



Table of contents

Overview by the CSIR Board Chairperson	2
Introduction by the CSIR President and CEO	4
The role of the CSIR in the National System of Innovation	6
Research, development and implementation highlights	11
Directed research	12
Development	22
Implementation	36
Platforms for collaboration	42
Corporate governance	44
Governance structure	48
CSIR Board Members	50
CSIR Board Committees	51
Report of the Audit Committee	53
Report of the Auditor-General	54
Executive report	56
Annual financial statements	92
Income statements	92
Balance sheets	93
Statements of changes in equity	94
Cash flow statements	95
Notes to the annual financial statements	96
CSIR research publications 2006	126
Patents	138
Abbreviations	140

Overview by the CSIR Board Chairperson



The CSIR's performance over the past year is testimony to an organisation that has managed to turn strategy into results, intent into impact.

In 2005, the CSIR adopted a renewed focus on areas such as human capital development (HCD), delivery of relevant research and development (R&D) outputs and transferring knowledge – all driven by the commitment to contribute to the national development agenda. The organisation has, simultaneously, had to ensure that the desired balance be retained – i.e. driving strategic objectives for renewal, while managing consistent performance on matters of good governance.

To fulfil the role it was established to play, the CSIR has to continuously ensure it has the capabilities that will generate scientific solutions for the needs of today and of future generations. As such, it requires an R&D portfolio that not only ensures the application of knowledge, but also the generation of new knowledge and exploration of new areas of science. One mechanism put into practice in this regard in the past year was the creation of an emerging research area in nanotechnology, with more such initiatives to follow in 2007/2008.

Investment in infrastructure and equipment, more strategic contracting and complementary partnerships have also contributed to high levels of quality and robustness in the CSIR's science, engineering and technology (SET) base. This is also evidenced in increased scientific publishing and intellectual property formalised through patents and technology demonstrators.

A critical component of this SET base is, of course, people. The increasing urgency to proactively develop SET human capital has been voiced by public as well as private sector stakeholders. The CSIR is acutely aware of its responsibility to develop, foster and maintain a cadre of South African scientific skills – not only for organisational requirements, but as a contribution to the knowledge workforce of the country. The crafting and adoption of a CSIR HCD strategy is one marker of commitment in this regard. There have been measured increases in levels of qualification and transformation that will be built upon in coming years to achieve an organisational make-up that reflects diversity and scientific excellence.



The CSIR is fortunate to enjoy a positive relationship and widespread interactions with its major stakeholder, the Department of Science and Technology (DST). The organisation has endeavoured to support the DST on matters of strategy, policy and SET priorities, while, in turn, it values the support given by the DST.

The CSIR is proud to have an extensive and varied set of partnerships and relationships with a number of government departments and tertiary education institutions, as is seen by a large number of joint projects and collaborative initiatives.

Nationally, efforts are underway to ensure an ideal climate for local investment in R&D. As a leading science authority, the CSIR is expected to feature prominently across industries, notably also in the private sector.

I am comfortable that the CSIR has sound governance practices in place. These include solid systems and mechanisms to track R&D investments, performance and progress. Particularly in the past year, where various operations were affected by the organisational change process, the CSIR's reputation for governance standards remained intact and good overall financial performance was achieved. The level of diligence, discipline and accuracy required of the scientific discovery process is equally applied to management of costs and operational efficiency.

At a higher level of performance tracking, the shareholder's compact, signed annually with the Ministry of Science and Technology, maps stakeholders' expectations and serves as a blueprint for planning and clear performance measurement.

A number of newly-appointed Board members were welcomed in the past year and added their fresh inputs and perspectives to the team. Also, the renewal of Dr Sibiso Sibisi's term as President and CEO of the CSIR acknowledges his performance and will ensure consistency in the management and leadership of the organisation going forward. It is a pleasure to be working with Dr Sibisi and the rest of the Board in the interests of an organisation that stands to play such a significant role in this country.

A knowledge organisation bases its endeavours on the calibre of its people. It would be remiss of me not to acknowledge the efforts of the CSIR people who contribute their talents and energy to the organisation.

The CSIR has delivered evidence of an organisation that is clear on its role and objectives, and committed to exceptional performance. I am privileged to have partaken in the journey thus far and expect to see a strong and unified CSIR moving forward, delivering on the promise of shaping a better future through science.



NOBUSI SHIKWANE

The CSIR is acutely aware of its responsibility to develop, foster and maintain a cadre of South African scientific skills – not only for organisational requirements, but as a contribution to the knowledge workforce of the country



Introduction by the CSIR President and CEO



The CSIR continued to demonstrate its strength and resilience during the past year, but to determine its effectiveness, the question one needs to ask is whether the organisation delivered on its core purpose. In other words, has the CSIR conducted world-class research and displayed technological innovation that contributes to scientific and industrial development – and has this in some way improved the quality of life of the people of this country?

Quality science

A critical aspect in fulfilling this requirement is a strong organisational science, engineering and technology (SET) base. It also requires an appropriate mix of research and development (R&D) activity – from knowledge-generating research through to implementation and transfer of technology and knowledge. In the past year, the CSIR achieved a notable increase in the peer-reviewed publication of scientific findings. In addition, the number of registered patents and technology demonstrators more than doubled if one compares these numbers to the targets we set for ourselves. There have also been positive results from dedicated processes pertaining to the transfer of knowledge and technology for social good through the establishment of some 36 community enterprises.

Approximately R80 million was invested in infrastructure and equipment in the past year to ensure that the CSIR remains at the forefront of cutting-edge scientific research. Internal interventions such as stringent processes for investment of the Parliamentary Grant and the establishment of Research Advisory Panels have further ensured quality of research output.

Quality people

Scientific inquiry is a human endeavour and it is therefore people who suffuse the CSIR with energy and power. We have placed much emphasis on the quality of our SET professionals – both in terms of qualification levels and diversity. Targets set for the number of postgraduates and other staff members actively engaged in the R&D activities of the organisation were exceeded. Similarly, good progress was made in demographic transformation: 36% of our researchers are black, while 31% are women. While this achievement is commendable, human capital development (HCD) will continue to receive priority and prominence. A strategy approved by the CSIR Board in this regard will ensure the implementation of a suite of mechanisms that will retain and develop expertise. The strategy follows a three-pronged approach by supporting young students in SET fields, offering our own staff opportunities for skills development and ensuring a culture of ongoing learning. Already in the past year, the implementation of career ladders provided greater clarity in advancing within a career in SET.

Quality partnerships and relationships

Whilst our strategic research partnerships continue to grow and flourish, we will be investing additional energy in this domain. Some 45 active local and international alliances and consortia each performs research activity to the value of more than R1 million per year. However, the qualitative value of partnerships is also important to further exploit opportunities for mutual learning, collaboration in new areas of research or shared challenges, and exchanges or sharpening of skills.

The CSIR has continued to contribute to the national plan of development by supporting or participating with government departments and agencies on issues of policy or decision making, development, implementation and service delivery. This amasses to one third of the work undertaken at the CSIR contributing to national priorities, including national strategies on R&D, advanced manufacturing, biotechnology, spatial development, climate change, and space and construction, to name a few.

Quality and operational excellence

Operationally, the CSIR has attained high standards of governance and operational excellence. Implementation of a shared services model for support duties was one of the changes informed by the 2005 reconfiguration and has progressed to a satisfactory level of entrenchment in daily operations. A formal process was implemented to ensure compliance – if not leadership – in support of black economic empowerment and achievement of level-four accreditation.

At a senior leadership level, Group Executive portfolios were reconstituted to resonate with organisational priorities. A largely new Group Executive team has stepped up to the challenge to ensure contributions from their respective portfolios.

Vula CSIR, Vula South Africa!

Of particular note is the CSIR's migration to an open source environment that was initiated in 2006 under the internal campaign name 'Vula!' (Nguni; meaning 'to open'). The leadership exemplified by South Africa's largest public science organisation through this move cannot be underestimated. With open source now on the agenda of national government, the CSIR is in a position to share learning and experience, as well as contribute to international developments in science computing desktops of an 'unfettered' nature.

Consistency, balance, agility – and science with a purpose

Despite the organisational renewal that was cemented during 2006, it is not sufficient to claim that a 'new' CSIR has surfaced. Our role has, after all, remained appropriate and consistent with the founding purpose of this organisation some 60 years ago. However, there is certainly evidence of a stronger CSIR, a unified CSIR and an organisation that has come to realise its role as a science institution. While performance was exceptional in the past year, real progress builds cumulatively – given consistency of focus and clarity of intent.

If one were to highlight specific areas of learning in the past year, it would include the importance of maintaining organisational balance, the challenge of remaining set in objectives yet flexible in responding to opportunities and challenges. Science or discovery cannot be undertaken as an end to itself: it has a commitment to deliver impact and benefit, to improve skills, service, safety and well-being – the complete picture of quality of life. What we do here can – or indeed must – shape the future in a positive manner.



DR SIBUSISO SIBISI

**Real progress builds
cumulatively –
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of focus and
clarity of intent**



The role of the CSIR in the National System of Innovation

The CSIR is a significant component of South Africa's public sector research and development (R&D) activities. It accounts for about 15% of total government expenditure on R&D, or about 4% of the total South African R&D expenditure. The organisation contains several unique research facilities and occupies in many respects a unique position within the National System of Innovation (NSI).

The CSIR considers science and technology (S&T) in the South African context as being a central part of its efforts to enhance the competitiveness of South African industry, promote economic growth, create jobs and advance the sustainable socio-economic development of the country's people.

As a result, the CSIR's portfolio of activities is designed to address these challenges within the framework of the National R&D Strategy, which continues to provide the overall context for scientific research and technology development in South Africa. In implementing the strategy, the country has already seen the national gross expenditure on R&D approaching the 1% of GDP target that was set for 2009. The implementation of tax incentives to the private sector is likely to stimulate further increases in this figure.

Governments fund research for two main reasons – firstly, to support public sector activities, including defence, poverty alleviation, health, transport infrastructure and environmental management. Secondly, owing to market failure in the area of funding





The value chain starts with a good idea and needs time, consistency, determination and dedication to get to the desired result

fundamental research that responds to society's needs. This type of research is typically too long term and too high risk for the private sector to support.

In support of the country's growth trajectory, significant investment in the S&T resource base through involvement in new research fields is envisaged to respond to global technology trends. A positive development is the creation of an intra-governmental cooperation framework for R&D led by the Department of Science and Technology (DST).

Components of the NSI are becoming increasingly stretched, mostly as a result of the shortage in skilled S&T human resources. According to the annual report of the National Advisory Council on Innovation (NACI), a number of studies were launched in 2005/2006 to determine the strengths and weaknesses of the NSI. It is anticipated that these studies will enable NACI to assess recent initiatives and identify areas that require attention and intervention. NACI also recently gathered information to develop a gender equity policy and a dynamic model of the supply and demand for human resources for a productive NSI. Much of that effort now forms part of the Joint Initiative on Priority Skills Acquisition (JIPSA) and the Accelerated and Shared Growth Initiative of South Africa (AsgiSA).

Contributing to national human capital development at postgraduate level therefore remains a critical priority that is factored into the CSIR's planning.

The *Frascati Manual* defines R&D as creative work undertaken systematically to increase the stock of knowledge, including knowledge of humanity, culture and society, and the use of this knowledge to devise new applications. At the CSIR, the research, development and innovation (RDI) chain encompasses, what the organisation terms as types A, B and C research:

- **Type A** refers to directed basic or applied research that explores the underlying nature of a system
- **Type B** talks to experimental development that typically results in a new prototype, which captures new knowledge into a product, service or policy
- **Type C** is technology transfer, the first step of knowledge application.

The value chain starts with a good idea and needs time, consistency, determination and dedication to get to the desired result. It involves many players at different stages, with people and resources driving the entire process. Whereas R&D is the process of creating a wealth of knowledge, innovation turns knowledge into wealth through financial gain.

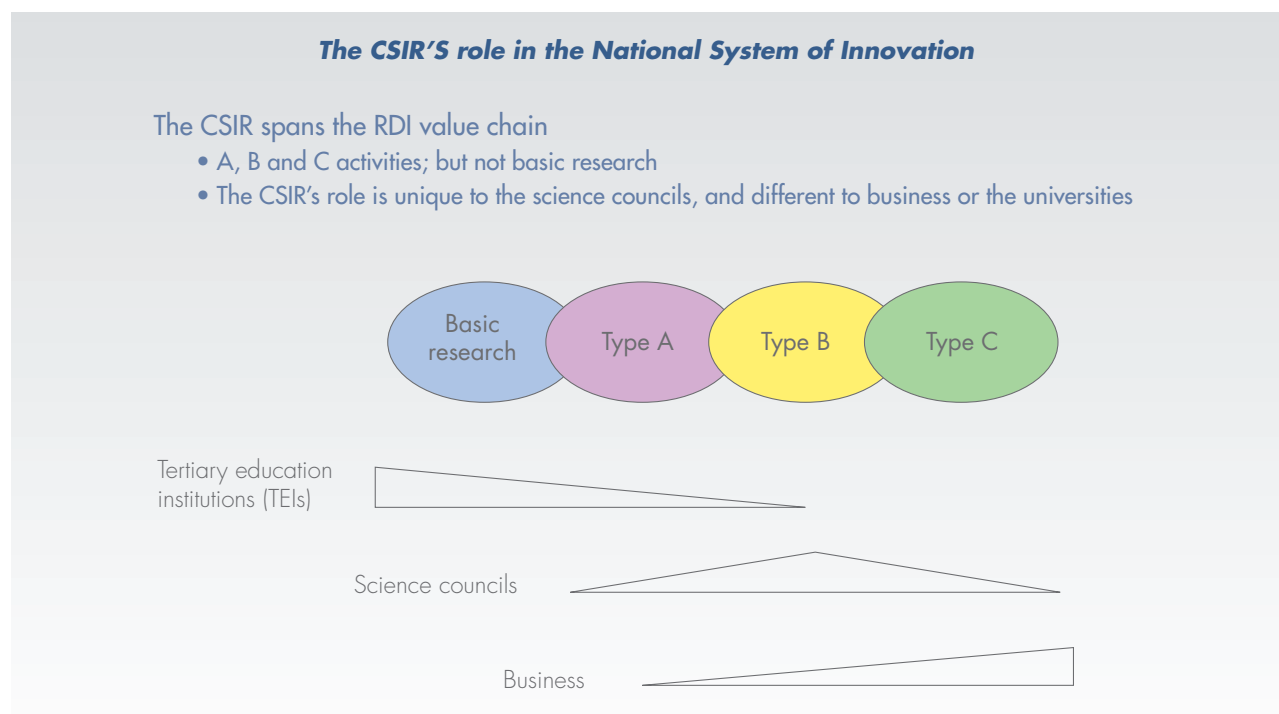
The CSIR operates with two kinds of R&D income, each with its own purpose. The Parliamentary Grant is used for strengthening the CSIR's S&T base – knowledge, people and infrastructure. It is expended on R&D with high national priority and in service of public good. Secondly, income is derived from performing contract research for clients in the public and private sectors, locally and abroad, on specific projects. This component of revenue amounted to about R643 million in the 2006/07 financial year.

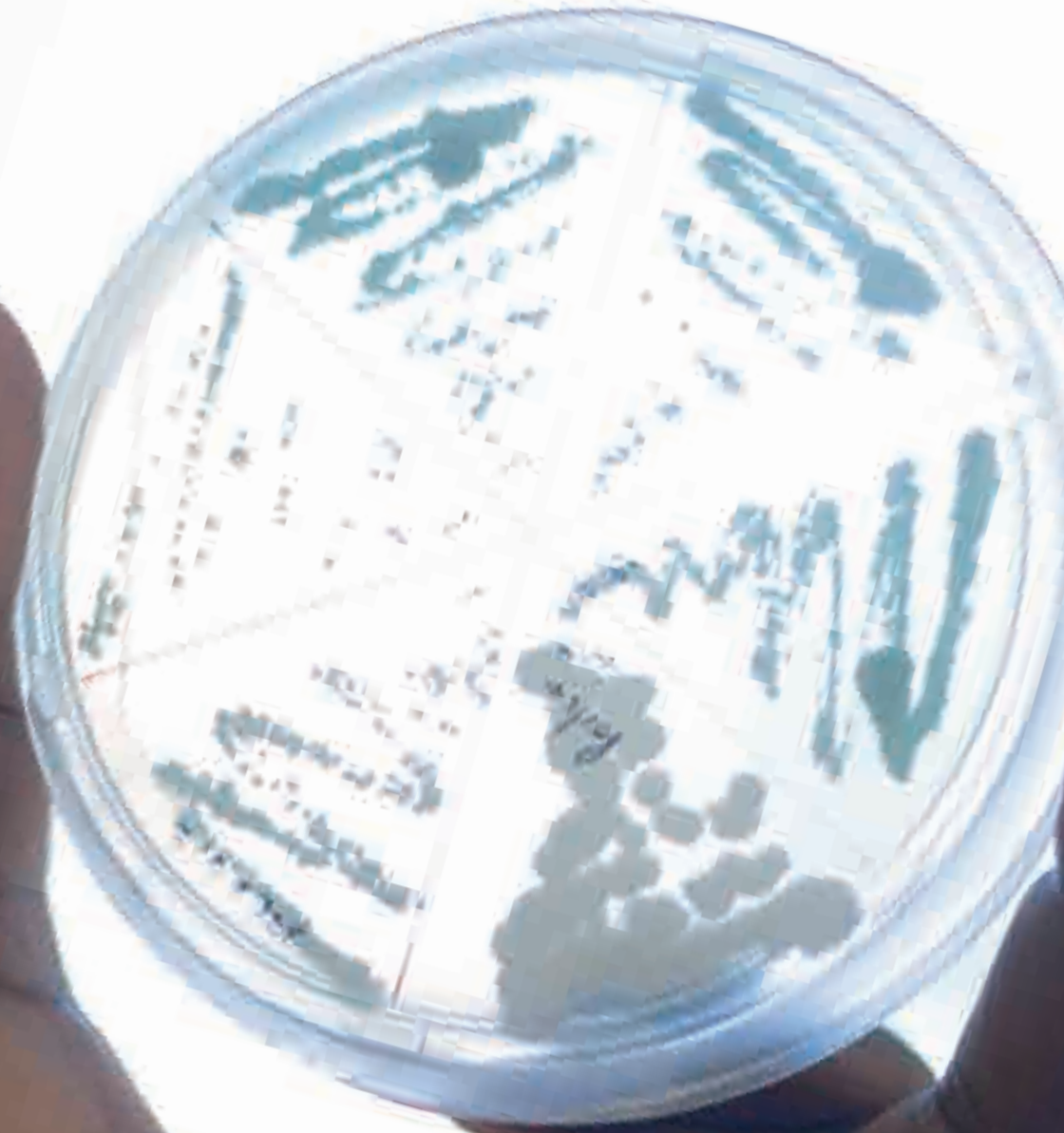
The CSIR and other science councils play a vital role in the NSI – and distinct from that of other players such as tertiary education institutions (TEIs) and business. (See figure on opposite page).

Public sector research is an essential component of the NSI due to its longer term and more fundamental nature. Whereas in the private sector, economic returns are the major driving force for innovation, social return is equally important in the public sector. A large proportion of TEI research, for instance, is undertaken in the interest of advancing knowledge. This role for government funding is most obvious from an examination of the Frascati categories, which shows that business enterprise R&D is mostly concentrated on experimental development (research closely linked to the development of new products and services), whereas the research by TEIs is dominated by basic research.

The CSIR and the science councils have a central role between the two sets of institutions. Many governments continue to fund national research laboratories in addition to universities on account of their more applied focus, which is essential in the overall conversion of new products and services into innovation and hence economic benefit.

The research role of the CSIR remains essential within the NSI. Its dominant focus on applied research (leading to innovative products and services) is still some way from near-market products and services and hence subject to higher commercial and technical risk, thus requiring continued government funding. This comes with the associated responsibilities of human capital development, diffusion of technologies, maintenance of essential research and scientific infrastructure, undertaking of longer-term research of industrial applications and of high social importance (and not necessarily of high economic return), and the establishment within South Africa of research programmes in emerging areas of S&T.

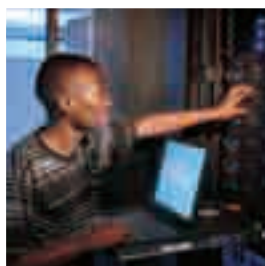




Research, development & implementation highlights

Towards a strong, singular CSIR

All operations of the CSIR work towards the same mandate by employing a selection of scientific disciplines. The organisation's operating units and research centres provide structure where key competency areas can flourish. It is when the highlights achieved through the research, development and implementation stages are viewed collectively, that one gets a sense of the CSIR's contribution to the National System of Innovation (NSI). The CSIR performs its work through groups focusing on biosciences; the built environment; defence, peace, safety and security; information and communications technology; laser technology; materials science and manufacturing; natural resources and the environment; space technology; and metrology (pursuant to the Measurement Standards Act, Act 18 of 2006, the National Metrology Laboratory was transferred to the National Metrology Institute of South Africa – NMISA).



Directed research

Research is a systematic activity undertaken to generate new knowledge, directed towards a specific practical aim or objective.

CSIR establishes nanoscience centre of innovation

The CSIR has established its first emerging research area (ERA) in nanoscience to conduct research that is expected to result in new discoveries in the properties and applications of nanomaterials. The ERA was selected as one of two Department of Science and Technology (DST)-funded centres of innovation in nanotechnology, and as such will be a platform for the implementation of the South African National Nanotechnology Strategy.

The centre aims to be a world player in the discovery and development of new materials and material properties at the nanoscale within the next five years. The specific research focus is on the fabrication of novel nanostructured materials, synthesis and characterisation of quantum dots, polymer nanocomposites, application of nanomaterials in the energy sector, and materials modelling and simulation.

The centre is building an extensive network with local and international universities and research organisations, has a strong focus on human capital development, and collaborates closely with industry to help ensure successful outcomes and impact of its research activities.



Designing components using green materials

In a collaborative project, CSIR researchers are developing a natural fibre composite material for use in aerospace structural interior components.

The quest for natural fibre-reinforced polymeric composites that substitute glass fibre reinforcement is growing internationally. This is attributed to the expected unique properties of this alternative material, including environmental sustainability, light weight, lower raw material price, and 'thermal recycling' capabilities.

The project, under the auspices of the Advanced Manufacturing Technology Strategy (AMTS), and managed by the CSIR's fibres and textile group in Port Elizabeth, involves partners from academic institutions and industry.

From a product perspective, the objective is to produce a secondary aerospace structure that conforms to stringent aerospace certification requirements for fire, smoke and toxicity. It also seeks to develop fully renewable bio-composite materials in line with the AMTS and international aerospace scientific technology plans.

Progress in advanced materials

Advanced materials are seen as the cornerstone of new and improved aerospace and automotive systems. In this regard, the CSIR is actively involved in the processing of aluminium, magnesium and titanium for these and other high-technology industries. Ongoing projects in this field include the development of:

- Novel composite material technologies for the aerospace sector, with the primary focus on smart structures and new emerging materials, such as natural composites
- Advanced metals manufacturing technologies for complex, thin-walled, light-weight components using investment casting processes
- Titanium research, in partnership with local and international universities and industries, such as Boeing and Airbus, with the CSIR focus being development of new primary titanium extractive process and powder metallurgy technologies. The research is of particular importance for the aerospace industry where titanium is becoming an alternative for aluminium in composite airframes
- Semi-solid metal processing of thick-walled aluminium components, a project funded by the DST.

The CSIR coordinates the Light Metals Development Network, part of the Advanced Metals Initiative, with the objective of providing active support for the growth and sustainability of an international downstream South African light metals industry. This is a joint initiative between the CSIR, Mintek and Necsa.

The CSIR is also an active founder member of the Rapid Product Development Association of South Africa, which looks at new and novel technologies for use in advanced manufacturing.



Breaking the barriers of rural development

Action research methodologies are intended to produce both understanding and change

Researchers at the CSIR are participating in an international research project aimed at enabling people in rural areas to participate fully in the research and technology development activities that potentially affect their lives. Funded by the European Union's (EU) Sixth Framework Programme (FP6), the consortium comprises 30 partners from 15 countries. The project commenced during 2006.

Titled Collaboration@Rural, a collaborative platform for working and living in rural areas (C@R), the three-year project aims to develop effective methodologies for the implementation of rural living labs – user-centric, real-life R&D contexts, involving people, businesses and public players in the co-creation of services enhancing rural development.

The Sekhukhune area in Limpopo has been selected as the location of the rural living lab in South Africa. The CSIR is using action research methodologies to detail the design and functional requirements of information, communications and technology (ICT) systems that could best serve the collaborative procurement, logistics and support needs of small, medium and macro enterprises (SMMEs) in the area. Additional focus areas include geospatial ICT (GeoICT), enhanced location, intelligence, mobility, mobile connectivity and logistical coordination, all of which are related to improved accessibility and collaboration.

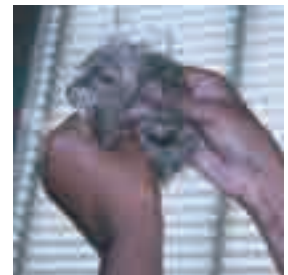
CSIR investigates use of natural fibre in construction

The CSIR is investigating the application of natural fibre composites (NFCs) in construction. The organisation aims to help produce construction materials that are less harmful, recyclable and made mainly from renewable materials.

A CSIR study investigated the use of industrial waste, agricultural crops and recycled materials in construction, and concluded that agricultural crops offered the best opportunity for the building and construction sector. The research team considered a number of crop-based applications resulting from the specific characteristics of agricultural crops, such as plant fibres, carbohydrates, proteins and oils.

The most significant advance could be found in the newest – and most promising – market sector, namely matting-based products and composites. This sector offers unique synergies with related technologies, such as computer-aided manufacturing, sensor technologies and technology that will assist the building and construction sector in delivering high-performance, immovable assets.

In addition to addressing the environmental impact of the construction sector, the use of crop-based construction materials is expected to generate employment across different economic sectors, create new construction enterprises and promote the use of new manufacturing methods.



Creating tools to enhance service delivery

The Urban Dynamics Laboratory (UDL), a multi-year research initiative of the CSIR launched in 2006, is working towards an improved understanding of the dynamics of urban and regional socio-ecological systems (systems created by the interactions among humans, and between human populations and their environments). The laboratory's main objective is to create tools and technologies to improve spatial planning and enhance the understanding of spatial dynamics in support of national efforts to improve public service delivery. The latter is a key requirement to enable government to meet its core social and economic objectives of halving the country's rates of poverty and unemployment by 2014.

Envisaged research outcomes include, among others, assessment of the possible impact of drivers such as crime, insecurity, increasing ambient intelligence (computing and networking technology unobtrusively embedded in human surroundings), changing demographic patterns, resource consumption and climate change on the resilience of socio-ecological systems, and modelling of various types of value chains and flows (including flows of ecosystem services) and how human activities compete to control these.

The laboratory will bring together a cross-institutional team following a trans-disciplinary approach, where cooperation extends between and across conventional disciplinary boundaries. It will serve as a practical workbench for a wide range of research applications, from testing theories developed in urban sustainability science – which studies the interface between human society and the environment upon which societal well-being depends – to providing science-based decision support in urban planning and design to all tiers of government. The facility will include a range of data sets, tools for modelling and simulation of systems interactions and spatial changes, and the necessary hardware to support these tools.

Converting biodiesel waste into a profitable product

In 2006, the DST awarded funding to the CSIR to establish a research project for developing new processes and applications for soya oilcake. One such application is as a replacement of fish meal in animal feeds, as the current practice of using fish to feed animals is unsustainable in the long term.

Soya oilcake, a high-protein by-product and stream residue of biodiesel production from an oilseed such as soya bean, comprises more than half the total weight of the bean. Improving its sale value is important to ensure the economic viability of biodiesel by-product processing plants.

Other applications being researched as part of the project include the development of new biomaterials, human food applications, use as a fermentation substrate to produce novel products, and the production of oilcake products with low levels of anti-nutrients. Future work will look at expansion into the by-product streams from other feedstocks, including other kinds of oilseeds and other systems, such as algae. The Agricultural Research Council is conducting animal feed trials.



CSIR undertakes research in ecological drivers of cholera

CSIR researchers are investigating outbreaks of cholera in Beira, Mozambique. Cholera is an acute bacterial infection of the small intestine, caused by *Vibrio cholerae* and characterised by severe diarrhoea with rapid depletion of body fluids and salts. Currently cholera outbreaks are reported in 52 countries and more than 90% of all cases reported are from Africa. According to reports, 106 389 cholera cases were reported in South Africa in 2001, with a total of 229 lives lost.

The CSIR research focuses on the ecological drivers of the disease and not on the social conditions promoting outbreaks. Previous research conducted in other parts of the world, notably Bangladesh, suggests a primarily marine driver of cholera outbreaks.

Preliminary findings of the Beira research indicate that the estuary as well as inland waterways and aquatic sediments are reservoirs for the bacteria. Both of the strains that are responsible for epidemics in the world, namely *V. cholerae* O1 and O139, have been identified in the environmental samples. *V. cholerae* O139 has never before been reported to occur in the natural environment in Africa. It was also positively identified only in the sea-based water samples and on fish scales. Patterns and consistencies between environmental factors and the cholera cases have been established and the work will contribute towards anticipating and mitigating future cholera outbreaks.



Towards a low-noise drilling system for blast and support holes

The Mine Health and Safety Council (MHSC) has set two milestones for the reduction of sound level exposure to mine workers, namely:

- By 2008, the hearing conservation programmes implemented by industry must demonstrate a deterioration in hearing of not greater than 10% in occupationally-exposed workers. Essentially, this implies no new incidents of compensable hearing loss
- By 2013, the total noise emitted by all equipment installed in the workplace must not exceed a sound pressure level of 110 decibels at any location in the workplace.

The typical pneumatic rotary-percussive drill used in the South African mining industry is a major contributor to noise, vibration and the emission of mists and fumes. Dry percussive drilling in kimberlite also releases asbestos fibres into the immediate atmosphere.

The CSIR has compiled a report supporting a re-evaluation process of the methods employed to reduce the noise levels experienced during blast hole and support hole generation in mines. The methods suggested for future use in the South African mining industry should meet or exceed the above MHSC milestones.

The report recommends research on potential technologies to reduce noise, vibration and pollution and provide improved worker and workplace safety. It details the scope, anticipated timing, cost and success probability for the development of such technologies. The report deals with gold, platinum, diamond and coal mines.

The CSIR's research partners and collaborators in this project include the University of Pretoria, Tetra Corporation, Hilti, Atlas Copco, Boartlongyear and the National Institute of Occupational Safety and Health in the USA.

Aptamers: a competitive new therapeutic and diagnostic tool

The CSIR established an aptamer research group in 2006 to investigate biomedical systems and the molecular basis of diseases with the aim of providing cutting-edge solutions to major public health problems such as HIV/Aids and tuberculosis. Aptamer technology is a powerful new tool to study, treat and diagnose diseases in the 21st century. From the Greek word 'to fit', aptamers – not detectable with the naked eye – are artificial nucleic acid molecules (RNA or DNA) engineered in a test tube for specific binding to various targets, such as small molecules and cancer cells. This includes viral and bacterial proteins and protozoan parasites that cause, for instance, African sleeping sickness and malaria.

This technology has applications in target validation and drug discovery and the powerful, precise nature of the aptamer makes it a likely candidate drug for the prevention of HIV infection. Current antiretrovirals act once the virus has infected target cells, while aptamers act to prevent viral entry into host cells. The CSIR's research aims to bring the people of South Africa and the continent improved tools for diagnosis, treatment and prevention of diseases endemic to Africa.



CSIR bioscience expertise sought after in the EU

EMPRO: The CSIR recently joined the European microbicides consortium (EMPRO), a research network investigating and developing new microbicides for the prevention of HIV infection. A microbicide is any compound or substance whose purpose is to reduce the infectivity of microbes, such as viruses or bacteria.

Novel Q: In this project that investigates innovative processing methods to extend the shelf life of selected foods, the CSIR lends its expertise in extracting underutilised proteins from grains and developing edible food coatings.

ANTIMAL: This consortium-based project aims to produce the next generation of antimalarial chemotherapeutics. It is led by the Liverpool School for Tropical Medicine, while the CSIR is tasked to develop potential antimalarials using natural products isolated from South African flora as the lead molecules.

New Medicines for Tuberculosis (NM4TB): This project aims to develop new drugs for the treatment of TB through an integrated approach. The team comprises some of Europe's leading academic TB researchers, a major pharmaceutical company and three SMEs, all with a strong commitment to discovering new anti-infective agents. The team is complemented by dedicated research groups from areas where TB is endemic (India, South Africa and Russia). The CSIR was asked to join the consortium as a result of its experience and intellectual property on the enzyme *Mycobacterium tuberculosis* glutamine synthetase – one of the key target proteins – and the design and synthesis of inhibitors to this enzyme.

Plans to eradicate lung diseases in mines

The CSIR is committed to helping eradicate pneumoconiosis (otherwise known as silicosis) in the South African mining industry. The CSIR has secured two multi-year and multi-million-rand projects, sponsored by the MHSC.

The first project's objectives will be achieved by:

- Assessing dust sources and determining the contribution of each source to the overall exposure
- Reviewing new technologies for breaking and moving rock
- Identifying and assessing different dust control technologies
- Developing industry standards for the determination of filter efficiency.

The second project's objectives will be achieved by:

- Reporting on the current status of noise and respirable silica dust assessment/determination systems used by practitioners in the mining industry by job category and commodity
- Compiling a baseline assessment strategy to enable the determination of employees' personal exposure to noise and respirable silica dust in the mining industry.

The CSIR has improved its high-precision process of weighing gravimetric airborne particulate filters in determining concentrations of pollutants to which employees may be exposed. It has also purchased a state-of-the-art particle size distribution analyser and an advanced diffractometer for the analysis of respirable quartz particulates.



The CSIR has improved its high-precision process of weighing gravimetric airborne particulate filters in determining concentrations of pollutants to which employees may be exposed



South African laser scientists join project on aero-engine design and manufacturing

The CSIR was named a consortium member with leading European research institutes and end users from the aerospace industry. The consortium was established to execute the European Union Sixth Framework Programme project, FANTASIA, an acronym for 'flexible and near-net shape generative manufacturing chains and repair techniques for complex-shaped aero engine parts'. The project is aimed at strengthening the global competitiveness of Europe's aero-engine industry through a comprehensive re-engineering of the entire value chain in aero-engine component design manufacture and maintenance. The anticipated outcome will result in significant cost savings based on reduced lead times, new design options and reduced raw material requirements.

These objectives will be met through harnessing the flexibility and rapid response capabilities of generative manufacturing techniques. Such techniques identified for this purpose include laser metal deposition and direct laser forming, both of which will be optimised to produce greater geometrical accuracy, significantly improved surface quality, increased efficiency in raw material utilisation and higher deposition rates. FANTASIA commenced in June 2006 and has a four-year life span.

Mitigating the effects of sediment discharges from diamond mining

The CSIR has compiled a report on the cumulative environmental impact of on-shore and near-shore diamond mining in the Benguela Current Large Marine Ecosystem region. The report advises the governments of South Africa, Angola and Namibia to consider additional environmental management and monitoring actions to better understand and mitigate the effects of discharged sediments resulting from near-shore and coastal diamond mining.

The effects of marine and near-shore diamond mining in that region may be severe, over time and space. It is estimated that from 1968 to 2005, 400 to 800 million tons of sediment were discharged from the Orange River. In the same period, about 400 million tons of sediment resulted from near-shore and coastal diamond mining. The discharge of large volumes of sand can result in unnatural and long-term deposition on reefs.

The report's recommendations include keeping detailed logs of the hourly and daily rates of all sediment discharges, as well as accurate directional wave measurements and wind data in mining areas. The four-year project was funded by the United Nations Development Programme.

Improved nutritional value of staple food crops

Improving the nutritional value and quality of staple food crops and production in a safe and environmentally-friendly manner continues to gain importance worldwide. The Develonutri project aims to develop and validate high-throughput metabolic profiling technologies for the quantification and optimisation of the nutritional value of crops and crop-based foods. It also aims to understand the major, minor and key nutrients in potato, wheat and tomato. This project provides valuable information that can be used when dealing with legislation, where the increasing stringent EU legislation on nutritional value and labelling of food crops has led to extra demands on specific nutritional claims on a crop and its derived foodstuff.



Studying the motion of atoms gets a boost

The CSIR is collaborating with Dutch-based Laser Centrum Vrije Universiteit (LCVU) in setting up its femtosecond laser science capability. (The CSIR has identified this field as a future research area.)

A femtosecond laser pulse is a pulse with a duration of 10-15/s, that is 0,000000000000001s. In other words, the duration of this light pulse is to a minute what a minute is to the age of the universe.

The short duration of femtosecond laser pulses allows the study of motions of atoms and electrons. The impetus for studying the motion of atoms and electrons comes from many areas of S&T. The ability to look at chemical and biochemical processes is a prerequisite for steering reactions, while insight into the dynamics of electrons and band gaps in semiconductor devices is crucial for speeding up electronic devices. The research covers femtosecond chemistry, biophotonics, solid-state laser sources and high resolution spectroscopy.

In a complementary project, the CSIR is working with the University of Stellenbosch and iThemba Labs to develop a high-peak power laser system to be used in nuclear physics, particularly in particle acceleration.



Development

Drawing from existing knowledge gained from research and practical experience, development aims to produce new materials, products and policies, install new processes, systems and services, or improve those already produced or installed.

Improved data capturing for better transport models and planning

CSIR researchers have developed numerous technologies that demonstrate how real-time information can be generated and used by transport and land-use planners in their efforts to analyse travel and activity patterns.

Traditional data collection techniques, such as travel surveys, are not always cost effective and present a number of difficulties when used locally, due to language barriers and lower levels of literacy. The GenDySI (generation and harnessing of dynamic spatial intelligence) project addressed this challenge by collecting and analysing real-time, geocoded information on transport-spatial interaction.

The GenDySI project was initiated to investigate a number of research questions arising from an original experiment, which proved the feasibility of building transport models by tracking cell phones, and hence people.

GenDySI consisted of five research areas and four pilot projects. Technologies developed include a modem for extracting various cell phone parameters and global positioning system (GPS) data, software for extracting road networks from satellite imagery, transport modelling, and the parallelisation of some of the algorithms for use on the CSIR Cluster Computer Centre (C4). C4 is an organisational-class, high-performance computing system used by CSIR scientists for the computational aspects of their research.

The fifth research area focused on ethical issues, including the submission of GenDySI's four pilot projects to a research ethics committee at the University of Pretoria, one of the research partners in the project. Other partners included the universities of Utrecht and Stellenbosch. A number of postgraduate studies linked to the project are underway at these institutions. GenDySI technologies being developed further include those used to build origin-destination models and to distribute messages to people in a target area.



Keeping an eye on South Africa's ports

The CSIR has developed a low-cost video system to support safe port operations. The system automatically provides additional visual information and early warning to harbour masters, vessel traffic controllers and port operators. In the absence of prominent port control buildings, cameras can be placed strategically to cover the entire port, make all views easily accessible and recordable, and raise the alarm on potentially-dangerous or unsafe conditions.

A demonstration system called Harbour Watch has been set up at the Port of Cape Town. The system is linked to the CSIR regional office in Stellenbosch to facilitate further development, while images can also be saved to a local network for viewing. Software developed by the CSIR to track ship motion in small-scale models has been modified to track prototype ship motions.

Technologies similar to Harbour Watch can be applied to key environmental monitoring points to maintain visual surveillance of oil spills or dredging plumes. Linked to prototype wave, wind and current measurements, these spatial data are georeferenced and can be used to calibrate numerical models.

SPOT 5 satellite:

The world's leading civil earth observation system. The CSIR has been a partner of the SPOT Image organisation for some 20 years

New remote sensing data management system taken into use

The CSIR has established a new geoprocessing chain that will be able to process 50% more remote sensing images received from numerous earth observation satellites orbiting the earth. CSIR remote sensing specialists commenced the technical implementation of this task, from the development of the necessary processing models to final hardware architecture, in September 2006.

The system code to automate several processes – including the multi-spectral band merge, pan-sharpening, orthorectification and mosaicking – was completed in November 2006. The selected hardware to provide the processing results required was procured in February 2007. Although the processing results were limited, most of the SPOT 5 satellite data were successfully geometrically corrected using this system.

The complex technical learning for the team was of tremendous value to achieve the final implementation of the envisaged South African Earth Observation System (SAEOS) architecture, as expected by the DST.



New model boosts computational building simulation

The development of a generic building product model (BPM) by the CSIR makes a significant contribution towards computational building simulation using a BPM as a generic platform. A BPM can be described as a digital information structure of the objects making up a building, capturing the form, behaviour and interactions between the parts and assemblies within the building.

Kronos, the BPM developed by the CSIR, captures only the essence of what is required for computational building simulation, without making significant compromises. The result is an efficient, technically-correct and, at the same time, almost photo-realistic presentation that works both in 2D and 3D. In addition to this, a system was created that supports static and dynamic modelling and simulation.

Two case studies undertaken during the past year provided useful insights into the required capabilities of autonomous agents, an aspect that was too underdeveloped in the initial project. The case studies transformed the underdeveloped agents into fully autonomous agents. Numerous new algorithms, such as steering and collision detection methods, were developed, while significant improvements to time synchronisation in the simulation environment now ensure realistic simulations.

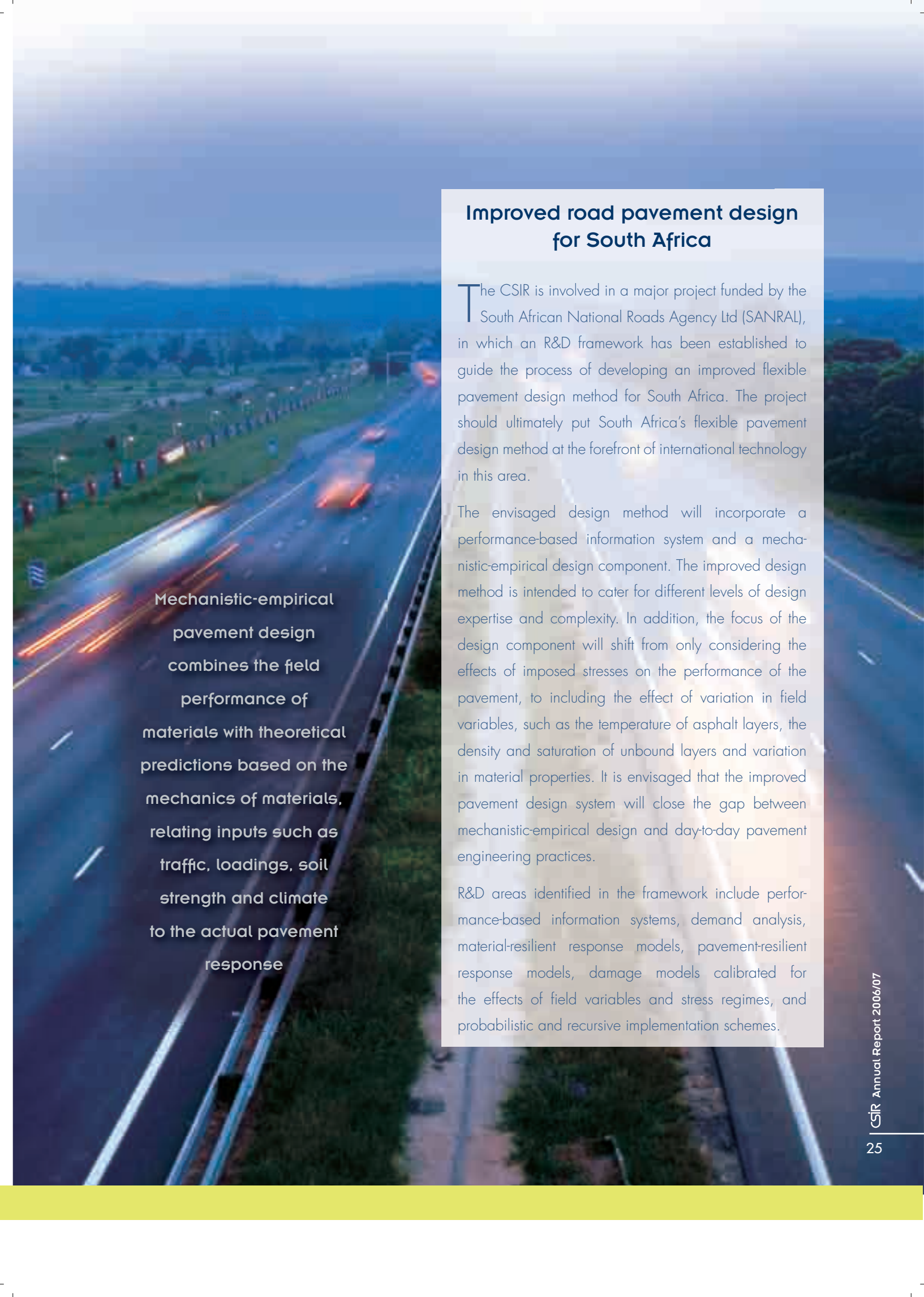
The ultimate aim of the research is to use Kronos as a tool for testing hypotheses formulated as a result of empirical research and built environment practices.

Establishing critical mass ICT R&D for innovation in human language technologies



The CSIR's human language technologies (HLT) research group has solidified research and collaboration in ICT. Collaborations include partnerships with government departments, local academic partnerships through the National HLT Network (aimed at bringing all South African academic partners involved in the development of HLT together) and international partnerships with the USA, the UK, Germany, Kenya and India.

Various technologies and toolkits have been released as open source software, including the first ever freely-available text-to-speech voices in South African languages. Supported by the Department of Arts and Culture, the HLT research group recently embarked on a project involving a multilingual telephony platform. This will be used to serve the South African public in a nationally-visible way and will integrate speech recognition and speech syntheses in all South African languages.



Mechanistic-empirical pavement design combines the field performance of materials with theoretical predictions based on the mechanics of materials, relating inputs such as traffic, loadings, soil strength and climate to the actual pavement response

Improved road pavement design for South Africa

The CSIR is involved in a major project funded by the South African National Roads Agency Ltd (SANRAL), in which an R&D framework has been established to guide the process of developing an improved flexible pavement design method for South Africa. The project should ultimately put South Africa's flexible pavement design method at the forefront of international technology in this area.

The envisaged design method will incorporate a performance-based information system and a mechanistic-empirical design component. The improved design method is intended to cater for different levels of design expertise and complexity. In addition, the focus of the design component will shift from only considering the effects of imposed stresses on the performance of the pavement, to including the effect of variation in field variables, such as the temperature of asphalt layers, the density and saturation of unbound layers and variation in material properties. It is envisaged that the improved pavement design system will close the gap between mechanistic-empirical design and day-to-day pavement engineering practices.

R&D areas identified in the framework include performance-based information systems, demand analysis, material-resilient response models, pavement-resilient response models, damage models calibrated for the effects of field variables and stress regimes, and probabilistic and recursive implementation schemes.

Innovative radar technology for persistent surveillance

The CSIR's AwareNet radar research focuses on the automatic detection and classification of small boats at all ranges and in all sea states and weather conditions. Researchers were challenged by radar echoes from small boats that are, in the presence of radar reflections from the ocean surface, only detectable with exceptionally long radar dwell times. The hypothesis is that a staring beam array radar, a concept currently being developed for the long range AwareNet radar sensor, will be able to achieve significantly-improved detection and classification performance in comparison to current maritime surveillance radar technology.

Using the CSIR-developed wideband Fynmeet radar measurement facility, an extensive measurement campaign was conducted during 2006 near Cape Agulhas, the southernmost tip of Africa. Calibrated radar-reflectivity measurements were recorded along with measurements of the prevailing weather conditions, the wave heights and directions and the positions and orientations of three different kinds of small boats. Data sets were recorded over a period of two weeks during which a variety of weather and oceanic conditions were encountered.

The CSIR processed this rich set of data in collaboration with radar specialists at the University College London and the University of Cape Town, and was able to answer a number of research questions. In addition, international radar specialists consider the recorded data set to be world-class, hence the CSIR's decision to make it globally available to researchers in this field. This research will be utilised in the development of the AwareNet radar technology demonstrator.



Instrument to provide geotechnical knowledge about mines



CSIR researchers are developing an instrument that allows rock mechanics, geologists, surveyors and drill rig operators to obtain significant and critical information on the geotechnical environment of a mine roof (in coal and platinum mines), during the installation of roof support systems. Data are collected and analysed during drilling.

Falls-of-ground remain a significant hazard in South African coal mines. Obtaining appropriate geotechnical data reduces the risk of installing unsuitable support mechanisms that could lead to an increase in the number of fatalities or injuries.

Apart from providing more accurate knowledge about the geotechnical condition of the roof by specifying appropriate support requirements, the instrument will allow drill rig operators to take immediate corrective action, should there be any irregularities in the roof. Corrective action could include providing longer support, increasing bolting density, or reporting to supervisors. While similar work has been carried out in the USA, this project focuses on South African conditions.

Joining forces for cleaner coal

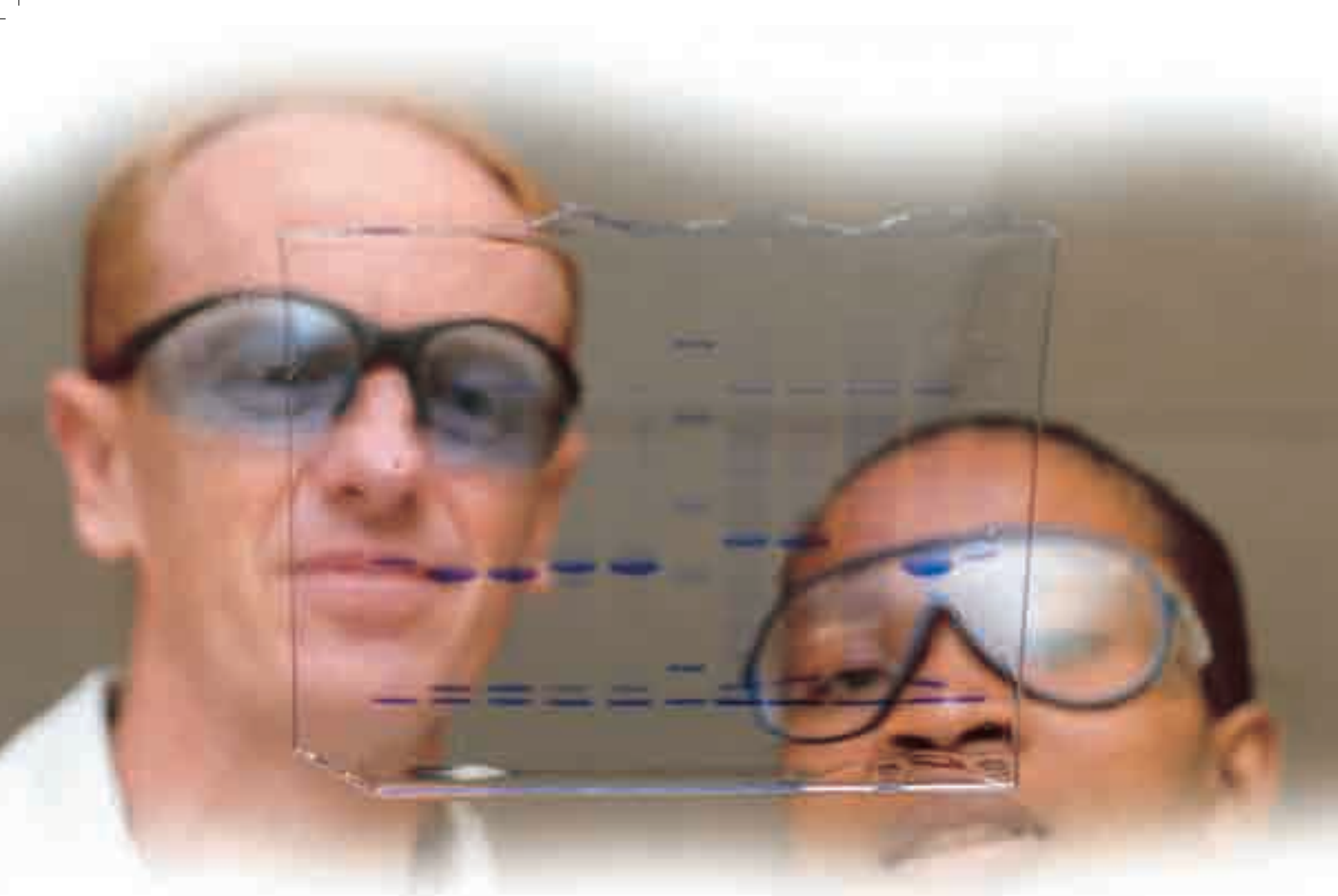
Fluidised bed technology is highly versatile, and has been applied successfully in the fields of combustion/incineration and thermal treatment of minerals.

In the case of fluidised bed combustion (FBC), fuel is burnt within an inert bed of sand or ash. This bed is maintained in a fluidised state by the upward passage of air. The resulting turbulent conditions cause gas-solids mixing, and therefore result in a high combustion efficiency of the fuel

The CSIR and the South African National Energy Research Institute (SANERI) have joined forces to further R&D in the field of clean coal technology.

Nearly 71% of South Africa's primary energy and 88% of electricity are derived from coal. Coal will remain the main energy source for at least the next 75 years. Coal gasification is regarded as the most likely technology to replace conventional coal combustion for power generation in the 21st century. With coal gasification, power station efficiencies can be improved from the current 35% to up to 55%. The emissions of CO₂ into the atmosphere can also be reduced by capture and storage.

The CSIR has more than 20 years' experience in fluidised bed technology and is subsequently developing capability in integrated gasification combined-cycle and fine-coal gasification, including the characterisation of South African coals on reactivity under gasification conditions. This will allow appropriate gasification technologies to be matched to a specific coal. The research is expected to hold considerable benefit for the South African economy.



Engineering bacterial cell surfaces for new applications

Significant intellectual property (IP) is being developed around the exploitation of various applications arising from a novel microbial expression system and future focus will be on extending and exploiting the IP portfolio associated with the system

CSIR researchers are using advances in cell surface engineering to negate the adverse effect of heavy metals – resultant from agricultural and industrial processes – on the environment. Conventional methods are often inadequate to reduce heavy metal concentrations in wastewater to acceptable regulatory standards. Researchers have developed a novel microbial expression system, which exploits the flagella synthesis mechanisms of bacteria. Flagella aid mobility of the bacterium. This technology is based on the development of a strain of the bacteria *Bacillus halodurans* for the surface display of proteins and peptides that act as passenger proteins, attaching itself to the bacterial cell wall. In this way the protein of interest is exposed to the outside of the bacterial wall.

The bacteria demonstrate certain characteristics that provide several advantages over traditional bacterial expression systems and are currently being developed for peptide production. The peptides can chelate the heavy metals and ensure safe disposal thereof. This research is currently supported by Mbuyu Biotech (Pty) Ltd, a CSIR/BioPAD joint initiative. Significant intellectual property (IP) is being developed around the exploitation of various applications arising from this system and future focus will be on extending and exploiting the IP portfolio associated with the system. In addition to bioremediation, this technology has numerous other applications, such as in vaccine delivery systems.

Valuable by-products derived from mine wastewater

The CSIR has signed a contract with Anglo Coal for building a demonstration plant for the recovery of products from waste gypsum, through the patented GypSLiM process. Gypsum is a crystalline mineral of hydrated calcium sulphate. This forms part of Anglo Coal's ongoing efforts to be involved in more ecofriendly operations, focusing primarily on wastewater derived from mining operations. GypSLiM is a CSIR-patented technology focused on the recovery of valuable by-products such as sulphur, limestone and magnesite, from gypsum that is produced during the neutralisation of acid mine water.

Managing waste from mining water treatment processes is a costly exercise. Even at the present 99% water recovery at the Emalahleni Water Reclamation Plant, the waste being produced over the next 20 years will cost R300 million to manage. The GypSLiM process is also set to change the present practice of converting imported sulphur to sulphurous waste in countries such as South Africa, Zambia and the Democratic Republic of Congo, through its ability to extract and recycle sulphur from various effluents. Plans are underway to adopt GypSLiM's principles to capture and convert natural sulphurous pollutants, such as sulphur dioxide generated during the burning of sulphur-rich coal, and gypsum precipitated during the production of phosphoric acid from sulphuric acid and rock phosphate. The GypSLiM technology will be vital in CSIR research involving the conversion of acid mine drainage into drinking water.

Key Structure Holdings is the CSIR's industrial partner in this project.

Project to improve pulpwood value

CSIR researchers have been working on a project aimed at developing new Eucalyptus hybrids to significantly improve the pulpwood value of this forest resource. Project Pulp aims to develop improved wood quality and high pulp yielding Eucalyptus through interspecific hybridisation, thereby adding value to the resource and redressing a strategy that neglected wood quality in favour of tree growth in the past. New species crosses will be made between high density, high pulp-yield species and advanced generation – rapid growth material suited to South African conditions.

The pulp and paper industry (including recycling) is the largest single contributor to the country's GDP – R6,9 billion – and provides employment to some 24 000 people.

Project Pulp is a five-year research partnership between the CSIR and NCT Forestry Co-Operative Ltd, receiving co-funding from the Innovation Fund.



CSIR develops tools for resource-directed water quality management

The CSIR has developed a series of tools for resource-directed management of water quality for the Department of Water Affairs and Forestry (DWAF). The series of guidelines provides policy, strategy and management instruments to facilitate the management of water quality from a water resource perspective.

It is aimed at facilitating the integration of the source, and resource-directed water quality management approaches, in a uniform and structured manner. The guidelines respond to the need for developing appropriate methods of determining levels of stress in water resources from a quality perspective and then to identify what proportion of the water resource could still be allocated for domestic, industrial, agricultural and recreational purposes.

The last volume in the series includes three specific guidelines, the first on catchment visioning; the second on determining water resource stress, resource water quality objectives, and allocatable water quality; and the third on monitoring and auditing.

Volume four will assist DWAF's regional office in making the water quality component of licences operational.



Sweeter-smelling industrial waste

Crude sulphated turpentine (CST) is a waste stream resultant from the pulp and paper industry. CST contains numerous sulphur compounds making it environmentally unfriendly and foul smelling. While there have been scientific attempts to convert CST into a more desirable product, Clive Teubes cc approached the CSIR to develop a cost-effective process for the production of citral (lemon fragrance), citronellol and citronellal, the variation used to scent soaps and give floral tones to detergents.

The organisation has brought this project to pilot scale. By December 2006, the CSIR had produced 1 kg market samples of the main products and key intermediates as well as demonstrating the process. The project is funded by THRIP (the Technology and Human Resources for Industry Programme) and is scheduled for conclusion in June 2007.

CSIR joins EU's aerospace project

In a South African first, the CSIR has joined an aerospace project funded by the European Union. The Environmentally Friendly Aero Engines project, VITAL, is directed at reducing noise and air pollutants from the low pressure components of commercial, high bypass ratio gas turbine engines. The project includes a consortium of companies and tertiary education institutions across Europe and leading European engine manufacturers SNECMA, Volvo, Rolls Royce and MTU.

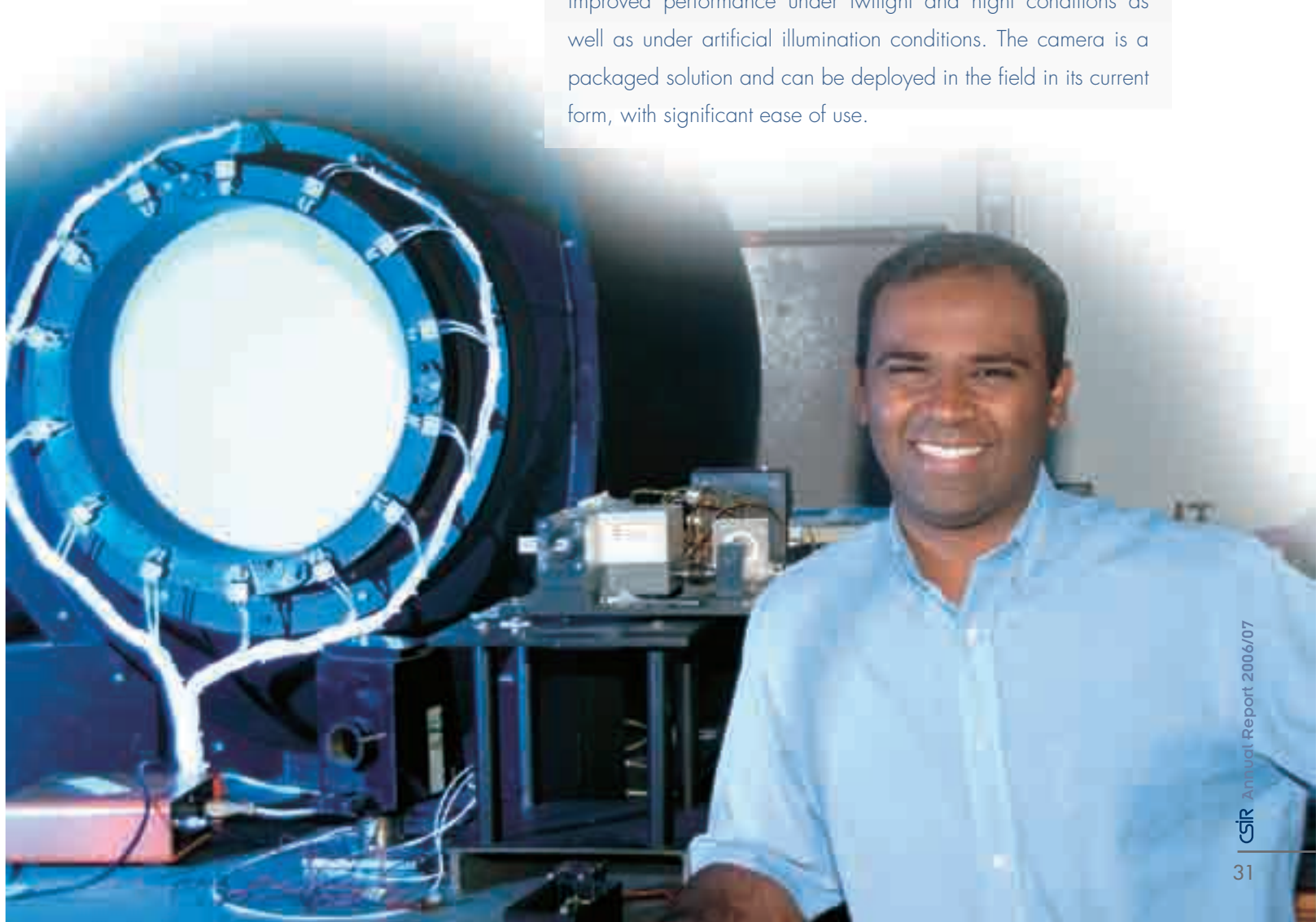
The CSIR is tasked to investigate promising design technologies for reducing secondary flow losses in low pressure turbines where the influence of unsteady flow phenomena can reduce the effectiveness of the complex 3D design features.

This project is the start of future European-funded projects in this area, placing the CSIR firmly on the international aerospace R&D map.

CSIR designs long-range, day and night camera

A significant feature of the Cyclone camera is the single barrel used for both day and night observation

The CSIR has designed a state-of-the-art, long-range day and night camera, dubbed Cyclone. The camera is fully digital, remote controlled and boasts precision zoom. Its observation range is up to 30 km. The development of the camera stems from a tactical requirement of the South African National Defence Force (SANDF) for long-range surveillance for targeting and observation. A significant feature of this camera is the single barrel used for both day and night observation. The upgraded version of this powerful camera, with an effective focal length of 560-1 360 mm, is a replacement of the third generation intensified charged-coupled device with an electron-multiplying charged-coupled device. The benefits of using this technology in the Cyclone camera include improved performance under twilight and night conditions as well as under artificial illumination conditions. The camera is a packaged solution and can be deployed in the field in its current form, with significant ease of use.





Placing passenger transport on the research agenda

The CSIR is providing technical support for the implementation of national transport policy, which states that transport service delivery must shift from a historically supply-driven system to a demand or needs-driven system, in a manner that is responsive to the needs of its users.

The ultimate aim of the CSIR's research programme is to support the design and implementation of customer-centric passenger transport services, while simultaneously ensuring the optimal allocation and utilisation of available resources.

Key aspects include defining the concept of service failure, designing incentive packages to effect certain travel behavioural changes, translating service design and delivery requirements into operational specifications, and investigating the use of service performance as a lever in inter and intra-modal competition.

Research highlights of the past year are the CSIR's inclusion in a team contracted to make recommendations on national transport subsidy policy and participation in a project to formulate a mobility management framework for the Department of Transport. The CSIR also participated in a study for the Development Bank of Southern Africa, which pieced together numerous cross-sectional travel survey data sets to create, for the first time, a time-series profile of changes in the state of passenger transport across all government spheres.



Updated road construction specifications for Ghana

The Ministry of Transportation in Ghana appointed the CSIR and Stewart Scott International in 2005 to review its *Standard Specifications for Road and Bridge Works* used on all construction projects in the country. The project formed part of the World Bank component of Ghana's Road Sector Development Programme. During the following two years, a team of eight specialists in different fields undertook the task of revising and updating the specifications. The country's revised *Standard Specifications for Road and Bridge Works*, a 449-page document, was launched in the capital city, Accra, in April 2007.

A much earlier specification document, dated 1991, had various inadequacies and included a number of outdated and obsolete procedures. As this document specifies the standards to which all road construction projects must adhere and to which contractors must conform, it is a highly significant and legally-binding document. Developments in Ghana since 1991 and more recent experiences indicated that the document did not reflect current best practice in many cases. It was also important to make the document applicable to the different agencies operating within the Ministry.

Areas covered in the updated document include traditional pavement, material and bridge engineering, concrete, road furniture, lighting and traffic signalisation, with a strong emphasis on environmental impact and awareness.

Demonstration of advanced countermeasure system

The CSIR is addressing the threat posed by shoulder-launched surface-to-air infrared (IR) missiles through research into advanced countermeasure systems.

Shoulder-launched surface-to-air IR missiles are deployed in large quantities around the world – including Africa, where South Africa is involved in peacekeeping missions – and delayed by various types of criminal organisations. It has been globally recognised that active IR-directed countermeasures, utilising laser radiation, is an effective means of countering these threats and protecting aircraft.

With funding from the South African Department of Defence and with a European partner, CSIR defence and laser experts have developed a system that successfully demonstrated some of the key 'soft kill' (low power jamming) directed countermeasure technologies during field trials in February 2006, protecting a South African Air Force transport helicopter from an IR missile threat. The demonstration proved that the technology exists within the respective institutes to develop a directed countermeasure system, though there is still room for technology improvements to optimise system performance and reduce physical size and weight.

Selecting the right battery

Research is being conducted into various battery types or chemistries (lead-acid, nickel-cadmium, nickel-metal-hydride, lithium-ion, lithium-polymer and rechargeable alkaline-manganese) to determine the strengths and weaknesses of these portable power sources under various conditions.

The everyday use of electronic equipment continues to grow, and with it the associated reliance on portable power, or batteries. Batteries can be primary (non-rechargeable) or secondary (rechargeable), with the choice determined by the equipment application. CSIR research is focused on understanding high/low power, short/long storage, and low/high temperature applications of batteries. When this is combined with the volume, weight, cost, recharge duration, life cycle, safety and memory effect, it allows for selection guidelines to be generated. These guidelines are being developed and will be used to improve and ensure better usage of current and new battery systems.

Combination HIV/Aids strategy for cheaper antiretrovirals

CSIR researchers are using biocatalysis to decrease the cost of manufacturing generic antiretrovirals. Successful HIV treatment regimens generally comprise a combination of several drugs from different classes. This combination strategy, known as HAART (highly active antiretroviral therapy), minimises the risk of resistance by the virus to any one of the drugs being developed. Cost is one of the factors that contribute to the availability of these drugs. Cheaper antiretroviral compounds allow more people to be treated within a given government budget. The CSIR initiated this project a few years ago to examine mechanisms of reducing the manufacturing costs of generic antiretrovirals by using a biocatalytic step. The biocatalytic step uses two enzymes to convert an inexpensive, relatively-abundant nucleoside into a high-value nucleoside, which is used as an intermediate in antiretroviral production. This work is conducted under the auspices of Arvir Technologies (Pty) Ltd, a private start-up biotechnology enterprise, of which the CSIR and LIFElab share equal partnership.



Successful HIV treatment regimens generally comprise a combination of several drugs from different classes

Fabric membrane developed with new, extra stretch

CSIR researchers have successfully developed a new polytetrafluoroethylene (PTFE) membrane, commonly known as Teflon®, with unique applications in the manufacture of breathable fabrics.

Membranes for the production of breathable fabrics are produced by only a few international companies, none of them in South Africa. While technology for the lamination of breathable membranes has existed locally for a number of years, there has been a need for import replacement and development of novel membranes.

Through a national Innovation Fund project, CSIR specialists in Port Elizabeth developed PTFE with extraordinary stretch properties of up to 50 times its original length. This feature makes it ideally suited for the manufacture of microporous membranes. The pilot-scale PTFE extruder, die and calendering system were found to perform satisfactorily in producing PTFE tape ready for further stretching into a biaxially-stretched microporous membrane.

The new development also lends itself to business opportunities for SMEs to commercially produce PTFE rods, sealing products, seam sealing tape and similar products.

Measuring diagnostic radiology

The CSIR initiated a project to establish traceability for diagnostic radiology to hospitals. The purpose of the project is to establish a national measurement standard (NMS) for diagnostic radiology, which entails:

- Realisation and dissemination of the unit of air kerma for x-rays (7,5 kV to 300 kV) and the fundamentals of dosimetry for diagnostic radiology
- Calibration of electrometers and voltmeters used for charge measurements
- Installation of a new rhodium tube for mammography calibrations
- Calibration and type testing of dosimetric instruments used for non-invasive measurements of x-ray tube voltage (kVp meters) in diagnostic radiology.

The International Atomic Energy Agency (IAEA) provided the equipment and fellowship training. Procedures based on the IAEA working document for diagnostic radiology have been written and work is underway to implement these.

The purpose of the project is to establish a national measurement standard (NMS) for diagnostic radiology

Seeking modern scientific advancements from indigenous knowledge

A CSIR bioprospecting team is developing 15 leads for therapeutic use in areas that include mosquito repellency, asthma and allergies, arthritis, anti-inflammatory, wound healing, benign prostatic hyperplasia, malaria, HIV, cancer and erectile dysfunction/libido. South Africa boasts a wealth of plant biodiversity with more than 24 000 indigenous plants, including a tradition of using plants for medicinal purposes. The CSIR investigates the combination of science with indigenous knowledge systems.

Three herbal remedies based on the traditional use of plants for the treatment of HIV-infected patients – for which the dosage forms have been manufactured in the clinical supplies unit in compliance with good manufacturing practices – have shown significant antiviral activity with limited toxicity in an HIV cytoprotection assay conducted in the United States and in South Africa. The development of these herbal treatments is entering the pre-clinical development phase. This group has captured more than 250 claims for cures based on medicinal plants and completed desktop and literature studies on at least 50% of these to determine what research is already in the public domain, establishing the therapeutic area and identifying possible biological assays. At least 72 claims for cures have been identified for which the therapeutic concepts have now been established.

Implementation

Implementation is the transfer and transformation of new knowledge, which has been gained through R&D, into a new or improved product introduced on the market, a new or improved operational process used in industry and commerce, or a new approach to a social service. It is the final stage of the research and innovation process, incorporating a series of scientific, technological, organisational, financial and commercial activities.

Trackless mobile equipment in mines reviewed for safety

The CSIR has compiled documentation detailing risks attributed to the design, operation and environmental conditions under which trackless mobile equipment operates in coal, base mineral and platinum mines. The documents also contain risk management strategies to ensure a safe, healthy and productive work environment, as well as practical and scientifically-based guidance to support decision-making regarding ergonomics design requirements.

Safety statistics for the mining industry suggest that besides rock-related incidents, mining equipment accounts for the largest proportion of occupational fatalities, injuries and health ailments. It is generally accepted that the application of sound ergonomics principles in the design of the human-machine interface will minimise design-induced human error, and also eliminate significant occupational health and safety (OHS) risks.

In the case of trackless mobile equipment, the ergosystem consists of three primary interacting components, namely the human operator, the mobile equipment (technology) and the physical environment. This human-technology-workspace environment model is useful in identifying factors that affect task performance, safety and health. Applied consistently, the model will ensure that no potential OHS risk factors are omitted.

CSIR secures top award for portable landing light system

A CSIR-developed portable landing light received an award at the International Soldier Technology 2006 Forum in the category *Best Operational Assessment for new Equipment* (one of six categories). The equipment was designed and developed for peace-keeping forces that have to go into areas by air at night or in poor light. The lights are unique in that they are remote controlled. The system consists of 12 lights, each fitted with a transmitter/receiver with a remote control effective up to 600 m. During the development of the system, the soldiers' needs were assessed, evaluated and met in three phases through incremental upgrades. The system has been evaluated, declared effective, produced and used by the South African National Defence Force. The primary users have ordered the system and numerous other potential users have expressed interest.

Geospatial technologies bring public domain benefits

The harnessing of geospatial technologies for disaster warnings and disaster management has allowed the CSIR to achieve beneficial outcomes in the public domain. The public broadcaster, the South African Broadcasting Corporation (SABC), screened a fire map of active fires from the Advanced Fire Information System (AFIS) for almost a year, displayed once a week after the evening news cast on two channels.

The SABC is the first public broadcaster in the world to screen fire maps. AFIS is a joint project between the CSIR, Eskom and the government. A new technology demonstrator was developed in the year under review that allows people to access satellite information on severe storms through their cell phones. Developed by the Space Science and Engineering group of the University of Wisconsin-Madison, the technology demonstrator was customised by the CSIR for local conditions to provide near real-time information on clouds, rainfall, wind and fires.

In the international arena, geospatial experts have forged international relationships in geo-informatics through the Sensor Web Alliance. The CSIR plays a lead role in the Group on Earth Observations Sensor Web Enablement Task Team.



CSIR ruggedised battery design submitted for production tender

The CSIR has successfully designed a cost-effective lithium-ion secondary military battery system. This 'intelligent' battery is a result of intense research of all types of batteries, with lithium-ion technology chosen based on the current South African National Defence Force (SANDF) value system. In contrast with current batteries in use, the new lithium-ion secondary battery is rechargeable, comparable to a laptop or a cell phone. It is also very light to carry and hence increases the mobility of today's soldier. The model has been demonstrated to the military and could potentially result in significant savings for the SANDF. Tests have shown that this high capacity battery could last three times longer than the battery presently used and it can be used in extreme temperatures. Currently, batteries are disposed of once their energy is depleted; the new battery is completely rechargeable.

Support for National Spatial Development Perspective

The project is part of government's effort to strengthen the integrated development planning process and promote shared analysis and planning between the three spheres of government

The Presidency has launched a national pilot project to contextualise and apply the National Spatial Development Perspective (NSDP) within districts and metros. The project is part of government's effort to strengthen the integrated development planning process and promote shared analysis and planning between the three spheres of government. The CSIR manages the project on behalf of The Presidency and its key partners and provides technical guidance in the development of planning technologies to support the project.

A geospatial analysis platform developed by the CSIR and updated as part of this project, provides a crucial contribution towards enabling a comparative analysis of the development potential and challenges in the various district and metropolitan areas.

Lessons generated through the first phase of implementation will be utilised to identify key issues, inform strategic planning processes and instruments in government, and create a platform for the implementation of the framework in all district and metropolitan municipalities by 2008/09.



Sensor technology successes continue

Korea became the first international recipient of a joint development by the CSIR and Eskom, the multi-spectral imaging system (MultiCAM). The Korea Electric Power Research Institute (KEPRI), part of the South Korean electricity utility, is the first international customer to take delivery of a MultiCAM unit. KEPRI will use the MultiCAM as part of its research programmes into high-voltage electricity transmission systems.

The MultiCAM model is a combination of the CoroCAM 504 daylight UV/Corona detection and visualisation system with the addition of an on-board infrared (IR) detection channel. For the first time ever, a single instrument can detect and visualise UV discharges as well as IR thermal gradients, giving the user a comprehensive picture of the state of high-voltage installations.

The MultiCAM system already boasts several awards as the most innovative research project and it is expected that market acceptance of the product will meet with the same success as its sister product, the CoroCAM 504, which is sold in more than 22 countries across five continents.

Range of international satellite players calls on CSIR support

A dedicated team of tracking, telemetry and command specialists made possible the successful support of several satellite launches for a range of international clients over the past year, despite technically-complicated conditions.

The CSIR team supported the launch of the NROL-21 satellite on a Delta II rocket by Boeing Launch Services, as well as the separation of the satellite from the launch vehicle. Critical orbit calculations for the French space agency, CNES, ensured the correct injection of a Russian Cosmos 3M booster carrying the German SAR-Lupe satellite into orbit. Support for the launch and early-orbit phase of a new Russian carrier rocket Soyuz 2-1B with a French satellite COROT on-board was backed by routine support.

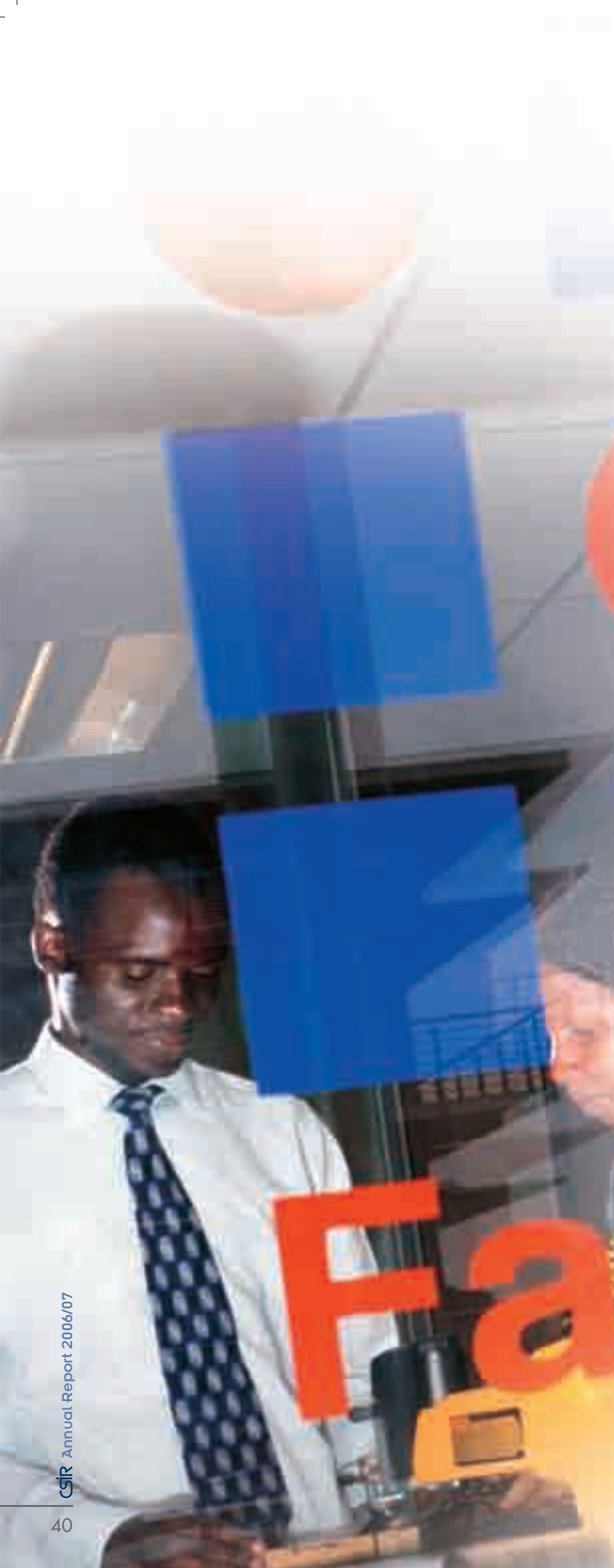
The Koreasat5 satellite, launched by a Zenit-3SL vehicle, was supported to geosynchronous transfer orbit. The team acquired the first signal from PanAmSat's Galaxy 16 communications satellite after spacecraft separation, following its successful launch to geosynchronous transfer orbit by Sea Launch. Five THEMIS science satellites lifted by a Delta II rocket were successfully tracked, despite being untraceable initially.

CSIR helps put SPOT 5 imagery to good use in South Africa

A new multi-government licence agreement negotiated by the CSIR is giving South Africa's government departments, research institutions and academia three years of direct, open access to detailed information from the SPOT (Satellite Pour l'Observation de la Terre) constellation of five earth observation satellites. The agreement with Spot Image runs until March 2009 and allows data to be received directly from these satellites.

Through this access, the CSIR is able to create South Africa's first national 2,5 m natural-colour seamless mosaic dataset. The direct open access to high-resolution SPOT data allows many images to be produced, as well as good turnaround times from the acquisition of data to its availability to end users. Applications include spatial analysis of land use, particularly informal settlements; monitoring of crops and yields to assess levels of food security; and alignment of land-use classes with geographically-coded crime data to illustrate spatially the relationship between crime incidents and changes in the environment.





South African FabLabs expanding fast

The inauguration of the fourth South African FabLab, this one situated in Bloemfontein, provided impetus to the objective of the DST of providing SET platforms for social development, while benefiting private sector competitiveness and growth.

The Fablab is a 'technology for the community' concept initiated by the Massachusetts Institute for Technology (MIT). FabLabs bring advanced manufacturing technology platforms to ordinary people and empower them by providing opportunities to participate in an environment that enables the freedom to experiment, with the added benefit of peer-to-peer learning. The platforms also provide the means to stimulate creativity and innovative problem solving, thus fostering techno-preneurship.

The Advanced Manufacturing Technology Strategy (AMTS) implementation unit, in partnership with MIT, established the first FabLab in South Africa in June 2005. Other FabLabs already operational in the country are situated at the Innovation Hub in Pretoria, Soshanguve near Pretoria and in Cape Town, with further labs to be launched in North-West, Mpumalanga, Limpopo and the Northern Cape. The aim is to eventually have at least one FabLab per province.



National foundry network to boost competitiveness

A National Foundry Technology Network (NFTN) to improve the global competitiveness of South African foundries has been established under the leadership of the CSIR. This milestone brings to fruition an initiative started some three years ago and which has since evolved into a national government priority.

Hosted by the CSIR, the NFTN serves as a gateway for the South African foundry industry to become globally competitive, enabled through technology transfer and the diffusion of state-of-the-art technologies.

Objectives of the network include skills development through practical and theoretical training to ensure a flow of skilled trainees entering the industry, promoting and developing SMEs in the foundry industry to ensure their economic sustainability, and technology empowerment of previously disadvantaged individuals to ensure the availability of technical foundry support. The network will also conduct R&D aimed at developing new technologies and solutions that can be transferred to industry.

High-temperature black body for pyrometry

The CSIR installed a Thermogauge high-temperature black body (smelter/oven) operating from 500 to 3 000 °C with the purpose to significantly reduce the uncertainties of high-temperature pyrometry.

This will allow the CSIR to participate in the relevant international comparisons and to meet industrial requirements.

The black body was already commissioned up to a temperature of 1 600 °C. It is highly stable and uniform and will eventually increase the previous high-temperature upper limit from 1 550 to 3 000 °C. A newly-purchased primary standard radiation thermometer will enable the commissioning and implementation of the black body over the full temperature range.

**Pyrometry
is the
measurement
of high
temperatures**



Platforms for collaboration

Laser specialists from developing countries meet European counterparts

In a European Union (EU) project aimed at linking laser specialists from the developing world with their European counterparts, the CSIR coordinates the participation of developing nations, including India, China and Brazil. The ultimate aim is to establish new international teams of excellence in the field of laser-based applications.

In Project EUDEVILAS, a database of competences and research areas is established. European researchers gain exposure to the production problems and new research approaches facing their counterparts in emerging markets. On the other hand, EUDEVILAS gives researchers from emerging markets access to radically different, high-power, high-beam quality laser sources. Combining these facets, the project has the potential to stimulate research and innovation in laser applications, thereby radically changing the face of future manufacturing, as laser technology is a leading tool in this regard.

The two-year project commenced in October 2006 and was awarded under the auspices of the EU Sixth Framework Programme. The Laser Zentrum Hannover, a leading laser centre in Germany, represents EU interests in this project.

Research in high performance computing centred in Cape Town

The CSIR implements significant DST-funded cyberinfrastructure projects as enablers of world-class research in the country and on the sub-continent. The organisation has been responsible for establishing a state-of-the-art facility for the DST-funded high performance computing capability in Cape Town. The Centre for High Performance Computing (CHPC) promises to be a success story of research infrastructure, which places South Africa at the forefront of ICT developments.

It is also committed to foster a critical mass of human resources in partnership with local and global commercial sectors to create further employment opportunities. Three eminent flagship projects in collaboration with tertiary education institutions focus on long-term African climate-ocean weather prediction, space weather prediction and simulations towards designing energy-saving batteries.

The contract for the South African National Research Network, a large-scale cyberinfrastructure intervention initiative for South Africa, has also been signed, and work will commence in the new financial year.

Other national initiatives include the national human language technologies network (NHN) run by the CSIR and the biomedical informatics Intel-donated supercomputer hosted by the CSIR for internal and external users.

Furthering collaboration between EC and South Africa

The CSIR, as a participant in the European South Africa Science and Technology Advancement Programme (ESASTAP), contributes significant experience in working within project consortia, understanding the needs of scientists and S&T institutions, operational aspects and challenges, as well as financial management of framework programmes. The aim of ESASTAP is to enhance the support and assistance available to South African and European researchers through enhanced networking and partnering.

The project seeks to achieve the following:

- Raise awareness about the European Commission (EC) Framework funding programme
- Identify opportunities for South African partners
- Explain modalities of the EC programme
- Foster partnerships with European organisations.



Corporate governance

GOVERNANCE PRINCIPLES

Framework

Corporate governance is formally concerned with the organisational arrangements that have been put in place to provide an appropriate set of checks and balances within which the stewards of the organisation operate. The objective is to ensure that those to whom the stakeholders entrust the direction and success of the organisation, act in the best interest of these stakeholders. It is about leadership with integrity, responsibility and transparency.

The CSIR is committed to principles and practices that will provide our stakeholders with the assurance that the organisation is managed soundly and ethically. We have established a management model that governs and provides guidance for the way that all employees – not only the leaders – interact with our various stakeholder groups.

The underpinning principles of the Group's corporate governance rest on the three cornerstones of an effective and efficient organisation, namely day-to-day management processes, a long-term strategic planning process and effective change processes. These processes are supported by systems that are used to plan, execute, monitor and control the strategic and operational domains of the organisation. The supporting infrastructure and its evolution are documented in our management model, which is reviewed and updated regularly.

The CSIR Board and the CSIR Executive Board believe that the organisation has applied and complied with the principles incorporated in the Code of Corporate Practices and Conduct, as set out in the King II Report.

Financial statements

The CSIR Board and the CSIR Executive Board confirm that they are responsible for preparing financial statements that fairly present the state of affairs of the Group as at the end of the financial year and the results and cash flows for that period. The financial statements are prepared in accordance with South African Statements of Generally Accepted Accounting Practice. In addition, the CSIR Board is satisfied that adequate accounting records have been maintained.

The external auditor is the Auditor-General, who is responsible for independently auditing and reporting on whether the financial statements are fairly presented in conformity with International Standards of Auditing. The Auditor-General's terms of reference do not allow for any non-audit work to be performed.

Risk management

In the case of risk management, the CSIR Board is accountable for the process of risk management and the systems of internal control. These are reviewed regularly for effectiveness. Appropriate risk and control policies are established and communicated throughout the organisation. The CSIR Board retains control through the final review of key risk matters affecting the organisation.



Risk management in the CSIR is an ongoing process, focused on identifying, assessing, managing and monitoring all known forms of significant risks across all operating units and Group companies. This was in place for the year under review and up to the date of approval of the annual report and financial statements.

A structured process of risk management has been put in place to ensure that the growth and development of human capital, strengthening of the SET base, operational excellence and financial sustainability will be achieved over time.

CSIR systems have been put in place to review aspects of economy, efficiency and effectiveness. Management is involved in a continuous process of improving procedures to ensure effective mechanisms for identifying, managing and monitoring risks in the following major broad risk management areas: research; business; financial internal control and operational; fraud; physical; and environment, health and safety risk management.

Documented and tested processes are in place, which will allow the CSIR to continue its critical business process in the event of a disastrous incident impacting on its activities.

Research risk management

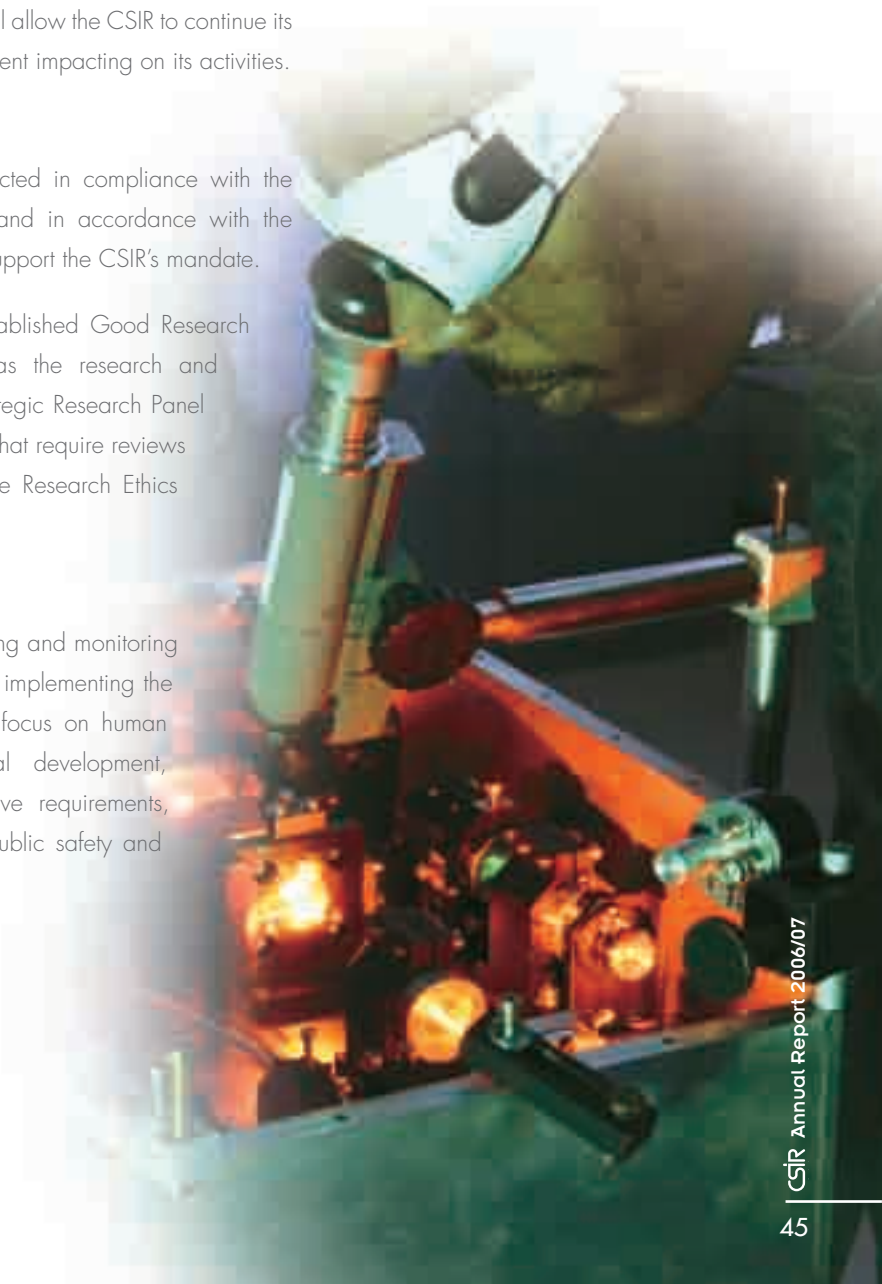
The Group recognises that research has to be conducted in compliance with the existing legal framework, aligned to CSIR strategies and in accordance with the standards and practices that would ensure outputs that support the CSIR's mandate.

To mitigate research-related risks, the CSIR has an established Good Research Guide and institutional governance structures such as the research and development (R&D) core management function, the Strategic Research Panel and the Research Advisory Panels. In addition, projects that require reviews from a research ethics perspective are submitted to the Research Ethics Committee of the University of Pretoria.

Business risk management

To ensure effective mechanisms are in place for identifying and monitoring risks that impact on the CSIR Group, the procedures for implementing the Group's business risk management process include a focus on human capital assessment and development, technological development, operations, contracting, Parliamentary Grant, legislative requirements, professional liability, occupational health and safety, public safety and security, natural disasters and general operating risks.

**The CSIR
is committed to
principles and
practices that
will provide our
stakeholders with
the assurance that
the organisation
is managed soundly
and ethically**



Fraud risk management

The objective is to manage the fraud risk and to raise the level of fraud awareness amongst the CSIR's internal and external stakeholders. The CSIR's fraud prevention plan intends to reduce the risk of fraud and provide contingency plans that will protect the interests of the organisation. The proactive approach consists of the responsibility, prevention, detection, reporting, communication and reaction to fraud.

Safety, occupational health and environment management

The CSIR is committed to the promotion of environment, health and safety principles and practices to create a safe and healthy environment for all and to meet the requirements of all relevant environments and health and safety legislation as a minimum standard. This commitment is depicted in two ways: in the manner it serves business as a supplier of environmental management-related products, and in the way it demonstrates sound environmental performance at all CSIR sites.

Operating risk management

The CSIR endeavours to minimise operating risk by ensuring that the appropriate infrastructure, controls, systems and people are in place throughout the Group. Key practices employed in managing operating risk include segregation of duties, transaction approval frameworks, financial and management reporting and monitoring of metrics, which are designed to highlight positive or negative performance across a broad range of key performance areas (KPA's). The Operations Committee, which comprises members of the executive, operating unit/centre executive directors and group managers, oversees all operational matters.

Financial risk management

Financial risks are managed within predetermined procedures and constraints as identified and detailed in the various policies and the setting of annual goals and objectives. Compliance is measured through regular reporting against the business goals, internal audit checks and external audit verification.

Going concern

The CSIR Board has reviewed the Group's financial budgets for the period 1 April 2007 to 31 March 2008 and is satisfied that adequate resources exist to continue business for the foreseeable future. The CSIR Board confirms that there is no reason to believe the business will not be a going concern in the year ahead.

Approval framework

The CSIR Board has adopted an approval framework that governs the authorisation processes in the CSIR. It deals with, among others, the construction of strategic plans, development of operational plans and budgets, appointment of staff, approval of salaries and acquisition and disposal of assets. It also defines authority levels in relation to organisational positions.

Appropriate controls are in place to ensure compliance with the above framework. A comprehensive set of procedures exists to provide the necessary checks and balances for the economical, efficient and effective use of resources. The essence of this framework is that it is comprehensive, clear and unambiguous, and easy to assimilate and internalise.

Each Group company's board of directors has adopted an approval framework, which mirrors that of the CSIR. All Group companies are under the control of the CSIR Board and CSIR Executive Board.

Internal control

The CSIR Board has ultimate responsibility for the system of internal controls. The key controls required to ensure the integrity and reliability of financial statements have been identified in conjunction with the internal and external auditors. Close cooperation between the internal and external auditors ensures adequate and efficient audit reviews of the proper functioning of these key controls.

The annual audit plan is based on the key financial risks to the organisation. The work programme that gives effect to the plan is reviewed by the Audit Committee at its February meeting and ratified or modified as required.

Employee participation

The CSIR strongly encourages effective and modern workplace practices and relationships to foster employee participation and work process involvement as a key practice at all levels in the organisation. Employee participation happens, for example, through self-directed teams, formal induction programmes, technical and strategic focus groups and task teams.

Charter of ethics and organisational values

The CSIR Board and CSIR Executive Board have approved and adopted a Charter of Ethics, which reflects its commitment to a policy of fair dealing and integrity in conducting its operations. The Charter, which incorporates the CSIR's Code of Conduct and links closely to its set of values, requires all employees to maintain the highest ethical standards, ensuring that business practices are conducted in a manner which, in all reasonable circumstances, is beyond reproach. Monitoring ethical behaviour is devolved to unit level and transgressions are addressed by means of procedures detailed in the CSIR's Conditions of Service and the Public Finance Management Act (PFMA), Act 1 of 1999, as amended by Act 29 of 1999.

The Board is satisfied that there has been compliance with the Charter of Ethics.

The CSIR endeavours to minimise operating risk by ensuring that the appropriate infrastructure, controls, systems and people are in place throughout the Group



Governance structure

CSIR Board

The responsibilities of the Board are governed by the Scientific Research Council Act (Act 46 of 1988, as amended by Act 71 of 1990).

The Board approves the strategy, goals, operating policies and priorities for the organisation and monitors compliance with policies and achievement against objectives.

With the exception of the President of the CSIR, all the members of the CSIR Board are non-executive. CSIR Board members are actively involved in and bring independent judgement to bear on Board deliberations and decisions.

The CSIR Board, whose current number of members adheres to the statutory minimum requirements, meets quarterly. For the year under review, the Board met on 27 June 2006, 21 September 2006, 15 November 2006 and 21 February 2007. The annual financial statements for the 2006/07 financial year were approved on 21 June 2007.

The CSIR Board has the following sub-committees: the Human Resources and Remuneration Committee, the Audit and Risk Committee and the Strategic Review Committee (see page 51). These committees are selected according to the skills sets required for the committees to fulfil their functions. For the 2006/07 year, the committees complied with their respective terms of reference.

Schedule of attendance at CSIR Board and CSIR Board Committee meetings

Board Member	Board Meetings (4)	Audit and Risk Committee (2)	Human Resources and Remuneration Committee (2)	Strategic Review Committee (2)
Ms Nobusi Shikwane	4	2	2	–
Professor Cheryl de la Rey	3	–	2	2
Dr Nomsa Dlamini	1	–	2	–
Dr Nhlanhla Msomi	3	–	2	2
Dr Francis Petersen	4	2	–	1
Professor Mike Wingfield	3	–	–	2
Mr Ebie Mayet*	3	1	–	1
Dr Sibusiso Sibisi	4	2	2	2
Professor Denis Hall*	1	–	–	–
Professor Brenda Gourley*	1	–	–	–

* Appointed on 18 August 2006

Executive management board

The Executive Management Board has executive responsibility for the CSIR and consists of the Chief Executive Officer (CEO) (Dr Sibusiso Sibisi); two Group Executive members: Operations (Dr Hoffie Maree) and R&D Outcomes and Strategic Human Capital Development (Khungeka Njobe); Interim Chief Financial Officer (Chris Sturdy) and Interim Director: Services (Raynold Zondo).

CSIR leadership team

The CEO of the CSIR is the President. The CSIR Management is responsible for strategy implementation and managing the day-to-day affairs of the CSIR and its operating units in accordance with the policies and objectives approved by the CSIR Board. This Leadership Team comprises the members of the CSIR Executive Board, Group/Portfolio Managers, and Operating Unit and Centre Executive Directors.

Other internal structures that contribute to governance at the CSIR include the Operations and Service Committees, the Strategic Research and Contract R&D Forums, and the Research Advisory Panels.

Board of directors of group companies

The CSIR Executive has control over the boards of the various group companies.

Board and executive management remuneration

Details of the CSIR Board are set out on page 50 of the Corporate Governance Report. The membership and terms of reference of each Board Committee are further described on page 51 of the Corporate Governance Report.

Remuneration to Board Members and the Executive Management is set out in Note 19 to the annual financial statements.

General

The CSIR acknowledges that systems of corporate governance should be reviewed continuously to ensure that these are sound and consistent with world-class standards relevant to the operations of the group and the evolution thereof.

We shall continue to comply with all major recommendations of the Code of Corporate Practices and Conduct as set out in the King II Report on Corporate Governance.

Public Finance Management Act

The Public Finance Management Act (PFMA), Act 1 of 1999, as amended by Act 29 of 1999, came into effect on 1 April 2000 and has had an impact on governance matters in terms of the regulation of financial management in the public sector. The Group complies, in all material aspects, with the Act.

Materiality framework

The materiality framework for reporting losses through criminal conduct and irregular, fruitless and wasteful expenditure, as well as for significant transactions envisaged per section 54(2) of the PFMA, has been finalised and incorporated into the shareholder's compact. No significant losses through criminal conduct and irregular, fruitless and wasteful expenditure were identified as having been incurred during the year.

The CSIR acknowledges that systems of corporate governance should be reviewed continuously to ensure that these are sound and consistent with world-class standards relevant to the operations of the group and the evolution thereof

CSIR Board Members



Ms Nobusi Shikwane
(Chairperson)
Chief Executive Officer
Tshenolitha Business Services



Mr Ebie Mayet
Financial Executive
arivia.com



Professor Cheryl de la Rey
Deputy Vice-Chancellor
(Research and Innovation)
University of Cape Town



Dr Nhlanhla Msomi
Chief Executive Officer
Africa Vukani Investment Ventures



Dr Nomsa Dlamini
Managing Director
Masifundisane Training and
Development Projects



Dr Francis Petersen
Head: Strategy
Anglo Platinum Corporation



Professor Brenda Gourley
Vice-Chancellor
The Open University



Professor Mike Wingfield
Director
Forestry and Agricultural
Biotechnology Institute,
University of Pretoria



Professor Denis Hall
Deputy Principal (Research)
Heriot Watt University



Dr Sibusiso Sibisi
Chief Executive Officer
and President
CSIR

CSIR Board Committees

Audit and Risk Committee

Chairperson: Mr Ebie Mayet

Members: Ms Nobusi Shikwane, Dr Francis Petersen, Dr Sibusiso Sibisi

Meetings: 7 June 2006, 7 February 2007

Purpose: Deals with all matters prescribed by the regulations issued in terms of the PFMA, Act 1 of 1999, as amended by Act 29 of 1999. Controls the final reviews of the key risk matters affecting the organisation. Agrees on the scope and reviews the annual external audit plan and the work of the CSIR internal auditors. Acts in an unfettered way to understand the dynamics and performance of the organisation with no artificial boundaries created by protocol. The Audit and Risk Committee has adopted formal terms of reference and is satisfied that it has complied with its responsibilities as set out in the terms of reference.

Human Resources and Remuneration Committee

Chairperson: Ms Nobusi Shikwane

Members: Dr Nhlanhla Msomi, Dr Nomsa Dlamini, Professor Cheryl de la Rey, Dr Sibusiso Sibisi

Meetings: 6 June 2006, 21 September 2006

Purpose: Provides the vehicle for the CSIR Board to influence and control human resources and remuneration in the organisation. Determines human resources policy and strategy. Approves remuneration changes and bonus payments. In addition, it reviews the remuneration and expenses of Executive Management.

Strategic Review Committee

Chairperson: Professor Cheryl de la Rey

Members: Dr Francis Petersen, Professor Mike Wingfield, Dr Nhlanhla Msomi, Dr Sibusiso Sibisi

Meetings: 6 June 2006, 11 October 2006

Purpose: Provides guidance and advice on the long-term trajectory and composition of the CSIR's science and technology portfolio in the context of the needs of the country. Ensures that key innovation and research processes are conducted effectively and benchmarked against international best practice, and that research outputs, organisational climate and credibility remain congruent with the role and objectives of the institution.



CSIR
Our Future Through Science

Report of the Audit Committee

REPORT OF THE AUDIT COMMITTEE REQUIRED BY TREASURY REGULATIONS 27.1.7 AND 27.1.10 (B AND C) OF THE PUBLIC FINANCE MANAGEMENT ACT, ACT I OF 1999, AS AMENDED BY ACT 29 OF 1999

The Audit Committee reports that it has adopted formal terms of reference as its Audit Committee Charter and that it has discharged all of its responsibilities for the year, in compliance with the charter.

The Audit Committee is satisfied that an adequate system of internal control is in place to reduce significant risks faced by the organisation to an acceptable level, and that these controls have been effective during the period under review. The system is designed to manage, rather than eliminate, the risk of failure and to maximise opportunities to achieve business objectives. This can provide only reasonable but not absolute assurance.

The Audit Committee has evaluated the Annual Financial Statements of the CSIR group for the year ended 31 March 2007 and based on the information provided to the Audit Committee considers that it complies, in all material respects with the requirements of the various Acts governing disclosure and reporting on the Annual Financial Statements. The Audit Committee therefore recommends the adoption of the Annual Financial Statements by the Board of the CSIR.



Ebrahim Hassen Mayet

Chairperson

10 August 2007

Report of the Auditor-General

REPORT OF THE AUDITOR-GENERAL TO PARLIAMENT ON THE GROUP FINANCIAL STATEMENTS AND PERFORMANCE INFORMATION OF THE COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH (CSIR) FOR THE YEAR ENDED 31 MARCH 2007

REPORT ON THE FINANCIAL STATEMENTS

Introduction

1. I have audited the accompanying group financial statements of the CSIR which comprise the consolidated and separate balance sheet as at 31 March 2007, consolidated and separate income statement, consolidated and separate statement of changes in equity and consolidated and separate cash flow statement for the year then ended, and a summary of significant accounting policies and other explanatory notes, as set out on pages 92 to 125.

Responsibility of the accounting authority for the financial statements

2. The accounting authority is responsible for the preparation and fair presentation of these financial statements in accordance with the South African Statements of Generally Accepted Accounting Practice and in the manner required by the Public Finance Management Act, 1999 (Act No. 1 of 1999) (PFMA) and section 14(1) of the Scientific Research Council Act (Act No. 46 of 1988) as amended by Act No. 71 of 1990. This responsibility includes:
 - designing, implementing and maintaining internal controls relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error
 - selecting and applying appropriate accounting policies
 - making accounting estimates that are reasonable in the circumstances.

Responsibility of the Auditor-General

3. As required by section 188 of the Constitution of the Republic of South Africa, 1996 read with section 4 of the Public Audit Act, 2004 (Act No. 25 of 2004), my responsibility is to express an opinion on these financial statements based on my audit.
4. I conducted my audit in accordance with the International Standards on Auditing and *General Notice 646 of 2007*, issued in *Government Gazette No. 29919 of 25 May 2007* and *General Notice 647 of 2007*, issued in *Government Gazette No. 29919 of 25 May 2007*. Those standards require that I comply with ethical requirements and plan and perform the audit to obtain reasonable assurance whether the financial statements are free from material misstatement.
5. An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal controls relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal controls.

6. An audit also includes evaluating the:
 - appropriateness of accounting policies used
 - reasonableness of accounting estimates made by management
 - overall presentation of the financial statements.
7. I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my audit opinion.

Basis of accounting

8. The public entity's policy is to prepare financial statements in accordance with South African Statements of Generally Accepted Accounting Practice and in the manner required by the PFMA, as set out in note 1 to the financial statements.

Opinion

9. In my opinion the financial statements present fairly, in all material respects, the financial position of the CSIR and group as at 31 March 2007 and its financial performance and cash flows for the year then ended, in accordance with South African Statements of Generally Accepted Accounting Practice and in the manner required by the PFMA.

OTHER REPORTING RESPONSIBILITIES

Reporting on performance information

10. I have audited the performance information as set out on pages 88 to 91.

Responsibilities of the accounting authority

11. The accounting authority has additional responsibilities as required by section 55(2)(a) of the PFMA to ensure that the annual report and audited financial statements fairly present the performance against predetermined objectives of the public entity.

Responsibility of the Auditor-General

12. I conducted my engagement in accordance with section 13 of the Public Audit Act, 2004 (Act No. 25 of 2004) read with *General Notice 646 of 2007*, issued in *Government Gazette No. 29919 of 25 May 2007*.
13. In terms of the foregoing my engagement included performing procedures of an audit nature to obtain sufficient appropriate evidence about the performance information and related systems, processes and procedures. The procedures selected depend on the auditor's judgement.
14. I believe that the evidence I have obtained is sufficient and appropriate to provide a basis for the audit conclusions.

Audit findings

15. I have not observed any matter that requires inclusion in my report.

APPRECIATION

16. The assistance rendered by the staff of the CSIR during the audit is sincerely appreciated.



P Bhana for Auditor-General

Pretoria

31 July 2007



Executive report

Introduction

On behalf of the CSIR Board, we have pleasure in submitting to Parliament, through the Minister of Science and Technology, this report and the audited annual financial statements of the CSIR Group for the year ended 31 March 2007.

In the opinion of the CSIR Board, which fulfils the role of directors as envisaged by the Companies Act, Act 61 of 1973, the financial statements fairly reflect the financial position of the CSIR Group as at 31 March 2007 and the results of its operations for the year then ended.

Our statutory basis

As a statutory research council established by government, the CSIR is governed by the Scientific Research Council Act (Act 46 of 1988, as amended by Act 71 of 1990). The organisation is listed as a Public Business Enterprise in terms of the PFMA, Act 1 of 1999, as amended by Act 29 of 1999.

Aligned with the National R&D Strategy

The CSIR's research agenda continues to be shaped to a greater degree through strategic technology development programmes established under the auspices of the National R&D Strategy and other key government strategies.

While the intent of the National R&D Strategy is to achieve significant overall increases in the quantity of R&D funded and performed in South Africa, the national shortage of highly qualified scientific and engineering postgraduates remains a cause for concern. Over the past year, increasing competition was experienced for talented individuals. Lack of resources could compromise achievement of the desired national increase in research efforts. Contributing to national human capital development at postgraduate level therefore remains a critical priority that is factored into the CSIR's planning.

Our mandate

The CSIR's mandate is as stipulated in the Scientific Research Council Act, section 3: Objects of the CSIR:

"The objects of the CSIR are, through directed and particularly multi-disciplinary research and technological innovation, to foster, in the national interest and in fields which in its opinion should receive preference, industrial and scientific development, either by itself or in co-operation with principals from the private or public sectors, and thereby to contribute to the improvement of the quality of life of the people of the Republic, and to perform any other functions that may be assigned to the CSIR by or under this Act."



Our imperatives

The CSIR's strategy for 2006/2007 translates into organisational priorities, informed by the DST key performance indicators (KPIs), against which our performance is measured both quantitatively and qualitatively.

In response to and against the backdrop of broader national R&D obligations and expectations, the CSIR's imperatives are structured according to the following:

- Building and transforming human capital
- Strengthening the S&T base
- Performing relevant knowledge-generating research and transferring technology and skilled human capital
- Securing financial sustainability through operational excellence.

The following pages outline the parameters within which we focus our operations. This information elaborates on the data found on pages 88 to 91: CSIR imperatives: A panorama.

Institutionalising strategy

Organisational priorities remain consistent to cumulatively contribute to achieving objectives, to ensure that the CSIR is continually strengthened in the science domain and geared to address the challenges of sustainable socio-economic development. The institutional building blocks through which we achieve our organisational priorities are:

- **Emerging research areas (ERAs)** that comprise new areas of science that the CSIR deems important to pursue
- Five **operating units** in biosciences; the built environment; defence, peace, safety and security; materials science and manufacturing; and natural resources and the environment
- **National research centres:** the Meraka Institute (the African Advanced Institute for Information and Communications Technology), the National Laser Centre, the Satellite Applications Centre and the National Metrology Laboratory (until its transfer to the National Metrology Institute of South Africa (NMISA), in accordance with the Measurements Standards Act, Act 18 of 2006).

Contributing to national human capital development at postgraduate level remains a critical priority that is factored into the CSIR's planning



Entering a growth phase

The CSIR has established a refreshed culture and values and is moving into the growth phase of organisational development. These achievements have positioned the organisation to take on a greater external focus through establishment of strategic research programmes that address stakeholder requirements and produce a strong flow of technology with significant impact on markets and society.

Production of high quality SET outputs is starting to increase, showing positive trends in publication equivalents, patenting and technology development. Investment of CSIR funds in scientific infrastructure in 2006/07 showed an increase of 54% over the previous year. Robust processes for management of the Parliamentary Grant (PG) are maturing with a strong thematic programme in place, the first emerging research area (ERA) in nanoscience established and a performance-based process adopted for allocation of block funding to units.

The activity of SET linkages through research alliances is increasing. At the end of December 2006, the CSIR had a total of 45 local or international research alliances, each of which included collaborative work with a value of at least R1 million per year.

The strength of human capital in the SET base has been enhanced through significant increases in the number of staff with postgraduate qualifications and implementation of career ladders with benchmarked criteria. The overall intent of the organisation's strategy is to continue pursuing a systematic evolution that will strengthen research capacity and maximise the impact that can be generated in favour of national priorities.

Our activities

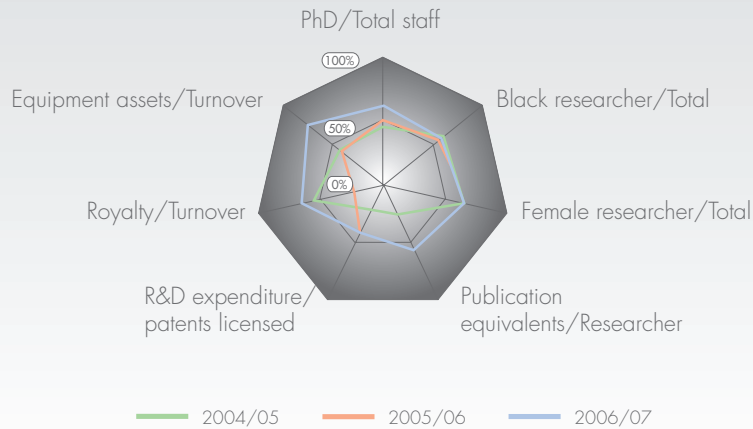
The organisation's activities comprise management of the research and innovation value chain through strategic basic and applied research, experimental development, and technology and knowledge transfer. This work is funded through a combination of core and directed grants from the Department of Science and Technology (DST), and contract R&D income from stakeholders in the public, private and international sectors. In addition, the CSIR provides a number of specialised and strategic services that address stakeholder requirements. The CSIR's portfolio of activities thus focuses mainly on the types A, B and C classifications as set out on page 71, but also incorporates type D to a limited extent.

The state of S&T in the CSIR

The State of Science and Technology (SoST) report has been used to cover the results of an annual evaluation of the CSIR's S&T base. The report was first published in 2002, covering the three categories of S&T human resources, S&T outputs, and investment in S&T infrastructure. Although changes to the structure of the organisation in 2005 resulted in certain modifications to the reported data on human resources, every effort was made to ensure that the information is consistent and hence comparable from one year to the next.

The report has been useful in guiding the CSIR and its stakeholders in the leadership of S&T and R&D within the organisation. However, many of the indicators have been formally incorporated into the CSIR's KPIs, with the result that the SoST report would duplicate other sections of the Annual Report and has thus become redundant. It has fulfilled its purpose and has made way for more mainstream reporting mechanisms.

CSIR outputs at a glance

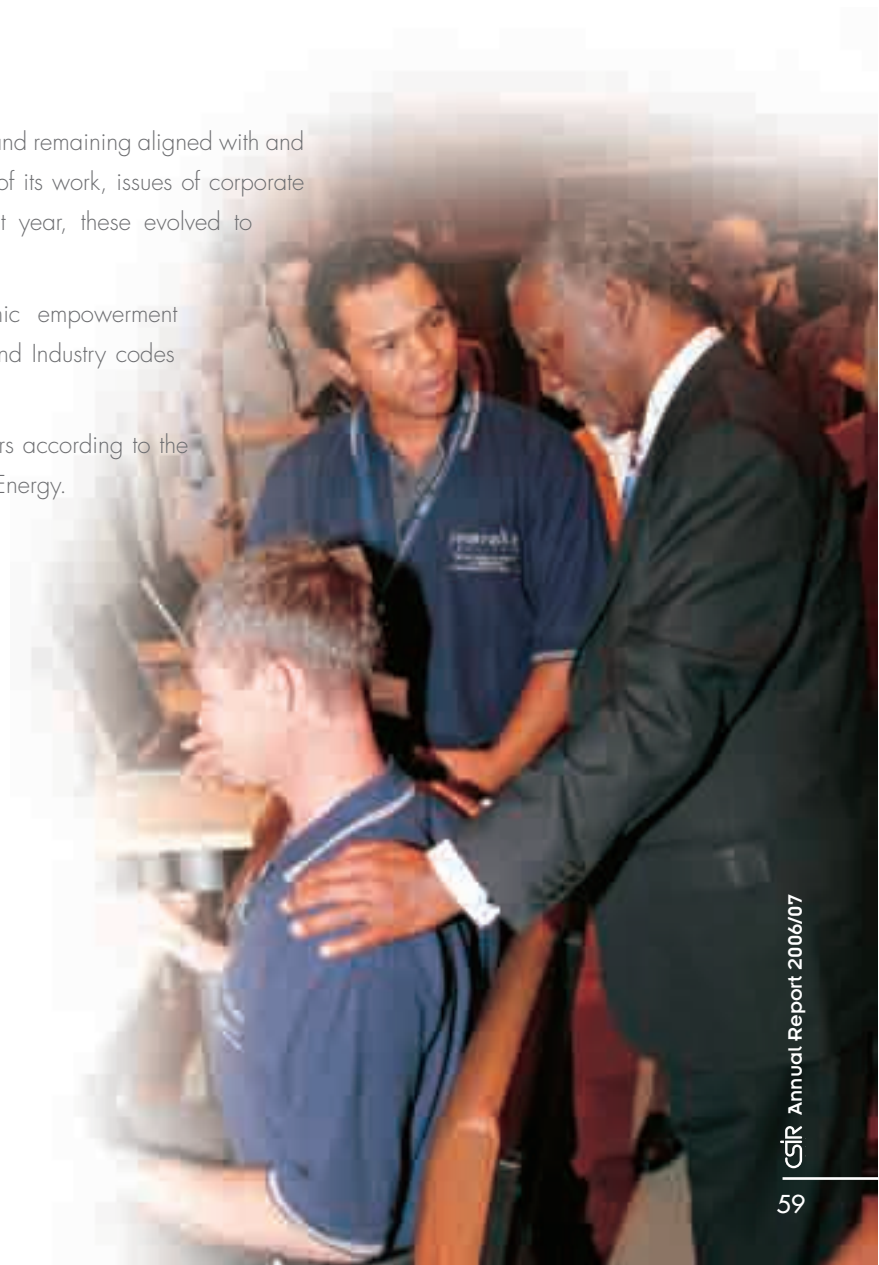


Corporate citizenship

The CSIR believes that apart from achieving its mandate and remaining aligned with and relevant to the national strategies that inform the scope of its work, issues of corporate citizenship also have to be embraced. Over the past year, these evolved to include:

- Contributing towards broad-based black economic empowerment (B-BBEE) as published in the Department of Trade and Industry codes of good practice
- Reducing energy consumption by 12% over 10 years according to the directive received from the Minister of Minerals and Energy.

The strength of human capital in the SET base has been enhanced through significant increases in the number of staff with postgraduate qualifications and implementation of career ladders with benchmarked criteria



Building and transforming human capital

Context

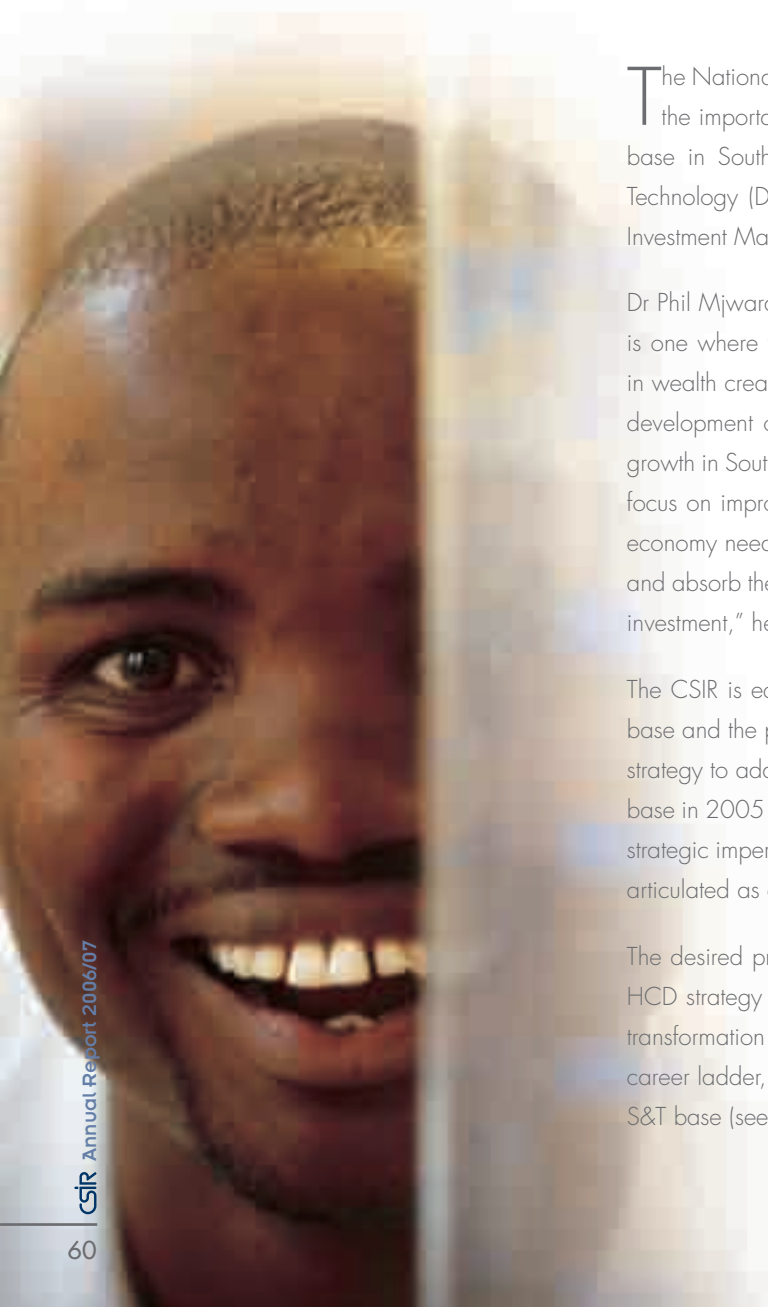
For the CSIR to deliver on its pervasive mandate, committed and highly skilled people are required. It is *people* who will contribute to an improved quality of life for people.

The National System of Innovation (NSI) and the National R&D Strategy underline the importance of building a strong science, engineering and technology (SET) base in South Africa. The Director-General of the Department of Science and Technology (DST) affirmed this at the launch of the Government and Technology Investment Managers' Forum in February 2007.

Dr Phil Mjwara, DST Director-General, asserted that a knowledge-based economy is one where the generation and exploitation of knowledge play a principal role in wealth creation and in improving the quality of life of all people. "The continued development of human capital is critical for sustaining innovation and economic growth in South Africa. We cannot address our national challenges without a strong focus on improving the supply and quality of skilled scientists and engineers. Our economy needs skilled people who are able to develop home-grown technologies and absorb the technologies that are developed abroad to attract local and foreign investment," he said.

The CSIR is equally serious about developing its human capital – both in the SET base and the professional (non-research) categories. As an integral part of its future strategy to address its mandate, the CSIR embarked on a reconfiguration of its S&T base in 2005 to ensure its relevance to South Africa and the continent. Amongst the strategic imperatives that emerged from this exercise, HCD and transformation were articulated as crucial components, organisationally and nationally.

The desired progression of the CSIR's S&T base has been established in a formal HCD strategy that will serve as the organisation's blueprint for future building and transformation of human capital. A suite of career ladders, additional to the research career ladder, has been developed aligned with the desired structure of the CSIR's S&T base (see opposite page).



Status of human capital

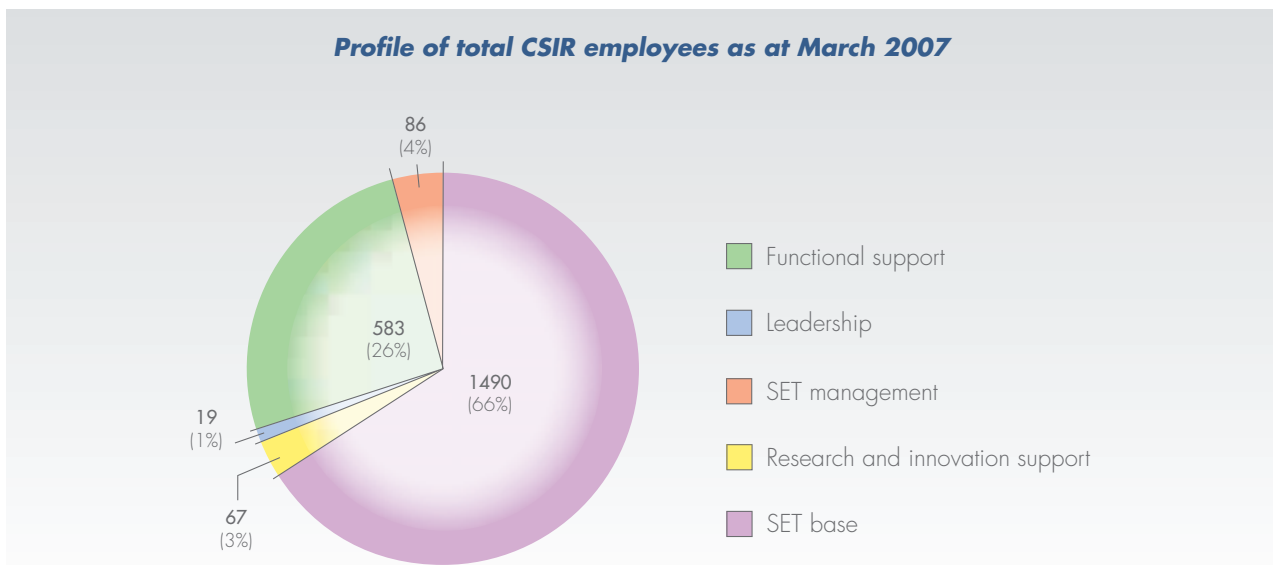
Defining the CSIR's human resource profile by employee role

The distribution of CSIR employees is reviewed according to their role within the organisation as at 31 March 2007. The five categories are:

- S&T base: This group consists of knowledge generation (employees on the research career ladder, research group leaders and postdoctoral appointments), knowledge application (employees on the research application and development career ladder), S&T pipeline (students, bursars and interns) and technical support (employees on the technical support career ladder, the project management career ladder and in a technical support function)
- S&T management: This group is responsible for direct management of the S&T base and consists of operations managers, competence area managers, strategic research managers, contract research managers, centre managers and R&D development outcomes managers
- Research and innovation support: This group includes CSIR employees who are positioned outside the units and centres (at a central or corporate level) and whose activities support the research and innovation objectives of the organisation. Examples are the offices of the R&D manager, the R&D outcomes manager, the contract R&D manager, the institutional planning manager, the human capital development manager and the strategic research alliances manager; CSIR Information Services; the CSIR Innovation, Leadership and Learning Academy; and the intellectual property and commercialisation office
- Functional support: This covers all the shared services functions within the CSIR including human resources, finance, communication, legal, audit, computing services and eBusiness Application Solutions
- Leadership: This category includes all the executive directors and senior leadership of the organisation.

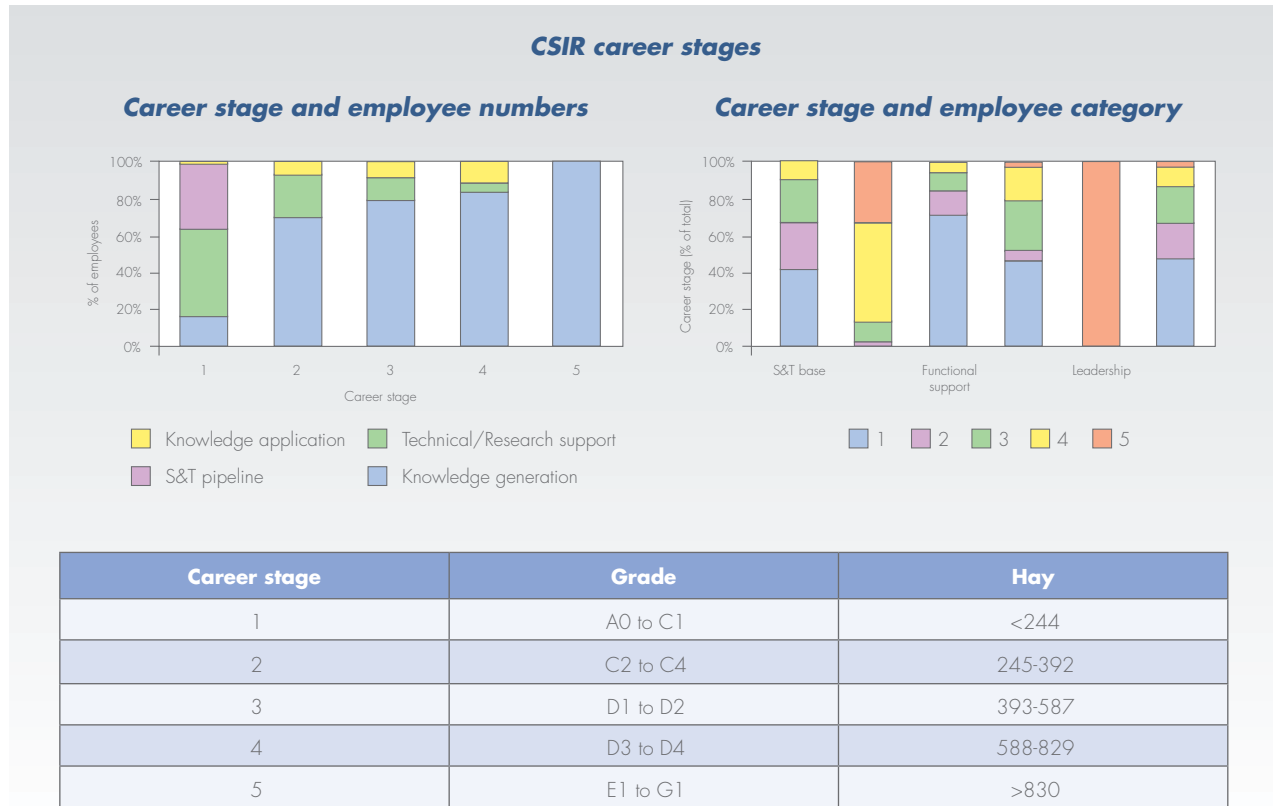
CSIR employee breakdown

The figure below shows the breakdown between the S&T base and professional categories.



The total number of employees as at March 2007 was 2 248 (2 088 prior year), which for the first time since 1984 (when the organisation reached a peak of 5 001 employees) represents a year-on-year increase in employee numbers. This increase is the result of a formal strategy to grow the S&T base of the organisation in line with its needs for higher S&T outputs and increased contribution to national human capital development.

The figure below shows the five functional categories in the CSIR, representing a new approach, based on the new definitions. The categories are a significant departure from the CSIR's previous structure. The career stages are linked to CSIR grades and Hay equivalents (i.e. measures of job size) as shown in the table below.



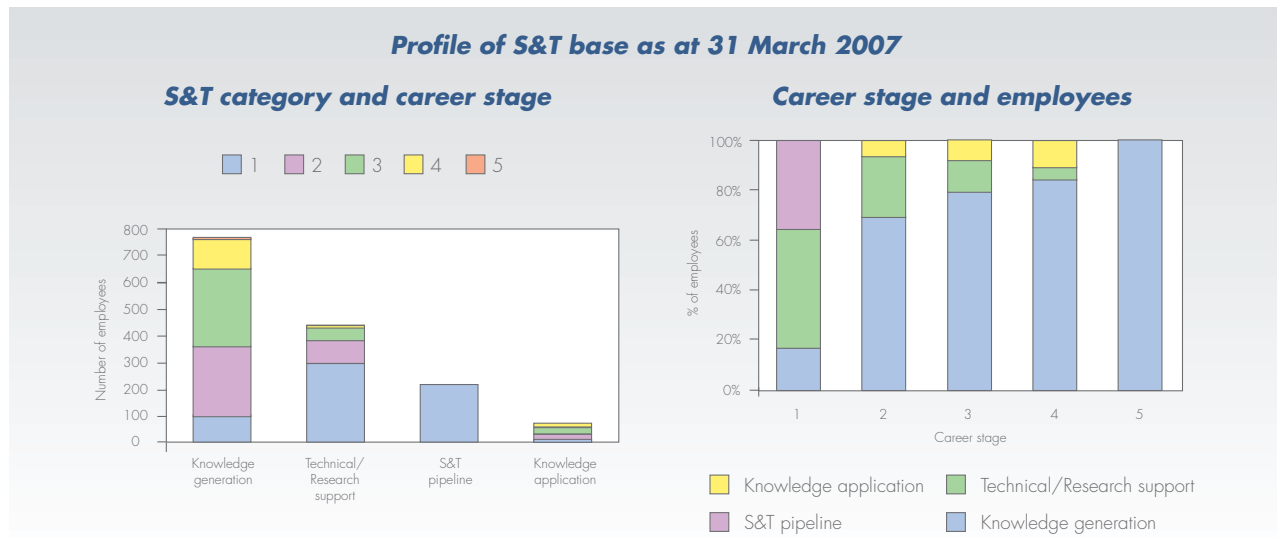
The data reflect a reasonably standard profile for research-based organisations, such as the CSIR. For instance, the higher grades consist mainly of leading researchers, S&T managers and leadership, whereas the lowest grade comprises mainly the S&T pipeline (interns, students and junior researchers) and support staff.

Under the new classification, the S&T base accounts for 66% of the total number of employees, compared to 59% in 2005/06. The support ratio and the management ratio declined for the second year running from 0,52 to 0,51 and from 0,12 to 0,07, respectively. Although some of this change is the result of the reclassification of staff functions, there has also been a focused initiative to increase the S&T base relative to the support functions, mainly achieved through the recruitment of new research staff.

Profile of the S&T base

The S&T base consists mostly of knowledge generation (researchers) and the S&T pipeline (researchers in training). The profile is improving but is deficient in the following respects:

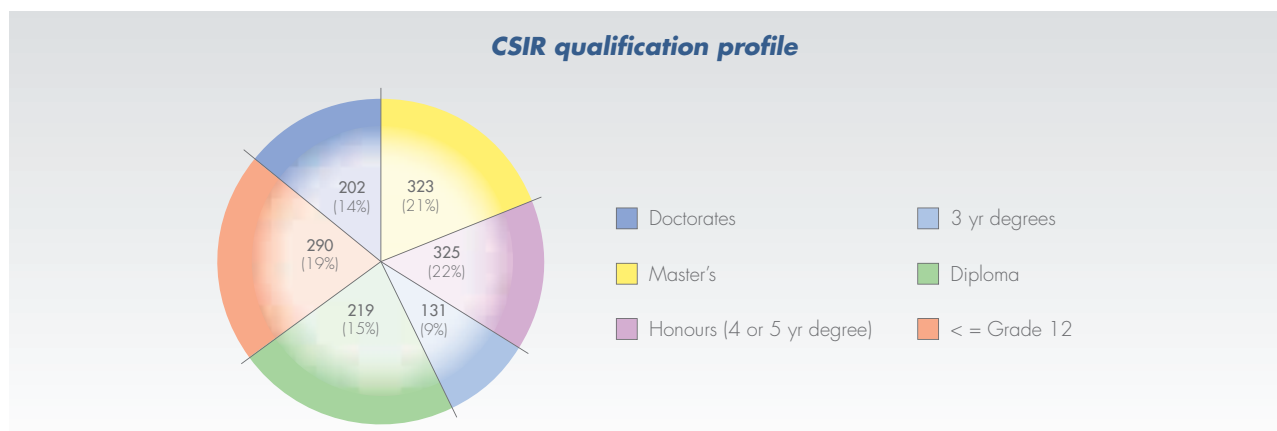
- There are too few stage 5 researchers; these are employees who are of international stature in the research community and able to lead the CSIR in its efforts to become a world-class research institution
- The S&T pipeline is also too small; there is currently considerable effort in the CSIR to grow the number of studentships and internships so that the organisation can meet its own and also its stakeholders' expectations in respect of national human capital development.



Qualifications

Looking at the South African situation, the increase in gross domestic product from 1% to 2,5% in the longer term suggests a desired three-fold increase in the number of scientists from the current 31 000 to approximately 98 000 – emphasising once again the need for dynamic human capital development strategies. Closer to home, the CSIR has intensified its drive to employ highly-qualified and skilled individuals and to encourage continual learning and development.

The number of doctorates and Master's qualifications held by CSIR staff bears testimony to this commitment towards research and professional excellence. The number of doctorates increased by 40 from the 2005/06 financial year, while the number of Master's qualifications increased by 48 from the previous year, both exceeding the target set for 2006/07.



Age and qualification

The age and qualification breakdowns are given in the following table.

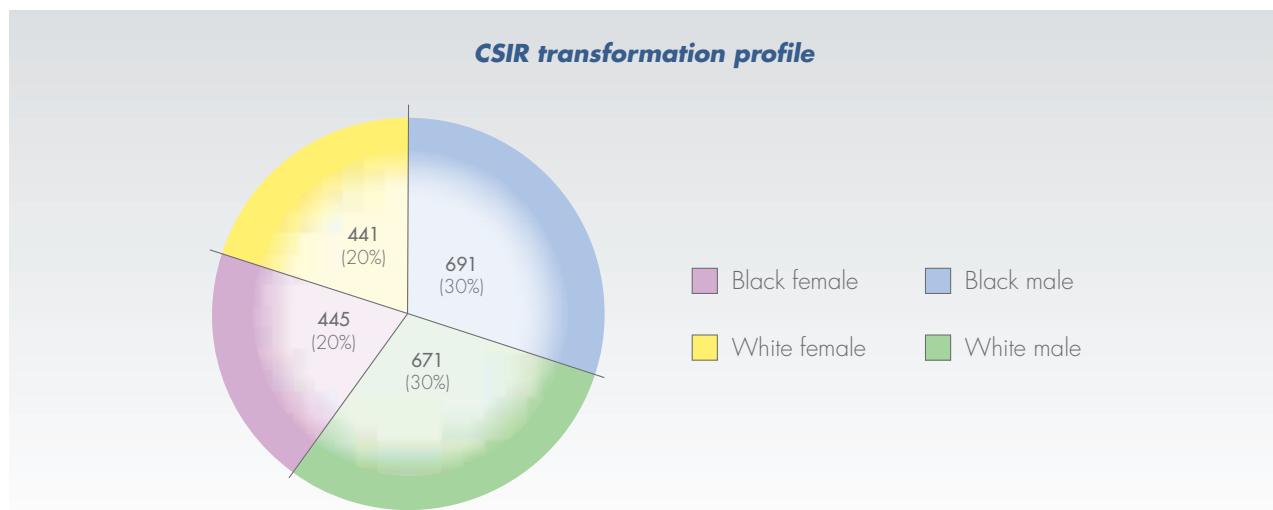
Age	Qualification levels					Totals	Percentage
	0-2 year Diploma, matriculation or less	BSc, BA, BTech	4 year BEng, BSc (Hons)	Master's degree	Doctorate		
<30 Years	216	158	89	79	14	556	24,7%
30-39 Years	240	130	79	164	97	710	31,6%
40-49 Years	286	53	35	108	66	548	24,4%
>49 Years	265	37	21	51	60	434	19,3%
All ages	1 007	378	224	402	237	2 248	
% of total employees	44,8%	16,8%	10,0%	17,9%	10,5%		100,0%

The low fraction of employees with advanced postgraduate qualifications has been a matter of concern since 2002. It is therefore encouraging to note that as a percentage of total employees, the proportion of PhDs employed increased for the fifth consecutive year from 7,3% as at March 2002 to 10,5% as at March 2007. Over the past year, nearly 30 new PhDs were recruited, many of whom are in the critical age group of 30-39 years.

The CSIR is approaching its target of 39% of its employees being in possession of an MSc or PhD degree (present level is 28,4%).

Staff demographics

The figure below illustrates the organisation's transformation profile (S&T base and professional).



The purpose of these indicators is to measure the CSIR's progress towards gender and race equity across all employment levels. The relevant information, as at 31 March 2007, is shown in the following tables. It is noted that the overall gender balance has remained unchanged at 39% of total employees.

Transformation profile: All CSIR

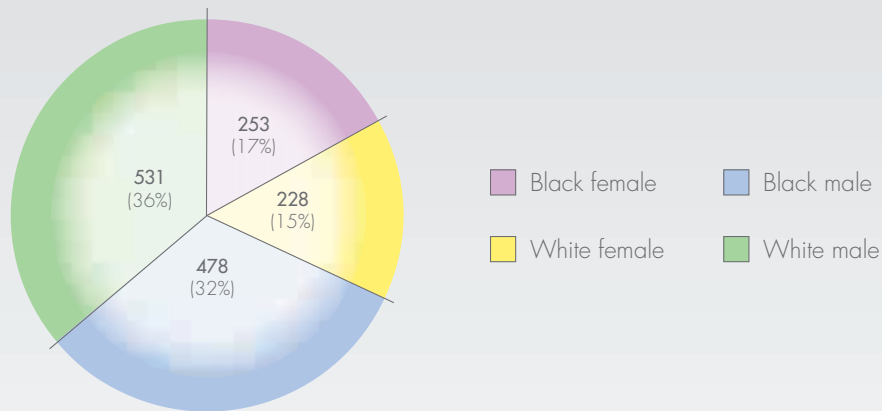
	Black		White		Total
	Number of staff	% of category	Number of staff	% of category	
S&T base	731	49%	759	51%	1 490
Other	405	53%	353	47%	758
Total	1 136	51%	1 112	49%	2 248

Gender profile: All CSIR

	Female		Male		Total
	Number of staff	% of category	Number of staff	% of category	
S&T base	481	32%	1 009	68%	1 490
Other	405	53%	353	47%	758
Total	886	39%	1 362	61%	2 248

The proportion of black employees has risen from 47% to 51% and the proportion of black researchers from 33% to 36% (as a percentage of total researchers). Of particular note is that the S&T pipeline is now 80% black, indicating that the CSIR is successful at recruiting a high proportion of young black researchers into the organisation.

CSIR transformation profile SET base



	Black		White		Total
	Number of staff	% of category	Number of staff	% of category	
Knowledge application	15	20%	59	80%	74
Knowledge generation	269	35%	494	65%	763
S&T pipeline	174	80%	43	20%	217
Technical/Research support	273	63%	163	37%	436
Total number of staff	731	49%	759	51%	1 490

Strengthening the science and technology base

Overall

The CSIR has achieved its main objectives for strengthening the S&T base, measured against all key performance indicators (KPIs). During 2006/07, significant progress was made in stimulating collaborative activity through strategic research alliances. The past year also saw an increase in investment in scientific equipment and infrastructure. A robust process was followed in the allocation of the Parliamentary Grant (PG) for research projects, involving Research Advisory Panels (RAPs).

R&D productivity

Publication equivalents

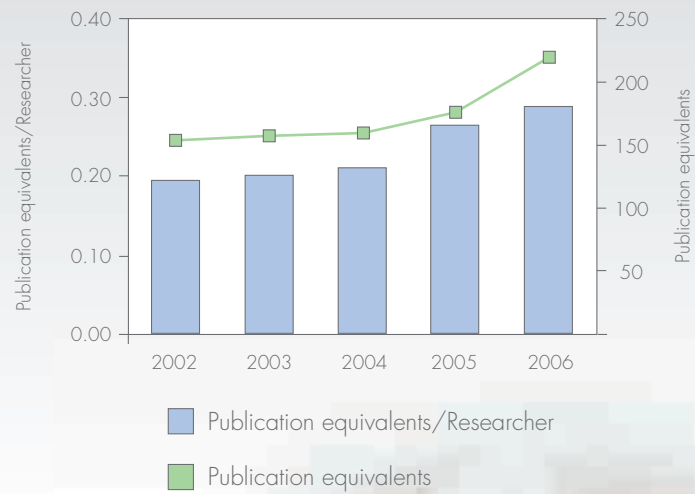
Publishing is a key output in the research process. It is therefore encouraging to see that the CSIR publication output in peer-reviewed literature grew significantly over the past two years, from 160 to the present level of 220 (see figure on opposite page). Much of the recent growth has been in the category of research papers, a category known to be more rigorously reviewed and more difficult to obtain.

Another highlight of the year was the publication in July 2006 of a dedicated issue of the *South African Journal of Science*, with papers from the CSIR's Research and Innovation Conference held in celebration of the CSIR's 60th anniversary.

Over the past three years, the CSIR pursued a more research-intensive strategy, within which publication in peer-reviewed literature was emphasised. It is therefore encouraging to note the increase in the CSIR's contribution to this body of knowledge. In 2006/07, the number of publication equivalents rose by 23%, which includes an increase from 89 to 129 research papers. The output, however, still remains somewhat below the CSIR target of 0,6 publication equivalents per researcher per year (present performance is 0,29).



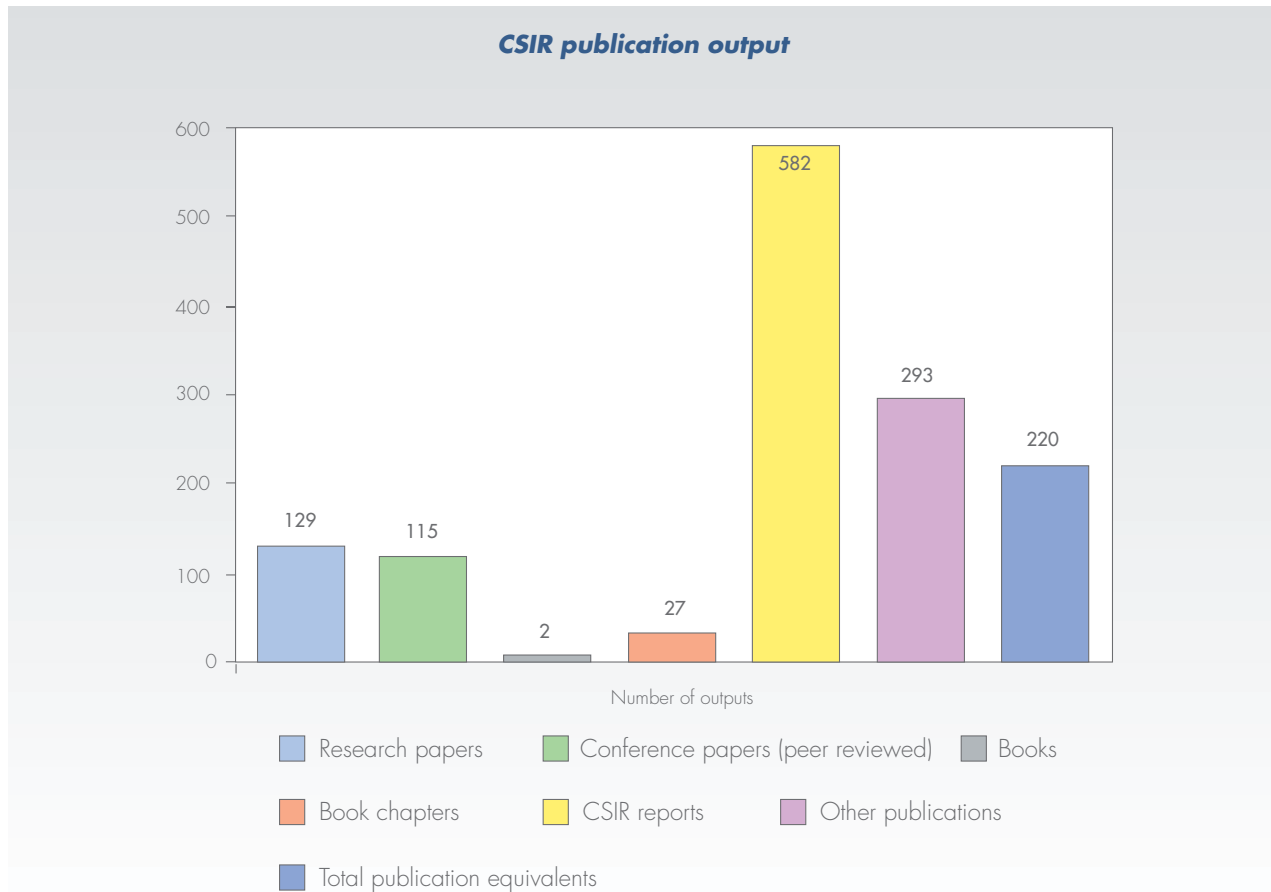
CSIR publication output



Publishing is a key output in the research process. It is therefore encouraging to see that the CSIR publication output in peer-reviewed literature grew significantly over the past two years

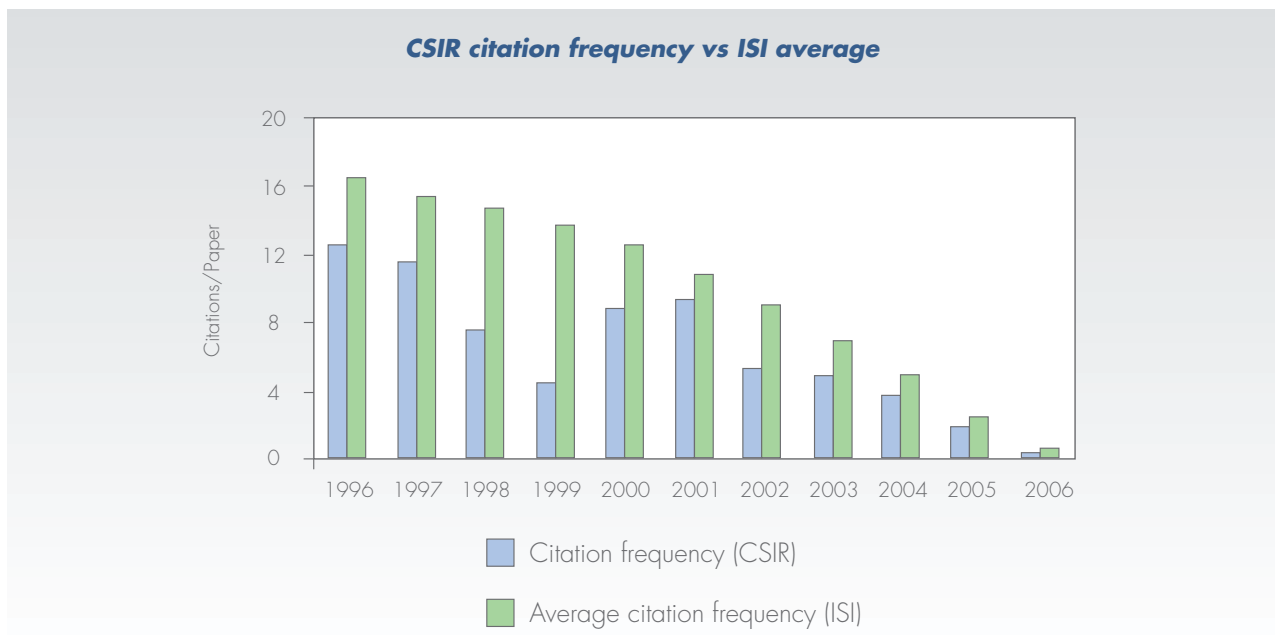


The CSIR's publication output during 2006/07 is broken down as follows:



- The information refers to publications within the 2006/07 financial year with the exception of the research papers, which are counted on a calendar year basis
- The category of *Research papers* refers to peer-reviewed articles in accredited journals only
- The category of *Conference papers (peer reviewed)* refers to proceedings that are both peer reviewed and published in a set of proceedings with an ISBN number
- The *CSIR reports* category covers mainly internal and client reports, in any medium, provided these are registered in CSIR databases. Many of these are peer reviewed and some are available in the public domain
- The *Other publications* category includes all others, such as dissertations, monographs, posters and non-peer-reviewed conference proceedings or journal articles
- *Total publication equivalents*: To increase the comparative value of the data, the CSIR reports its publication output in the form of publication equivalents, measured according to the standard guidelines from the Department of Education (DoE). At present no adjustment is made for co-authorship; as a result, publications that are co-authored with external researchers are counted as a single unit, as opposed to a fraction of a unit as recommended by the DoE guidelines.

The CSIR citation rate is 67% of the ISI average rate of citation over the period 1996 to 2006 (see figure). An improvement in this regard to a target of 100% of the ISI average will be highly desirable.



International patents and technology demonstrators

Apart from providing valuable protection to an organisation's intellectual property, patenting also acts as an incentive to invest in further research that may lead to a commercial product. For the past financial year, the CSIR achieved 12 international patents and 49 technology demonstrators.



R&D alliances and consortia

Engagement in the NSI

The CSIR's objective with regard to strategic research relationships is to actively strengthen existing ones, while also forging new research alliances and consortia with complementary local and international organisations.

With regard to relationships with tertiary education institutions (TEIs) in South Africa, memoranda of understanding (MoU) on research collaboration exist with the universities of Cape Town, Stellenbosch, the Witwatersrand, Johannesburg and Pretoria. An MoU is being negotiated with the University of KwaZulu-Natal. A number of collaborative projects were established, in areas such as ICT, environmental management and biosciences, and some staff were appointed joint professors at these institutions.

Several relationships were established with previously disadvantaged TEIs, including Walter Sisulu University, the University of Limpopo and Tshwane University of Technology. New projects with these institutions were initiated through the CSIR Cooperation Fund.

Spanning several years, the CSIR has had scholarship agreements that outline areas of collaboration in human capital development with the universities of the Witwatersrand and Cape Town. During the course of the year, a similar agreement was initiated with the University of Johannesburg. Students are currently being trained in 11 different areas, mainly at the Master's and PhD levels.

The target for maintaining and increasing engagement in the NSI was 13 active local research alliances. The CSIR has done well in relation to this target with 23 active relationships valued at more than R1 million each.

International R&D collaboration

The establishment of international research partnerships was supported through the development of several MoUs, including with the University of Regina, the Stockholm Water Institute and the LCVU Amsterdam. There have also been visits by the Association of Swedish Research Centres (SWEREA) and the Beijing Association of Science and Technology aimed at exploring relationships in the areas of human capacity development (HCD), ICT, and laser science.

The benefits of membership of the Regional Research Alliance (RRA) and the Global Research Alliance (GRA) are increasing. RRA activities are given better focus through the development of a strategic plan. With regard to the GRA, an MoU in the areas of materials science and manufacturing and energy is being negotiated with a fellow member of the Alliance, the Danish Technology Institute.

One example of a private sector international association is Boeing, where discussions have advanced to explore possibilities for research collaboration in the area of materials science and manufacturing.

The target for maintaining and increasing international R&D collaboration was 14 active research alliances. The CSIR has done well in relation to this target with 22 active relationships.

Mix of R&D activities

Contract R&D funding to develop research capacity

Significant emphasis was placed on developing strategic, committed relationships in the area of contract R&D funding where the primary intent is to build research capacity. The performance in this area exceeded the target by some R47 million.

Mix of types A, B, C and other research activities

Considerable progress was made in classifying CSIR research activities, informed by guidelines from the Frascati Manual.

Type A:	Directed basic or applied research that explores the underlying nature of a system
Type B:	Experimental development that typically results in a new prototype, which captures new knowledge into a product, service or policy
Type C:	Technology transfer, the first step of knowledge application

During the first phases of the organisational transformation, strong emphasis was placed on rebuilding the science base through substantial type A activities, including HCD. Efforts will be placed on increasing the proportion of types B and C activities in future years, leading to the desired balance.

The benchmark mix for research activities of 30:50:20 for types A, B and C remains valid. In addition, the CSIR will be involved in a range of activities that supports this value chain. This includes provision of scientific advice in support of national policy development, participating in processes for establishing national programmes for S&T development and provision of specialised services.



Quality of R&D processes and practices

Research Advisory Panels appointed

In addition to strengthening the S&T base, a number of other processes were designed and implemented to improve the quality of the CSIR's S&T research. Research Advisory Panels (RAPs) were appointed in all units and centres to assist with strategic research decisions and SET quality management.

These panels typically meet twice a year, once to review progress of the unit's investment portfolio and once to make strategic decisions about the allocation of core funds for the following funding cycle. The panels are also required to report on their assessment of the quality of work undertaken by each unit directly to the CSIR Group Manager: R&D.

Management of Parliamentary Grant investment

The past year saw improved processes for the management of the Parliamentary Grant (PG) and active portfolio management across the CSIR. Some 80% of the core PG was allocated to projects on a competitive basis within units.

All units now use the Strategic Investment Management System (SIMS) to track their respective research projects. The system links to PeopleSoft and hence allows all project proposals to be referenced to the financials. All units also follow a competitive process, mediated by the RAPs, for allocation of discretionary research funds.

Research projects are subject to both *ex ante* and *ex post* review. In the medium term, this approach will assist in improving the quality of research undertaken by the organisation.

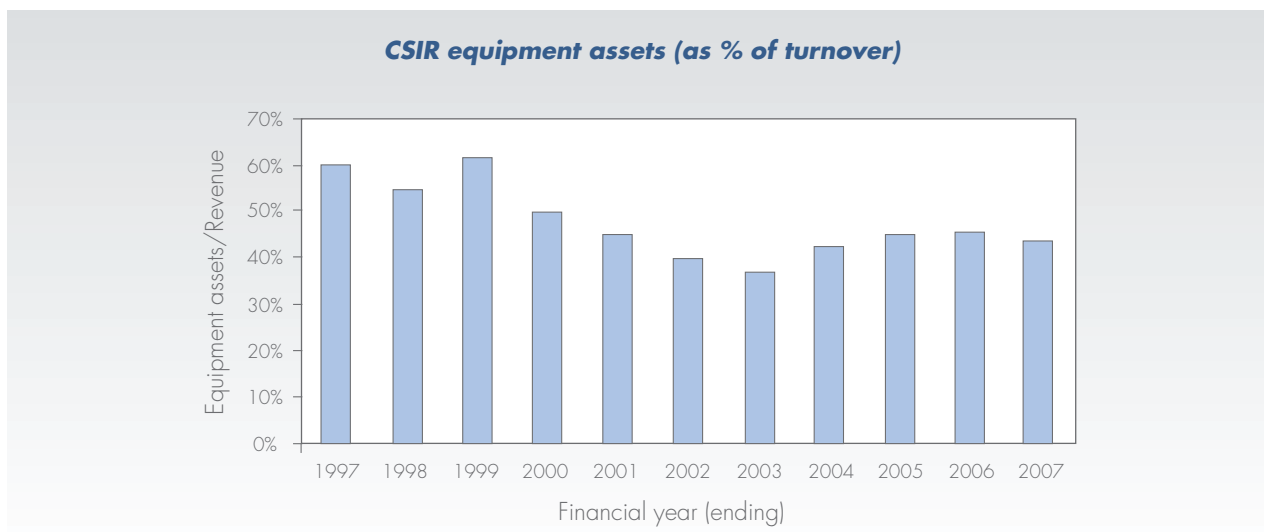
Investment of CSIR funds in scientific equipment and research infrastructure

The purpose of this indicator is to show whether the investment in research infrastructure is sufficient to support the research activities of the CSIR. As for previous years, two indicators were used, namely the value of the equipment assets at cost expressed as a percentage of the CSIR's income for the same year (benchmark is 55%), and the investment in scientific equipment¹ during the financial year, also expressed as a percentage of the total income for the same year (benchmark is 10%).

The latter value is R70,1 million or 6,3% of revenue, which is a 129% increase over the value of R30,6 million (3,1% of income) in 2005/06. However, the equipment asset value as a percentage of revenue has declined from 45,7% to 43,5% (see figure on opposite page), despite the sharp increase in expenditure. This effect is due to a number of fully-depreciated items no longer appearing on the CSIR's asset base. The inclusion of the investment in scientific equipment within the CSIR's 2006/07 KPI framework contributed considerably to the increase in actual expenditure.

The CSIR's equipment renewal programme is being supported by the national Equipment Programme (funded by the DST and implemented by the National Research Foundation), although the CSIR's success in this programme has been relatively limited.

¹ Scientific equipment excludes vehicles, buildings, land, and low-value items (<R15 000)



Major contributors to the increased investment included the infrastructure for the nanoscience emerging research area (ERA) and initial investment into the Centre for High Performance Computing.

Building on advances in electronic information searching, major progress was achieved in enhancing the quality of support to the research process. While achieving reductions in the support cost, partly through participation in consortia of scientific research institutes, CSIR Information Services is able to offer researchers significantly faster turn-around times and more comprehensive results. Some 90% of information requests are satisfied within two hours through application of advances in information technology. The Virtual Research Environment also places new information search capabilities directly on the desktops of researchers. The impact of these developments on the overall quality of the CSIR's R&D is considered to be substantial.

Migration to open source environment

The CSIR's migration to open source software (OSS), through Project Vula (Nguni word meaning 'to open'), is managed by the Meraka Institute in collaboration with CSIR ICT Services. Early in 2007, Cabinet approved a policy and strategy to implement OSS throughout government, indicating that the CSIR's migration to Linux is relevant and well timed. A number of important milestones have been reached, in this regard, the most significant being the adoption of open document format (ODF) as the CSIR's document standard. Open document standards are needed to allow open access to information now and in the future. Adopting ODF enables CSIR staff to use OpenOffice prior to the switch to Linux. This lessens the associated learning curve and levels the playing field between Windows and Linux users. In terms of Linux migration, the process is also on track, with a pilot being implemented to migrate about 10% of the CSIR before full-scale migration. Full-scale Linux migration is planned for the new financial year, and it is anticipated that a significant percentage of all CSIR desktops will be migrated during 2007.

Performing relevant knowledge-generating research and transferring technology and skilled human capital

Introduction

Transformation of the CSIR's research funded directly by stakeholders has progressed well in terms of increasing alignment with the implementation mechanisms of the National R&D Strategy. The CSIR's contract R&D portfolio reflects clear understanding of national imperatives and the needs of industry. It leverages public, private and international partnerships in support of cutting-edge SET, and ultimately to deliver R&D outputs with real impact.

Public policy on science increasingly focuses on the generation of and value realisation from intellectual property (IP) as an indicator of performance for publicly-funded research. In the context of the CSIR's mandate, value realisation refers to both financial returns and outcomes that result in improvement of the quality of life (public good). For the first time, the CSIR is able to provide a focused report on its R&D outcomes, showing where patents were adopted by industry and new products created to benefit society.

The CSIR's R&D outcomes activities encompass the effective protection of IP, transfer of technology, knowledge dissemination and activities for the assessment of impact of scientific research for socio-economic benefit. The R&D outcomes part of this report focuses specifically on:

- IP management
- Technology transfer
- Knowledge dissemination and
- Other related activities of relevance in the past year as indicators of the performance referred to above.





Quality of contract R&D

R&D in support of relevant national strategies

Significant effort went into revitalising relationships with key public and private sector stakeholders. Some 50% of the contract R&D income earned in 2006/07 was in support of relevant national strategies and technology missions.

The CSIR has provided leadership on emerging national and international initiatives subscribed to by the South African government. These include the AsgiSA; the NEPAD Africa S&T Plan; the European Union S&T Framework; and national sectoral plans, which include the National Biotechnology Strategy, the National Spatial Development Framework, the Grant Information System, the Limpopo Infrastructure Maintenance Policy, the AMTS, the Energy and Fuel Cells Strategy, the National Nanotechnology Strategy, the dti Customised Sector Programmes, the ICT R&D&I Strategy, the National Accessibility Portal, and the Mine, Health and Safety Council.

Additional highlights include participation in the National Working Group on the Information Society and Development of the Presidential National Commission on Information Society and Development, and the CSIR's leadership role in the Open Source Working Group of GITOC, which developed the free and open source software strategy recently adopted by Cabinet.

R&D in support of NEPAD

The African Ministerial Council on Science and Technology, established under the auspices of NEPAD and the African Union, is a high-level platform for developing policies and setting priorities on science, technology and innovation for African development.

The CSIR has received acknowledgement for its leadership and active support to the NEPAD S&T Plan from the DST and the NEPAD S&T Office. The main areas of activity continued to be SANBio and the African Laser Centre with the appointment of two new directors. The CSIR was commissioned to develop an energy business plan for the NEPAD S&T Office and discussions are underway with regard to climate change, water, desertification, peace and security and materials science.

The CSIR continued to play a lead role in SANBio and was officially appointed as the SANBio biotechnology hub in September 2006. Projects are now rolled out with the CSIR's lead involvement in key initiatives.

Contract R&D for public sector stakeholders

Excellent progress was made with the strategic alignment of contract R&D with the core focus of the CSIR. Indicative of this is the increase in public funding from R370,9 million to R435,4 million.

Good progress was made with securing multi-year R&D contracts, including the TB drug delivery project, the Light Materials Development Network (IMDN) multi-year contract with the DST (R15,4 million per year), the textile centre of excellence agreement with the dti (R5-7 million per year), the advanced production and investment casting agreements with the AMTS (R5-7 million per year) and the hydrogen infrastructure and production agreement with the DST (R3-5 million per year).

Further highlights (not mentioned in *Research, development and implementation highlights*) of contract R&D undertaken for public sector stakeholders include:

- The KwaZulu-Natal provincial government to advise and assist the province in developing a provincial broadband strategy
- The Department of Environmental Affairs and Tourism in the areas of air quality, pollution and waste, and marine and coastal management
- The Department of Water Affairs and Forestry (DWAF) in various areas of collaboration and support to aid policy implementation.

New R&D contracts during the past year include:

- Integrated planning development and modelling for the DST
- Monitoring and evaluation of water and sanitation projects for DWAF
- National spatial development perspective district application for The Presidency
- Development of the Infrastructure Maintenance Policy, Strategy and Programme for the Limpopo Department of Health.

Contract R&D for private sector stakeholders

Considerable effort has gone into analysing the portfolio of R&D conducted on behalf of private sector stakeholders and the CSIR is revitalising existing relationships with such players. The business sector is the major performer and financier of R&D in the country and performs 58% of all R&D undertaken, while financing 45% of the total R&D effort. The tertiary education sector performs 21,1% of national R&D, while government (including the science councils) performs 20,9% of the total, and finances 32,1% of R&D undertaken. About 15% of South Africa's R&D is financed from abroad.

Recent announcements of tax incentives mean that, with a corporate tax rate of 36%, government will forego 18 cents of tax revenue for each rand spent on R&D as a means to encourage the private sector to spend more on research in support of its own business objectives.

Given that the private sector expenditure on R&D currently amounts to about 0,45% of GDP, this tax credit could translate to a further R1 billion allocated to R&D. The CSIR has a renewed focus on performing contract R&D with the private sector, assisted by the tax incentives, as well as the strong economic growth expected next year.

Strategic stakeholder relationships

Using the previous customer satisfaction measurement survey, the CSIR achieved a score of 83% for the financial year. The organisation also received formal external recognition for R&D collaboration and stakeholder support in the form of the Eskom Chairman's Award for the Advanced Fire Information System (AFIS).

At the end of 2006, a revised measurement tool to gauge customer satisfaction was analysed and developed. All CSIR units had the opportunity to make suggestions to the revised questionnaire and some existing clients were approached to ensure the measurement tool is user friendly. The revised tool will be implemented during the new financial year.

R&D outcomes

Where available, historical data were obtained to provide a reference of progress over time. The CSIR will continue examining the scope of its measures and introduce new measures in future, such as invention disclosures and the economic activity (sales) of licences in respect of licensed products.

IP management

The CSIR conducted a series of studies and reviews, which resulted in the establishment of an R&D outcomes group and the appointment of dedicated R&D outcomes managers in the various operating units, charged with the responsibility of governance of IP, technology transfer and knowledge dissemination.

A five-year strategy has been formulated, giving new impetus and focus to these activities. Key to this strategy are clear objectives as well as process and outcome measures that will direct the organisation to better performance.

CSIR research activities span the full spectrum of SET, which has implications for limited resources available for developing a strong patent position in all areas where research is performed and where inventions may arise.

Some activities that the CSIR is currently active in, where patenting has taken place

Biosciences

- Bioprospecting leads and botanical extracts derived from indigenous resources and African traditional medicines
- Aroma, flavour and fragrance manufacturing technologies and extracts (including essential oils and end formulations)
- Microbial and plant expression systems
- Health supplement technologies
- Biological agents for agricultural and aquaculture applications
- Pharmaceuticals (especially those of high regional priority, e.g. antiretrovirals against HIV/Aids, malaria drugs and TB drugs) including biological catalysts and enzyme formulations and novel kinase drug targets
- Speciality chemicals & chemical synthesis

Defence, safety and security

- Landmine protection technologies

- Optical and imaging systems
- Sensor and sensor-related technologies, security systems and solutions

Environment

- Water treatment and purification
- Forestry
- Air pollution and air quality

Logistics and infrastructure

- Logistical applications for transport operations and infrastructural applications for road engineering

Materials

- Textile processing and testing
- Advanced biomaterials
- Advanced polymer materials
- Light metals processing
- Thermal processes in energy and metals

Mining

- Transport and safety in mining

One of the reviews conducted in 2006 was an IP audit that took stock of the CSIR's (and its subsidiary Technifin's) current IP portfolio and recent (five year) patenting performance.

The results of the review of the CSIR IP as at 31 December 2006 are as follows:

CSIR portfolio	Total
Patent cooperation treaty (PCT) applications	19
Foreign national/regional phase applications	106
Granted South African patents	81
Granted foreign patents	91
Patent families	112

Although the patent portfolio reflects high numbers, when examined in detail, it does not reflect adequate breadth of patenting in any one technology area. Also, many of the patents are not key to industry standards or lack strong commercial application. The biosciences patent pipeline (invention disclosures, provisional patents and PCTs) does, however, indicate that an earlier start in strategic focus of resources is resulting in patents that appear to have strong commercial relevance.

In biosciences and materials research, the CSIR has a higher rate of patent activity and potentially greater scope for future licensing or enterprise creation. It should be noted that a significant component of the research conducted by the CSIR in the areas of defence, peace, safety and security is most often protected by secrecy and not open to patenting.

Technifin IP portfolio as at 31 March 2007	Total
Granted South African patents	40
Granted foreign patents	128
Patent families	41
Trademarks	5

The Technifin portfolio includes patents acquired from other research institutions as well as the general public in the period prior to 1996, when the acquisition of patents from entities other than the CSIR, for licensing, was part of its business model.

In the **national/regional phase**, each patent office of countries listed in a PCT application is responsible for examining the application in accordance with national or regional patent laws, regulations and practices resulting in, if all things are favourable, the grant of a patent.

A **patent family** is all the patents and patent applications resulting from a specific patent application.

CSIR five-year patent performance

The following table shows the number of foreign PCT applications/patents granted to the CSIR in the past five calendar years.

Year	PCT applications	European patent office	US patent and trademark office
2002	8	1	4
2003	10	1	1
2004	11	1	1
2005	7	1	1
2006	9	2	3
Total	45	6	10

The relatively low number of US and foreign patents obtained speaks to the need identified during the CSIR reconfiguration/change process to have greater emphasis on directed research, which aims to deliver outcomes that benefit stakeholders.

There is a fairly long lead time between the start of major research programmes and generation of knowledge that leads to new industry-relevant patents. The results of patent outcomes in foreign patents obtained are therefore consistent from 2002 to 2006 with the condition that existed in the CSIR prior to the change process.

The above measures, while important, do not reveal the effect of numerous changes underway in the CSIR to improve the patent pipeline and commercial prospects. The measures will be broadened in the coming year to report on such aspects.

Performance highlights

The following are the key results for 2007 in terms of patents and licensing:

International and PCT applications	18
International patents granted	12
Revenue from licence income: CSIR	R10,8 million
Revenue from licence income: Technifin	R11,4 million

These results are an outstanding outcome in relation to the organisational research expenditure, industry norms and the targets for 2006/07. The total budget for licence income for the CSIR group was R8,7 million in this year. The patent filings also significantly exceeded budgets.

The CSIR filed five South African patent applications during the financial year and 15 PCT and international patent applications. Six South African patents and 14 international patents were granted.

Technology transfer

The professional body that represents technology transfer professionals in the United States (and other countries) is known as the Association of University Technology Managers (AUTM). Its learning events are attended by professionals in the technology transfer arena from all kinds of R&D institutions in the US and other parts of the world.

The annual AUTM Licensing Survey and numerous government statistics show that technology transfer benefits academic research, economic development and the public. The President of the University of Michigan, Dr Mary Sue Coleman, said at the 2005 AUTM Annual Meeting: "Many people are often confused about why we are interested in technology commercialisation, in nurturing start-up companies, and in facilitating more patents and license agreements. It is not about the promise of future revenues that might be generated from this activity. You heard me correctly. It is not about the money. Technology transfer must serve our core mission: sharing ideas and innovations in the service of society's well-being."

Getting research results to the public is, quite simply, the reason technology transfer professionals are passionate about the work they do every day.

Licence income

Licence income is an important indicator of the quality of a patent portfolio and of the performance of an organisation. It must always, however, be borne in mind that the CSIR's mandate requires it also to be active in the public good domain, where most often the outcomes are not measured in financial gain for the CSIR but in how it impacts communities as reported on in the next section.

The CSIR Group earned R22,2 million from licences in the current year. This relatively high figure is attributable to a number of factors, including the ability to support technologies licensed, with ongoing world-class research competences in specific fields; and the exit from technologies where the CSIR no longer maintains a strong skills competence, resulting in once-off payments upon divestiture.

It is worth highlighting some CSIR licensing milestones:

- In the field of food sweeteners, the CSIR licensed technology to a major US company in the food sector. The earnings resulted not only because of the patents, but also because of highly-regarded competences in the CSIR's biosciences unit, which provided ongoing research to the licensee in developing a strong technology position in preparation of going to market. This competence led to the unit earning research income (characterised by the industry as IP-induced sponsored research) in excess of R10 million associated with this licence, in addition to the licence income.
- Another highlight was the CSIR's work in the development of mine-resistant vehicles and the demand from a key US manufacturer and defence supplier for the technology, as well as ongoing CSIR research support in the implementation of this technology in various products.

Enterprises

The CSIR's Technology Transfer for Social Impact (TTSI) implementation unit is mandated to manage technology-based projects aimed at stimulating economic activity especially in rural communities. The TTSI has a strategic partnership with the DST and, among others, the Provincial Government Western Cape (PGWC).

The TTSI follows a structured and targeted approach by steering a product or business idea through various stages of activity to create a sustainable enterprise. In all instances, the interventions are either:

- Social (public good), such as skills development and infrastructure establishment, or
- Economic, such as enterprise development and economic development structures.

Executed through partnership programmes with the private sector and the three tiers of government, the TTSI typically operates as technology and implementation agent for projects, such as:

- A hydroponics project in Beaufort West in the arid Northern Cape. (Hydroponics is the science of growing crops without soil and under controlled conditions of light, temperature, water and nutrients.) In 2006/07, this project received an award for its role in alleviating poverty and enhancing the quality of life of a poor community.
- The development of an essential oils and medicinal plants market sector in collaboration with the DST. The focus is on growing, extraction and processing activities of herbs such as buchu, lemon grass, African ginger and milk thistle. Most of these projects are based on CSIR-developed technologies.
- Leather beneficiation projects, entailing the creation of economic activities for rural communities through the value addition of leather. This is a poverty alleviation project of the DST undertaken in KwaZulu-Natal, North West and the Western Cape. It manufactures a range of professionally-designed leather products. This project has created at least 67 jobs in economically-depressed areas.



Other achievements during 2006/07 include the securing of a three-year memorandum of agreement between the TTSI and the DST to the value of R43,8 million, and the implementation of 26 projects situated in Limpopo, Mpumalanga, KwaZulu-Natal, the Eastern Cape, Free State, the Northern Cape and the Western Cape. These projects provide employment for more than 400 people located in under-developed areas. During the financial year, 10 PGWC projects were also implemented, employing about 180 people.

The TTSI is a strong contributor to B-BBEE objectives. All of its projects are black-owned and managed, i.e. more than 95% of board members are black, as are almost 100% of beneficiaries.

The TTSI ensures that all enterprises created are made aware of and are able to implement good governing principles. Some examples at a project level are:

- The use of drip irrigation instead of pivot or flood
- Recycling of water at the hydroponics project
- The use of high-tech mulch films aimed at water conservation on essential oils sites
- Ensuring that projects comply with safety, health and environment regulations, e.g. appropriate boiler certification; ladder registers; safety, emergency and evacuation procedures.

Stakeholder satisfaction with the TTSI's performance is high, as indicated by the increased funding allocated by the DST and the PGWC for the following three financial years. During the 2006/07 year, the TTSI had contracts to the value of R66,6 million.

Knowledge dissemination – outreach activities

In terms of knowledge dissemination, the CSIR participated in a number of outreach activities aimed at taking SET to learners and educators. Some highlights include:

- National Science Week in May 2006, where the CSIR participated in events held in Mpumalanga, Gauteng, KwaZulu-Natal, the Eastern Cape and Limpopo. An estimated 80 000 learners and educators attended interactive workshops and exhibitions
- Sasol SciFest in Grahamstown in March 2007, attended by 50 000 learners and educators. The CSIR offered demonstrations in laser science and engineering, space technology and computer programming
- ScienceUnlimited in Pretoria in March 2007, where the CSIR involved thousands of learners in 20 workshops. Workshops focused on learners' understanding of laser science and engineering, manufacturing and programming of PC boards and micro-controllers. Learners were also exposed to innovative construction products, building systems, sanitation and road products.

Targeted at key stakeholders, the CSIR supported the DST's International Science, Innovation and Technology Exhibition (INSITE) in October 2006, where the CSIR showcased 21 projects.





Establishment of the South African Intellectual Property (SAIP) fund

In 2004, the CSIR collaborated with the dti and private sector financial institutions to form an early-stage technology venture capital fund to provide capital to technologies that would form the basis of new business start-ups. The CSIR's involvement provided assistance with the implementation or completion of technologies, as well as an environment where people are exposed to early-stage technologies that could be commercialised.

The SAIP Fund makes long-term (three to seven years) equity investments in start-up, early-stage and expansion-stage South African technology companies that have significant growth potential and that are proposed by experienced entrepreneurs.

The fund actively promotes B-BBEE involvement at shareholder, director and operational levels in all its portfolio companies over the life of the investment and has minimum threshold criteria for black share ownership.

Since the fund's inception, it has reviewed 227 possible investment opportunities and invested in two portfolio companies, both in the start-up phase. One of these companies is in the pre-revenue phase whilst the other has generated revenues of R18,3 million up to December 2006.

In total, 11 projects seeking R132,95 million were reviewed. Of these projects, three (seeking R31,25 million from the fund) date from the last quarter of 2005. Eight projects requesting R101,70 million were appraised by the fund in the 2006 calendar year. By the end of March 2007, a further three projects totalling R33 million were approved. Additional investments of R15 million have been approved in principle, subject to terms being finally negotiated.

A fund of this nature aims to make its investments by its seventh year. The CSIR is well within these norms. The dti has allocated a sum to develop fund managers with experience in managing investment in early-stage technologies. The decision was to do this through the CSIR. The goal is to have the development programme formulated by the end of 2007. The CSIR has approved a programme in collaboration with SAVCA (South African Venture Capital Association) and several hundred candidates have been screened to a short list of eight potential appointees. Three people have been appointed and the recruitment process is ongoing.

Securing financial sustainability through operational excellence

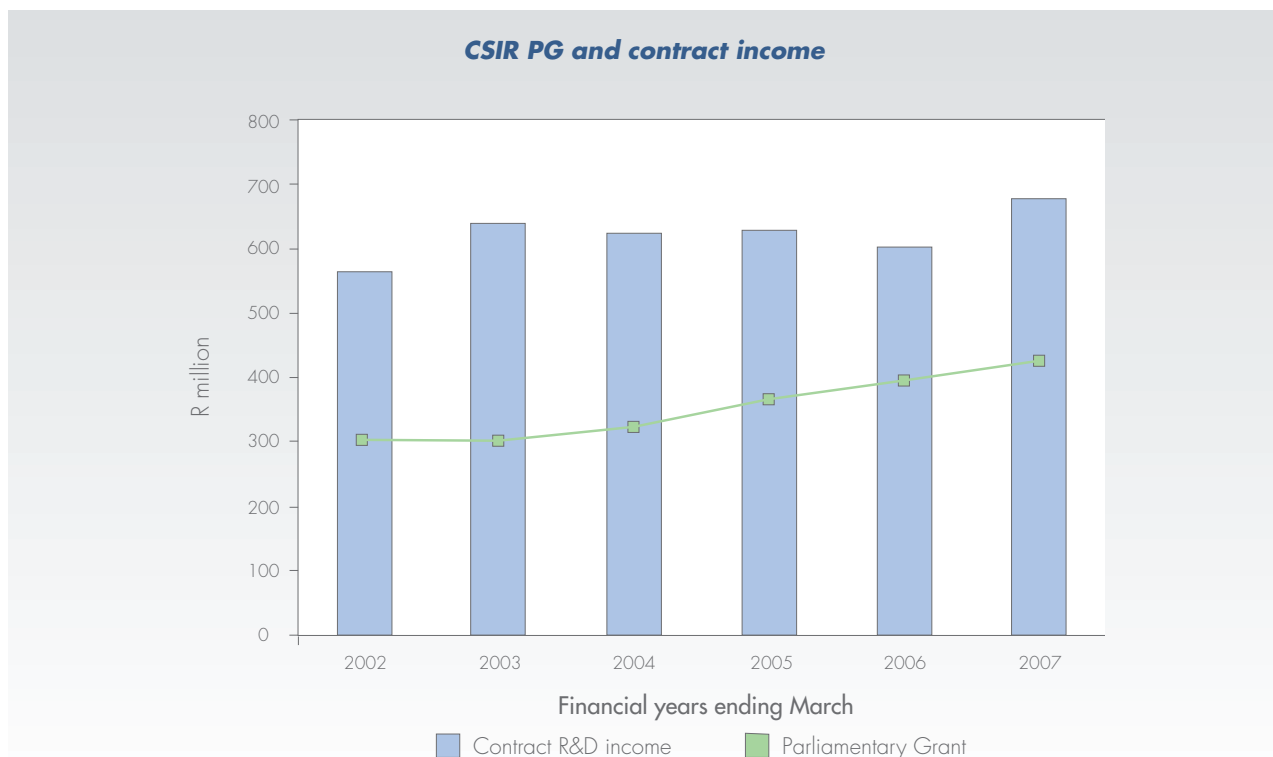
Financial performance overview

Income

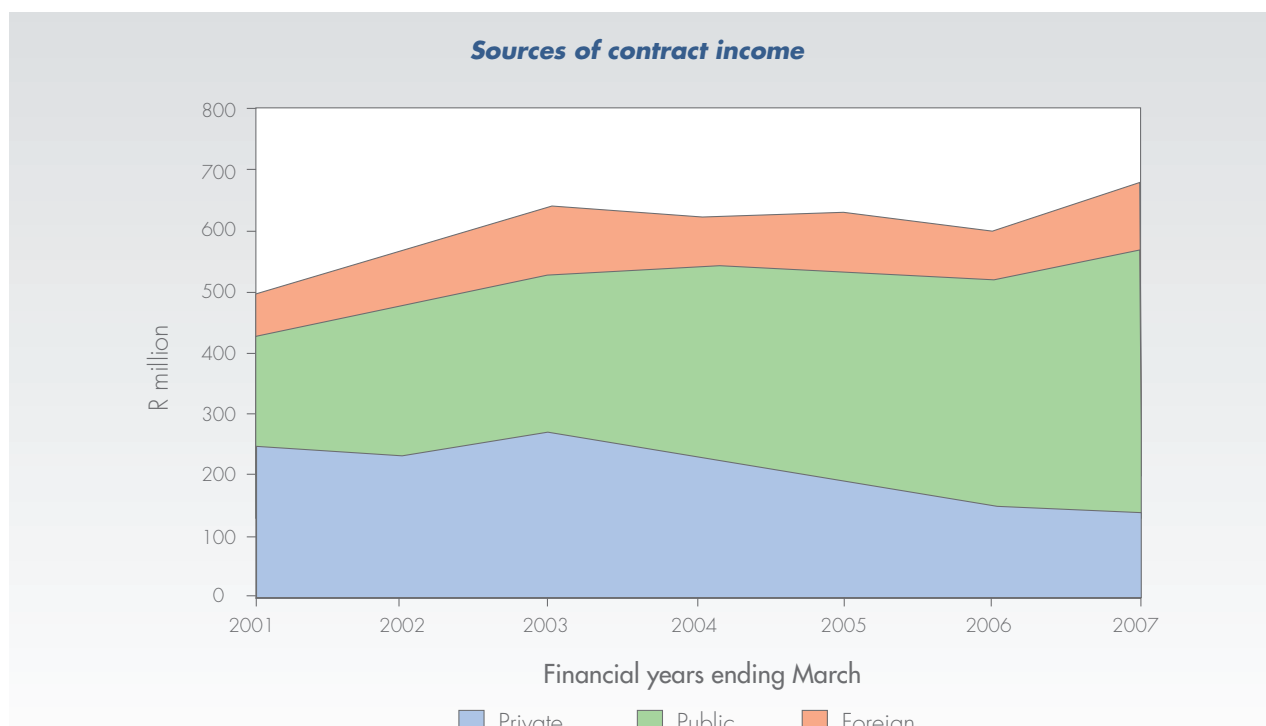
The Parliamentary Grant (PG) allocated to the CSIR, the key investment resource of the CSIR for the 2006/07 financial year, amounted to R423,8 million (2006: R394,4 million), which represents an increase of 7,5%.

The total contract income grew by 13,1%. The year-on-year growth since 2003 on the average income over the past five years reflects a growth of 5,4%.

The total operating revenue of the CSIR, excluding post-retirement medical benefits, increased by 12,7% to an amount of R1 121,4 million (2006: R994,3 million).



The CSIR's international income increased to R106 million in 2007 (2006: R82,2 million). As a key provider of technology solutions, the organisation's focus is on regional linkages through networks and alliances, internationally-financed projects and regional business development.



The CSIR Group operating revenue, excluding the post-retirement medical benefits, increased by R143,7 million (2006: a decrease of R5,1 million) to R1 151,6 million (2006: R1 007,9 million), an increase of 14,2%.

Five-year review of income and expense indicators

	2007 R'000	2006 R'000	2005 R'000	2004 R'000	2003 R'000
Total income	1 121 441	994 400	991 716	949 710	938 019
Parliamentary Grant recognised as income	428 055	391 077	356 992	321 996	295 429
External operating revenue including royalty and other income	693 386	603 323	634 724	627 714	642 590
Private sector	134 647	146 765	187 592	231 751	268 949
Public sector	435 391	370 892	345 472	311 265	261 010
International sector (incl Africa)	106 027	82 254	94 291	80 530	107 686
Royalties and other	17 321	3 412	7 369	4 168	4 945
Operating expenditure	1 131 375	1 047 745	987 348	948 481	934 368
Employee remuneration	584 822	624 202	557 593	527 722	482 723
Operating expenses	496 752	384 157	388 592	384 691	419 841
Depreciation	49 801	39 386	41 163	36 068	31 804

Net surplus and cash flow

The net surplus of the CSIR is R21,6 million (2006: R52,9 million). The prior year net surplus included a non-operational net actuarial gain of R56,6 million for the CSIR on the post-retirement medical aid liability. The full unfunded liability was settled with all eligible members in the 2006 financial year. The remaining liability on the balance sheet of R12,7 million is fully funded.

Cash flow generated from operating activities for the year being reported on was R341,4 million (2006: R146,6 million). The cash and cash equivalent holdings increased to R357,5 million (2006: R289,0 million).

Five-year ratio analysis

	2007 R'000	2006 R'000	2005 R'000	2004 R'000	2003 R'000
Operating expenses					
Remuneration as a % of total income (excl investment income)	52,1%	62,8%	56,2%	55,6%	51,5%
Remuneration as a % of total expenditure	51,7%	59,6%	56,5%	55,6%	51,7%
Asset management					
Net asset turn	3,2	2,9	2,7	2,8	2,9
Current ratio	0,9	1,0	1,2	1,2	1,3
Cash flow					
Net cash from operating activities	341 357	146 659	131 909	110 937	70 278
Cash and cash equivalents end of year	357 529	289 070	295 417	208 737	105 712

DEFINITIONS

- **Net asset turn** – Total revenue (incl investment income) divided by net assets
- **Current ratio** – Current assets divided by current liabilities
- The post-retirement medical benefit expense and liability, distribution from the National Laser Centre Trust (2004) and the effects of the adoption of SA GAAP, AC133: Financial instruments – recognition and measurement, have been excluded for comparison of financial indicators

Safety, occupational health, environmental and quality management

As a corporate citizen, the CSIR acknowledges its obligation to its employees and the communities it serves in conforming to safety, health and environmental laws and the internationally-accepted standards and practices. The CSIR maintained its certification to ISO14001 and OHSAS18001 and achieved a DIFR of 0,5 (below a target of <1,0) and a reduction in the number of claims to the Compensation Commissioner. Various units achieved certification and/or accreditation to ISO9001 and/or ISO17025. A protocol for the management of organisational policies and procedures was developed and a Policy Review Committee formed to review a number of organisational policies to ensure alignment with the Beyond 60 reconfiguration objectives.

With the emphasis on SET excellence, the CSIR adopted an integrated approach to management of business systems and more emphasis was placed on good laboratory practice (GLP) implementation, health and safety and environmental management. The CSIR is firmly on the road to achieving the highest standards of operational efficiency and effectiveness in all its activities and continuously improves its processes for the benefit of its stakeholders and clients.

Broad-based Black Economic Empowerment (B-BBEE) charter

In line with the B-BBEE policy, an implementation charter has been developed addressing all components of B-BBEE. This includes representation of black people in executive management and across the staff body, training and skills development for black employees, preferential procurement, stimulating the growth of empowered small and medium enterprises, and socio-economic development investments. Among others, the latter includes outreach mechanisms for popular knowledge dissemination and making technology available for public good.



CSIR imperatives: A panorama

CSIR imperatives	Performance area	Performance measure	2006/07 Target	CSIR 2006/07 performance
Strengthening the science and technology (S&T) base	Research and development (R&D) productivity	Total number of publication equivalents	230	220
		Total number of international patents and registered designs granted, and technology demonstrators	21	61
	R&D alliances and consortia	Maintain and increase engagement in National System of Innovation through research alliances and consortia	13	23
		Maintain and increase international R&D collaboration through active alliances with research institutes	14	22
	Mix of R&D activities	Contract R&D funding where the primary intent is building research capacity	R19,9 million	R66,9 million
		Mix of Types A, B, C and other activities calculated on turnover	Type A – 20% Type B – 40% Type C – 28 % Other – 12%	Type A – 44,8% Type B – 20,4% Type C – 8,8% Other – 26,0%
	Quality of R&D processes and practices	RAPs appointed in units to assist with strategic research decisions and SET quality management	RAPs in place in all research units and meeting twice per year to review Parliamentary Grant (PG) proposals, review PG projects and provide input into S&T strategy	RAPs are in place in all units and are reviewing the S&T pipeline, but are not yet issuing formal reports on the strength of competency areas
		Improved processes for management of PG investment	Value of PG deployed through directed funding streams (incl ERAs) increased by 30% from 2005/06; 50% of core PG allocated to projects on a competitive basis within research units; SIMS up to date; portfolio and pipeline management initiated in all research units; 2007/08 core PG allocations to units determined on a performance basis	PG allocation to research has increased significantly; all such allocations are now made on a competitive basis
		Investment of CSIR funds in scientific equipment and research infrastructure	R54 million	R79,2 million

CSIR imperatives	Performance area	Performance measure	2006/07 Target	CSIR 2006/07 performance
Building and transforming human capital	Status of human capital	Total number of doctoral degrees	215	237
		Total number of Master's degrees	382	402
		Number of interns and postdoctoral research grant holders	130	Postdoctorates – 4 Interns – 80 In-service trainees – 46 SETA learners – 15 Postgraduate students – 16 Total – 161
		Number of staff who are classified as researchers	845	845
		Number of staff who are classified as professionals	1 252	1 336
		Total number of newly qualified doctorates	13	26
		Total number of newly qualified Master's	25	48
		Intensity of employee training as days per fulltime equivalent	3	4,40
		Indicator of staff commitment, loyalty and satisfaction	Basis of measurement to be determined	The revised methodology is to be implemented in 2007/08
		Staff demographics	Total number of black doctorates	72
	Total number of female doctorates		50	57
	Total number of black Master's		125	142
	Total number of female Master's		139	152
	Black researchers as percentage of research staff		31,7%	36,0%
	Female researchers as percentage of research staff		28,9%	31,4%
	Black professionals as percentage of professional staff		35,4%	39,1%
	Female professionals as percentage of professional staff		33,5%	34,9%
	Total number of newly qualified black doctorates		8	13
	Total number of newly qualified female doctorates		8	10

CSIR imperatives: A panorama (continued)

CSIR imperatives	Performance area	Performance measure	2006/07 Target	CSIR 2006/07 performance
Building and transforming human capital (continued)	Staff demographics (continued)	Total number of newly qualified black Master's	12	29
		Total number of newly qualified female Master's	8	14
Performing relevant knowledge generating research and transferring technology and skilled human capital	Quality of contract R&D	Value of R&D formally recognised in support of relevant national strategies, e.g. S&T missions of the National R&D Strategy, Aerospace Industry Support, Logistics, AMTS, AMI, Mining Charter	R156 million	R274,34 million
		Value of active R&D involvement formally recognised in support of South Africa's NEPAD interactions	R9,4 million	R8,3 million
		Proportion of all contract R&D, i.e. R&D income excluding PG funded under multi-year strategic research agreements by public sector stakeholders	50,3%	55,5%
		Proportion of all contract R&D, i.e. R&D income excluding PG funded under multi-year strategic research agreements by active private sector stakeholders	5,7%	9,4%
		Health of strategic stakeholder relationships	Basis of measurement to be determined	The enhancements to the customer satisfaction survey have been effected and are to be implemented for the 2007/08 financial year
		R&D outcomes	Governance and strategies for implementation of intellectual property (IP) and commercialisation	Updated CSIR policy adopted and formal structures to support implementation in all units
	Strategies and practices to promote application of R&D outcomes for public good, including knowledge dissemination		Mechanisms in place in all units for implementing CSIR R&D Outcomes policy and practices	Through directed interactions within the CSIR, a range of technologies suited for public good application has been identified and implementation is taking place on selected technologies

CSIR imperatives	Performance area	Performance measure	2006/07 Target	CSIR 2006/07 performance
	R&D outcomes (continued)	Revenue from IP royalties, software licences, specialised publications, etc.	R6,5 million	R10,8 million
		Number of new arrangements formalised for routine supply of CSIR technology to the market or society	20	37
Securing financial sustainability through operational excellence	Sustainability and operational excellence	Total contract R&D revenue (before GAAP fair value adjustments)	R699,9 million	R653,8 million
		Net margin (before VBPM bonuses and nonoperational adjustments)	R27,4 million	R56,1 million
		Direct R&D human resources expressed as percentage of total cost less project direct external costs	39,2%	40,1%
	Governance	Adherence to standards of good corporate governance	No audit queries of material significance	No audit queries of material significance
		Progress with quality system implementation e.g. ISO9001:2000	Internal review of quality system documentation commenced in all units	An internal review of quality management system has been implemented in all units. With the exception of one operating unit and research centre, units have held internal and external quality audits
		Disabling injury frequency rate	1,00	0,58
		Retention of ISO14001 & OHSAS18001 certification	Certification retained by all units	Units which were certified to ISO9001:2000 and ISO17025 quality management standards maintained their certification after third party audits
		Broad-based black economic empowerment (B-BBEE) charter	Developed and formally adopted	The strategy and plan for B-BBEE implementation in the CSIR have been prepared. Systems are being put in place aligned with the requirements for monitoring performance on all dimensions of BBBEE
		Energy consumption	1,2%	The baseline energy consumption report has been completed. Short-term energy savings measures have been implemented that have resulted in a 1,3% energy savings against the baseline

Annual Financial Statements

Income Statements

for the year ended 31 March 2007

	Notes	GROUP		CSIR	
		2007 R'000	2006 R'000	2007 R'000	2006 R'000
Revenue	2	1 143 185	1 006 680	1 114 928	993 725
Other income		8 448	1 233	6 513	674
Post-retirement medical benefits	18.4	2 146	92 410	2 146	92 410
Total operating income		1 153 779	1 100 323	1 123 587	1 086 809
Expenditure					
Employees' remuneration		594 974	634 196	584 822	624 202
Depreciation and amortisation	6 & 7	50 682	40 239	49 801	39 386
Operating expenses		510 700	380 794	496 752	384 157
Total operating expenditure		1 156 356	1 055 229	1 131 375	1 047 745
Finance income	4	36 588	31 544	35 717	31 159
Finance cost	4	(6 376)	(17 398)	(6 285)	(17 256)
Share of deficit of joint ventures and associates		(999)	(1 114)	-	-
Operating surplus for the year before taxation		26 636	58 126	21 644	52 967
Income tax expense	5	(103)	(7)	-	-
Surplus for the year		26 533	58 119	21 644	52 967
Attributable to:					
Stakeholders		26 533	58 119	21 644	52 967
Surplus for the year		26 533	58 119	21 644	52 967

Balance Sheets

31 March 2007

	Notes	GROUP		CSIR	
		2007 R'000	2006 R'000	2007 R'000	2006 R'000
ASSETS					
Non-current assets					
Property, plant and equipment	6	218 855	299 511	218 485	299 236
Intangible assets	7	280	628	–	–
Interest in joint ventures and associates	8	–	16 983	1	15 000
Interest in subsidiaries	9			18 115	12 341
Other investments	10	200 000	859	200 000	859
Current assets					
Trade and other receivables	11	146 906	159 980	141 606	156 844
Inventory and contracts in progress	12	43 203	46 866	43 203	46 866
Cash and cash equivalents	25	379 243	294 011	357 529	289 070
Non-current asset held for sale	6.1	95 070	–	95 070	–
TOTAL ASSETS		1 083 557	818 838	1 074 009	820 216
EQUITY AND LIABILITIES					
Reserves					
Retained earnings		334 723	308 190	333 795	312 151
Self-insurance reserve		10 750	10 750	10 750	10 750
Non-distributable reserve:					
Foreign currency translation reserve		2 243	989		
Non-current liabilities					
Post-retirement medical benefits	18.4	12 751	14 897	12 751	14 897
Deferred tax liabilities	13	13	19	–	–
Current liabilities					
Advances received	14	356 576	172 461	356 576	172 461
Trade and other payables	15	294 253	246 232	287 889	244 660
Provisions	16	72 248	65 300	72 248	65 297
TOTAL EQUITY AND LIABILITIES		1 083 557	818 838	1 074 009	820 216

Statements of Changes in Equity

for the year ended 31 March 2007

	Retained earnings	Self-insurance reserve*	Non distributable reserve**	Total
GROUP				
Balance at 31 March 2005	250 071	10 750	1 564	262 385
Surplus for the year	58 119	–	–	58 119
Exchange differences arising from translations of foreign operations	–	–	(575)	(575)
Balance at 31 March 2006	308 190	10 750	989	319 929
Surplus for the year	26 533	–	–	26 533
Exchange differences arising from translations of foreign operations	–	–	1 254	1 254
Balance at 31 March 2007	334 723	10 750	2 243	347 716
CSIR				
Balance at 31 March 2005	259 184	10 750	–	269 934
Surplus for the year	52 967	–	–	52 967
Balance at 31 March 2006	312 151	10 750	–	322 901
Surplus for the year	21 644	–	–	21 644
Balance at 31 March 2007	333 795	10 750	–	344 545

* Refer to note 20

** The non-distributable reserve consists of a foreign currency translation reserve. The translation reserve comprises all foreign currency differences arising from the translation of the financial statements of foreign operations as well as from the translation of liabilities that hedge the Group's net investment in a foreign subsidiary, if applicable

Cash Flow Statements

for the year ended 31 March 2007

	Notes	GROUP		CSIR	
		2007 R'000	2006 R'000	2007 R'000	2006 R'000
Cash flow from operating activities					
Cash receipts from external customers		745 861	627 230	717 593	611 214
Parliamentary Grant received		423 854	394 429	423 854	394 429
Cash paid to suppliers and employees		(843 914)	(910 473)	(829 116)	(890 143)
Cash generated by operations	24	325 801	111 186	312 331	115 500
Net finance income	4	29 806	31 402	29 026	31 159
Income taxes paid		(109)	(12)	-	-
Net cash from operating activities		355 498	142 576	341 357	146 659
Cash flow from investing activities					
Property, plant and equipment acquired		(65 984)	(119 359)	(65 803)	(119 278)
Proceeds on disposal of property, plant and equipment		427	4 299	127	4 266
Increase in net interest in subsidiaries		-	-	(1 801)	(1 197)
Deregistration of subsidiary	28	(4)	-	-	-
Disposal of interest in subsidiaries	27	-	4	-	-
(Increase)/decrease in interest in joint ventures and associates		(913)	2 729	(914)	2 729
Increase in investments		(200 000)	-	(200 000)	-
Acquisition of long-term patents		(459)	(368)	-	-
Net cash used in investing activities		(266 933)	(112 695)	(268 391)	(113 480)
Cash flow from financing activities					
Decrease in long-term liabilities		(4 507)	(39 526)	(4 507)	(39 526)
Net cash used in financing activities		(4 507)	(39 526)	(4 507)	(39 526)
Net increase/(decrease) in cash and cash equivalents					
		84 058	(9 645)	68 459	(6 347)
Cash and cash equivalents at beginning of the year		294 011	304 209	289 070	295 417
Effect of foreign exchange rate changes		1 174	(553)	-	-
Cash and cash equivalents at the end of the year	25	379 243	294 011	357 529	289 070

Notes to the Annual Financial Statements

for the year ended 31 March 2007

1 PRINCIPAL ACCOUNTING POLICIES

The consolidated annual financial statements are prepared on the historical cost basis except for financial instruments held for trading and financial instruments classified as available-for-sale, stated at fair value in accordance with statements of South African Generally Accepted Accounting Practice (SA GAAP) and the Public Finance Management Act (Act 1 of 1999 as amended by Act 29 of 1999). The following principal accounting policies have been consistently applied by group entities in all material respects.

The preparation of financial statements requires management to make judgements, estimates and assumptions that affect the application of policies and reported amounts of assets and liabilities, income and expenses. The estimates and associated assumptions are based on historical experience and various other factors that are believed to be reasonable under the circumstances, the result of which forms the basis of making judgements about carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates.

The consolidated annual financial statements are presented in South African rand (R) and are rounded off to the nearest thousand.

Basis of consolidation

Interest in subsidiaries

The consolidated annual financial statements incorporate the annual financial statements of the CSIR and the annual financial statements of the entities under its control from the date that control commences until the date that control ceases. Control exists when the CSIR has the power to govern the financial and operating policies of an investee entity so as to obtain benefits from its activities.

On acquisition, the assets and liabilities of the relevant subsidiaries are measured at their fair values at the date of acquisition. The interest of minority shareholders is stated at the minority's proportion of the fair values of the assets and liabilities recognised. The operating results of subsidiaries acquired or disposed of during the reporting period are included in the consolidated income statement from the effective date of acquisition or up to the effective date of disposal. All significant inter-company balances between group entities have been eliminated on consolidation.

Where a group enterprise transacts with a subsidiary company, unrealised gains and losses are eliminated in preparing the consolidated financial statements.

Any excess of net assets of a subsidiary over the cost of an acquisition is treated in terms of the Group's accounting policy on goodwill.

Interest in associates

An associate is an entity over which the Group is in a position to exercise significant influence, but not control, through participation in the financial and operating policy decisions of the investee. The Group share of the total recognised gains and losses of associates is incorporated in the consolidated financial statements, from the date that significant influence commences until the date that significant influence ceases, using the equity method of accounting. The carrying amount of such interests is reduced to recognise any impairment, other than a temporary impairment, in the value of individual investments.

Where a group enterprise transacts with an associate company, unrealised gains and losses are eliminated to the extent of the group's interest in the relevant associate company, except where unrealised losses provide evidence of an impairment of the asset transferred.

Any excess of net assets of an associate over the cost of an acquisition is treated in terms of the Group's accounting policy on goodwill.

Notes to the Annual Financial Statements

for the year ended 31 March 2007

1 PRINCIPAL ACCOUNTING POLICIES (continued)

Interest in joint ventures

A joint venture is a contractual arrangement whereby the CSIR and other parties undertake economic activity, which is subject to joint control.

Interests in jointly-controlled entities are accounted for by means of the equity method from the date that joint control commences until the date that joint control ceases. The carrying amount of such interests is reduced to recognise any impairment, other than a temporary impairment, in the value of individual investments.

Where a group enterprise transacts with a joint venture, unrealised gains and losses are eliminated to the extent of the group's interest in the relevant joint venture, except where unrealised losses provide evidence of an impairment of the asset transferred.

Any excess of net assets of a joint venture over the cost of an acquisition is treated in terms of the Group's accounting policy on goodwill.

Foreign currencies

Foreign operations

All foreign subsidiaries of the CSIR are foreign operations.

The financial statements of foreign subsidiaries are translated into South African rand as follows:

- Assets and liabilities, including goodwill and fair value adjustments on consolidation, at rates of exchange ruling at the reporting entities' financial year end
- Revenue, expenditure and cash flow items at the average rates of exchange during the relevant financial year (the average rates approximate fair value).

Differences arising on translation are reflected as non-distributable reserves called a foreign currency translation reserve.

Foreign currency transactions and balances

Transactions in foreign currencies are converted to South African rand at the rate of exchange ruling at the date of the transactions. Monetary assets and liabilities denominated in foreign currencies are stated in South African rand using the rates of exchange ruling on the balance sheet date. The resulting exchange differences are dealt with in the income statement. Non-monetary assets and liabilities stated at fair value are translated at foreign exchange rates ruling at the date the fair value was determined.

Notes to the Annual Financial Statements

for the year ended 31 March 2007

1 PRINCIPAL ACCOUNTING POLICIES (continued)

Property, plant and equipment

Owned assets

Land is stated at cost less accumulated impairment losses. Buildings, plant, equipment and vehicles are stated at cost less accumulated depreciation and accumulated impairment losses.

The cost of self-constructed assets includes the cost of materials, direct labour, the initial estimate, where relevant, of the costs of dismantling and removing the items and restoring the site on which they are located and an appropriate proportion of production overheads.

Where parts of an item of property, plant and equipment have different useful lives, they are accounted for as separate items of property, plant and equipment.

Leased assets

Assets acquired by way of finance lease are stated at an amount equal to the lower of the fair value and the present value of the minimum lease payments at inception of the lease, less accumulated depreciation and impairment losses. Assets held under finance leases are depreciated over their expected useful lives on the same basis as owned assets or, where shorter, the term of the relevant lease.

Subsequent costs

The Group recognises in the carrying amount of an item of property, plant and equipment the cost of replacing a part of such an item when that cost is incurred if it is probable that the future economic benefits embodied in the item will flow to the Group and the cost of the item can be measured reliably. All other costs are recognised in the income statement as an expense when incurred.

Depreciation

Depreciation is based on cost and calculated on the straight-line method from the day the assets are available for use, at rates considered appropriate to write off carrying values over the estimated useful lives of the assets, except for:

- Assets specifically acquired for a contract, which are depreciated over the life of the contract
- Strategic assets of limited commercial application, which are written down to expected future commercial recoverable value at acquisition, with the remaining carrying value depreciated over the estimated useful lives of the assets.

The estimated lives of the main categories of property, plant and equipment are as follows:

- Buildings : 40 years
- Plant : 10 years
- Equipment : 3 to 10 years
- Vehicles : 5 years

The gain or loss arising on the disposal of an asset is determined as the difference between the sales proceeds and the carrying amount of the asset and is recognised in gain or loss.

Depreciation methods, useful lives and current residual values, if not insignificant, are reassessed annually.

Notes to the Annual Financial Statements

for the year ended 31 March 2007

1 PRINCIPAL ACCOUNTING POLICIES (continued)

Intangible assets

Research and development

Expenditure on research activities, undertaken with the prospect of gaining new scientific or technical knowledge and understanding, is recognised in profit or loss when incurred.

Development activities involve a plan or design for the production of new or substantially improved products and processes. Development expenditure is capitalised only if development costs can be measured reliably, the product or process is technically and commercially feasible, future economic benefits are probable, and the Group intends to and has sufficient resources to complete development and to use or sell the asset. The expenditure capitalised includes the cost of materials, direct labour and overhead costs that are directly attributable to preparing the asset for its intended use. Other development expenditure is recognised in profit or loss when incurred.

Capitalised development expenditure is measured at cost less accumulated amortisation and accumulated impairment losses.

Investment in technology

Investment in technology licencing projects and dividend producing rights is capitalised at cost and is stated at cost less accumulated amortisation and accumulated impairment losses. Investment in technology is amortised over the expected useful life or is impaired based on its viability, whichever is the shorter.

Development expenditure and intellectual property

Development expenditure and intellectual property consist of capitalised development costs as approved by the Board. Capitalisation is limited to the present value of expected net future income (refer to research and development).

Goodwill

Goodwill arising on consolidation represents the excess of the cost of an acquisition over the fair value of the Group's interest of the net assets of the acquired subsidiary, associate or joint venture at the date of the acquisition (refer to basis of consolidation, interest in associates and interest in joint ventures). All business combinations are accounted for by applying the purchase method.

Goodwill arising from the acquisition of a joint venture or an associated company is included within the carrying amount of the joint venture or associated company. Goodwill arising from a subsidiary is presented separately in the balance sheet and tested annually for impairment and is stated at cost less accumulated impairment losses. Goodwill is allocated to cash-generating units. On disposal of a subsidiary, joint venture or associated company, the attributable amount of goodwill is included in the determination of the profit or loss on disposal.

When an excess arising on an acquisition is negative (negative goodwill), it is recognised directly in profit.

Subsequent costs

Subsequent expenditure on capitalised intangible assets is capitalised only when it increases the future economic benefits embodied in the specific asset to which it relates. All other expenditure is expensed as incurred.

Amortisation

Amortisation is based on cost and calculated on the straight-line method at rates considered appropriate to write off carrying values over the estimated useful lives of the intangible assets with definite useful lives. Intangible assets are amortised from the day they are available for use.

The estimated lives of intangible assets with definite useful lives are as follows:

- Investment in technology : 3 to 10 years
- Development expenditure and intellectual property : 1 to 3 years

Notes to the Annual Financial Statements

for the year ended 31 March 2007

1 PRINCIPAL ACCOUNTING POLICIES (continued)

Impairment

Financial assets

A financial asset is considered to be impaired if objective evidence indicates that one or more events have had a negative effect on the estimated future cash flows of that asset.

An impairment loss in respect of a financial asset measured at amortised cost is calculated as the difference between its carrying amount, and the present value of the estimated future cash flows discounted at the original effective interest rate. An impairment loss in respect of an available-for-sale financial asset is calculated by reference to its current fair value.

Individually significant financial assets are tested for impairment on an individual basis. The remaining financial assets are assessed collectively in groups that share similar credit risk characteristics.

All impairment losses are recognised in profit or loss. Any cumulative loss in respect of an available-for-sale financial asset recognised previously in equity is transferred to profit or loss.

An impairment loss is reversed if the reversal can be related objectively to an event occurring after the impairment loss was recognised. For financial assets measured at amortised cost and available-for-sale financial assets that are debt securities, the reversal is recognised in profit or loss. For available-for-sale financial assets that are equity securities, the reversal is recognised directly in equity.

Non-financial assets

The carrying amounts of the Group's non-financial assets, other than biological assets, investment property, inventories and deferred tax assets, are reviewed at each reporting date to determine whether there is any indication of impairment. If any such indication exists then the asset's recoverable amount is estimated. For goodwill and intangible assets that have indefinite lives or that are not yet available for use, the recoverable amount is estimated at each reporting date.

An impairment loss is recognised if the carrying amount of an asset or its cash-generating unit exceeds its recoverable amount. A cash-generating unit is the smallest identifiable asset group that generates cash flows that largely are independent from other assets and groups. Impairment losses are recognised in profit or loss. Impairment losses recognised in respect of cash-generating units are allocated first to reduce the carrying amount of any goodwill allocated to the units and then to reduce the carrying amount of the other assets in the unit (group of units) on a pro rata basis.

The recoverable amount of an asset or cash-generating unit is the greater of its value in use and its fair value less costs to sell. In assessing value in use, the estimated future cash flows are discounted to their present value using a pre-tax discount rate that reflects current market assessments of the time value of money and the risks specific to the asset.

An impairment loss in respect of goodwill is not reversed. In respect of other assets, impairment losses recognised in prior periods are assessed at each reporting date for any indications that the loss has decreased or no longer exists. An impairment loss is reversed if there has been a change in the estimates used to determine the recoverable amount. An impairment loss is reversed only to the extent that the asset's carrying amount does not exceed the carrying amount that would have been determined, net of depreciation or amortisation, if no impairment loss had been recognised.

Non-current assets held for sale

Non-current assets (or disposal groups comprising assets and liabilities) that are expected to be recovered primarily through sale rather than through continuing use are classified as held for sale. Immediately before classification as held for sale, the assets (or components of a disposal group) are remeasured in accordance with the Group's accounting policies. Thereafter generally the assets (or disposal group) are measured at the lower of their carrying amount and fair value less cost to sell.

Notes to the Annual Financial Statements

for the year ended 31 March 2007

1 PRINCIPAL ACCOUNTING POLICIES (continued)

Retirement benefits

Pension fund

The Group operates a defined contribution plan, the assets of which are held in a separate trustee-administered fund. The benefits payable by the fund in the future, due to retirements and withdrawals from the fund, are contributions by members to the fund together with fund interest at a rate determined by the valuator with the consent of the trustees. The rate is so determined that the value of the total of the fund shall not exceed the value of the total assets of the fund. The Group's contribution to the plan is charged to the income statement when incurred.

Post-retirement benefits other than pensions

The Group provides post-retirement medical benefits to qualifying employees. The expected costs of these benefits are determined using the projected unit credit method, with actuarial valuations being carried out at each balance sheet date. Contributions are made to the relevant funds over the expected service lives of the employees entitled to those funds. The estimated cost of providing such benefits is charged to the income statement on a systematic basis over the employees' working lives within the Group.

Actuarial gains and losses are recognised in full in the income statement in the year when actuarially determined. The amount recognised in the balance sheet represents the present value of the post-retirement medical aid contribution reduced by the fair value of the plan assets. Any asset resulting from this calculation is limited to actuarial losses and the present value of available refunds and reductions in future contributions to the plan.

Inventory and contracts in progress

Raw materials and finished goods are stated at the lower of cost and net realisable value. Cost of inventory is determined by the weighted average method. Net realisable value represents the estimated selling price less all estimated costs to completion and costs to be incurred in selling.

Contracts in progress are stated as a percentage of the sales value of work completed, after provision for losses relating to the stage of completion and any foreseeable losses to completion of the contract.

Taxation

The charge for taxation is based on the profit or loss for the year as adjusted for items that are non-taxable or disallowed. It is calculated using tax rates that have been enacted or substantially enacted at the balance sheet date. Income tax expense is recognised in profit or loss except to the extent that it relates to items recognised directly in equity, in which case it is recognised in equity.

Deferred tax is accounted for using the balance sheet liability method in respect of temporary differences arising from differences between the carrying amounts of assets and liabilities in the financial statements and the corresponding tax basis used in the computation of the taxable profit.

Where the tax effects of temporary differences, including those arising from tax losses, give rise to a deferred tax asset, the asset is recognised only if it is probable that future taxable profits will be sufficient to allow the tax benefit of the loss to be realised.

Deferred tax assets and liabilities are offset when they relate to income taxes levied by the same taxation authority and the Group intends to settle its current tax assets and liabilities on a net basis.

The amount of deferred tax provided is based on the expected manner of realisation or settlement of the carrying amount of assets and liabilities using tax rates enacted or substantively enacted at the balance sheet date. Deferred tax is charged to the income statement except to the extent that it relates to a transaction that is recognised directly in equity. The effect on deferred tax of any changes in tax rates is recognised in the income statement except to the extent that it relates to items previously charged or credited directly to equity.

Notes to the Annual Financial Statements

for the year ended 31 March 2007

1 PRINCIPAL ACCOUNTING POLICIES (continued)

Provisions

Provisions are recognised when the Group has a present legal or constructive obligation as a result of past events, for which it is probable that an outflow of economic benefits will be required to settle the obligation, and a reliable estimate can be made of the amount of the obligation. Provisions are determined by discounting the expected future cash flows at a pre-tax rate that reflects current market assessments of the time value of money and the risks specific to the liability.

Government grants

Government grants are recognised as income on a systematic basis over periods necessary to match the assistance with the related costs it is intended to compensate.

Grants that compensate the Group for the cost of an asset are deducted in arriving at the carrying amount of the acquired asset.

Revenue recognition

Revenue from the sale of goods is measured at the fair value of the consideration received or receivable, net of returns and allowances, trade discounts and volume rebates. Revenue is recognised when the significant risks and rewards of ownership have been transferred to the buyer, recovery of the consideration is probable, the associated costs and possible return of goods can be estimated reliably, and there is no continuing management involvement with the goods.

Revenue comprises:

- The net invoiced value of research, development and implementation contracts, excluding Value Added Tax
- Income acknowledged on contracts in progress is recognised in the income statement in proportion to the stage of completion of the transaction at the balance sheet date. The stage of completion is assessed by reference to work performed as at balance sheet date
- The annual Parliamentary Grant adjusted for the grant received for projects started before year end, but not completed as detailed above (see government grant)
- Royalties are accrued based on the stipulations of the applicable contracts.

Finance income

Finance income comprises interest receivable on funds invested, dividend income, fair value adjustments on investments and interest payable on borrowings. Interest income is recognised in the income statement as it accrues, using the effective interest rate method. Dividend income is recognised in the income statement on the date the entity's right to receive payments is established (which is when the dividend is declared). Interest payable on borrowings is calculated using the effective interest rate method.

Expenses

Operating lease payments

Payments made under operating leases are recognised in the income statement on a straight-line basis over the term of the lease. Lease incentives received are recognised in the income statement as an integral part of the total lease expense.

Finance lease payments

Minimum lease payments are apportioned between the finance charge and the reduction of the outstanding liability. The finance charge is allocated to each period during the lease term so as to produce a constant periodic rate of interest on the remaining balance of the liability.

Financial instruments

Financial instruments are initially measured at fair value plus, for instruments not at fair value through profit or loss, any directly attributable transaction costs, when the Group has become a party to contractual provision of the instrument. Subsequent to initial recognition, these instruments are measured as set out as follows:

Notes to the Annual Financial Statements

for the year ended 31 March 2007

1 PRINCIPAL ACCOUNTING POLICIES (continued)

Trade and other receivables

Trade receivables are subsequently measured at amortised cost using the effective interest method less any impairment losses, which approximate their fair value due to the short-term nature thereof.

Receivables originated by the Group and not held for trading are measured at amortised cost using the effective interest rate method if they have a fixed maturity.

Investments and loans

Investments, other than in subsidiaries, associates or joint ventures, are recognised at fair value. Dividends are accounted for on the last day of registration in respect of listed investments and when declared in respect of unlisted investments. On disposal of an investment, the difference between the net disposal proceeds and the carrying amount is charged or credited to the income statement.

Loans are measured at amortised cost using the effective interest rate method if they have a fixed maturity, or at cost if there is no fixed maturity.

Cash and cash equivalents

Cash on hand is stated at face value, which is its fair value. Cash and cash equivalents comprise bank balances, cash on deposit and cash on hand.

Forward exchange contracts

Forward exchange contracts are fair valued and gains and losses are recognised in the income statement. Hedge accounting is not applied.

Trade and other payables and advances received

Trade and other payables and advances received are stated at amortised cost, which approximates their fair value due to the short-term nature thereof.

De-recognition

Financial assets (or a portion thereof) are de-recognised when the Group realises the rights to the benefits specified in the contract, the rights expire or the Group surrenders or otherwise loses control and does not retain substantially all risks and rewards of the asset. On de-recognition, the difference between the carrying amount of the financial asset and proceeds receivable is included in the income statement.

Financial liabilities (or a portion thereof) are de-recognised when the obligation specified in the contract is discharged, cancelled or expires. On de-recognition, the difference between the carrying amount of the financial liability and amount paid for it is included in the income statement.

Fair value methods and assumptions

The fair value of financial instruments traded in an organised financial market is measured at the applicable quoted prices necessary to realise the asset or settle the liability.

The fair value of financial instruments not traded in an organised financial market is determined using a variety of valuation methods and assumptions that are based on market conditions and risk existing at balance sheet date, including independent appraisals and discounted cash flow methods.

Related parties

The Group operates in an economic environment currently dominated by entities directly or indirectly owned by the South African government. As a result of the constitutional independence of all three spheres of government in South Africa, only parties within the national sphere of government will be considered to be related parties.

Key management is defined as being individuals with the authority and responsibility for planning, directing and controlling the activities of the entity. All individuals from the level of Group Executive up to the Board of Directors are regarded as key management.

Close family members of key management are considered to be those family members who may be expected to influence, or be influenced by key management individuals or other parties related to the entity.

Notes to the Annual Financial Statements

for the year ended 31 March 2007

	GROUP				CSIR			
	2007		2006		2007		2006	
	R'000	%	R'000	%	R'000	%	R'000	%
2 REVENUE								
Parliamentary Grant	428 055	38	391 077	39	428 055	39	391 077	40
Parliamentary Grant received	423 854	37	394 429	39	423 854	38	394 429	40
Less:								
Grant received for projects started before year end but not completed	(27 079)	(2)	(31 280)	(3)	(27 079)	(2)	(31 280)	(3)
Add:								
Grant received in prior year for projects completed in this year	31 280	3	27 928	3	31 280	3	27 928	3
National Metrology Laboratory grant	32 388	3	30 554	3	32 388	3	30 554	3
Contract income	660 587	58	581 602	58	643 677	58	569 357	57
Private sector	134 111	12	146 992	15	134 647	12	146 765	15
Public sector	403 003	35	340 338	34	403 003	36	340 338	34
International sector (including Africa)	123 473	11	94 272	9	106 027	10	82 254	8
Royalties	22 155	1	3 447	-	10 808	-	2 737	-
	1 143 185	100	1 006 680	100	1 114 928	100	993 725	100

Total contract income above is net of a fair value adjustment of R10,179 million (2006: R13,340 million)

Estimates on Parliamentary Grant recognition are based on cost to completion, budgets and percentage of completion

Notes to the Annual Financial Statements

for the year ended 31 March 2007

	GROUP		CSIR	
	2007 R'000	2006 R'000	2007 R'000	2006 R'000
3 OPERATING SURPLUS				
The net operating surplus is arrived at after taking the following items into account:				
Auditors' remuneration	2 613	2 444	2 410	2 233
Audit fees	2 613	2 322	2 410	2 198
Expenses	–	122	–	35
Fees for services	4 022	3 814	3 569	3 100
Patent costs	2 962	3 361	2 770	2 820
Legal costs	1 060	453	799	280
Operating leases	14 046	16 176	13 998	15 762
Buildings	4 258	5 496	4 224	5 146
Equipment	7 545	8 335	7 531	8 283
Vehicles	2 243	2 345	2 243	2 333
Net realised foreign exchange (gain)/loss	(7 715)	157	(6 899)	147
Net unrealised foreign exchange loss/(gain)	418	(806)	418	(810)
Board members' and executive management's emoluments (note 19)	13 767	11 688	11 278	8 158
Impairments	19 996	1 924	14 952	10 618
Impairment on loans to subsidiaries, joint ventures & associates	19 587	–	24 031	10 680
Reversal on impairment to subsidiaries, joint ventures and associates	–	–	(9 401)	–
Impairment/(reversal on impairment) on trade receivables	330	(329)	322	(317)
Impairment on stock	–	255	–	255
Impairment on intangible assets	79	1 998	–	–
Provision for bonuses and leave	42 552	36 777	42 552	36 777
Lost and/or stolen equipment	527	626	527	626
Damaged equipment	68	512	68	512
Theft and/or damage to hired vehicles	585	452	585	452
Loss on disposal of property, plant and equipment	1 268	2 002	1 556	1 993
Profit on disposal of interest in subsidiary	–	4	–	–
Loss on disposal and deregistration of interest in subsidiary	4	–	–	–

Notes to the Annual Financial Statements

for the year ended 31 March 2007

	GROUP		CSIR	
	2007 R'000	2006 R'000	2007 R'000	2006 R'000
4 FINANCE INCOME/COST				
Finance income	36 588	31 544	35 717	31 159
Interest on bank balances and investments	26 409	18 204	25 538	17 819
Fair value adjustment on initial recognition of contract income	10 179	13 340	10 179	13 340
Finance cost	(6 376)	(17 398)	(6 285)	(17 256)
Interest paid on loans and liabilities	(91)	(142)	-	-
Fair value adjustment	406	(7 801)	406	(7 801)
Fair value adjustment on initial recognition of operating expenses*	(6 691)	(9 455)	(6 691)	(9 455)
	30 212	14 146	29 432	13 903

* Comparative figures of R9,5 million have been reclassified from operating expenses to finance cost to ensure that figures are comparable

5 INCOME TAX EXPENSE

The CSIR and its subsidiary, the South African Inventions Development Corporation (SAIDCOR), are exempt from South African income tax.

South African normal taxation	-	-
Current taxation: current year	-	-
Current taxation: prior year	-	-
Foreign taxation	103	7
Current taxation	109	12
Deferred taxation – temporary differences	(6)	(5)
	103	7
South African normal rate of taxation	29%	29%
Surplus attributable to tax exempt entities	(32%)	(30%)
Assessed loss	3%	1%
Effect of foreign taxation	-	-
Current and deferred taxation – effective rate	-	-

Notes to the Annual Financial Statements

for the year ended 31 March 2007

6 PROPERTY, PLANT AND EQUIPMENT

	2007			2006		
	Cost R'000	Accumulated depreciation R'000	Carrying value R'000	Cost R'000	Accumulated depreciation R'000	Carrying value R'000
Group						
Land	5 549	–	5 549	5 549	–	5 549
Buildings	193 300	82 588	110 712	281 051	82 836	198 215
Equipment	473 151	372 092	101 059	455 360	360 421	94 939
Vehicles	5 513	3 978	1 535	4 655	3 847	808
	677 513	458 658	218 855	746 615	447 104	299 511
CSIR						
Land	5 549	–	5 549	5 549	–	5 549
Buildings	193 300	82 588	110 712	281 051	82 836	198 215
Equipment	471 754	371 065	100 689	453 762	359 098	94 664
Vehicles	5 513	3 978	1 535	4 655	3 847	808
	676 116	457 631	218 485	745 017	445 781	299 236

Notes to the Annual Financial Statements

for the year ended 31 March 2007

6 PROPERTY, PLANT AND EQUIPMENT (continued)

	Land R'000	Buildings R'000	Equipment R'000	Vehicles R'000	Total R'000
Group					
Carrying value 31 March 2005	8 197	112 783	104 331	653	225 964
Additions	–	88 142	30 742	482	119 366
Disposals	(2 648)	(2 507)	(1 122)	(9)	(6 286)
Depreciation	–	(203)	(38 990)	(318)	(39 511)
Exchange differences	–	–	(22)	–	(22)
Carrying value 31 March 2006	5 549	198 215	94 939	808	299 511
Additions	–	7 880	56 902	1 202	65 984
Disposals	–	(412)	(1 216)	(68)	(1 696)
Depreciation	–	99	(49 646)	(407)	(49 954)
Exchange differences	–	–	80	–	80
Transfer to non-current asset classified as held for sale	–	(95 070)	–	–	(95 070)
Carrying value 31 March 2007	5 549	110 712	101 059	1 535	218 855
CSIR					
Carrying value 31 March 2005	8 197	112 777	103 992	638	225 604
Additions	–	88 142	30 655	481	119 278
Disposals	(2 648)	(2 502)	(1 110)	–	(6 260)
Depreciation	–	(202)	(38 873)	(311)	(39 386)
Carrying value 31 March 2006	5 549	198 215	94 664	808	299 236
Additions	–	7 880	56 721	1 202	65 803
Disposals	–	(412)	(1 203)	(68)	(1 683)
Depreciation	–	99	(49 493)	(407)	(49 801)
Transfer to non-current asset classified as held for sale	–	(95 070)	–	–	(95 070)
Carrying value 31 March 2007	5 549	110 712	100 689	1 535	218 485

Land and buildings are unencumbered and full details of the titles are available at the registered office of the CSIR.

A change in the depreciation estimate due to a change in the residual value of buildings had an impact of nil on the current financial year figures (2006: R3,710 million).

Included above are assets with a cost of R268,0 million that are fully depreciated as the remaining useful life is incidental. Assets with a cost of R13,4 million were purchased during the year with Parliamentary Grant funds and are shown at a nil carrying value.

6.1 Non-current asset held for sale

A building of R95,07 million is in the process of being transferred to the Department of Science and Technology.

The sale of the building is subject to a suspensive condition relating to the rezoning of the property. The expected date for fulfilment is 31 March 2008. Transfer of title will commence thereafter.

Notes to the Annual Financial Statements

for the year ended 31 March 2007

7 INTANGIBLE ASSETS

	2007			2006		
	Cost	Accumulated amortisation	Carrying value	Cost	Accumulated amortisation	Carrying value
	R'000	R'000	R'000	R'000	R'000	R'000
Group						
Investments in technology	8 296	8 016	280	7 837	7 209	628
CSIR						
Investments in technology	–	–	–	–	–	–

	GROUP	CSIR
	R'000	R'000
Carrying value 31 March 2005	2 986	–
Additions	368	–
Disposals	–	–
Impairment	(1 998)	–
Amortisation	(728)	–
Carrying value 31 March 2006	628	–
Additions	459	–
Disposals	–	–
Impairment	(79)	–
Amortisation	(728)	–
Carrying value 31 March 2007	280	–

Notes to the Annual Financial Statements

for the year ended 31 March 2007

	GROUP		CSIR	
	2007 R'000	2006 R'000	2007 R'000	2006 R'000
8 INTEREST IN JOINT VENTURES AND ASSOCIATES				
Cost of investments less impairment losses	41	1	1	1
Loans to joint ventures and associates	34 045	33 172	34 085	33 172
Share of postacquisition losses	(17 189)	(16 190)	-	-
	16 897	16 983	34 086	33 173
Impairment of joint ventures and associates	(16 897)	-	(34 085)	(18 173)
	-	16 983	1	15 000

Agreements have been entered into between the CSIR and certain joint ventures and associates to subordinate the loans made to those joint ventures and associates. The subordination agreements will remain in force for as long as the liabilities of the relevant joint ventures or associates exceed their assets, fairly valued.

Details of the joint ventures and associates at 31 March 2007 are as follows:

Name of joint venture/associate	Place of incorporation	Portion of ownership interest	Portion of voting power held	Principal activity	Carrying value		Financial year end
					2007 R'000	2006 R'000	
Joint ventures							
Mbuyu Biotech (Pty) Ltd	South Africa	50%	50%	Development and trading in biotechnology and expertise	285	630	31 March
Sera (Pty) Ltd	South Africa	50%	50%	Commercialisation and licencing of patents	16 363	16 056	31 March
Ellipsoid Technology (Pty) Ltd	South Africa	50%	50%	Development of encapsulation technology	249	297	31 March
Arvir Technologies (Pty) Ltd	South Africa	50%	50%	Research and development on production of more costeffective antiretrovirals	-	-	28 Feb
Associates							
AIDC Development Centre Eastern Cape (Pty) Ltd	South Africa	25%	25%	Automotive industry development and support services	-	-	31 March
Eyeborn (Pty) Ltd	South Africa	26%	26%	Holding, licencing and exploitation of intellectual property technology	-	-	31 March
					16 897	16 983	

Notes to the Annual Financial Statements

for the year ended 31 March 2007

8 INTEREST IN JOINT VENTURES AND ASSOCIATES (continued)

The following are details of the significant joint ventures' and associates' assets, liabilities, income and expenses:

	JOINT VENTURES GROUP		ASSOCIATES GROUP	
	2007 R'000	2006 R'000	2007 R'000	2006 R'000
Current assets	42 120	35 045	3 281	4 229
Long-term assets	3 887	1 232	257	195
Current liabilities	11 544	2 100	2 134	4 647
Long-term liabilities	69 826	65 172	4 224	2 586
Income	6 355	2 830	14 497	17 180
Expenses	10 702	5 214	14 506	16 057

9 INTEREST IN SUBSIDIARIES

Shares at cost less impairment losses

Indebtedness

– by subsidiaries

– impairment of loans

– to subsidiaries

CSIR	
2007 R'000	2006 R'000
23 212	18 364
(5 097)	(6 023)
20 187	18 758
(16 805)	(16 130)
(8 479)	(8 651)
18 115	12 341

Details disclosed in Addendum A

Agreements have been entered into between the CSIR and certain subsidiaries to subordinate the loans made to those subsidiaries. The subordination agreements will remain in force for so long as the liabilities of the relevant subsidiaries exceed their assets, fairly valued.

Notes to the Annual Financial Statements

for the year ended 31 March 2007

10 OTHER INVESTMENTS

	% held	Number of shares held		Class of shares	GROUP		CSIR	
		2007	2006		2007 R'000	2006 R'000	2007 R'000	2006 R'000
Listed shares								
Samsys Technologies Ltd	-	-	1 100 000	Ordinary	-	859	-	859
					-	859	-	859
Unlisted shares								
Breathetex (Pty) Ltd	15.30	12 000	12 000	Ordinary	11 025	9 195	11 025	9 195
Breathetex (Pty) Ltd		11 680	11 680	Preference	-	-	-	-
Accumulated impairment losses					(11 025)	(9 195)	(11 025)	(9 195)
Pan-A-Cam (Pty) Ltd	15.00	18	18	Ordinary	-	-	-	-
Fixed deposits					200 000	-	200 000	-
					200 000	859	200 000	859

11 TRADE AND OTHER RECEIVABLES

Trade receivables	132 246	145 770	127 025	142 729
Prepaid expenditure	9 625	4 839	9 625	4 839
Other receivables	5 035	9 371	4 956	9 276
	146 906	159 980	141 606	156 844

Trade receivables are shown net of impairment losses. Impairment losses/(reversals) amounting to R322 000 (2006: (R317 000)) have been recognised in the income statement.

12 INVENTORY AND CONTRACTS IN PROGRESS

Inventory	938	1 160	938	1 160
Contracts in progress less provision for losses	42 265	45 706	42 265	45 706
	43 203	46 866	43 203	46 866

Estimates on contract in progress recognition are based on cost to completion, budgets and percentage of completion.

13 DEFERRED TAX LIABILITIES

Balance at the beginning of the year	19	24
Accelerated capital allowances	(6)	(5)
	13	19

14 ADVANCES RECEIVED

Advances on contracts received from clients	356 576	172 461	356 576	172 461
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Included in advances received is an amount of R133,1 million (incl VAT) that relates to the transfer of the building to the Department of Science and Technology (refer note 6.1 and note 29).

15 TRADE AND OTHER PAYABLES

Accounts payable and accruals	294 253	246 232	287 889	244 660
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Notes to the Annual Financial Statements

for the year ended 31 March 2007

16 PROVISIONS

	Opening balance R'000	Additional provisions R'000	Utilised and reversed R'000	Closing balance R'000
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Group

Provision for salary and related expenses

The provision for salary and related expenses includes provisions for leave pay and bonuses. The provision for leave is based on the actual number of leave days outstanding per employee. The provision for bonus is based on the principles of Value Based Performance bonus management. Value Based Performance bonus management combines the concept of economic performance and non-financial performance.

65 300	42 552	(35 604)	72 248
--------	--------	----------	--------

65 300	42 552	(35 604)	72 248
--------	--------	----------	--------

CSIR

Provision for salary and related expenses

The provision for salary and related expenses includes provisions for leave pay and bonuses. The provision for leave is based on the actual number of leave days outstanding per employee. The provision for bonus is based on the principles of Value Based Performance bonus management. Value Based Performance bonus management combines the concept of economic performance and non-financial performance.

65 297	42 552	(35 601)	72 248
--------	--------	----------	--------

65 297	42 552	(35 601)	72 248
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GROUP		CSIR	
2007 R'000	2006 R'000	2007 R'000	2006 R'000

17 OPERATING LEASE COMMITMENTS

Financial commitments under non-cancellable operating leases will result in the following payments falling due:

Within one year:	5 579	9 578	5 579	9 578
Land and buildings	1 181	3 342	1 181	3 342
Equipment	2 710	4 706	2 710	4 706
Vehicles	1 688	1 530	1 688	1 530
Within two to five years:	4 018	5 994	4 018	5 994
Land and buildings	–	1 181	–	1 181
Equipment	1 289	3 105	1 289	3 105
Vehicles	2 729	1 708	2 729	1 708

Agreements relating to operating lease payments for equipment and vehicles vary between 12 and 60 months and are fixed for the term of the agreements.

The CSIR leases buildings under operating leases. The leases typically run for a period of five years. Lease payments are increased with a fixed annual escalation percentage to reflect market rentals. None of the leases includes contingent rentals.

Notes to the Annual Financial Statements

for the year ended 31 March 2007

18 RETIREMENT BENEFITS OF EMPLOYEES

18.1 CSIR Pension Fund

The fund is registered in terms of the Pension Funds Act, 1956, and is a defined contribution plan. The CSIR's liability to the fund is limited to paying the employer contributions. Life cover and dependants' pensions are fully secured by a continued income and life insurance policy. All the CSIR's permanent employees are members of the fund.

Employer contributions of R40,9 million (2006: R43,2 million) and employee contributions of R22,7 million (2006: R22,1 million) were paid over during the year. Employer contributions are charged against income when incurred.

18.2 Mine Officials Pension Fund and Sentinel

At the time of the merger with the Chamber of Mines Research Organisation (COMRO) in 1993, certain COMRO (Sentinel Mining) employees elected to remain members of the Mine Officials Pension Fund (one member) and Sentinel (three members) (previously Chamber of Mines Pension Fund). In terms of the agreement with the Chamber of Mines, this election holds no liability for the CSIR other than paying the monthly employee contributions. The funds are defined benefit plans.

On 1 March 2001 the members of the Chamber of Mines Pension Fund moved to Sentinel.

In respect of the employees who have formally converted their secondment to a CSIR appointment, employer contributions of R165 852 (2006: R158 032) and employee contributions of R91 067 (2006: R86 779) were paid over during the year. Employer contributions are charged against income when incurred.

18.3 Associated Institutions Pension Fund (AIPF)

The fund is a defined benefit plan. The formula used to determine pensions is based on the pensionable earnings of the final year, and the aggregate period of uninterrupted membership.

The CSIR has two employees (2006: two employees) who are members of the AIPF. The fund is controlled by the state, which has assumed responsibility for the unfunded portions of these funds.

Employer contributions of R7 262 (2006: R17 398) and employee contributions of R4 538 (2006: R10 873) were paid over during the year to the AIPF.

18.4 Post-retirement medical benefits

The CSIR formed its own Medical Aid Scheme, based on managed health care principles, with a strong emphasis on co-responsibility between the fund and its members. The objective is to provide sustainable health care and simultaneously limit the cost, present and future, to a level that is affordable. The CSIR Board approved a cash payment of R190 million in 1997 to the Medical Aid Scheme, thereby transferring the liability for retirement benefits of members to the scheme. Due to changes in the Medical Schemes Act of 1998, the scheme can no longer accept the liability for retirement benefits of qualifying members of the scheme.

The accumulated benefit obligation and the annual cost of accrual of benefits are assessed by independent qualified actuaries using the projected unit credit method. Subsequent to the settlement of the liability in 2005/06, another 25 of the 80 members not traced in 2005/06 were traced and their liabilities settled. The estimated present value of the anticipated expenditure for the remaining 55 continuation members was recalculated by the actuaries as at 31 March 2007 and will be funded through cash and cash equivalents.

Notes to the Annual Financial Statements

for the year ended 31 March 2007

GROUP		CSIR	
2007	2006	2007	2006
R'000	R'000	R'000	R'000

18 RETIREMENT BENEFITS OF EMPLOYEES (continued)

18.4 Post-retirement medical benefits (continued)

The amount included in the balance sheet arising from the CSIR's obligation in respect of postretirement medical benefits is as follows:

Present value of obligations	12 751	14 897	12 751	14 897
Net liability on balance sheet	12 751	14 897	12 751	14 897

Amounts recognised in income in respect of the scheme are as follows:

Current service cost	–	6 061	–	6 061
Settlements	(5 787)	–	(5 787)	–
Interest cost	960	16 920	960	16 920
Expected return on plan assets	–	(9 822)	–	(9 822)
Actuarial loss/(gain) recognised during the year	2 681	(69 760)	2 681	(69 760)
Total	(2 146)	(56 601)	(2 146)	(56 601)

Movement in the net liability recognised in the balance sheets is as follows:

Net liability at the beginning of the year	14 897	107 307	14 897	107 307
	(2 146)	(92 410)	(2 146)	(92 410)
Net income recognised in the income statement	(2 146)	(56 601)	(2 146)	(56 601)
Contributions	–	(35 809)	–	(35 809)
Net liability at the end of the year	12 751	14 897	12 751	14 897
Actual return on investments/plan assets	7.60%	56.68%	7.60%	56.68%

Principal actuarial assumptions at the balance sheet date

Discount rate at 31 March	8.00%	8.00%	8.00%	8.00%
Expected return on plan assets at 31 March	–	8.00%	–	8.00%
Medical inflation costs	3.85%	3.85%	3.85%	3.85%

Historical information	2007	2006	2005	2004	2003
Present value of the defined benefit obligation	12 751	14 897	380 992	371 222	345 346
Fair value of plan assets	–	–	(273 685)	(222 998)	(174 699)
Deficit in the plan	12 751	14 897	107 307	148 224	170 647

Notes to the Annual Financial Statements

for the year ended 31 March 2007

19 BOARD MEMBERS, DIRECTORS AND EXECUTIVE MANAGEMENT'S REMUNERATION

	Entity	Fees for services as director R'000	Managerial Services			Total R'000
			Basic salary R'000	Bonuses and performance-related payments R'000	Retirement fund and medical aid contributions R'000	
Board members and Executive Directors						
Dr S Sibisi	CSIR	–	1 751	744	312	2 807
Foreign subsidiaries						
Dr NA Waterman (up to Nov 06)	Quotec Limited (UK)	–	102	–	–	102
Dr A Hickman	Quotec Limited (UK)	–	1 160	307	8	1 475
Dr JR Galsworthy	Quotec Limited (UK)	–	638	94	6	738
Mr AA Davidson (since Nov 06)	Quotec Limited (UK)	–	174	–	–	174
Remunerated in British pound						
Non-executive Board members						
Ms N Shikwane	CSIR	26	–	–	–	26
Professor C de la Rey	CSIR	13	–	–	–	13
Dr N Msomi	CSIR	12	–	–	–	12
Professor M Wingfield	CSIR	10	–	–	–	10
Dr N Dlamini (since January 06)	CSIR	5	–	–	–	5
Dr F Peterson (since January 06)	CSIR	10	–	–	–	10
Professor DR Hall (since August 06)	CSIR	3	–	–	–	3
Mr EH Mayet (since August 06)	CSIR	9	–	–	–	9
Executive Management						
Mr AJ Jordaan (up to July 06) *	CSIR	–	1 956	1 694	73	3 723
Mr VP Pillay (up to June 06) **	CSIR	–	323	132	41	496
Dr JH Maree (since August 06)	CSIR	–	707	546	105	1 358
Ms K Njobe (since May 06)	CSIR	–	955	500	120	1 575
Mr CR Sturdy (Interim: since Aug 06)	CSIR	–	570	–	34	604
Mr RM Zondo (Interim: since Aug 06)	CSIR	–	578	–	49	627
2007		88	8 914	4 017	748	13 767
2006		52	7 052	3 713	871	11 688

* Including severance and leave payout

** Including leave payout

20 INSURANCE AND RISK MANAGEMENT

The insurance and risk management policies adopted by the CSIR are aimed at obtaining sufficient cover at the minimum cost to protect its asset base, earning capacity and legal obligations against unacceptable losses.

All property, plant and equipment are insured at current replacement value. Risks of a possible catastrophic nature are identified and insured while acceptable risks of a non-catastrophic nature are self-insured. Self-insurance has been instituted where the cost-to-benefit relationship exceeds the risk and the incidence of losses is of a minor and infrequent nature. Self-insured risks are reviewed on an annual basis to ensure cover is adequate. An amount of R10,75 million (2006: R10,75 million) is held in a self-insurance fund to cover these risks. This amount is disclosed as part of reserves in the balance sheet. No major losses were experienced during the year under review. Claims of a general nature were adequately covered.

Notes to the Annual Financial Statements

for the year ended 31 March 2007

21 CONTINGENT LIABILITIES AND FACILITIES

Bank guarantees issued in respect of third party liabilities

GROUP		CSIR	
2007 R'000	2006 R'000	2007 R'000	2006 R'000
27 793	13 990	27 793	13 990

Legal costs and litigation:

In the nature of the CSIR's business, agreements with complex deliverables may be entered into. All necessary steps are taken to manage the risks inherent to these transactions. If and when it is evident that there is a reasonable probability that a dispute on a transaction could lead to costs against the CSIR, such costs will be disclosed.

The CSIR is involved in labour-related claims. While the liability is not admitted, if the claims are successful, then costs could amount to R1,2 million. Management was not aware of any other pending legal action and litigation against the CSIR up to the date of this report, which could result in any material losses to the CSIR.

Banking facilities:

The CSIR has a short-term general banking facility of R43,105 million available.

22 CAPITAL COMMITMENTS

Authorised but not contracted

18 714	16 369	18 714	16 369
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This capital expenditure is to be financed from internal sources.

23 FINANCIAL INSTRUMENTS

23.1 Foreign currency risk

The Group enters into forward exchange contracts to buy specified amounts of foreign currencies in the future at a predetermined exchange rate.

Forward exchange contracts are entered into mainly to cover import orders. The Group has no policy to enter into forward exchange contracts for anticipated foreign receipts.

The Group does not use derivative financial instruments for speculative purposes.

Accounts receivable at 31 March 2007 include foreign trade receivables of R13,1 million (2006: R14,4 million).

The following summarises amounts to be paid under forward exchange contracts:

US dollars

0-3 months at rates averaging USD 7,2674

1 811	–	1 811	–
2 127	–	2 127	–
4 163	–	4 163	–
8 101	–	8 101	–

Euro

0-3 months at rates averaging EUR 9,6520

British pound

0-3 months at rates averaging GBP 14,4407

Notes to the Annual Financial Statements

for the year ended 31 March 2007

23 FINANCIAL INSTRUMENTS (continued)

23.2 Credit risk

Financial assets that could subject the Group to credit risk consist principally of bank balances and deposits, trade and other receivables and loans to joint ventures and subsidiaries. The Group's bank balances and cash are placed with high credit quality financial institutions. Trade and other receivables and loans to joint ventures and subsidiaries are presented net of impairment losses. Credit risk with respect to trade receivables is limited due to the large number of customers comprising the Group's customer base and their dispersion across different industries and geographical areas. Accordingly the Group does not have a significant concentration of credit risk.

The carrying amounts of financial assets included in the balance sheet represent the Group's exposure to credit risk in relation to these assets.

The Group does not have any significant exposure to any individual customer or counter party.

23.3 Fair values

At 31 March 2007 the carrying amount of bank balances and cash, deposits, trade and other receivables, contracts in progress, advances received and trade and other payables approximated their fair values due to the short-term maturities of these assets and liabilities.

23.4 Interest rate risk

Interest rate exposure and investment strategies are evaluated by management on a regular basis. Interest-bearing investments are held with reputable banks in order to minimise exposure.

Notes to the Annual Financial Statements

for the year ended 31 March 2007

	GROUP		CSIR	
	2007 R'000	2006 R'000	2007 R'000	2006 R'000
24 RECONCILIATION OF OPERATING SURPLUS TO CASH GENERATED BY OPERATIONS				
Operating surplus for the year before taxation	26 636	58 126	21 644	52 967
Adjusted for:				
Profit on disposal of property, plant and equipment	–	(24)	–	–
Loss/(profit) on disposal of interest in subsidiary	4	(4)	–	–
Depreciation and amortisation	50 682	40 239	49 801	39 386
Net unrealised foreign exchange (gain)/loss	418	(806)	418	(810)
Net finance income	(30 212)	(23 601)	(29 432)	(23 358)
Post-retirement medical benefits	2 361	(52 884)	2 361	(52 884)
Straight-lining adjustment of operating leases	(486)	702	(486)	702
Provision for bonuses and leave	42 552	36 777	42 552	36 777
Impairments	19 996	1 924	14 952	10 618
Loss on disposal of property, plant and equipment	1 268	2 002	1 556	1 993
Share of deficit of joint ventures and associates	999	1 114	–	–
Operating surplus before changes in working capital	114 218	63 565	103 366	65 391
Decrease/(increase) in trade and other receivables	11 320	(15 759)	13 491	(15 273)
Decrease in inventory and contracts in progress	3 663	18 384	3 663	18 228
Increase in advances received	184 115	39 614	184 115	39 614
Increase in trade and other payables and provisions	12 485	5 382	7 696	7 540
Net working capital changes	211 583	47 621	208 965	50 109
Cash generated by operations	325 801	111 186	312 331	115 500
25 CASH AND CASH EQUIVALENTS				
Cash on deposit	316 909	229 929	313 154	226 153
Bank balances	62 186	63 926	44 227	62 763
Cash on hand	148	156	148	154
	379 243	294 011	357 529	289 070
26 RELATED PARTY TRANSACTIONS				

The CSIR is one of 29 schedule 3B National Government Business Enterprises in terms of the Public Finance Management Act (Act 1 of 1999 as amended by Act 29 of 1999) and therefore falls within the national sphere of government. As a consequence, the CSIR has a significant number of related parties being entities that fall within the national sphere of government.

In addition, the CSIR has a related party relationship with its subsidiaries (see Addendum A) and joint ventures and associates (see note 8). Unless specifically disclosed, these transactions are concluded at arm's length and the Group is able to transact with any entity.

Notes to the Annual Financial Statements

for the year ended 31 March 2007

	GROUP		CSIR	
	2007 R'000	2006 R'000	2007 R'000	2006 R'000
26 RELATED PARTY TRANSACTIONS (continued)				
26.1 Transactions with related parties				
The following is a summary of transactions with related parties during the year and balances due at year end:				
Constitutional institutions				
Services rendered	1 973	121	1 973	121
Services received	343	324	343	324
Amount due from/(to)	424	3	424	3
Major public entities				
Services rendered	117 469	108 343	117 469	108 343
Services received	13 531	11 692	13 531	11 692
Amount due from/(to)	1 343	11 409	1 343	11 409
National public entities				
Services rendered	49 236	53 015	49 236	53 015
Services received	148 502	2 660	148 502	2 660
Amount due from/(to)	712	13 499	712	13 499
National government business enterprises				
Services rendered	2 204	4 052	2 204	4 052
Services received	4 600	1 255	4 600	1 255
Amount due from/(to)	208	1 200	208	1 200
Government departments				
Services rendered	595 659	492 677	595 659	492 677
Services received	161	95	161	95
Amount due from/(to)	1 585	5 828	1 585	5 828
Subsidiaries				
Services rendered	–	–	1 680	1 852
Services received	–	–	266	1 130
Amount due from/(to)	–	–	(4 659)	(6 023)
Associates				
Services rendered	6 631	60	6 631	60
Services received	110	–	110	–
Amount due from/(to)	3 120	14 813	3 120	14 813

26.2 Transactions with key management

There were no new loans to key management during the year (2006: nil) and R27 000 (2006:R93 000) is included in the other receivables (see note 11). No interest is payable by key management.

Total remuneration is included in employee remuneration (see note 19).

Notes to the Annual Financial Statements

for the year ended 31 March 2007

GROUP

2007	2006
R'000	R'000

27 DISPOSAL OF INTEREST IN SUBSIDIARIES

27.1 Technovent Administration (Pty) Ltd

The Group held 100% of the issued share capital in Technovent Administration (Pty) Ltd. The shares held were sold effective 31 July 2005.

The net assets of Technovent Administration (Pty) Ltd on 31 July 2005 were as follows:

Net asset value	-
Profit on disposal	2
Total consideration	2
Net cash outflow arising on disposal of interest in subsidiary	
Bank balance and cash disposed	-

27.2 Technovent Engineering (Pty) Ltd

The Group held 100% of the issued share capital in Technovent Engineering (Pty) Ltd. The shares held were sold effective 31 July 2005.

The net assets of Technovent Engineering (Pty) Ltd on 31 July 2005 were as follows:

Net asset value disposed	-
Profit on disposal	2
Total consideration	2
Net cash outflow arising on disposal of interest in subsidiary	
Bank balance and cash disposed	-

28 DEREGISTRATION OF SUBSIDIARY

28.1 Agrimage (Pty) Ltd

The Group held 100% of the issued share capital in Agrimage (Pty) Ltd. The company was deregistered on 4 August 2006.

The net assets of Agrimage (Pty) Ltd on deregistration were as follows:

Net asset value disposed	4
Loss on deregistration	(4)
Total consideration	-
Net cash outflow arising on deregistration of interest in subsidiary	
Bank balance and cash disposed	-

Notes to the Annual Financial Statements

for the year ended 31 March 2007

29 SUBSEQUENT EVENTS

29.1 Department of Science and Technology building

Negotiations to transfer the building as disclosed in note 6.1 are being finalised. An advance has been received as disclosed in note 14.

29.2 National Metrology Laboratory (NML)

In terms of the Measurement Units and Measurement Standards Act, Act 18 of 2006, the National Metrology Institute of South Africa (NMISA) was established as a separate public entity, the Executive Authority of which is the Minister of Trade and Industry. The commencement date of the Act, which coincides with the date of the establishment of NMISA, was 1 May 2007, as per Proclamation R8, published in Government Gazette No 29833 of 26 April 2007.

Pursuant to the said Act, all rights, obligations and liabilities acquired or incurred by the CSIR National Metrology Laboratory (NML) vest in NMISA as from 1 May 2007 and similarly all employees of the erstwhile NML will be transferred to NMISA.

	2007
	R'000
Profit attributable to the NML is as follows:	
Revenue	48 487
Employees remuneration	(22 267)
Operating expenses	(23 340)
Surplus for the year	2 880
Assets and liabilities attributable to the NML are as follows:	
Assets	
Current assets	17 341
Trade and other receivables	1 266
Bank balances and cash on hand	16 075
Total assets	17 341
Equity and liabilities	
Reserves	10 894
Retained earnings	10 894
Current liabilities	6 447
Advances received	758
Trade and other payables	4 666
Provisions	1 023
Total equity and liabilities	17 341

Notes to the Annual Financial Statements

for the year ended 31 March 2007

30 STANDARDS AND INTERPRETATIONS ISSUED, NOT YET EFFECTIVE

At the date of authorisation of the financial statements of the Group for the year ended 31 March 2007, the following standards and interpretations were in issue but not yet effective:

Standard/Interpretation	Description
IFRS 7 (AC 144), IAS 1 (AC 101) and IFRS 4 (AC 141)	Financial instruments: Disclosures (including amendments to IAS 1 (AC 101), presentation of financial statements: Capital disclosures and IFRS 4 (AC 141), insurance contracts)
IFRS 8 (AC 145)	Operating segments
IFRIC 8 (AC 441)	Scope of IFRS 2 (AC 139)
IFRIC 9 (AC 442)	Reassessment of embedded derivatives
IFRIC 12 (AC 445)	Service concession arrangements
IAS 23 amendment	Borrowing costs

The effect of adopting the above standards or interpretations has not yet been determined, but will be applied after the effective date.

Addendum A: Interest in subsidiaries

31 March 2007

Consolidated subsidiaries	Country of incorporation	Interests of the CSIR			Financial year end	Shares at cost less accumulated impairment losses	
		Issued capital R'000	Effective holding			2007 R'000	2006 R'000
			2007 %	2006 %			
Direct investments							
South African Inventions Development Corporation (SAIDCOR)	South Africa	27 220	100	100	31 March	23 213	13 812
Technovent (Pty) Ltd	South Africa	5 000	100	100	31 March	-	-
CSIR International Limited*	British Virgin Island	326	100	100	31 March	-	326
Quotec Limited	United Kingdom	20	100	100	31 March	-	4 226
* No statutory audit was performed							
						23 213	18 364
Indirect investments							
Included in SAIDCOR:							
Technology Finance Corporation (Pty) Ltd (Technifin)	South Africa	5 200	100	100	31 March	4 650	4 650
Included in Technifin carrying value:							
Implico BV (Incorporated in the Netherlands)	Netherlands/ South Africa	71	100	100	31 March	-	-
Included in Technovent (Pty) Ltd:							
Brilliant Security Solutions (Pty) Ltd *	South Africa	-	88	88	31 March	-	-
Plasmatherm (Pty) Ltd **	South Africa	-	100	100	31 March	-	-
Agrimage (Pty) Ltd***	South Africa	-	-	100	31 March	-	-
* Issued capital R100 and shares at cost R88							
** Issued capital R1 and shares at cost R1							
*** Issued capital R100 and shares at cost R80							

The Group has interests in four dormant companies. Details of these interests are available at the CSIR's registered office.

				Interests of the CSIR		
Net indebtedness less accumulated impairment losses to subsidiaries		by subsidiaries		Net investment		General nature of business
2007 R'000	2006 R'000	2007 R'000	2006 R'000	2007 R'000	2006 R'000	
8 479	8 651	-	-	14 734	5 161	Investment in research development and implementation of technology.
-	-	-	-	-	-	The company sources technologies and entrepreneurs from the CSIR, other S&T institutions, universities or any developer of technology and develops them into viable businesses with the aim of spinning them off for capital gain.
-	-	-	-	-	326	The company serves as a holding company for certain international CSIR activities.
-	-	3 381	2 628	3 381	6 854	The principal activity of the company is that of consultants on technology auditing, technology evaluation and technology transfer on behalf of clients in the public and private sectors.
8 479	8 651	3 381	2 628	18 115	12 341	

The acquisition and transfer of technology to industry by licencing new inventions, providing finance to develop technology and venture capital for the exploitation thereof.

Assisting research institutes, companies and individuals to acquire and/or develop and transfer to industry commercially viable technology. Supporting the commercialisation of technology by licencing inventions, providing finance to develop technology and selling certain products.

Commercialising and exploiting a range of intrusion alarm systems. The company was placed into liquidation during the 2007 financial year.

Providing plasma nitrating surface hardening services to industry.

Providing satellite images to farmers for precision farming. The business was sold during the 2005 financial year and the company was deregistered during the 2007 financial year.

8 479	8 651	3 381	2 628	18 115	12 341
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CSIR research publications 2006

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Patents

CSIR PCT applications 2006

Patent number	Title	Inventors
WO2006072845A2	Gram Positive Recombinant Protein producing Bacteria	Berger Eldie; Louw Maureen Elizabeth; Crampton Michael Craig
WO2006109198A2	Methods for obtaining optically active glycidyl ethers and optically active vicinal diols from racemic substrates	Botes Adriana Leonora; Labuschagne Michel; Mitra Robin Kumar; Lotter Jeanette
WO2006097811A1	Method for converting Aloeresin A to Aloesin	Phehane Vuyisile Ntosi; Steenkamp Lucia Hendrina; Mitra Robyn Kumar; Heggie Steven James
WO2006120529A1	Aligning of optical devices	Kirsten Trevor James; Mueller Klaus
WO2006027753A1	An indirect fire weapon aiming device	Steyn Douw Gerbrand; Smith Pieter; De Villiers Daniel
WO2006111832A2	Control of slurry flow	Ilgner Hartmut Johannes
WO2005100569A3	Methods for the preparation of optically active epoxides and vicinal diols from styrene epoxides using enantioselective epoxide hydrolases derived from yeasts.	Botes Adriana Leonora; Labuschagne Michel; Mitra Robin Kumar; Lotter Jeanette
WO2005100578A3	Methods for obtaining optically active epoxides and vicinal diols from meso-epoxides	Botes Adriana Leonora; Labuschagne Michel; Lotter Jeanette
WO2005100587A3	Methods for obtaining optically active epoxides and vicinal diols from 2,2-disubstituted epoxides	Botes Adriana Leonora; Lotter Jeanette

CSIR US granted patents 2006

Patent number	Title	Inventors
US7026144B2	Process for preparing (-) menthol and similar compounds	Chaplin Jennifer Ann; Gardiner Neil Stockenstrom; Mitra Robin Kumar; Parkinson Christopher John; Portwig Madrie; Mboniswa Butana Andrew; Evans-Dickson Melanie Daryl; Brady Dean; Marais Stephanus Francois; Reddy Shavani
US7043989B2	Method and apparatus for testing installation quality in a grouted anchor system	Brink Van Zyl; Canbulat Ismet; Haarhoff Johann
US7129082B2	Bio-reactor device	Van der Merwe Schalk; Moolman Francis Sean; Bond Robert Paul; Van Wyk Adriaan Jacobus

CSIR US patent applications 2006

Application number	Title	Inventors
US20060246241A1	Packaging with water soluble barrier layer	Truter Patricia Ann; Kruger Arnoldus Jacobus

CSIR EPO granted patents 2006

Patent number	Title	Inventors
EP973534B1	Plant extracts containing appetite suppressant activity	Van Heerden Fanie Retief; Vlegaar Robert; Maharaj Vinesh; Whittal Rory Desmond; Horak Roelof Marthinus; Learmonth Robin Alec
EP1594994B1	Method of and apparatus for processing of semi solid alloys	Bruwer Retief; Wilkins Jeremias Daniel; Ivanchev Lillian Hristov; Rossouw Pierre; Damm Oliver Frank Rudolf August

CSIR SA granted patents 2006

Patent number	Title	Inventors
2005/09295	Protection against landmine explosion	Vernom Pregrin Joynt
2005/06792	Transporting of valuables	Kappetijn Dennis; Smit Daniel Petrus

Abbreviations

AFIS	Advanced Fire Information System	ICT	Information and communications technology
AIPF	Associated Institutions Pension Fund	IFRIC	International Financial Reporting Interpretations Committee
AMTS	Advanced Manufacturing Technology Strategy	IFRS	International financial reporting standards
AsgiSA	Accelerated and Shared Growth Initiative for South Africa	INSITE	International Science, Innovation and Technology Exhibition
AUTM	Association of University Technology Managers	IP	Intellectual property
B-BBEE	Broad-based black economic empowerment	IR	Infrared
BPM	Building product model	JIPSA	Joint Initiative on Priority Skills Acquisition
C@R	Collaboration at Rural	KEPRI	Korea Electric Power Research Institute
CHPC	Centre for High Performance Computing	KPA	Key performance area
COMRO	Chamber of Mines Research Organisation	KPI	Key performance indicator
CST	Crude sulphated turpentine	LCVU	Laser Centrum Vrije Universiteit
DoE	Department of Education	LMDN	Light Materials Development Network
DST	Department of Science and Technology	MHSL	Mine, Health and Safety Council
dti	Department of Trade and Industry	MIT	Massachusetts Institute of Technology
DWAF	Department of Water Affairs and Forestry	MoU	Memorandum of understanding
EC	European Commission	NACI	National Advisory Council on Innovation
EMPRO	European Microbicides Consortium	NEPAD	New Partnership for Africa's Development
ERA	Emerging research area	NFC	Natural fibre composites
ESASTAP	European South African Science and Technology Advancement Programme	NFTN	National Foundry Technology Network
EU	European Union	NM4TB	New Medicines for Tuberculosis
FANTASIA	Flexible and near-net shape generative manufacturing chains and repair techniques for complex-shaped aero engine parts	NMISA	National Metrology Institute of South Africa
FBL	Fluidised bed combustion	NML	National Metrology Laboratory
GAAP	Generally accepted accounting principles	NMS	National measurement standard
Geo ICT	Geospatial information and communications technology	NSDP	National Spatial Development Perspective
GLP	Good laboratory practice	NSI	National System of Innovation
GRA	Global Research Alliance	ODF	Open document format
HAART	Highly active antiretroviral therapy	OHS	Occupational health and safety
HCD	Human capital development	OSS	Open source software
HLT	Human language technologies	PCT	Patent cooperation treaty
IAEA	International Atomic Energy Agency	PFMA	Public Finance Management Act
IAS	International accounting standards	PG	Parliamentary Grant
		PGWC	Provincial Government Western Cape
		PTFE	Polytetrafluoroethylene