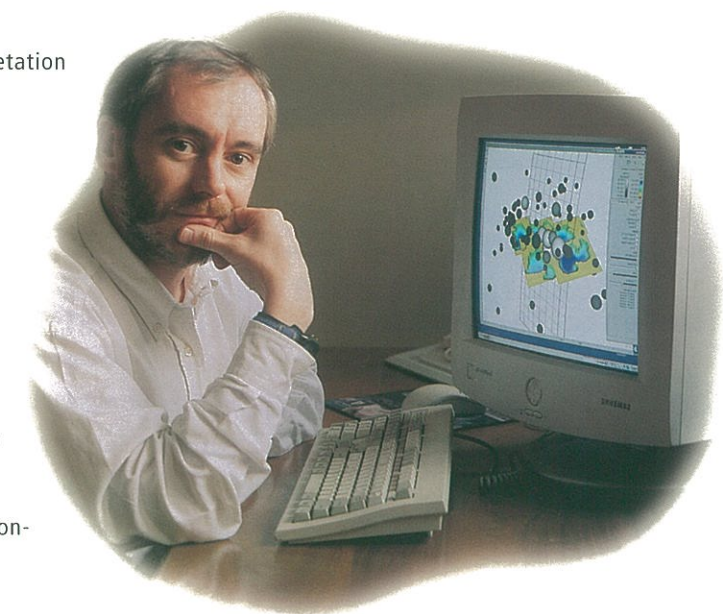
iport's has revolutionised the accessibility and integration of transport information. It contains a wealth of written, visual and commercial information in an integrated format. The portal also provides communication facilities, such as a discussion forum, web links and e-mail. Information and problems posted in the discussion forum are assessed and commented on by CSIR technical professionals.

New mine design software launched

Maintaining stable and safe excavations, while optimising extraction, is critical to the future of the gold-mining industry. New rock engineering mine design software, MinSim 2000, provides the mining industry with an invaluable tool for designing optimal mine layouts.

MinSim 2000 offers a number of major advances over previous programmes, including a very fast and sophisticated solution engine combined with easy-to-use interface facilities.

In addition, results may be viewed either in plan or as fully integrated and interactive 3-D representations that can incorporate other mine design data such as seismic event plots. Other features include greater ease of analysis of mine design scheduling, as well as the ability to view, simultaneously, multiple solution sheets, reefs and variable graphs.





Front: Dr Bruce Foulis, Dr Güner Gürtunca, Ms Tina Eboka, Mr Neo Moikangoa and Dr Hoffman Maree, and back: Mr Phil Hendricks, Dr Petro Terblanche and Mr Johann Ahlers.

THE CSIR's “engine room”

Eight market-oriented operating units

Building and Construction Technology

Research and technology solutions for serviced land, housing, facilities and related social infrastructure in urban and rural areas; policy and decision support relating to quality of life and the capacity and performance of the building and construction industry.

Defence Technology

Advice on and technology support of radar, artificial intelligence products, information warfare, electronic warfare, command control, modelling and simulation, electronic systems engineering, simulation design,

testing and evaluation of aircraft and weapons, stores integration, landwards defence technology, research into humanitarian mine cleaning, and development of land-mine protection for vehicles.

Food, Biological and Chemical Technologies

Multi-disciplinary support from concept to commercialisation for new and improved products or process development in the food, pharmaceutical and chemical industries. A world-class plant-based drug and nutraceutical discovery programme opens up global partnerships in novel compounds for the food and pharmaceutical industries.

Information and Communications Technology

IT, communications and space technologies. Activities range from satellite launch support and providing geo-information solutions, to contract solution development and consulting in IT, communications and business intelligence, to generating future technology ideas and seeding digital ventures.

Manufacturing and Materials Technology

Research and intellectual property development, technology solutions, and specialist services in support of the manufacturing and materials industry, including manufacturing policy and foresight studies, manufacturing enterprise development and improvement, process development and optimisation, materials engineering and conversion technologies covering polymers, metals, high-tech ceramics and smart materials, fibres, textiles and clothing, product development technologies, metrology and sensing systems. Understands the need to combine technology solutions with business process optimisation and skills development.

Mining Technology

Rock engineering expertise and the development of tools to maintain safe working excavations while maximising extraction; the development of new methods and tools for preventing explosions underground and reducing airborne pollutants such as heat, dust and radiation, and improving productivity and safety levels through mechanising the mining operation and developing tools and techniques to optimise short- and long-term mine planning.

Roads and Transport Technology

Appropriate and innovative technological solutions in the field of transport, incorporating transportation, traffic management, transport infrastructure and technology, and information management expertise.

Water, Environment and Forestry Technology

Technologies for environmental assessment and management, terrestrial resources, forestry, water resource management and coastal development.

**PEOPLE WITH VISION,
PARTNERSHIPS WITH PURPOSE,
TECHNOLOGY WITH IMPACT**

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