CORPORATE STRATEGY

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Department:
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DEPARTMENT

OF

SCIENCE AND TECHNOLOGY

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Minister of Science and Technology:
Mosibudi Mangena

Deputy Minister of Science and Technology:
Derek Hanekom

Accounting Officer:
Director-General of the Department of Science and Technology:
Dr Philemon Mjwara

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1. EXECUTIVE SUMMARY

This Corporate Strategy document is a continuation of that of 2005, when departments were tasked by National Treasury to develop their first five year plans, with annual updates of policy changes and budgets. It stands to reason, then, that the contents of this plan will to a large extent reflect the detail of the previous one as the DST has concentrated on implementing the new governance framework over the past year.

Over the next MTEF we will continue to implement the National Research and Development Strategy (NRDS) in the areas of Human Capital Development, Innovation and Governance. We will also implement strategies in new areas of knowledge and technology such as indigenous knowledge, nanotechnology, astronomy and intellectual property derived from publicly funded research.

Over the MTEF period we managed to attract R1.2 billion of new money, most of which will be used to fund new research and development (R&D) initiatives in a bid to build on and improve South Africa's ageing scientific infrastructure.

We have also been successful in accelerating the introduction of tax incentives for research and development expenditure. It is expected that this change will be instrumental in our reaching the targeted R&D intensity of 1% of GDP by 2008.

Over the short term, we will continue to assist our sister departments in accounting for R&D expenditure as per the widely accepted framework laid down in the latest Estimates of National Expenditure (ENE).

1.1 MISSION

Our mission is to develop, coordinate and manage a National System of Innovation (NSI) that will bring about maximum human capital, sustainable economic growth and improved quality of life for all.

1.2 VISION

Our vision is to create a prosperous society that derives enduring and equitable benefits from science and technology.

1.3 STRATEGIC OVERVIEW AND KEY POLICY DEVELOPMENTS: 2001/02-2008/09

The years 1990-94 saw a rapid dismantling by the State of the key strategic technology missions established during the latter years of the apartheid era. In particular, the nuclear and defense industries were targeted and total expenditure on R&D by public and private sectors fell from 1.04% of GDP in 1991 to 0.75% in 1993. The democratic government therefore inherited a somewhat demoralised and directionless science and technology system.

The task of the science and technology branch of the new Department of Arts, Culture, Science and Technology (DACST) was to direct the system towards new goals in support of economic development and social well-being. The 1996 White Paper on Science and Technology attempted to do this by placing innovation (rather than the supporting pillars of scientific discovery and technological development) at centre stage.

In 2001 Government developed the Micro-Economic Reform Strategy (MERS), which was an attempt to go beyond macro-economic measures intended to stabilise and grow the economy. Central to the MERS is the notion that certain sectors (e.g. ICT, tourism) have the potential to contribute significantly to growth. Research and development was designated as a key

provide a blueprint in this regard. The NRDS is based on an integrated approach to innovation, human resource development and the government science and technology system. Five key technology missions were identified for intensified support. These are information technology, biotechnology, manufacturing technology, technologies to add value to natural resources and technologies to impact upon poverty reduction. In addition, a framework based on utilising geographic advantage was established to prioritise support for the basic sciences, and this led to major programmes in, for example, astronomy and human palaeontology. Coinciding with Cabinet's approval of the NRDS, the decision was taken in August 2002 to split the DACST into separate departments of Science and Technology (DST) and Arts and Culture, and a separate Ministry of Science and Technology was created in April 2004. An additional R750 million was added to the baseline of the DST over the period 2003/04-2005/06 in response to the needs of the NRDS.

The period 2001-2005 has been characterised by the maturing of a number of DST institutions either established by or redirected in terms of the White Paper on Science and Technology and the NRDS. The National Research Foundation (NRF) has grown from being a relatively small organisation focused on making individual grants in the natural sciences to researchers in the higher education sector, to a R1 billion plus multifaceted granting agency serving the R&D needs of many sectors. The Human Sciences Research Council (HSRC) has cut non-core staff, boosted its research output, its funding from donor agencies and its funding from competitive contract research, as well as created strategic partnerships in the public sector.

The Council for Scientific and Industrial Research (CSIR), transferred at the beginning of the 2005/06 financial year from **dti** to DST, has begun to redirect itself to replenishing the stock of knowledge upon which its success in serving industry and government has historically been based.

The Africa Institute of South Africa has been transformed from an apartheid-style institution to one that serves government admirably in terms of strategic thinking about affairs on the African continent.

The new incubator and technology transfer institutions, Godisa and Tshumisano, established to serve the needs of small technology intensive businesses, have grown significantly and have good track records in high quality job creation.

The Innovation Fund has done well to balance the requirement of a less constrained environment that fosters innovation with accountability with regard to public money. R&D based commercial success stories (e.g. Geratech and Eyeborn) are now emerging. The Academy of Sciences has begun to play an active role with its sister institutions on the African continent. Contributing towards these successes has been a governance framework characterised by strong and empowered Boards held accountable to well-developed sets of key performance indicators.

The new missions highlighted in the NRDS have achieved different levels of maturity, partly because of unequal initial funding levels. Biotechnology has advanced most, with significant innovations. Technology to promote poverty reduction has also achieved some notable successes, particularly in the area of essential oil production, and new programmes in aquaculture show great promise. The creation of the Meraka Institute at the CSIR, with funding from both DST and the Department of Communication, is intended to drive R&D in the ICT sector. The Advanced Manufacturing Technology Strategy has buy-in from industry, several provincial governments as well as the Department of Trade and Industry (**dti)**. The development of technologies that add value to our natural resources has been funded by Mintek, CSIR, universities and the private sector. In respect of the basic sciences, the decision has been taken to develop Southern Africa as an attractive location for international astronomical observatories. In this regard, both the optical Southern African Large Telescope (SALT) and the gamma ray High Energy Stereoscopic System (HESS) in Namibia were launched during the past year. SALT is the most powerful optical telescope in the Southern Hemisphere and HESS is the most powerful gamma ray telescope in the world. New scientific

knowledge has already emerged from HESS and more will undoubtedly come from SALT. The most important new astronomy project is the Karoo Array Telescope (KAT), a radio-telescope that will demonstrate South Africa's engineering competence and enhance South Africa's chances of hosting the Square Kilometre Array (SKA).

A new governance framework for the State-owned part of South Africa's science and technology system was approved by Cabinet in 2004. This governance framework assigns DST the role of developing key, cutting-edge emerging areas of science and technology, as well as supporting sister government departments in more mature areas. DST has also been given the task of developing the framework for a national cross-cutting science and technology budget, including contributions from all departments. As a result, DST has been re-structured to support the two key functions of “frontier science and technology” and “intergovernmental partnerships”.

During the pre-1994 years of political isolation, international scientific contact was also limited. The contribution of foreign funding to research and development in South Africa grew from almost zero in 1994 to over 10% in 2003/04. This increase has been supported by a burgeoning of bilateral and multilateral activity linking South Africa with science and technology systems on all continents. During the past two years there have been important breakthroughs, particularly with respect to the European Union, where South African participation in the 6th Framework Programme increased significantly, and NEPAD, where South Africa (as the first Chair of the African Ministerial Council on Science and Technology) drove the development of a continent-wide Plan of Action. The key to sustainability in international collaborations is in selecting programmes that clearly benefit both parties. Two relevant examples are the SALT telescope, where 66% of the financial contributions to date have been made by international partners, and the European Developing Countries Clinical Trials Partnership, where significant funding of South African medical research is anticipated, within the context of clinical trials for drugs targeting locally endemic diseases such as malaria, tuberculosis and HIV and AIDS.

Indications are that national expenditure on research and development, which continued its decline after 1994, has now begun to pick up significantly. South Africa's expenditure on R&D in 2003/04 was 0.81% of GDP (across both public and private sectors) and it is anticipated that the 2004/05 survey will show further increases, enabling us to move closer to the target of 1% by 2008/09. South Africa's National R&D Survey has been accredited by the OECD and declared official by the Statistician-General in terms of the National Statistics Act.

One disturbing feature of both the 2001/02 and 2003/04 National R&D Surveys is the declining funding contribution by Government to R&D, in comparison with the private sector and foreign sources. The 2003/04 results indicate that Government's contribution has fallen to 28%, whereas the private sector now contributes well over 50%. While a high business contribution is to be welcomed, the relative contribution of government is generally much higher in rapidly developing countries (e.g. Brazil), where the State takes responsibility for driving change.

The increased funding allocated to DST for R&D (some R1,215 billion over 2006/07 2008/09) will be allocated largely to new scientific infrastructure, such as the Centre for High Performance Computing, nanotechnology characterisation centres and astronomy and space science, and will also accommodate associated human resource requirements. For instance, although the competitive funding instruments set up by the National Research Foundation and the Innovation Fund are working well , it is clear that these instruments are dependent to a significant extent on the availability of up-to-date infrastructure.

At the end of the current MTEF period all of the Technology Missions of the 2002 R&D strategy will have had significant funding over a three to six year period. In addition, new, widely applicable infrastructure in high performance computing, nanotechnology and renewable energy technologies will have been established. New programmes to enhance our capacity in nuclear science and technology in the context of South Africa's commitment to global climate change mitigation will be in

place. Furthermore, the Astronomy Geographic Advantage Programme will have placed SouthAfrica on an equivalent footing with Chile as a provider of world class observational facilities for ground-based observations on all wavelengths.

Over several years we have attempted to address the issue of focusing South Africa's technological expertise on alleviating the plight of the poor. Despite some successes, we have yet to develop widely applicable “platform” technologies, for example to reduce the cost of housing, to enable low cost communication (e.g. the Indian symputer) or practical sanitation. This “social impact” programme will be given high priority over the MTEF.

The problem of human resources for science and technology is being addressed at all levels, in collaboration with the Department of Education and other departments. Although the basic constraint remains the quantity and quality of students entering higher education programmes, much can be done to utilise existing human resource streams more effectively. The key here is to inspire students to take up science and engineering and to ensure that sustainable career paths are available. The excitement generated by high technology projects such as SALT and the Pebble Bed Modular Reactor (PBMR) will be important in this regard. The pathology of an aging cohort of highly skilled scientists is being addressed by bringing large numbers of much younger researchers into the system. However, this still leaves a gap in the middle which will have to be filled, possibly by returning South Africans.

In general, the establishment of a science base to fit the needs of post 1994 South Africa is proceeding well. A range of technology-intensive flagship programmes (e.g. biofuels) has been embedded in the Accelerated and Shared Growth Strategy of South Africa (ASGISA). The contribution of the science and technology portfolio to national development continues to be affirmed.

A consequence of the new governance framework has been the dismantling of the so-called Science Vote. This has been replaced by a new planning framework in which individual departments will be reporting on their own research and development spending, using the ENE mechanism. DST will assist the line departments in developing these plans through its Government Sector Programmes and Coordination programme, as follows:

- *Sector Research and Development Planning/Coordination* supports sector-based departments and institutions in developing five-year research and development plans. It also prepares an annual national science and technology expenditure plan aimed at providing a holistic view of government's total science and technology spending. The annual national science and technology expenditure plan will also improve decision-making on the deployment of all government funds allocated to research and development.

- *The science and technology expenditure plan*
  Cabinet approved the framework for the strategic management of South Africa's science and technology (S&T) system. This framework introduced reforms to improve the budgeting process and the management of the S&T system. The Cabinet Memo recommended the development of an annual expenditure plan as proposed in the White Paper on Science and Technology (1996).

A significant number of national departments and provinces support or fund S&T activities in a variety of ways including direct transfers to public R&D entities, agencies and/or outsourcing to consultants/researchers. From the 2006 financial year the National Treasury and DST will initiate a process to report on such S&T expenditure by including a section in departmental ENE chapters that will highlight expenditure on R&D according to internationally recognised definitions. This will require changes to budget systems and capacity development.

The department will develop an integrated R&D Management Information System (MIS) that will provide high level information on expenditure and other key indicators from the public R&D performers. The integrated R&D MIS will be used as a strategic management tool that provides performance indicators for in depth discussion.

The purpose of the discussion of S&T expenditure is to provide a broad, consolidated view of public expenditure by sector and in an integrated manner. This should help decision makers to influence sector appropriations to S&T activities and to develop sector specific R&D plans.

In addition, special studies on good practices in sector R&D coordination and management will be undertaken to inform the R&D plans.

- **Fiscal Incentives for R&D**
  As a path to improving R&D expenditure, the department aims to broaden government's scope of gross national expenditure on science and technology beyond direct policy incentives to include fiscal incentives. This will provide a holistic approach to national efforts aimed at meeting the 2008 target of gross expenditure on R&D of 1 percent of GDP.

1.4 DST GOALS AND KEY DELIVERABLES

The principal goals for the Department of Science and Technology are laid out in the 2002 NRDS. Broadly speaking, these are:

- to ensure that our National System of Innovation (NSI) addresses national growth and development goals in both the first and the second economy;
- to develop and maintain a highly competent and representative cohort of scientists in South Africa;
- to ensure that South Africa has a world class scientific infrastructure in place;
- to administer an optimal set of funding instruments;
- to respond creatively to global and continental challenges, and
- that it is supported by an appropriate governance framework that seeks to steer the NSI in the right direction.

We have established key deliverables under each of these goals. At the end of the five years covered by this strategic plan, the following targets will have been achieved:

1. Strong innovation chains in biotechnology, nanotechnology, the hydrogen economy, space science, information technology and manufacturing.
2. The development of technologies to address poverty and the poor quality of life of some.
3. A healthy and diverse influx of young people seeking and finding careers in science and engineering.
4. Notable successes, for example in astronomy and space science, in turning trends in global science to national advantage.

Science and technology cut across many sectors, from agriculture and health to defense. A critical success factor in achieving our goals will be to know when to lead our sister departments (for example in new areas and in areas of “market failure”) and when to support their leadership (for example, where technology is a determining factor but not a deliverable itself).

1.5 TECHNOLOGY MISSIONS AND TECHNOLOGY TRANSFER

Enhanced innovation requires the establishment and funding of a range of technology missions that are critical in promoting economic and social development. These include the two key technology platforms of the modern age, namely *biotechnology* and *information technology*. Two additional missions are *technology for manufacturing* and *technology to leverage knowledge*

and technology from, and add value to, our natural resources sectors. Finally, we will establish a mission, *technology for poverty reduction*, to address one of the scourges of our age. This portfolio of missions must be managed to respond to the requirements of both technology for development and technology for competitiveness.

The National Biotechnology Strategy was published and financed at a seed level in 2002/3 and raised to a significant level in 2003/4. Seed financing will be provided in the area of advanced manufacturing and logistics, resourcebased industries and new approaches to innovation to reduce poverty, stimulate SMMEs and Black Economic Empowerment. New and additional resources must still be attracted to these areas.

Some progress has been made in the domain of technology diffusion, but much more needs to be done. In a situation where there is considerable private equity and venture capital available and indications of a positive increase in protection of new intellectual property, South Africa lags behind in not having a comprehensive strategy for technology transfer. This will require development as a building block for the broader NSI goals.

1.6 HUMAN RESOURCES

Our approach to human resource development is rooted in the need radically to increase the number of women and people from previously disadvantaged communities entering the sciences and remaining in the system and, in addition, a strategy to maximise the pursuit of excellence in global terms. Public Understanding of Science Programmes can succeed in increasing these numbers only if young people see fulfilling and remunerative careers ahead of them. Global experience shows that the time-tested method of producing high-quality creative scientists and engineers capable of transferring from one discipline to another is to focus on excellence. One way of achieving national excellence is to focus our basic science on areas where we are most likely to succeed because of important natural or knowledge advantages. In South Africa, such areas include astronomy, human palaeontology and indigenous knowledge. The key institution, in the context of this strategy of promoting science, is the National Research Foundation, linked to the higher education sector through the National Plan for Higher Education.

The S&T skills of the broader workforce must also be established through targeted interventions that focus on critical skills gaps in the biotechnology, ICT, nuclear science and advanced manufacturing sectors. In response to the President's call for the employment of interns, DST will roll out an Integrated Internship Programme in conjunction with one of its public entities.

1.7 GOVERNANCE AND INVESTMENT

Many countries across the world, in response to the increasing rate of knowledge production, dissemination and application, the shortening of product life cycles and increased competition for human resources, are increasing their national investment in research and development. The OECD average across public and private sectors is 2.15% of GDP. Countries such as Finland and Korea spend far more. Expenditure in a number of developing economies such as Chile and India is prioritised and rising. South Africa's current level of 0.81% is significantly lower than it should be if it is to ensure national competitiveness in years to come.

Accordingly, this R&D Strategy depends on doubling government investment, in real terms, in science and technology over the next six years, with more gradual increases thereafter. This would raise the national investment to something over 1%, not yet as great as many of our competitors, but enough to signal an appropriate, comprehensive and sustainable strategy for the knowledge economy, South Africa's current research community, and the new generation that will be required to achieve our goals.

The Department of Science and Technology, now under a single Ministry of Science and Technology, will further develop and administer policy, institutional governance and performance programmes. The objective of this is to establish and maintain key scientific competencies and technology platforms required to facilitate national competitiveness and development. The DST will provide funding and a sound governance framework for science, engineering, and technology, (SET) and monitoring of its performance. It will promote national capacities for innovation and provide the SET human resources while ensuring they are more representative of our nation. It will also establish international partnerships in science and technology. The Department will promote excellence in science that is uniquely South African and with a global competitive edge.

The National Research and Development Strategy (NRDS) is the guiding strategic framework for operational activities of the Department. The various line functions of the DST have been capacitated to support the implementation of the strategy and the implementation of a coherent and effective governance framework.

At the January 2002 Lekgotla, the lack of a strategic approach to the management of government funded portion of South Africa's science and technology system was highlighted. Arising from this discussion and from the National Research and Development Strategy adopted by Cabinet in July 2002, a new strategic management model to improve the state of affairs was developed by DST and presented to Cabinet in early 2004. Cabinet approved the detailed planning around this new governance framework.

The new framework classifies the technology related services, (R&D) activities supported by Government into three basic types:

(i) early stage or highly cross-sectoral generic technology and associated human resources, for which DST would take responsibility;
(Ii) focused, sectoral and relatively mature technology domains, which would be primarily the responsibility of sector-specific departments, with the DST's assistance; and,
(iii) standard technology-based services, for which sector-specific departments would take responsibility.

The new strategic framework and the change in approach to the publicly funded portion of South Africa's science and technology system initiated a number of concrete steps:

- the transfer of the CSIR from the **dti** to the DST, timed to coincide with the beginning of the 2005 financial year;
- an institutional mechanism for the integration of Higher Education Research to be developed by the Department of Education and the DST;
- the appointment of DST representatives to the boards of the Agricultural Research Council (ARC), the Medical Research Council (MRC), Council for Mineral Technology (Mintek), South African National Biodiversity Institute (SANBI), the Nuclear Energy Council of South Africa (NECSA), the National Energy Research Institute (NERI) and the Water Research Commission (WRC);
- the redefinition of the “Science Vote” process for the 2006/07 budgeting process to create a national science and technology expenditure plan;
- the implementation of a three-tiered MTEF Science and Technology Expenditure Plan with National Treasury and other departments;
- the drafting of a policy on governance standards for science and technology institutions; and
- the drafting of a policy on intellectual property derived from publicly funded research.

This initiative has implications for better allocation of accountability and more effective alignment between the DST and line function departments and the Department of Education, and the re-design and re-articulation of the Science Vote to reflect these new accountabilities and structures.

1.8 STRATEGIC ASSESSMENT OF THE CONTRIBUTIONS OF THE DST

Over the past five years the science system has completed its initial transformation. This has enabled the funding instruments and the science and technology institutions to make a significant impact on improving the quality of life of and service delivery to the people, and has underpinned the economic performance of the economy. The focus and impact of science and technology remain robust, as outlined in Chapter 2 of the 1996 White Paper on Science and Technology, namely competitiveness, quality of life, environmental sustainability, the harnessing of information technology and knowledge generation to address the needs of society and the economy.

The Science Vote, which delivers the major portion of public science funding in South Africa, was improved through the implementation of key performance indicators for the relevant institutions and consistent measuring of performance. In 2002, the MRC underwent a further institution-wide review, which showed positive progress in core areas and effective leveraging of the increased public funding received. All Science Councils have completed this round of reviews, which will provide positive feedback on the core competencies, focus and relevance of the institutions to their stakeholders and customers.

The reform in funding regimes (the removal of rigid formula-based approaches) allowed the DST, assisted by the National Advisory Council on Innovaion (NACI), to introduce ring-fenced funding to promote R&D thrusts in key areas. Funds within the budgets of the MRC, ARC, CGS, NRF, HSRC and other science councils were earmarked to address specific South African problems, needs and opportunities. The problems and service delivery needs which were identified resulted in the establishment, inter alia, of the selected projects outlined below.

- DST participated in the development of a Ten Year Implementation Plan for Global Earth Observation Systems of Systems (GEOSS). The Group on Earth Observation (GEO) process aims to enable globally coordinated earth observations across a number of domains to provide better data, models and decision support in societal benefit areas such as disasters, agriculture, climate, weather, water, health, energy, biodiversity and ecosystems.
- *Square Kilometre Array* (SAK). The South African SKA bid has progressed with the selection of a final site and the completion of an initial description and simulation of the SKA configuration. Aprocess of site optimisation is underway. The major activities include the building of Radio Frequency Interference (RFI) equipment, and the taking of detailed RFI measurements at the identified site. The process for selection of remote sites has been initiated and completed. Political and technical engagement of neighbouring countries with respect to location of the remote site is also underway.
- The establishment of a Research and Technology Collaboration Centre (RTCC) to utilise the technology challenges of the SKA and to drive innovation has begun. Aproposal has also been submitted to National Aeronautical and Space Administration (NASA) to establish one component of their Deep Space Array Network (DSAN) in South Africa. The best site for the DSAN in South Africa has been identified and the site analysis completed. The DSAN bid has been catalysed by the SKA Programme.
- *Open Source Software.* This initiative, driven by the Meraka Open Source Centre at the CSIR, has made strides in advocating and shaping the use and application of open source software in the country. A number of projects, including the migration of the CSIR systems to open source software, support of the Mogalakwena Open Source Centre initiative, and the Mobile Technology Platforms for rural clinics have been completed or are nearing completion.
- *South African Research Network.* A high speed research network, the South African Research Network (SANReN), that would connect all South African research institutions to those located elsewhere in the world has been established. The DST has completed a study on the architectural and organisational structure of this network and is currently in the process of establishing the SANReN. Included in this process are ongoing efforts to reduce the cost of bandwidth.

- *Indigenous Knowledge Systems (IKS)*. The IKS policy was developed and has recently been approved by Cabinet. The policy provides an enabling framework to stimulate and strengthen the contribution of indigenous knowledge to social and economic development in South Africa. A trust fund for IKS has been established and funded. An IKS workshop of SADC countries was held recently to address the issues of protection of indigenous knowledge.
- The DST Centres of Excellence Programme was launched in June 2003 with the establishment and funding of six new centres of excellence in the South African science system. These centres recognise and reward excellent scientific capacity and productivity, and are outstanding vehicles for the delivery of highly trained science and technology human resources.
- Programmes in the Science and Youth domain continue with great success. Notably, National Science Week was held simultaneously in all nine provinces during the second week of May 2006. Public consultations on a policy to inform the funding of a network of science centres in South Africa culminated with their adoption at a national conference held in August 2004.
- Poverty reduction developmental initiatives are concentrated in the poverty nodes of the Integrated Sustainable Rural Development Strategy and had provided over five thousand permanent employment and more temporary job opportunities by the end of 2003/4. These opportunities were targeted at the most socially vulnerable sectors of the population, namely women, youth and the disabled.

1.9 PURPOSE AND MEASURABLE OBJECTIVES

The successes of the DST over the past year, including the roll-out of technology missions, increased robustness of the NSI and the biotechnology strategy are reported on in the relevant sections.

The new management framework is central to the DST strategy and the department has reorganised itself and its line programmes to reflect this, as outlined below.

Frontier Science and Technology: A line programme to focus on cross-cutting themes

Building on the successful roll-out of the technology missions specified in the National R&D Strategy, new programmes in nanotechnology, space science, nuclear technology and science to support South Africa's engagement with the hydrogen economy are being established. Human resource development remains the principal challenge in advancing South Africa's NSI. A programme of DST Centres of Excellence in research has been established. Additional focus on professional development of young researchers and strengthened post-doctoral programmes for South African researchers is currently being initiated. Future developments will include the establishment of research chairs at South African universities in strategic areas, as well as the renewal and extension of our scientific infrastructure base.

Government Sector Programmes and Coordination: A line programme to partner other departments in R&D and Technology Development

With the acceleration of technological change come challenges and opportunities in almost all sectors of the economy, in delivery of social services and in the environment. A crucial task of the DST is to assist various sectors, from manufacturing and transport to health and crime prevention, to develop appropriate strategies and to make the right investments in technology and R&D. Customised programmes, such as the South African Aids Vaccine Initiative (SAAVI) and the National Energy Research Institute, have already been established in relevant departments. Partnerships with other departments, particularly ones that promote migration from the second to the first economies, will be created in a systematic manner.

International Cooperation and Resources: A line programme to focus on Science and Technology in the global setting

Before 1994, foreign funding of South African research and development was negligible. The most recent National R&D Survey estimated that in the 2001/02 financial year it had grown to 6% of total expenditure. Global opportunities seized upon by the DST and its associated institutions (e.g. the National Research Foundation) in projects such as the Southern African Large Telescope and the European Developing Countries Clinical Trials Partnership are beginning to contribute significantly. The political alliances being forged with the European Union and within NEPAD (underpinned by directed scientific cooperation programmes) and the India-Brazil-South Africa (IBSA) partnership will carry this momentum forward.

In addition, the following non-line programme was developed:

Science and Technology Expert Services: An integrative resource group to optimise research and innovation management, policy capacity and effective implementation

The above programmes will be facilitated by pooling the core content and research management expertise in a flexible and responsive Science and Technology Expert Service. The programme provides the expertise and resource base to deliver on NSI initiatives in the line programmes, leadership functions, and governance functions.

The Department of Science and Technology will deliver, through the above mechanisms and partnerships, an increased strategic capacity to establish science and technology human resources and innovation potential in new areas of science and technology, and across existing sectors in partnership with government departments and the private sector.

The global nature of science and the local nature of the adoption and stimulation of innovation are clearly in view.

Neglecting to invest in our people and in the capacity of our economy to innovate will result in a persistent pattern of systemic under-performance initially hard to detect but, in the medium-term, creating a stark contrast with other emerging economies which invest more public resources in science and technology than we do. The intermediate goal of 1% of GDP dedicated to R&D remains an important indicator of our way forward. This is linked directly to our capacity to continue the transformation and renewal of the S&T workforce and the engineers who underpin incremental and quantum innovations in existing sectors which feed our economic growth and spill over to social development and quality of life. An increased emphasis on renewed commitment to macro-economic targets, supported by practical programmes and a clear focus on the system will elicit short, medium and long-term benefits from this critical portfolio.

2. ORGANISATION AND STRUCTURE

2.1 INTRODUCTION

The Department of Science and Technology (DST) came into being on 1 August 2002. Subsequently, on 28 April 2004, the Ministry of Science and Technology was established by the President as a entity separate from the Ministry of Arts, Culture, Science and Technology . The new Science and Technology Management Framework was approved by Cabinet on 24 October 2004. This framework is a high-level functional model for strategic management of the South African science and technology (S&T) system and is based on a classification of activities into three broad areas. These are cross-cutting science and technology sector specific science and technology; and, critical technology intensive services. The DST had to restructure its programmes to comply with the first two objectives of this model, which are:

- to be the principal driver in government of the programmes and key publicly funded institutions that stimulate and enable cross-cutting science and technology; and;
- in case of sector-specific science, to develop interventions in the case of market failure, under subscription or where there are technology gaps of a national strategic nature, e.g. where sector departments are not ready to drive the relevant sector specific-technology due to capacity deficiencies.

Hence the DST developed a new organogram and structure conforming to the S&T framework which was to be implemented with effect from 01 April 2005. The post structure, Appendix 1, details the programme resources and operations as outlined below. DST activities are organised into five programmes as follows:

PROGRAMME 1

CORPORATE SERVICES & GOVERNANCE: Provide core support services, including finance, human resources, legal services, information technology, as well as managing the governance and reporting system for government funded science and technology in general, and the DST institutions and programmes in particular.
Measurable objectives: Uniform governance system for research institutions.

PROGRAMME 2

SCIENCE AND TECHNOLOGY EXPERT SERVICES: Provide expert content-based services to the DST line programmes, Executive Committee and the National System of Innovation (NSI), across a range of relevant science and technology domains, research and innovation management practice and policy.
Measurable objectives: Deliver required outcomes within the strategic themes and portfolio of the DST in order to give effect to the strategy and mandate of the NS I.

PROGRAMME 3

INTERNATIONAL COOPERATION AND RESOURCES: Take responsibility for the development of bilateral and multilateral cooperation in science and technology to strengthen the NSI, and for a coherent strategic programme to access official development assistance for science and technology in South Africa and on the African continent. Establish a technological intelligence capacity to monitor and evaluate international science and technology trends, and to leverage South Africa's competitive advantage in new and innovative technologies globally.
Measurable objectives: To increase the flow of scientific knowledge and resources to South Africa through participation in joint programmes.

PROGRAMME 4

FRONTIER SCIENCE AND TECHNOLOGY*:* Provide leadership in respect of relevant, long-term and cross-cutting research, development, innovation and human capital development across the NSI.
Measurable objectives: Build programmes within the NSI, using in particular the resources of the DST and its institutions to ensure that South Africa has an evolving world class science and technology portfolio and a thriving, expanding and representative human capital base.

PROGRAMME 5

GOVERNMENT SECTOR PROGRAMMES AND COORDINATION*:* Take leadership of and provide support to other government departments in respect of sector specific research, development and technology and directed human capital programmes.
Measurable objectives: Build partnerships and programmes to ensure the appropriate contribution of science and technology within different sectors.

2.2 OPERATIONALISING THE STRATEGY: TARGETING INVESTMENT IN SPECIFIC AREAS

The dominant theme is the funding of the National R&D Strategy and the phasing of this expenditure to achieve coherent and integrated outputs. Key principles for the phasing include:

- Implementing the new strategic management model for the S&T system. One of the purposes of the new governance framework is to re-engineer the "Science Vote" fundamentally and to develop an annual S&T expenditure plan as envisaged in the White Paper on Science and Technology (1996). The plan will be to provide a holistic view of S&T expenditure by government to enable improved decision-making regarding the deployment of resources. The integrated S&T expenditure plan will be aligned with the re-grouping of public R&D entities as recommended in the recent governance review of public entities by the National Treasury.
- Promoting South Africa as a preferred destination for global science facilities such as the Square Kilometre Array (SKA) radio telescope. In 2003 and 2004 concerted actions were undertaken to advance South Africa's SKA bid and to include Southern African partner countries in the proposal through their hosting of remote stations.
- Establishing the Research and Technology Collaboration Centre (RTCC). A proposal has also been submitted to NASA to establish one component of their Deep Space Array Network (DSAN) in South Africa. The best site for the DSAN in South Africa has been identified and the site analysis completed. The DSAN bid has been catalysed by the SKA Programme.
- Developing of draft legislation to establish the Academy of Engineering. This is at an advanced stage and will strengthen the character of advice on engineering matters and innovation and support the evolution of a modern academy system in South Africa.
- Establishing a technology intelligence capacity to enhance South Africa's ability to monitor and evaluate new international technology and trends, and to leverage South Africa's competitive advantage in new and innovative technologies internationally.
- Implementing the new DST organogram in line with the objectives of a new Science and Technology Framework.

2.3 EXPENDITURE TRENDS

The DST, in delivering the first phase of the National R&D Strategy, has developed the strategic capacity to deploy and prioritise resources timeously and effectively. The increase in overall expenditure in the delivery of this strategy is detailed in the programme tables below.

In the 2005/6 financial year, the new and additional resources and the broader expenditure increases are attributable to the deployment of resources in the third year of the National R&D Strategy. This constitutes the bulk of the 26% increase (dropping to 10% in 2006/7; with an increase to 15% in 2007/8). The restructuring of the DST is reflected to address the establishment of a dedicated Ministry, the strengthening of the efforts in inter-governmental and international collaborations and resource leveraging, the stimulation of new frontier programmes and the provision of professional resources to give effect to these changes.

These changes were largely envisaged in the previous MTEF, but a particular change occurred in the reprioritisation of the Innovation Fund to focus on near-market industry programmes, while the frontier programmes and initiatives, human capital and inter-governmental partnerships have attracted more resources to build their capacity for early impact.

There is a strengthening of Human Capital programmes, which will be further leveraged in the 2006/7 year. This domain requires further strategic development in partnership with all post-graduate research stakeholders in the next period.
The principle of access to Infrastructure Budgets in this Vote has been supported and the first tranche of financing, currently at the level of R39m for 2007/8, is included. Detailed planning in this regard has already been initiated.

Table 31.1 Science and Technology

Programme	Audited outcome			Adjusted appropriation	Revised estimate	Medium-term expenditure estimate		
R thousand	2002/03	2003/04	2004/05	2005/06		2006/07	2007/08	2008/09
1. Corporate Services	47 153	57 873	62 558	74 098	100 028	211 582	82 657	87 208
2. Science and Technology Expert Services	41 579	33 487	41 416	38 283	38 283	51 556	54 581	57 510
3. International Co operation and Resources	30 512	40 508	46 170	83 165	83 165	131 946	146 921	176 969
4. Frontier Science and Technology	875 148	1 064 822	1 170 201	1 384 585	1 383 655	1 633 037	1 978 957	2 231 662
5. Government Sector Programmes and Coordination	107 054	194 892	312 532	464 324	439 324	585 972	645 363	697 149
Total	**1 101 446**	**1 391 582**	**1 632 877**	**2 044 455**	**2 044 455**	**2 614 093**	**2 908 479**	**3 250 497**
Change to 2005 Budget estimate				57 816	57 816	430 701	467 919	678 146

Table 31.1 Science and Technology (continued)

R thousand	Audited outcome 2002/03	Audited outcome 2003/04	Audited outcome 2004/05	Adjusted appropriation 2005/06	Revised estimate 2005/06	Medium-term expenditure estimate 2006/07	Medium-term expenditure estimate 2007/08	Medium-term expenditure estimate 2008/09
Economic classification								
Current payments	**79 667**	**105 573**	**127 140**	**164 156**	**164 156**	**180 770**	**186 657**	**196 763**
Compensation of employees	31 756	45 710	58 204	80 196	80 196	93 107	97 453	102 663
Goods and services	47 904	59 863	68 728	83 960	83 960	87 663	89 204	94 100
of which:								
Communication	*3 229*	*4 048*	*4 459*	*5 216*	*5 216*	*5 544*	*5 644*	*5 957*
Computer Services	*2 675*	*2 817*	*2 965*	*3 121*	*3 121*	*3 309*	*3 507*	*3 696*
Consultants, contractors and special services	*9 684*	*12 144*	*12 867*	*21 476*	*21 476*	*21 739*	*22 123*	*23 327*
Inventory	*5 612*	*5 907*	*6 219*	*6 546*	*6 546*	*6 940*	*7 356*	*7 753*
Maintenance, repair and running cost	*146*	*153*	*161*	*169*	*169*	*178*	*189*	*199*
Operating leases	*2 204*	*2 465*	*5 107*	*2 996*	*2 996*	*3 195*	*3 442*	*3 697*
Travel and subsistence	*12 450*	*15 613*	*15 346*	*20 116*	*20 116*	*21 397*	*21 706*	*22 878*
Other	*11 904*	*16 716*	*21 604*	*24 320*	*24 320*	*25 362*	*25 238*	*26 593*
Financial transactions in assets and liabilities	7	–	208	–	–	–	–	–
Transfers and subsidies	**1 017 478**	**1 282 827**	**1 497 448**	**1 879 494**	**1 854 494**	**2 299 469**	**2 720 924**	**3 052 787**
Provinces and municipalities	106	139	6 732	229	229	26	–	–
Departmental agencies and accounts	614 254	748 769	712 761	940 340	940 340	1 221 549	1 432 127	1 575 444
Universities and technikons	–	–	16 289	22 036	22 036	–	–	–
Public corporations and private enterprises	302 751	334 554	489 201	479 166	479 166	483 194	507 352	534 749
Foreign governments and international organisations	–	–	11	–	–	–	–	–
Non-profit institutions	100 367	199 365	263 526	202 898	202 898	594 700	781 445	942 594
Households	–	–	8 928	234 825	209 825	–	–	–
Payments for capital assets	**4 301**	**3 182**	**8 289**	**805**	**25 805**	**133 854**	**898**	**946**
Buildings and other fixed structures	–	–	–	–	–	133 000	–	–
Machinery and equipment	4 301	3 182	8 289	805	25 805	854	898	946
Total	**1 101 446**	**1 391 582**	**1 632 877**	**2 044 455**	**2 044 455**	**2 614 093**	**2 908 479**	**3 250 497**

Expenditure trends

Expenditure is expected to continue to increase rapidly, rising from R1.1 billion in 2002/03 to an expected R3.25 billion in 2008/09, an annual average increase of 19.8 %. The expenditure increases over the next three years will go largely towards research infrastructure, for example in nanotechnology, astronomy and space science, and associated human capital programmes.

The 2006 Budget sets out additional allocations of R430 million in 2006/07, R467 million in 2007/08 and R678 million in 2008/09 for a new head office building, R&D infrastructure, international leveraging of funds and for VAT adjustments to several public entities.

Table 31.2 Departmental receipts

	Receipts outcome			Adjusted appropriation	Medium-term estimate		receipts
	Audited	Audited	Preliminary outcome		2006/07	2007/08	2008/09
	2003/04	2004/05	2005/06				
R thousand	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Sales of goods and services produced by department	40	17	44	44	50	55	61
Interest, dividends and rent on land	-	-	-	-	-	-	-
Financial transactions in assets and liabilities	230	285	6	6	7	8	9
Total	**270**	**302**	**50**	**50**	**57**	**63**	**70**

3. DST PROGRAMMES

3.1 Programme 1: Corporate Services & Governance

- This programme conducts the overall management of the department and provides centralised support services. It also ensures that funded organisations comply with good corporate governance practices and are aligned with the strategic focus of the national system of innovation. It also monitors and evaluates the science councils. The new *Property Management* sub-programme covers functions and funds which have been devolved from the Department of Public Works.

Expenditure estimates

Table 31.3 Corporate Services and Governance

Subprogramme	**Audited outcome**			**Adjusted appropriation**	**Medium-term expenditure estimate**		
R thousand	**2002/03**	**2003/04**	**2004/05**	**2005/06**	**2006/07**	**2007/08**	**2008/09**
Minister [1]	685	746	813	836	888	935	981
Deputy Minister [2]	1 024	607	780	680	721	760	798
Management	5 757	3 808	5 840	3 912	4 970	5 233	5 491
Corporate Services	36 593	49 300	51 337	63 629	199 028	69 371	73 167
Governance	1 300	1 378	1 461	2 522	3 273	3 439	3 625
Property Management	1 794	2 034	2 327	2 519	2 702	2 919	3 146
Total	**47 153**	**57 873**	**62 558**	**74 098**	**211 582**	**82 657**	**87 208**
Change to 2005 Budget estimate				5 262	138 609	6 001	6 412

1 Payable as from 1 April 2005. Salary: R 669 462. Car allowance: R 167 365.

2 Payable as from 1 April 2005. Salary: R 544 123. Car allowance: R 136 030.

Economic classification

Current payments	**44 320**	**55 612**	**55 391**	**72 366**	**76 823**	**80 806**	**85 247**
Compensation of employees	21 125	26 295	24 182	35 726	40 869	42 797	45 108
Goods and services	23 188	29 317	31 002	36 640	35 954	38 009	40 139
of which:							
Communication	*1 498*	*1 910*	*2 246*	*2 291*	*2 429*	*2 550*	*2 688*
Computer Services	*1 424*	*1 499*	*1 578*	*1 661*	*1 761*	*1 866*	*1 967*
Consultants, contractors and special services	*4 493*	*5 729*	*6 739*	*8 566*	*8 764*	*9 216*	*9 723*
Inventory	*2 072*	*2 181*	*2 296*	*2 417*	*2 562*	*2 716*	*2 862*
Maintenance, repair and running cost	*21*	*22*	*23*	*24*	*25*	*27*	*28*
Operating leases	*1 989*	*2 239*	*4 870*	*2 746*	*2 930*	*3 161*	*3 401*
Travel and subsistence	*5 776*	*7 366*	*7 445*	*8 837*	*9 369*	*9 837*	*10 368*
Other	*5 915*	*8 371*	*5 805*	*10 098*	*8 114*	*8 636*	*9 102*
Financial transactions in assets and liabilities	7	–	207	–	–	–	–

Table 31.3 Corporate Services and Governance (continued)

R thousand	Audited outcome 2002/03	2003/04	2004/05	Adjusted appropriation 2005/06	Medium-term expenditure estimate 2006/07	2007/08	2008/09
Transfers and subsidies[1]	**70**	**88**	**83**	**1 432**	**1 441**	**1 517**	**1 608**
Provinces and municipalities	70	88	83	82	10	–	–
Non-profit institutions	–	–	–	1 350	1 431	1 517	1 608
Payments for capital assets	**2 763**	**2 173**	**7 084**	**300**	**133 318**	**334**	**352**
Buildings and other fixed structures	–	–	–	–	133 000	–	–
Machinery and equipment	2 763	2 173	7 084	300	318	334	352
Total	**47 153**	**57 873**	**62 558**	**74 098**	**211 582**	**82 657**	**87 208**

1. Where the name of an entity is not specified, transfer payments are being made to various institutions

Details of major transfers and subsidies:

Non-profit institutions							
Current	**–**	**–**	**–**	**1 350**	**1 431**	**1 517**	**1 608**
Technology Top 100	–	–	–	1 350	1 431	1 517	1 608
Total	**70**	**88**	**83**	**1 432**	**1 441**	**1 517**	**1 608**

Expenditure trends

Corporate Services and Governance expenditure in the four-year period from 2002/03 to 2005/06 increased rapidly at an annual average rate of 16,3%, rising from R47,2 million to R74,1 million. The increase reflects mainly an expansion of administrative capacity. Expenditure over the next three years increases steadily at a slower rate of 5,6%, to reach R87,2 million in 2008/09. The sharp increase in 2006/7 is due to the allocation of R133 million for a new head office.

Service delivery, objectives and indicators

Recent outputs

The programme made some important contributions to maintaining cohesion in the National System of Innovation (NSI), with a few of these highlighted below.

- The Governance sub-programme guided board appointments of the NRF, CSIR and the HSRC. It is currently following the recommendations of the review team in drafting a new HSRC Act and crafting a shareholder compact with DST.
- The programme also participated in the recent review of National Treasury and Department of Public Service and Administration of Public Entities and State Owned Enterprises and made important contributions in this regard. The recommendations emanating from this review indicate that this Governance sub-programme will have to consider the whole science system and internal DST programmes very carefully to ensure that there is harmonisation of its institutional frameworks. To this end, it has been proactive in drafting revisions to the various enabling legislations of its public entities in order to ensure harmonisation with the Public Finance Management Act and best practice in corporate governance.
- The programme continued to give strategic advice to relevant stakeholders in maintaining sound governance practices in the science system.
- In support of the new governance model for the science system, the sub-programme also facilitated the appointment of DST officials to the boards of public entities in the NSI.
- It has also sensitised the NSI to some systemic risks that it faces, mainly as a result of changes in accounting convention.

The Communications sub-programme will continue to profile DST strategically over the MTEF in the media and local and international events. It has been restructured to give it a stronger marketing bias and has formed useful alliances with our public entities.

The Governance sub-programme has been restructured similarly to improve its supervisory capabilities over both public entities and DST programmes. A major challenge will be the development of shareholder compacts and the execution of recommendations by the synthesis review.

The Human Resource sub-programme has been restructured in the same way and has developed a strategy to retain scarce skills. It will also serve as a catalyst in implementing an integrated internship programme both within DST and across the science system. The impact of these programmes will be assessed annually to ensure that the DST's objective of a well skilled department is achieved.

Selected medium-term output targets

Service delivery objectives and indicators (Governance sub-programme)
Measurable objective: Uniform governance system for research institutions.

Subprogramme	Output	Measure/Indicator	Target
Governance sub-programme	Contextualised performance management system (KPI reports).	Targets as set out in Key Performance Indicator Reports met or exceeded.	Ongoing monitoring & evaluation to improve the performance of institutions relative to targets sound governance protocols in place.

3.2 Programme 2: Science and Technology Expert Services

The role of *Science and Technology Expert Services* is to support the department by providing expert services in science and technology policy, implementation, monitoring and reviewing initiatives.

There are two sub-programmes:

- *Expert Services* provides content-based services to the line programmes in support of the department's strategic priorities, carries out initiatives as commissioned by the executive committee, and deals with ad hoc requests. The programme maintains a strategic set of core skills in the department while using a network of specialists and service providers to complement and enhance its core competences.
- *National Advisory Council on Innovation* (NACI) provides policy advice to the Minister of Science and Technology on the role and contribution of innovation in promoting and achieving national objectives. These national objectives include improving the quality of life of South Africans and promoting sustainable economic growth and international competitiveness.

Expenditure estimates

Table 31.4 Science and Technology Expert Services

Sub-programme	Audited outcome			Adjusted appropriation	Medium-term expenditure estimate		
R thousand	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
Expert Services	41 579	28 029	34 916	30 055	42 834	45 423	47 857
National Advisory Council on Innovation (NACI)	–	5 458	6 500	8 228	8 722	9 158	9 653
Total	**41 579**	**33 487**	**41 416**	**38 283**	**51 556**	**54 581**	**57 510**
Change to 2005 Budget estimate				(2 743)	7 092	6 918	7 273
Economic classification							
Current payments	**17 015**	**21 385**	**32 746**	**33 922**	**41 087**	**42 825**	**45 138**
Compensation of employees	4 872	7 966	16 421	21 120	25 387	26 507	27 938
Goods and services	12 143	13 419	16 325	12 802	15 700	16 318	17 199
of which:							
Communication	*1 144*	*1 110*	*1 133*	*1 193*	*1 265*	*1 340*	*1 421*
Computer Services	*231*	*244*	*257*	*270*	*286*	*303*	*320*
Consultants, contractors and special services	*2 550*	*2 818*	*2 378*	*1 205*	*1 379*	*1 507*	*1 588*
Inventory	*1 629*	*1 715*	*1 805*	*1 900*	*2 014*	*2 135*	*2 250*
Maintenance, repair and running cost	*9*	*9*	*10*	*10*	*11*	*11*	*12*
Operating leases	*86*	*90*	*95*	*100*	*106*	*112*	*118*
Travel and subsistence	*3 279*	*3 623*	*3 058*	*3 477*	*3 701*	*3 866*	*4 075*
Other	*3 215*	*3 811*	*7 590*	*4 647*	*6 939*	*7 043*	*7 415*
Transfers and subsidies[1]	**23 868**	**11 741**	**8 438**	**4 161**	**10 257**	**11 533**	**12 137**
Provinces and municipalities	17	26	39	77	8	–	–
Departmental agencies and accounts	10 000	–	–	–	–	–	–
Universities and technikons	–	–	–	130	–	–	–
Non-profit institutions	13 851	11 715	8 399	3 954	10 249	11 533	12 137
Payments for capital assets	**696**	**361**	**232**	**200**	**212**	**223**	**235**
Machinery and equipment	696	361	232	200	212	223	235
Total	**41 579**	**33 487**	**41 416**	**38 283**	**51 556**	**54 581**	**57 510**

1. Where the name of an entity is not specified, transfer payments are being made to various institutions

Details of major transfers and subsidies:

Departmental agencies and accounts							
Public entities							
Capital	**10 000**	**–**	**–**	**–**	**–**	**–**	**–**
Grant-In-Aid to Various Institutions	10 000	–	–	–	–	–	–
Universities and technikons							
Current	**–**	**–**	**–**	**130**	**–**	**–**	**–**
Grant-In-Aid to Various Institutions	–	–	–	130	–	–	–
Non-profit institutions							
Current	**13 851**	**11 715**	**8 399**	**3 954**	**10 249**	**11 533**	**12 137**
Academies	1 350	2 290	2 500	2 500	3 000	3 150	3 320
Institutional and Programme Support	12 501	9 425	5 899	1 454	2 249	3 383	3 547
Indigenous Knowledge Systems	–	–	–	–	5 000	5 000	5 270

Expenditure trends

Expenditure has grown at an annual average of only 5.5%, from R41.6 million in 2002/03 to an expected amount of R57.5 million in 2008/09. This is due to the fact that the programme provides expert support to the department in the implementation of projects. Expenditure is expected to grow at an annual average of 14.5% over the MTEF period.

Service delivery objectives and indicators

Recent outputs

The programme has provided management services and content deliverables to a large number of departmental initiatives, including developing frameworks and strategies, setting up institutions and networks, international collaborations and research. These initiatives are elaborated on under *Programme 4: Frontier Science and Technology* and *Programme 5: Government Sector Programmes and Coordination*.

Cabinet approved the hydrogen economy initiative and the nanotechnology strategy as two key frontier programmes driven by the Department of Science and Technology. The Pebble Bed Modular Reactor (PBMR) human capital, research and innovation frontier programme and the South African National Energy Research Institute are making good progress in their implementation. The Fablab facility at the Innovation Hub has given concrete expression to the second phase of the Advanced Manufacturing Technology Strategy.

The programme houses the National Advisory Council on Innovation (NACI). It also maintains the DST's relationship with the Academy of Science of South Africa and the Academy of Engineering. NACI's functions are effective policy development and the provision of specialised advice on the national system of innovation. NACI develops science and technology indicators and houses the Reference Group for South African Women in Science as well as the Biotechnology Advisory Committee.

Over the past three years, NACI has done the following: made critical inputs in the allocation of resources in the national system for innovation and the shape and form of the national research and development strategy; coordinated the process that led to the advanced manufacturing technology strategy; and developed South Africa's policy on open source information technologies. Within NACI, key studies have been completed on: science and technology resources in the higher education system; the mobility of science and technology workers internationally and across science areas; and research and development indicators, including the research and development survey of the DST (which Statistics South Africa has accepted as part of the national statistical system). NACI, the Reference Group for South African Women in Science and the department jointly published a major baseline study on the gender profile and policies of the NSI.

The Academy of Science of South Africa has taken over the publication of the SouthAfrican Journal of Science, the impact of which as a national journal has improved. The academy also launched Quest, a general science periodical aimed at scientifically literate readers.

The legislation currently being finalised for establishing the Academy of Engineering will strengthen the quality of advice on engineering issues and innovation while supporting the development of a modern academy system in South Africa.

Selected medium-term output targets

Science and Technology Expert Services

Measurable objective: Deliver required outcomes within the strategic themes and portfolio of the department to give effect to the strategy and mandate of the NSI.

Subprogramme	Output	Measure/Indicator	Target
Expert Services	Provide analytical support and services to political principals and department's executive. System of strategic intelligence knowledge and Information (capacity, expertise, foresight, technology roadmaps,indicators, scenarios, best practice and benchmarking).	Policy responses, speeches, and briefing notes provided timeously and effectively. Number of reports and knowledge transfer events delivered with stakeholder support.	Timely response that meets the brief. Two reports by 2007 and rated by the users of the programme.

3.3 Programme 3: International Cooperation and Resources

Through its three sub-programmes, *International Cooperation and Resources* develops and services bilateral, polylateral and multilateral relationships and agreements in science and technology to strengthen the National System of Innovation (NSI) and to ensure that there is a net flow of knowledge, capacity and resources into South Africa and Africa.

- *Multilateral and Africa* coordinates and manages South Africa's participation in international science and technology platforms at sub-regional (SADC), continental (Africa) and global levels (the OECD, United Nations System and South-South multilateral organisations). The sub-programme is responsible for funding the Africa Institute of South Africa and for providing financial support to various institutions in support of international science programmes.
- *International Resources* provides assistance, both nationally and to Africa, in accessing international resources for science and technology, through leveraging strategic international partnerships, supporting participation in competitive international funding programmes, promoting foreign investment, locating global scientific infrastructure in South Africa and developing a strategic international technology information capacity.
- *Bilateral Cooperation* is responsible for ensuring that South Africa is a priority destination for science and technology through identification, development, promotion and facilitation of collaborative activities with other countries outside the African continent and leveraging of resources in support of the NSI. The sub-programme also uses North-South and South- South cooperation to achieve its objectives.

Expenditure estimates

Table 31.5 International Cooperation and Resources

Sub-programme	Audited outcome			Adjusted appropriation	Medium-term expenditure estimate		
R thousand	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
Multilaterals and Africa	24 418	27 554	28 954	40 852	84 763	97 378	124 750
International Resources	–	4 864	8 715	26 305	29 791	31 281	32 970
Bilateral Cooperation	6 094	8 090	8 501	16 008	17 392	18 262	19 248
Total	**30 512**	**40 508**	**46 170**	**83 165**	**131 946**	**146 921**	**176 969**
Change to 2005 Budget estimate				454	42 454	53 454	78 454
Economic classification							
Current payments	**9 371**	**20 474**	**24 320**	**35 901**	**40 400**	**39 637**	**41 725**
Compensation of employees	3 001	7 899	10 361	13 500	16 410	17 186	18 061
Goods and services	6 370	12 575	13 959	22 401	23 990	22 451	23 664
of which:							
Communication	*446*	*880*	*924*	*1 568*	*1 677*	*1 569*	*1 654*
Computer Services	*527*	*555*	*584*	*615*	*652*	*691*	*728*
Consultants, contractors and special services	*1 338*	*2 641*	*2 773*	*4 704*	*5 030*	*4 706*	*4 960*

Inventory	*1 602*	*1 687*	*1 776*	*1 869*	*1 981*	*2 100*	*2 213*
Maintenance, repair and running cost	*114*	*120*	*126*	*133*	*141*	*149*	*158*
Operating leases	*129*	*135*	*143*	*150*	*159*	*169*	*178*
Travel and subsistence	*1 720*	*3 395*	*3 565*	*6 048*	*6 468*	*6 051*	*6 378*
Other	*494*	*3 162*	*4 068*	*7 314*	*7 882*	*7 016*	*7 395*
Transfers and subsidies[1]	**20 678**	**19 625**	**21 326**	**47 134**	**91 408**	**107 138**	**135 090**
Provinces and municipalities	10	11	25	36	3	–	–
Departmental agencies and accounts	8 981	11 713	16 325	25 119	21 954	23 030	24 249
Universities and technikons	–	–	–	726	–	–	–
Public corporations and private enterprises	–	–	–	619	–	–	–
Foreign governments and international organisations	–	–	11	–	–	–	–
Non-profit institutions	11 687	7 901	4 965	20 634	69 451	84 108	110 840
Payments for capital assets	**463**	**409**	**524**	**130**	**138**	**146**	**154**
Machinery and equipment	463	409	524	130	138	146	154
Total	**30 512**	**40 508**	**46 170**	**83 165**	**131 946**	**146 921**	**176 969**

1. Where the name of an entity is not specified, transfer payments are being made to various institutions

Table 31.5 International Cooperation and Resources (continued)

	Audited outcome			Adjusted appropriation	Medium-term expenditure estimate		
R thousand	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
Details of major transfers and subsidies:							
Departmental agencies and accounts							
Public entities							
Current	**8 981**	**11 713**	**16 325**	**25 119**	**21 954**	**23 030**	**24 249**
Africa Institute of South Africa	8 981	11 713	16 325	18 968	21 954	23 030	24 249
Global Science	–	–	–	6 151	–	–	–
Universities and technikons							
Current	**–**	**–**	**–**	**726**	**–**	**–**	**–**
Global Science	–	–	–	726	–	–	–
Public corporations and private enterprises							
Public corporations							
Current	**–**	**–**	**–**	**619**	**–**	**–**	**–**
Global Science	–	–	–	619	–	–	–
Foreign governments and international organisations							
Current	**–**	**–**	**11**	**–**	**–**	**–**	**–**
Global Science	–	–	11	–	–	–	–
Non-profit institutions							
Current	**11 687**	**7 901**	**4 965**	**20 634**	**69 451**	**84 108**	**110 840**
Global Science	11 687	7 901	4 965	20 634	69 451	84 108	110 840
Total	**20 678**	**19 625**	**21 326**	**47 134**	**91 408**	**107 138**	**135 090**

Expenditure trends

Expenditure is expected to continue to increase rapidly, rising from R30,5 million in 2002/03 to an expected R177 million in 2008/09, an annual average increase of 34% per cent. These increases go towards transfer payments to various institutions in support of international science programmes, as well as the leveraging of international resources through matched payments.

Service delivery objectives and indicators

Recent outputs

Apart from managing 38 bilateral arrangements, resulting in over 400 research and development projects, bigger projects with prominent human capital development components and regional activities have been initiated with international

partners. At the same time, the level of cooperation with selected countries has been elevated to address social development issues and institutional capacity building, especially at Historically Disadvantaged Institutions (HDI's). Science, technology and innovation policy discussions have been conducted in various fora with a view to strengthening the South African innovation system. The trilateral consortium between India, Brazil and South Africa (IBSA) generated a number of knowledge sharing workshops, seminars, and several joint projects are being developed in the priority areas of cooperation.

Official development has generated considerable resources for research projects in priority areas such as HIV/AIDS and related diseases. International programmes promoting the development of human capital, management skills and research and innovation capacity in the provinces are being developed. The leveraging of resources for SADC and NEPAD programmes from international sources has been initiated in selected areas. The leveraging of resources and the production and use of scientific knowledge has been enhanced by the introduction of science and technology representatives in strategically selected countries.

The DST, with the support of the European Commission, has established a dedicated platform for promoting improved South African participation in and the leveraging of funds from the European Union's Framework Programmes for Research, the European South African Science and Technology Advancement Programme (ESASTAP). This initiative has already resulted in a marked improvement in South Africa's participation in the current Sixth Framework Programme and positions the country favourably for the Seventh Framework Programme to be launched in 2006.

Significant progress has been registered in the DST's development of partnerships with multinational companies aimed at promoting foreign investment in South African science and technology through, for example, the location of the research capacities of these companies in South Africa. Several such partnerships will be launched in 2006.

Other international partnerships with potentially important resources benefits for South Africa currently being explored include an Innovation Systems cooperation programme with the Government of Finland and an investigation with the European Commission into opportunities for enhanced support from European Union development cooperation funding for South African science and technology.

South Africa has played a leading role as one of the Co-Chairs of the Group on Earth Observations (GEO) in developing the implementation plan for the Global Earth Observation System of Systems (GEOSS), which will boost global earth observation capacities for sustainable development significantly. In order to harness SouthAfrica's contribution to the GEOSS, DST is also developing the South African Earth Observation Strategy (SAEOS).

The DST has further established a dedicated unit, Global Partnerships, to promote South Africa as a preferred destination for the location of global scientific infrastructures. The Unit is, for example, supporting the promotion of South Africa's bid to host the Square Kilometre Array (SKA) global radio telescope and a third component centre of the International Centre for Genetic Engineering and Biotechnology (ICGEB).

The DST has also successfully established a technology intelligence capacity to improve South Africa's ability to monitor and evaluate new international technology and trends, and to leverage South Africa's competitive advantage in new and innovative technologies internationally. The functionality of this platform, the International Technology Information Platform (ITIP), will be further enhanced in 2007.

In the last few years, the DST's participation in the Organisation for Economic Co-operation and Development's (OECD) Committee for Scientific and Technological Policy has increased tremendously. This was demonstrated through a workshop held in South Africa in 2005, co-hosted by the OECD and DST, on International Scientific and Technological Cooperation for

Sustainable Development. The workshop resulted in the adoption of resolutions that invite various OECD committees to develop a framework on science and technology for sustainable development indicators. It is envisaged that in between 2006 and 2008, the DST's participation in various OECD subsidiary bodies will be similarly increased.

The DST has been actively involved in International Centre for Genetic Engineering and Biotechnology (ICGEB) activities since becoming a full member in 2004, through the appointment for a three year term of South Africa's Auditor General, Mr Shauket Fakie, as the ICGEB External Auditor. South Africa, as a board member through University of Cape Town, is supporting the establishment of the third component of the ICGEB in Africa, and intends to submit a formal bid in 2006 for the third component to be located in South Africa. This will fulfill its mandate to support regional cooperation on biotechnology, strengthen the NEPAD Biosciences platform and further its National Biotechnology Strategy. In 2005, Cabinet also approved South Africa's membership to the Non Allied Movement's Science and Technology Centre, in our endeavour to strengthen South-South cooperation.

Within the United Nations family of organisations, the DST continues to play a significant role, including participation in the UNESCO programme with specific focus on Science, Technology and Education. The DST was a key participant in the UNESCO General Conference which took place from 3 to 21 November 2005. DST's participation in the UN Commission on Sustainable Development was significant during the 13th session held in April 2005 and focused on Water and Sanitation and Human Settlement. The role of S&T in these thematic areas was emphasised.

The DST is expected to provide expert scientific advice in the implementation of the Multilateral Environmental Agreements (MEAs) which South Africa has ratified or intends to ratify. To deal with this challenge, the DST has undertaken initiatives to study the levels of implementation of the MEAs in South Africa, including obligations and opportunities in relation to the environment, trade, traditional knowledge, technology-transfer and economic spin-offs accruing as a result of being party to the MEAs. The second phase of the study will be finalised in the 2007/08 financial year. Some of the MEAs under scrutiny include: the Convention on Biological Diversity (CBD 1993); Cartagena Bio-safety Protocol (2003); Climate Change Convention (1994); Kyoto Protocol (2005); and the Montreal Protocol (1992).

South Africa has successfully handed over the chair of the African Minister's Council on Science and Technology (AMCOST) to Senegal. The main achievement during that period was the development of the Africa's Consolidated Plan of Action for Science and Technology.

South Africa has provided leadership in regional cooperation. In this regard, it facilitated the 2004-2005 SADC Policy workshops which yielded the projects on SADC SET (Science, Engineering and Technology) week. South Africa played a leading role in the establishment of a dedicated Science and Technology component in the SADC secretariat. As a result of the resolutions of the SADC summit in 2005, the Ministers recommended that a desk for S&T be created at the SADC secretariat.

Strategically, South Africa has engaged bilaterally with African countries in order to support the NEPAD Programme and regional cooperation, as well as to support our science institutions engagement with African countries on research and development. In this regard, we concluded science agreements with the following countries: Algeria, Kenya, Namibia, Botswana, Lesotho and Senegal.

Selected medium-term output targets

International Cooperation and Resources
Measurable objective: Increase flow of scientific knowledge and resources to South Africa by participating in joint programmes.

Subprogramme	Output	Measure/Indicator	Target
Multilateral and African	African and multilateral cooperation on science and technology.	Level of participation and where appropriate, leadership by South Africa in African and global science.	Intensive bilateral programmes of cooperation with at least two more countries in addition to the current six. South African institutes participate in all NEPAD S&T flagship programmes and serve as focal points for at least a quarter of all established networks. Lead in selected multilateral fora in the development of the World Science and Technology Innovation Report and Global Science and Technology Review Conference by 2008. Submit a formal bid to secure South Africa as the preferred location for the 3rd ICGEB component centre by 2006/07.
International Resources	Flow of international resources (such as international research funding, foreign investment, donor support, location of global infrastructure, knowledge, etc.) to science and technology in South Africa and Africa.	Level of international resource flows for science and technology.	Increase by 50% the international funds won through leveraging and participation in comparison with the previous year. Further enhance the International Technology Information Platform in 2007.
Bilateral Co-operation	Country-to country cooperation in science and technology outside Africa as well as development assistance.	Extent of flow of knowledge, people and skills; level of ODA and other resource flows.	Enhance existing cooperative relationships, and extend to remaining countries of the 'new 10' of the European Union in Europe, and Latin America and Asia, by 2007.

3.4 Programme 4: Frontier Science and Technology

The *Frontier Science and Technology* programme provides leadership in long-term and cross-cutting research, and human capital development in the National System of Innovation (NSI).

There are two sub-programmes:

- *Frontier Programmes* focuses on cross-cutting research, development and innovation that will make the NSI a world class science and technology resource. The programme focuses on harmonising activities in research, development and innovation in industry, academia and research institutions.
- *Human Capital* focuses on formulating, developing and implementing national programmes aimed at the production of knowledge and the development of human capital. Focus areas include astronomy, human palaeontology and indigenous knowledge systems. Future developments will include establishing research chairs at South African universities in strategic areas as a human capital development endeavour, as well as renewing and extending South Africa' s scientific infrastructure base.

Expenditure estimates

Table 31.6 Frontier Science and Technology

Sub-programme	Audited outcome			Adjusted appropriation	Medium-term expenditure estimate		
R thousand	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
Frontier Programmes	482 895	652 440	677 438	785 134	882 794	1 051 312	1 253 924
Human Capital	392 253	412 382	492 763	599 451	750 243	927 645	977 738
Total	**875 148**	**1 064 822**	**1 170 201**	**1 384 585**	**1 633 037**	**1 978 957**	**2 231 662**
Change to 2005 Budget estimate				22 508	132 211	252 211	411 671
Economic classification							
Current payments	**4 640**	**3 602**	**10 110**	**8 693**	**7 108**	**7 466**	**7 870**
Compensation of employees	1 489	1 462	5 681	4 050	4 293	4 508	4 751
Goods and services	3 151	2 140	4 428	4 643	2 815	2 958	3 118
of which:							
Communication	*86*	*90*	*95*	*100*	*106*	*112*	*118*
Consultants, contractors and special services	*662*	*449*	*930*	*2 558*	*592*	*621*	*655*
Inventory	*80*	*84*	*88*	*93*	*99*	*104*	*110*
Maintenance, repair and running cost	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Travel and subsistence	*851*	*578*	*1 196*	*718*	*761*	*799*	*842*
Other	*1 471*	*938*	*2 118*	*1 173*	*1 256*	*1 320*	*1 392*
Financial transactions in assets and liabilities	–	–	1	–	–	–	–
Transfers and subsidies[1]	**870 318**	**1 061 138**	**1 159 804**	**1 375 892**	**1 625 929**	**1 971 491**	**2 223 793**
Provinces and municipalities	4	5	11	15	2	–	–
Departmental agencies and accounts	510 734	583 600	480 200	636 298	804 864	951 212	1 060 029
Universities and technikons	–	–	–	20 430	–	–	–
Public corporations and private enterprises	302 751	334 554	489 201	452 249	483 194	507 352	534 749
Non-profit institutions	56 829	142 979	190 392	97 780	337 869	512 927	629 015
Households	–	–	–	169 120	–	–	–
Payments for capital assets	**190**	**82**	**287**	**–**	**–**	**–**	**–**
Machinery and equipment	190	82	287	–	–	–	–
Total	**875 148**	**1 064 822**	**1 170 201**	**1 384 585**	**1 633 037**	**1 978 957**	**2 231 662**

1. Where the name of an entity is not specified, transfer payments are being made to various institutions

Table 31.6 Frontier Science and Technology (continued)

R thousand	Audited outcome 2002/03	2003/04	2004/05	Adjusted appropriation 2005/06	Medium-term expenditure estimate 2006/07	2007/08	2008/09
Details of transfers and subsidies:							
Departmental agencies and accounts							
Public entities							
Current	**494 346**	**576 759**	**476 200**	**632 058**	**754 864**	**901 212**	**948 923**
National Research Foundation	357 921	404 239	446 288	512 641	586 671	618 394	650 832
Centres of Excellence	–	11 070	1 500	15 000	–	–	–
Frontier Science and Technology	–	–	–	170	–	–	–
Science Themes	–	–	–	2 650	–	–	–
Innovation Fund	136 425	161 450	28 412	101 597	128 193	132 818	139 990
Human Resource Development	–	–	–	–	40 000	150 000	158 100
Capital	**16 388**	**6 841**	**4 000**	**4 240**	**50 000**	**50 000**	**111 106**
Centres of Excellence	6 700	–	–	–	–	–	–
National Research Foundation	9 688	6 841	4 000	4 240	–	–	–
Research and Development Infrastructure	–	–	–	–	50 000	50 000	111 106
Universities and technikons							
Current	**–**	**–**	**–**	**20 430**	**–**	**–**	**–**
Biotechnology Strategy	–	–	–	200	–	–	–
Frontier Science and Technology	–	–	–	20 200	–	–	–
Science Themes	–	–	–	30	–	–	–
Public corporations and private enterprises							
Public corporations							
Current	**302 751**	**334 554**	**489 201**	**452 249**	**483 194**	**507 352**	**534 749**
Council for Scientific and Industrial Research	297 751	323 014	348 326	431 649	483 194	507 352	534 749
Human Resource Development	–	–	–	2 600	–	–	–
Biotechnology Strategy	–	–	122 875	–	–	–	–
Council for Scientific and Industrial Research: National Laser Centre	5 000	11 540	18 000	18 000	–	–	–
Non-profit institutions							
Current	**56 829**	**142 979**	**190 392**	**97 780**	**277 869**	**297 927**	**314 015**
Square Kilometre Array	–	–	–	8 000	8 000	12 000	12 648
Frontier Science and Technology	–	–	–	36 630	40 700	44 300	46 692
Science Themes	3 500	13 983	25 681	2 400	50 583	53 112	55 980
Science and Youth	10 829	7 294	11 000	–	20 000	22 000	23 188
Biotechnology Strategy	41 850	116 001	143 711	40 750	158 586	166 515	175 507
Indigenous Knowledge System	650	5 701	10 000	10 000	–	–	–
Capital	**–**	**–**	**–**	**–**	**60 000**	**215 000**	**315 000**
Frontier Science and Technology	–	–	–	–	60 000	135 000	200 000
Square KilometreArray	–	–	–	–	–	80 000	115 000
Households							
Other transfers							
Current	**–**	**–**	**–**	**159 120**	**–**	**–**	**–**
Science and Youth	–	–	–	18 000	–	–	–
Science Themes	–	–	–	19 670	–	–	–
Biotechnology Strategy	–	–	–	114 050	–	–	–
Human Resource Development	–	–	–	7 400	–	–	–
Capital	**–**	**–**	**–**	**10 000**	**–**	**–**	**–**
Equipment Placement	–	–	–	10 000	–	–	–

Expenditure trends

Expenditure increased by an annual average of 16.5% (in nominal terms) from a 2002/03 base of R875 million to R1.384 billion in 2005/06. The trend from 2006/07 shows a steady average nominal growth of 16.9% in the funding cycle. This growth can be attributed mainly to a new and increased support for research and development infrastructure.

Growth in the future will be directed at support for new frontier programmes such as nanotechnology and the hydrogen economy and the implementation of human capital programmes such as science platforms, research chairs, expansion of the Centres of Excellence programme and the implementation of a comprehensive human capital programme.

Service delivery objectives and indicators

Recent outputs

Frontier Programmes

Nanotechnology

The National Nanotechnology Strategy (NNS) has been finalised and approved by Cabinet. The NNS is the outcome of extensive consultation with a wide spectrum of stakeholders and a study of international best practice. The implementation of the strategy will centre on providing the requisite research infrastructure and capacity building.

Space Science and Technology Programme

Support for the development of multispectral imaging technology by the Innovation Fund has resulted in South Africa developing the capacity to design and manufacture a world class small satellite for earth observation. This is being used as a foundation by the country developing a second satellite as a pathfinder to be launched before the second quarter of 2007. Capacity for the development of technological know-how in satellite development is thus being expanded. A school competition to name the satellite is engaging communities and engendering excitement and an interest in satellite science and technology among high school learners.

High Performance Computing

Discussions with stakeholders in the National System of Innovation (NSI) on the need to provide research, development and innovation with cyber infrastructure have culminated in unanimous support for the establishment of a Centre for High Performance Computing (CHPC). This centre, the objective of which is to provide high-end computing facilities and expertise for research, development and innovation as well as applications in the business sector, will be administered by the Meraka Institute. For instance, the CHPC will foster research that will address grand challenges such as HIV/AIDS, climate change and new paradigms for the Web such as grid and semantic web applications for business, the global earth observation system of systems (GEOSS) and simulations for the Square Kilometre Array (SKA) design.

Open source software

The Open Source Software (OSS) initiative is now part of the newly established Meraka Institute at the CSIR. This institute is now moving the focus of OSS from an advocacy of open source software role to a long-term plan. An Open Source Software strategy is being developed in which a technology road map will be articulated.

Biotechnology strategy

The roll-out of the National Biotechnology Strategy saw the successful establishment of the Biotechnology Regional Innovation Centres (BRICs) in 2002/3. In addition to the three BRICs, BioPad, CapeBiotech and LifeLab, a national centre for plant biotechnology innovation, PlantBio, was developed and launched in 2004. A National Bioinformatics Network (NBN) was created to supplement South Africa's human capacity in bioinformatics. Lastly, a Public Understanding of Biotechnology

programme (PUB), which is implemented through South African Agency for Science and Technology Advancement (SAASTA), an agency of the NRF, was established. This provides a source of balanced, science-based information on biotechnology as well as acting as a platform for public dialogue on biotech developments. Although the manifestation of the results of biotechnology investment has long lead times, sometimes of as much as 15 years, some success stories resulting from the investments and interventions made by the biotechnology institutions are already being realised. The following are examples of success stories.

- The completed development of Aquabio technology that will alleviate the problems of disease burden and water re-use associated with intensive aquaculture.
- Production of flavourants from micro-organisms to meet the demand for natural and environmentally-friendly consumer products in the food and cosmetics industries.
- Technology for adding value to aloe bitters has been delivered. It is an opportunity for partnership between rural aloe tapper cooperatives and the local cosmetic industry to export value-added products from aloes. A commercial partner is marketing the product globally.
- The BioSURE technology enables the treatment of industrial and mining water. It has resulted in the commissioning and launch of a process plant in Springs and a pipeline which links the Grootvlei mine to water-treatment works.
- Technology for the creation of chiral chemicals has been developed and will allow SA to compete globally in this market.
- The NBN has established nodes at eight (8) universities where it has invested in technology research and development, infrastructure, teaching and the creation of capacity.
- The PUB programme continues to build on its growing recognition as a credible source of information on biotechnology using exhibitions, workshops, theatrical productions, print and broadcast media for targeted engagement with learners, scientists, media industry, and general members of the public.

Innovation Fund

Some examples of recent highlights from the Innovation Fund include the establishment of a Zirconuim plant for downstream zirconium products with associated value-added chemical lines. The locally developed orbital eye implants may become widely available at much more competitive prices than existing ones. The Innovation Fund continues to promote the commercialisation of innovative ideas through the National Innovation Competition.

Indigenous Knowledge Systems (IKS)

A national office on Indigenous Knowledge Systems (IKS) is being established as one of the priorities in the implementation of the IKS policy. Subsumed in the mandate and activities of the National Office is the development of a recordal system, an aggressive public awareness programme, and the development of a national database on IKS (similar to the Indian TKDL). Amongst other activities these require dedicated funding. During the course of the new financial year the National Office will also establish provincial nodes.

Hydrogen Economy and Fuel Cells

A baseline study on Hydrogen and Fuel Cell Technologies was completed in June 2004. This was followed by a high-level policy dialogue which led to the proposed frontier programme being presented to Cabinet. Cabinet approved the establishment of an intergovernmental committee to be chaired by the DST on the broader implications of the Hydrogen Economy in the South African context. The draft Hydrogen Economy innovation strategy was completed and the next phase will entail the initiation of priority research projects.

Pebble Bed Modular Reactor (PBMR)

In June 2004, Cabinet approved the PBMR Human Capital and Innovation Frontier programme, designed to build up local know-how along the whole technology value chain of PBMR development. The implementation of the programme saw the

establishment of three university chairs and the awarding of bursaries to undergraduate and post-graduate students. The awareness programme included a National Youth Nuclear Conference and school-based programmes. The next phase of implementation will see the growth of the bursary and chair programmes.

Human Capital Initiatives

In an effort to develop human resources in science, engineering, and technology, a number of programmes have been initiated.

Research Professional Development Fellowship Programme

This programme is designed to enable outstanding Masters and Doctoral graduates to gain experience in research at Science Councils or through a partnership between a Science Council and a university, in order to secure a supply of highly qualified South Africans with leading edge scientific and research skills.

Innovation Post-doctoral Fellowship Programme

The programme is tailored to enable doctoral graduates to gain experience in research at a university in partnership with a Science Council, in order to secure a supply of highly qualified South Africans with leading-edge scientific and research skills for the national system of innovation.

South African Research Chairs (SARC) Programme

The SARC programme was developed recently and is designed to significantly expand the scientific research base of South Africa in a way that supports the implementation of the National Research and Development Strategy and which is relevant to national development in an internationally competitive global knowledge economy. The programme is intended to increase the number of highly qualified scientists by teaching/supervising postgraduate level students and post-doctoral researchers whose learning should be embedded in the field of the research focus. It aims to advance the frontiers of knowledge through focused research in identified fields or problem areas, to advance transformation in the scientific community and to increase the level of excellence in identified research areas and increase the stock of world-class researchers across the country

Centres of excellence (CoEs)

These are physical or virtual centres of research which concentrate on existing capacity and resources to enable researchers to collaborate on long-term projects across disciplines and across institutions. These projects are locally relevant and internationally competitive to enhance the pursuit of research excellence and capacity development. Six centres were launched in 2004 and will be funded in a 10-year cycle. A seventh CoE was established in 2005. It is the intention of the DST to expand the number of CoEs in the future.

Science and youth programmes

- **Youth into Science Strategy**
  A draft Youth into Science Strategy (2005/9) was developed in partnership with the Department of Education. This strategy will play the following role: enhancing science literacy among the public in general and youth in particular; contributing towards increased enrolments and performance in science, technology, engineering and mathematics (STEM); identifying and nurturing STEM talent and potential, especially of those from disadvantaged backgrounds; providing quality career education in science, technology, engineering and mathematics; and establishing a capable network of Science Centres to deliver STEM programmes and interventions.

- **Other programmes targeted at Youth in Science**
  The Youth into Science Strategy is an attempt to consolidate a number of initiatives already underway in an attempt to address the issue of feeder systems into the Higher Education sector. These include the Out of School programme

which concentrates on activities outside the formal structures of curriculum delivery such as the network of science centres and the national Science Week; the Curriculum Support programme which comprises formal curriculum-related activities such as the development of guidelines and materials to support the teaching and learning of indigenous knowledge systems; and the Carrier Education programme which involves, among others, the development of SET career dictionaries, the nurturing of talent and potential in SET and the exposure of youth to role models in the SET sector.

Science and Technology Related National Events

These events engender excitement in targeted science fields, particularly among the youth. The National Science Week is now an annual event taking place in May each year.

Science Platforms

Astronomy

- **Square Kilometre Array telescope (SKA)**
  South Africa is bidding to host the largest radio telescope, the Square Kilometre Array (SKA). The International SKA Steering Committee (ISSC) has recently communicated timelines for the decision of the location of SKA. Bidding countries submited final proposals to host the SKA in December 2005 and the results of radio frequency interference measurements in March 2006. In September 2006, the ISSC will rank the sites on the basis of scientific, technical and infrastructure-cost merit. The ranking results will then be presented to the governments that will be funding the SKA for selection of the host country.

- **Karoo Array Telescope**
  The Karoo Array Telescope (KAT), a South African SKA technology demonstrator, will be constructed in the Northern Cape by 2009. KAT will comprise an array of 20 antennas with a design that allows for upgrade and an increase in the number of antennas. A KAT prototype to optimise the performance of these antennas is being designed and a first virtual model of the prototype has been developed. The prototype will be located at the Hartebeeshoek Radio Astronomy Observatory in Gauteng for testing and improvement in 2007.

- **Southern African Largest Telescope (SALT)**
  SALT is an 11 metre telescope located at the South African Astronomical Observatory (SAAO) in Sutherland, Northern Cape. The project is the result of a multilateral partnership between South Africa, Germany, New Zealand, Poland, the United Kingdom and the United States. SALT was inaugurated on 10 November 2005 by President Thabo Mbeki.

- **Astronomy Frontier Programme**
  The Department of Science and Technology is coordinating a plan to develop capacity, including student training, through the Astronomy Frontier Programme the (AFP). The objective of AFP is to develop a new generation of researchers who will utilise large astronomy instruments that have been constructed or are planned for construction in Southern Africa.

South African National Antarctica Programme (SANAP)

After cabinet allowed the migration of SANAP scientific research from Department of Environmental Affairs and Tourism (DEAT) to DST in 2003, DST formulated an Antarctic Research Strategy for South Africa (ARESSA). The strategy guides funding for researchers and students in the SANAP programme. A total of R10 million has been allocated during the 2004/5 and 2005/6 fiscal years. A steering committee comprising the DST, DEAT, WC Provincial Government, City of Cape Town and private sector stakeholders has been constituted by the DST to drive the positioning of Cape Town as a Gateway to Antarctica.

The DST continues to fund research in palaeontology and related fields through the Palaeo-Anthropological Scientific Trust (PAST). In order to strengthen and broaden research in this area a strategy to support Palaeo-sciences through an African Origins Platform is being formulated with stakeholders.

Marine Research

In partnership with DEAT, South Africa is acquiring a submersible for a broad spectrum marine programme. The African Coelacanth Ecosystem Programme will also benefit from this submersible. Explorative discussions with various stakeholders are continuing towards the development of an integrated marine research programme.

International Year of Physics (IYP) 2005

South Africa, through the DST, developed a comprehensive programme for IYP 2005. Initiatives included targeting schools, universities and the broader public. The year culminated in a successful World Conference on Physics and Sustainable Development in Durban, and the launch of the South African Women in Physics Programme.

Selected medium-term output targets

Frontier Science and Technology

Measurable objective: Build research, innovation and human capital programmes within the NSI, effectively using the resources of the department. Develop public research institutions to make sure that South Africa has an evolving world class science and technology portfolio.

Sub-programme	Output	Measure/Indicator	Target
Frontier Programmes	Development of new and progress on current frontier programmes.	Continue roll out of biotechnology strategy.	Regional biotechnology instrument plans finalised: June 2006. Documentation of all the successful projects: September 2006.
		Implementation of nanotechnology strategy.	Develop an implementation plan for the nanotechnology strategy: June 2006. Fund 2 demonstration projects: March 2007.
		Finalise the hydrogen economy innovation strategy.	Cabinet approved strategy: March 2007. Intergovernmental committee established: June 2006. A fuel cell demonstration project initiated by December 2006.
			Establish 3 new chairs and award bursaries: August 2006.
		Implementation of PBMR programme Space.	Framework for space agency approved by Cabinet: June 2006. Satellite technology roadmap: September 2006.
	Research and development Infrastructure programmes.	Establish centre for high performance computing (CHPC).	CHPC established and operational by March 2007.
	Development of a nanotechnology R&D Infrastructure.		Establish at least one fully operational nanotechnology characterization centre: January 2007.
Human Capital	Programmes to develop the Science Engineering and Technology human capital.	Implementation of the South African Research Chairs Initiative.	Identify research chairs from proposals submitted: November 2006. Twenty chairs (20) to be established for implementation in 2007.
		Expansion of centres of excellence programme Youth into Science Strategy.	3 more centres of excellence established: March 2007. Cabinet approval of the finalised strategy: December 2006.
		Professional development and research post-doctoral fellows programmes Development of a SET Human Capital Strategy.	Programmes growth will depend on availability of financial resources. Approval of the SET Human Capital Strategy: March 2007.

	Development of Science Missions and Platforms.	Astronomy Geographical Advantage Strategy and associated programmes Development of a SET Human Capital Strategy. Palaeo-sciences research development plan. Research Equipment Plan.	Astronomy Geographical Advantage Strategy approved by cabinet: October 2006. Palaeo-Sciences Research plan developed: July 2006. Research Equipment plan developed: June 2006.

3.5 Programme 5: Government Sector Programmes and Coordination

Government Sector Programmes and Coordination aims to lead and give support to other government departments in sector-specific research and development, technology and directed human capital programmes.

There are three sub-programmes:

- *Science and Technology for Economic Impact* leads and supports a number of strategic science and technology interventions requiring interdepartmental and government and industry cooperation to achieve government's strategic economic growth and development objectives.
- *Science and Technology for Social Impact* leads and supports a number of strategic science and technology interventions requiring interdepartmental cooperation for extending scientific research and technology to address identified priorities in different sectors and those expressed in the context of the millennium development goals.
- *Sector Research and Development Planning/Coordination* supports sector-based departments and institutions in developing five-year research and development plans. It also prepares an annual national science and technology expenditure plan aimed at providing a holistic view of government's total science and technology spending. The annual national science and technology expenditure plan will also improve decision-making on the deployment of all government funds allocated to research and development.

Expenditure estimates

Table 31.7 Government Sector Programmes and Coordination

Sub-programme	**Audited outcome**			**Adjusted appropriation**	**Medium-term expenditure estimate**		
R thousand	**2002/03**	**2003/04**	**2004/05**	**2005/06**	**2006/07**	**2007/08**	**008/09**
Science and Technology for Economic Impact	19 530	84 516	140 220	261 124	324 324	396 376	434 976
Science and Technology for Social Impact	83 957	102 230	168 066	199 503	257 139	244 253	257 183
Sector Research and Development Planning / Coordination	3 567	8 146	4 246	3 697	4 509	4 734	4 990
Total	**107 054**	**194 892**	**312 532**	**464 324**	**585 972**	**645 363**	**697 149**
Change to 2005 Budget estimate				32 335	110 335	149 335	174 335
Economic classification							
Current payments	**4 321**	**4 500**	**4 573**	**13 274**	**15 352**	**15 923**	**16 783**
Compensation of employees	1 269	2 088	1 559	5 800	6 148	6 455	6 804
Goods and services	3 052	2 412	3 014	7 474	9 204	9 468	9 979
of which:							
Communication	*55*	*58*	*61*	*64*	*68*	*72*	*76*
Computer Services	*493*	*519*	*546*	*575*	*610*	*646*	*681*
Consultants, contractors and special services	*641*	*507*	*47*	*4 443*	*5 974*	*6 073*	*6 401*
Inventory	*229*	*241*	*254*	*267*	*284*	*301*	*317*
Maintenance, repair and running cost	*1*	*1*	*1*	*1*	–	–	–
Travel and subsistence	*824*	*651*	*82*	*1 036*	*1 098*	*1 153*	*1 215*

Other	*809*	*435*	*2 023*	*1 088*	*1 171*	*1 223*	*1 289*
Transfers and subsidies[1]	**102 544**	**190 235**	**307 797**	**450 875**	**570 434**	**629 245**	**680 160**
Provinces and municipalities	5	9	6 574	19	3	–	–
Departmental agencies and accounts	84 539	153 456	216 236	278 923	394 731	457 885	491 167
Universities and technikons	–	–	16 289	750	–	–	–
Public corporations and private enterprises	–	–	–	26 298	–	–	–
Non-profit institutions	18 000	36 770	59 770	79 180	175 700	171 360	188 993
Households	–	–	8 928	65 705	–	–	–
Payments for capital assets	**189**	**157**	**162**	**175**	**186**	**195**	**206**
Machinery and equipment	189	157	162	175	186	195	206
Total	**107 054**	**194 892**	**312 532**	**464 324**	**585 972**	**645 363**	**697 148**

1. Where the name of an entity is not specified, transfer payments are being made to various institutions

Table 31.7 Government Sector Programmes and Coordination (continued)

R thousand	Audited outcome			Adjusted appropriation	Medium-term expenditure estimate		
	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	008/09
Details of transfers and subsidies:							
Provinces and municipalities							
Municipalities							
Municipal bank accounts							
Current	**5**	**9**	**6 574**	**19**	**3**	**–**	**–**
Technology for Poverty Alleviation	–	–	6 561	–	–	–	–
Departmental agencies and accounts							
Public entities							
Current	**84 539**	**153 456**	**216 236**	**278 923**	**394 731**	**457 885**	**491 167**
Learnerships	–	–	4 000	3 367	6 000	6 300	6 640
Technology Planning and Diffusion	19 452	46 176	47 900	56 263	94 058	91 486	96 426
Advanced Manufacturing Technology Strategy	–	2 750	21 000	31 500	51 800	62 400	56 204
South African National Energy Research Institute	–	–	10 000	20 000	40 000	42 000	44 268
National Public Assets	–	30 000	35 000	43 000	43 000	43 000	45 322
South African Aids Vaccine Initiative	–	–	15 000	20 000	15 000	15 750	16 601
Human Science Research Council	65 087	70 030	83 336	104 293	119 873	129 949	136 706
South African National Research Network	–	–	–	–	22 000	67 000	89 000
Indicators	–	4 500	–	500	–	–	–
Leveraging Services Strategy	–	–	–	–	3 000	–	–
Universities and technikons							
Current	**–**	**–**	**16 289**	**750**	**–**	**–**	**–**
Technology for Sustainable Livelihoods	–	–	16 289	750	–	–	–
Public corporations and private enterprises							
Public corporations							
Current	**–**	**–**	**–**	**26 298**	**–**	**–**	**–**
Learnerships	–	–	–	1 633	–	–	–
Technology for Sustainable Livelihoods	–	–	–	4 665	–	–	–
Nuclear Energy Corporation of South Africa: Fluoro Chemicals	–	–	–	20 000	–	–	–
Non-profit institutions							
Current	**18 000**	**36 770**	**59 770**	**79 180**	**175 700**	**171 360**	**188 993**
Natural Resources	–	650	10 000	3 880	30 000	31 500	33 201
Technology Planning and Diffusion	–	–	–	23 400	–	–	–
Information Communication Technology	–	4 856	9 000	14 000	29 200	44 210	54 977
Technology for Poverty Alleviation	–	9 263	24 200	37 900	63 500	40 000	42 160
Technology for Sustainable Livelihoods	18 000	22 001	16 570	–	53 000	55 650	58 655
Households							
Other transfers							
Current	**–**	**–**	**8 928**	**65 705**	**–**	**–**	**–**
Natural Resources	–	–	–	24 120	–	–	–
Technology for Sustainable Livelihoods	–	–	8 928	41 585	–	–	–

Households							
Other transfers							
Current	**–**	**–**	**8 928**	**65 705**	**–**	**–**	**–**
Natural Resources	–	–	–	24 120	–	–	–
Technology for Sustainable Livelihoods	–	–	8 928	41 585	–	–	–
Total	**102 544**	**190 235**	**307 797**	**450 875**	**570 434**	**629 245**	**680 160**

Expenditure trends

Expenditure has increased rapidly over the last four years, rising from R107 m in 2002/03 to R464 m in 2005/06, an annual average increase of 63%. This rapid growth is expected to continue, with expenditure reaching R697 million by 2008/09.

The future growth in expenditure reflects an increased commitment to the Technology Mission areas of the National R&D Strategy, the research programmes of the Human Sciences Research Council (HSRC) and investments in technology applications that have the potential to address the Millennium Development Goals of poverty reduction and access to basic services.

Service delivery objectives and indicators

Recent outputs

South African National Research Network (SANReN)

SANReN is a high speed research network that will connect all South African research institutions to others in the world. The DST technical specifications for the establishment of the SANReN have been finalised and engagement with potential service providers is proceeding. At the end of the three phases of implementation and operationalisation it is envisaged that SANReN will connect approximately 45 research institutions through a 10-20 Giga Byte national backbone and a 2.5 Giga Byte international connection to similar research networks across the world. The establishment of the SANReN will allow exchange of research data from research facilities in South Africa with counterparts around the world. Currently, the biggest bandwidth demand drivers for the SANReN are Hartbeeshoek Radio Astronomy Observatory, the Centre for High Performance Computing, the High Energy Physics Collaboration with CERN at UCT, the SALT telescope and the National Bioinformatics Network. Demand is expected to grow as the SANReN becomes operational.

Resource Based Industries and the Advanced Metals Initiative (AMI)

The National R&D Strategy expresses a commitment to government's broader objective of adding value to the country's natural resource base. The cooperative research networks established through the Advanced Metals Initiative have been extended through coordination activities by the CSIR, Mintek and NECSA in the areas of light metals, precious metals and new metals. The Light Metals Development Centre aims to provide research and development support for the light metals industry and focuses on aluminum, titanium and magnesium based alloys. Work in the precious metals area focuses on promoting industry-relevant research and development and developing the requisite science, engineering and technology human resource base in South Africa. The focus of the work has been on gold and platinum group metals-based materials.

The National R&D Strategy for Information and Communications Technologies

The ICT R&D and Innovation Strategy has been finalised and is in the process of being approved by Cabinet. The strategy seeks to create an enabling framework for the advancement of ICT R&D and Innovation and was developed with input from academia, science councils, industry, government and international experts. Flagship research programmes in Geomatics, Wireless and Satellite Communications and ICT in Education have been seeded. Together with the AMTS and its flagship on electronics, plans are being finalised for the development of new sensor based technologies for earth observation. New flagship programmes will be seeded in subsequent years.

Advanced Manufacturing Technology Research Flagships

Flagship programmes to support advanced manufacturing activities in the aerospace and automotive sectors have been developed and are being implemented. A key area of intervention is the development of capabilities and technology in composite materials. This includes a strategic focus on competence in lightweight materials (linked to the Advanced Metals Initiative).

Institutes for Advanced Tooling (IATs)

The Institute for Advanced tooling has been established under the Tshumisano programme to effect R&D, technology transfer and skills development in the area of tool design and manufacture. In line with the target of "establishing sector specific, work-integrated training institutions". Two regional Institutes for Advanced Tooling have been established, one based in Gauteng at the Soshanguve Campus of Tshwane University of Technology and the other in the Western Cape at the University of Stellenbosch and Cape Peninsular University of Technology.

Bio fuels

The bio fuels initiative is being driven by the Department of Science and Technology and the Department of Minerals and Energy. (Organic matter can be converted directly into liquid fuels called bio fuels. The two most common bio fuels are ethanol and bio diesel.) Work has been completed on the technical standards for bio diesel as well as testing on six candidate crops (soya, sunflower, canola, ground nut, cotton and jatropha). The Department of Agriculture is managing the environmental impact assessments required for jatropha. Substantial learning has grown out of the consultations with industry (agriculture, automobile manufacturers, heavy-duty diesel vehicle manufacturers, fuel producers and researchers). The DST has recognised that capacity and institutional infrastructure has to be built up for testing and production capabilities as the broader bio fuels industry initiative gains momentum. The bio fuels industry initiative promises substantial job creation and new business development opportunities. A research project has been developed during 2005/06 for beneficiation of the by-products from bio diesel production in areas such as the animal feed sector.

Cooperative relationships

The DST has embarked on a course of structured cooperation with other national departments and has already established a programme of cooperation activities with the Department of Agriculture. Bilateral discussions with the Department of Transport are at an advanced stage, with a particularly good stakeholder re-engagement established between DoT and CSIR which reports to DST. Through the efforts of the DST's SciTES Programme, the cooperation with the Department of Minerals and Energy has been very strong throughout the year in terms of the establishment of the South African National Energy Research Institute (SANERI) and the Energy R&D Strategy. SANERI's main aim is to build research capacity through funding research at universities and in science councils. In 2005/06 fifty per cent of the transfer funding was used for the establishment of SANERI at the CEF (PTY) Ltd as per the Cabinet approved governance model. There has also been high-level cooperation with the Department of Environmental Affairs and Tourism (DEAT) on a range of fronts that include climate change issues and biodiversity. The Conference on Climate Change held in October 2005 was one such joint DST/DEAT example of government departments working together. South Africa also hosted the 12th Meeting of the Board of Governors of the Global Biodiversity Information Facility (GBIF) in April 2006. Atwo day Science Symposium was held back to back with the GBIF Governing Board meeting. The Governing Board comprises twenty-six countries as voting members of GBIF, and a number of other developing countries and organisations such as Species 2000 as associate members and organisations. The Science Symposium enjoyed participation by more than 150 delegates, including scientists from a number of African countries who presented excellent papers on research related to managing biodiversity information for conservation and other decision-making purposes. The DST has also been successful in finalising the case for revitalising the fluoro-chemicals research capacity at the Nuclear Energy Corporation of South Africa (NECSA). Government partnerships in this industry sector include DST, DME and the **dti**.

Government has finalised consultations on reorganising, in a more focused way, the efforts necessary to consolidate and strengthen state support instruments to small and medium enterprises. This has led to the establishment of the Small Enterprise Development Agency (SEDA). Arising out of these consultations, DST and the **dti** have agreed that the jointly funded Godisa Trust be transferred to SEDA in 2006. The Godisa Trust funds technology centres that support newly created SMMEs. Godisa has extended its incubation services to Local Economic Development (LED) programmes thereby enhancing the economic growth of local governments. The Tshumisano Trust, a joint venture between government, the German Agency for Technical Co-operation (GTZ) and the Committee of Technikon Principals (CTP), is already generating stronger working relationships between the Department of Science and Technology and the Department of Labour. With CTP falling away in the new higher education environment, the DST is engaged in forging a cooperation relationship with Higher Education South Africa (HESA) as it relates to the Universities of Technology. The Tshumisano technology stations offer novel training and product development support linkages between universities of technology and technology-based small and medium businesses. The Tshumisano Centres have grown with the addition of the Agro-processing station at the Cape Peninsula University of Technology and an additional two stations will be implemented in Mpumalanga and the Limpopo region. A study to evaluate the impact of the Technology Station Programme (TSP) on technology transfer and the "University of Technology" dynamics is currently being undertaken and the report will be made available before the end of the financial year. A major international technology transfer conference is planned for 2006. The purpose of this conference is to share the Tshumisano model with other countries and, secondly, to demonstrate the Tshumisano instrument as a vehicle impacting directly on improving the socio-economic status of communities.

Agro-Processing

Sustainable livelihoods based on new "value-adding" activities in rural regions is one of the key focus areas of the newly created Sub-Programme: Science and Technology for Social Impacts. DST is cooperating with the CSIR and a new Foundation that serves as a platform for delivery in the Agro-processing interventions which include Essential Oils and Natural Products. These interventions involve application of indigenous knowledge, agricultural science, chemistry, medical science and old manufacturing technology to integrate the second economy with first economy industries such as pharmaceuticals. Recent developments include the launch in Giyani of the Hi-Hanyile factory which produces candles that contain an indigenous-knowledge-based plant substance effective as a mosquito repellent. A review of DST funded initiatives was carried out and recommendations accepted for exiting some of the established projects. The new "Sustainable Livelihoods" component of the Social Impacts Framework for Interventions allows for a larger scale of intervention that no longer focuses on individuals but on sub-industries such as Essential Oils, informed now by the Nedlac Fridge study. Expansion of the Aquaculture programme is also planned with feasibility studies due for completion in the first quarter of 2006.

Integrated planning

With the implementation of the new strategic management model for government' s science and technology system, one of the major recommendations is to re-engineer the science vote fundamentally and to develop an annual science and technology expenditure plan as envisaged in the White Paper on Science and Technology. This integrated expenditure plan will be aligned to the re-grouping of public research and development entities, as recommended in the recent governance review of public entities by the National Treasury. A first step towards a holistic view on science and technology was Cabinet's approval of the national research and development strategy and the science and technology strategic management model which mandated the Department of Science and Technology to help other departments with the development of research and development plans (or research and technology plans). The 2006 ENE guidelines included a requirement that all government departments and provinces report on S&T expenditure by including a section in departmental ENE chapters that will highlight expenditure on these activities. This information will be consolidated into a supplement to the ENE to provide a broad view of public S&T expenditure by sector.

Selected medium-term output targets

Government Sectoral Programmes and Co-ordination

Measurable objective: Build partnerships, programmes and institutional capacity to ensure the appropriate contribution of science and technology within different sectors and synergistically within clusters.

Subprogramme	Output	Measure/Indicator	Target
Science and Technology for Economic Impact.	Strategic government partnerships and directed science, engineering and technology programmes demonstrating potential for positive economic results.	Strategy agreements established.	Roll out of new flagship programmes of AMTS. Establish first phase of the South African National Research Network. Establishment of new flagship programmes under ICT R&D strategy. Establish new chairs of Energy Research and Development under SANERI. Establish Integrated South African Earth Observation System. Develop new sensor based technologies for EO.
	Science, engineering and technology human capital development.	Structured plans and programmes of action for science, engineering and technology contributions to provincial growth and development plans.	Implement science and technology support programmes and interventions in low GDP provinces.
Science and Technology for Social Impact.	Strategic government partnerships and directed science, engineering and technology programmes demonstrating potential for positive service delivery results within the social and justice, crime prevention and security sectors.	Implementing Strategic agreements with partners and Stakeholders.	Achieve working agreements with social cluster departments by end March 2006. Working agreements with the JCPS cluster departments by end 2006.
	Two technology-based sustainable livelihoods interventions planned, consultations completed and business plans approved for implementation. Two technology-based sustainable livelihoods interventions planned, consultations completed and business plans approved for implementation. Workshops held and Research working groups established on MegaCities and sustainable development planning. Workshops held and Research working groups established on Enabling Technologies.	Implementation of strategic programs based on transfer of technology for sustainable livelihoods.	Adoption of new technologies for sustainable livelihoods and improvement of quality of life.
	Research on social cohesion and integration as a service to all government departments and science councils.	Ongoing applied social research and policy research initiatives.	Reports of the work conducted on behalf of the department and co-ordination of at least 1 research project on science and technology best practice.
	Identification and dissemination of poverty reduction technologies designed to improve sustainable livelihoods.	Established initiatives that address the impact of HIV and Aids and related health issues.	One community-based factory that produces nutritional supplements by end of 2006/07. Participate in the activities of the South African Aids Vaccine Initiative.
		Transferred technologies to community-based projects to reduce poverty and create jobs as well as increased impact of technologies used in poverty reduction.	Implementation of joint projects with government departments and municipalities on poverty reduction. Consolidation and review of current poverty reduction projects to create sustainability and establish exit strategies by March 2007. Implementation of science and technology based poverty reduction policy guidelines from April 2006.

Sector Research and Development Planning/Coordination.	Science and technology expenditure plan.	Publish government science and technology expenditure plan.	2006/07 budgeting cycle.
		Science and technology investment management system accessible to all public research and development institutions and users.	2006/07 budgeting cycle.
	Effective planning and efficient investment on science and technology by government departments.	Research and development plans and strategies approved by Cabinet. Examine the scope of the Science and Technology Systems Bill.	Agreed scope and draft in the 2006/07 budget cycle.
	Share good practices in sector specific research and development planning.	Publish reports on organisation and funding of research in sectors.	At least two in the 2006/07 budgeting cycle.

3.6 Public entities reporting to the Minister

Human Sciences Research Council

The Human Sciences Research Council of South Africa (HSRC) is a statutory body established in 1968. It supports development nationally, in the Southern African Development Community (SADC) and in Africa. It conducts primarily large-scale, policy-relevant, social-scientific projects for public-sector users, non-governmental organisations and international development agencies, in partnership with researchers globally, but specifically in Africa. Over the last couple of years the HSRC has undergone major restructuring, aligning its research activities and structures with South Africa's national development priorities: notably poverty reduction through economic development, skills enhancement, job creation, the elimination of discrimination and inequalities, and effective service delivery.

With its new structures and greatly extended research complement of about 120 top researchers and 100 support staff in five different centres across the country, the HSRC is well equipped to respond flexibly and comprehensively to these current and emerging needs.

Table 31.8 Financial summary for the Human Sciences Research Council (HSRC)

	Outcome				Medium-term estimate		
	Audited	Audited	Audited	Estimated Outcome			
R Thousand	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
INCOME STATEMENT SUMMARY							
Revenue							
Non-tax revenue	**46 209**	**64 510**	**91 949**	**57 884**	**60 903**	**54 827**	**57 195**
Sale of goods and services other than capital assets	33 542	51 053	75 359	46 152	48 741	42 025	43 762
of which:							
Sales by market establishments	*33 542*	*51 053*	*75 359*	*46 152*	*48 741*	*42 025*	*43 762*
Other non-tax revenue	*12 667*	*13 457*	*16 590*	*11 732*	*12 162*	*12 802*	*13 433*
Transfers received	**90 628**	**122 643**	**145 459**	**165 931**	**178 887**	**194 390**	**190 775**
Total revenue	**136 837**	**187 153**	**237 408**	**223 815**	**239 790**	**249 217**	**247 970**
Expenses							
Current expenses	**145 105**	**184 507**	**229 056**	**221 418**	**237 223**	**246 549**	**245 315**
Compensation of employees	59 736	70 777	82 816	93 497	100 170	104 108	103 587
Goods and services	81 105	108 036	140 058	122 740	131 501	136 671	135 987
Depreciation	4 265	5 694	6 182	5 181	5 551	5 769	5 741
Transfers and subsidies	**2 208**	**2 856**	**3 558**	**2 396**	**2 567**	**2 668**	**2 654**
Total expenses	**147 313**	**187 363**	**232 614**	**223 814**	**239 789**	**249 216**	**247 969**
Surplus / (Deficit)	**(10 477)**	**(210)**	**4 794**	**1**	**1**	**1**	**1**

BALANCE SHEET SUMMARY							
Carrying value of assets	52 778	57 930	49 494	48 988	48 437	47 667	46 927
Investments	58 851	39 352	29 070	14 273	14 273	14 273	14 273
Inventory	970	1 724	1 474	1 312	1 312	1 312	1 312
Receivables and prepayments	15 306	27 679	33 731	37 345	39 100	40 938	40 119
Cash and cash equivalents	6 963	8 995	1 305	1 781	1 781	1 781	1 781
Total assets	**134 868**	**135 680**	**115 074**	**103 699**	**104 903**	**105 971**	**104 412**
Capital and reserves	55 262	53 419	46 994	44 275	44 276	44 276	44 276
Trade and other payables	72 701	74 707	60 608	50 680	51 276	51 985	50 474
Provisions	6 905	7 554	7 472	8 744	9 351	9 710	9 662
Total equity and liabilities	**134 868**	**135 680**	**115 074**	**103 699**	**104 903**	**105 971**	**104 412**

Data provided by the Human Science Research Council

Council for Scientific and Industrial Research (CSIR)

The (CSIR) is governed by the Scientific Research Council Act (46 of 1988), as amended by Act 71 of 1990. The CSIR's mandate is to foster industrial and scientific development either by itself or in partnership with public and private sector institutions to contribute to the improvement of the quality of life of the people of South Africa. This must, in terms of the legislation, be done in the national interest through directed and multidisciplinary research and technological innovation. Building on past successes, the CSIR will continue to use its research skills innovatively in the transformation of the country. Cooperation between the science councils is important for finding holistic solutions.

Table 31.9 Financial summary for the Council for Scientific and Industrial Research (CSIR)

	Outcome				Medium-term estimate		
	Audited	Audited	Audited	Estimated outcome			
R Thousand	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
INCOME STATEMENT SUMMARY							
Revenue							
Non-tax revenue	**700 840**	**654 239**	**674 737**	**666 667**	**700 000**	**735 000**	**771 750**
Sale of goods and services other than capital assets	671 970	638 931	659 241	638 187	670 096	703 601	738 781
of which:							
Sales by market establishments	*671 970*	*638 931*	*659 241*	*638 187*	*670 096*	*703 601*	*738 781*
Other non-tax revenue	*28 870*	*15 308*	*15 496*	*28 480*	*29 904*	*31 399*	*32 969*
Transfers received	**295 429**	**321 996**	**356 992**	**439 408**	**423 854**	**445 045**	**460 099**
Total revenue	**996 269**	**976 235**	**1 031 729**	**1 106 075**	**1 123 854**	**1 180 045**	**1 231 849**
Expenses							
Current expenses	**704 765**	**938 136**	**954 275**	**1 060 252**	**1 082 129**	**1 136 600**	**1 193 794**
Compensation of employees	669 634	539 741	567 621	587 566	585 445	614 717	645 453
Goods and services	–	360 390	344 382	433 243	455 270	478 398	502 682
Depreciation	34 411	37 788	42 272	38 580	40 509	42 535	44 661
Interest, dividends and rent on land	720	217	–	862	906	951	998
Transfers and subsidies	**–**	**–**	**–**	**7 422**	**7 793**	**8 183**	**8 592**
Total expenses	**704 765**	**938 136**	**954 275**	**1 067 674**	**1 089 922**	**1 144 782**	**1 202 386**
Surplus / (Deficit)	**291 504**	**38 099**	**77 454**	**38 400**	**33 932**	**35 263**	**29 463**
Tax payment	**836**	**155**	**3**	**–**	**–**	**–**	**–**
Outside shareholders Interest	**1 049**	**–**	**(805)**	**–**	**–**	**–**	**–**

BALANCE SHEET SUMMARY							
Carrying value of assets	212 085	218 884	228 950	253 585	259 919	266 571	273 554
Investments	17 936	39 150	29 895	22 153	22 000	20 000	18 000
Inventory	52 761	50 032	65 504	26 506	27 831	29 223	30 684
Receivables and prepayments	171 053	149 512	143 157	156 681	162 916	168 311	173 077
Cash and cash equivalents	124 253	214 108	304 209	276 840	313 430	354 974	391 307
Total assets	**578 088**	**671 686**	**771 715**	**735 765**	**786 096**	**839 079**	**886 622**
Capital and reserves	148 782	183 975	262 388	300 471	334 403	370 166	399 629
Borrowings	85	–	–	–	–	–	–
Post retirement benefits	170 647	148 224	107 307	107 307	107 307	107 307	107 307
Trade and other payables	192 380	268 246	329 168	273 809	287 499	301 874	316 968
Provisions	66 194	71 241	72 852	54 178	56 887	59 731	62 718
Total equity and liabilities	**578 088**	**671 686**	**771 715**	**735 765**	**786 096**	**839 079**	**886 622**

Data provided by the Council for Scientific and Industrial Research

National Research Foundation (NRF)

The NRF, in terms of the National Research Foundation Act (23 of 1998), supports and promotes research through funding, human resource development and the provision of the necessary research facilities in order to facilitate the creation of knowledge, innovation and development in all fields of science and technology, including indigenous knowledge, thereby contributing to the improvement of the quality of life of all people of South Africa. The NRF supports the attaining, training, retaining and sustaining of human resources through various instruments. Science outreach by the National Research Foundation national facilities and their flagship projects provides an excellent opportunity for generating a sense of excitement about science in young people.

Table 31.10 Financial summary for the National Research Foundation (NRF)

	Outcome				Medium-term estimate		
	Audited	Audited	Audited	Estimated Outcome			
R Thousand	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
INCOME STATEMENT SUMMARY							
Revenue							
Non-tax revenue	**289 551**	**353 850**	**500 639**	**558 373**	**527 615**	**568 948**	**592 733**
Sale of goods and services other than capital assets	8 824	9 872	34 928	47 311	39 000	44 000	47 500
of which:							
Admin fees	*8 824*	*9 872*	*28 071*	*38 828*	*30 000*	*33 000*	*35 000*
Sales by market establishments	–	–	*6 857*	*8 483*	*9 000*	*11 000*	*12 500*
Other non-tax revenue	*280 727*	*343 978*	*465 711*	*511 062*	*488 615*	*524 948*	*545 233*
Transfers received	**336 431**	**378 966**	**413 669**	**538 944**	**599 671**	**635 394**	**668 480**
Total revenue	**625 982**	**732 816**	**914 308**	**1 097 317**	**1 127 286**	**1 204 342**	**1 261 213**
Expenses							
Current expenses	**208 936**	**244 892**	**323 143**	**462 099**	**438 204**	**462 036**	**488 457**
Compensation of employees	122 522	142 985	174 990	234 531	246 360	261 581	274 595
Goods and services	71 879	84 527	129 511	206 866	170 036	177 273	189 191
Depreciation	14 535	17 380	18 642	20 702	21 808	23 182	24 670
Transfers and subsidies	**397 291**	**491 763**	**592 657**	**687 862**	**689 082**	**742 306**	**772 756**
Total expenses	**606 227**	**736 655**	**915 800**	**1 149 961**	**1 127 286**	**1 204 342**	**1 261 213**
Surplus / (Deficit)	**19 755**	**(3 839)**	**(1 492)**	**(52 644)**	**–**	**–**	**–**

Table 31.10 Financial summary for the National Research Foundation (NRF) (continued)

	Outcome				Medium-term estimate		
	Audited	Audited	Audited	Estimated Outcome			
R Thousand	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
BALANCE SHEET SUMMARY							
Carrying value of assets	131 282	125 339	126 801	152 501	160 689	160 758	161 384
Investments	75 052	72 100	97 547	97 543	97 543	97 543	97 543
Inventory	1 846	1 878	2 801	3 000	3 000	3 000	3 000
Receivables and prepayments	155 391	95 477	136 184	129 500	123 500	122 500	116 500
Cash and cash equivalents	277 885	456 925	426 407	298 893	305 893	312 643	324 392
Total assets	**641 456**	**751 719**	**789 740**	**681 437**	**690 625**	**696 444**	**702 819**
Capital and reserves	253 625	245 083	243 381	216 437	224 625	220 694	215 320
Post retirement benefits	22 385	35 725	38 225	45 000	50 000	58 000	66 000
Trade and other payables	221 678	279 984	435 672	350 000	350 000	350 000	350 000
Provisions	8 818	10 247	14 535	15 000	16 000	16 750	17 499
Managed funds	134 950	180 680	57 927	55 000	50 000	51 000	54 000
Total equity and liabilities	**641 456**	**751 719**	**789 740**	**681 437**	**690 625**	**696 444**	**702 819**

Data provided by the National Research Foundation

Africa Institute of South Africa (AISA)

The AISA is a statutory body focusing primarily on political, socio-economic, international and development issues in contemporary Africa. AISA's key role is to conduct research and support policy development; to embark on training programmes, to establish, participate in and maintain networks for peace, development and prosperity on the African continent. It contributes to the goals of the NSI with its research programmes having a particular impact on knowledge generation and human resource development.

Godisa Trust

Godisa operates the innovation and technology demonstration activities and incubator programme, initiated with European Union (EU) financing and now co-financed with funding streams from the **dti** and the DST. During 2005, progress was been made in the transfer of Godisa to the **dti** and its placement under the Small Enterprise Development Agency. The transfer gives effect to the national strategy of strengthening and coordinating support for small enterprise development. The transfer will be effective from 1 April 2006. In terms of the transfer arrangement, DST funding for Godisa will continue for the 2006/7 financial year. From 2007/8 onwards the Department of Trade and Industry will assume responsibility for Godisa's funding.

Tshumisano Trust

The DST supported the establishment of the Tshumisano Programme with the establishment of the Trust by the Committee of Technikon Principles (CTP) and support from the German government through Geselschaft für Techniesche Zussamenarbeit (GTZ). The Higher Education landscape has undergone some dramatic changes with "University of Technology" status being given to technikons and the CTP now operating under Higher Education South Africa (HESA). Tshumisano operates the Technology Stations Programme (TSP) through stations established at the Universities of Technology (UoT) to further efforts in training and SME product development, and also aims to improve market responsiveness to UoT programmes.

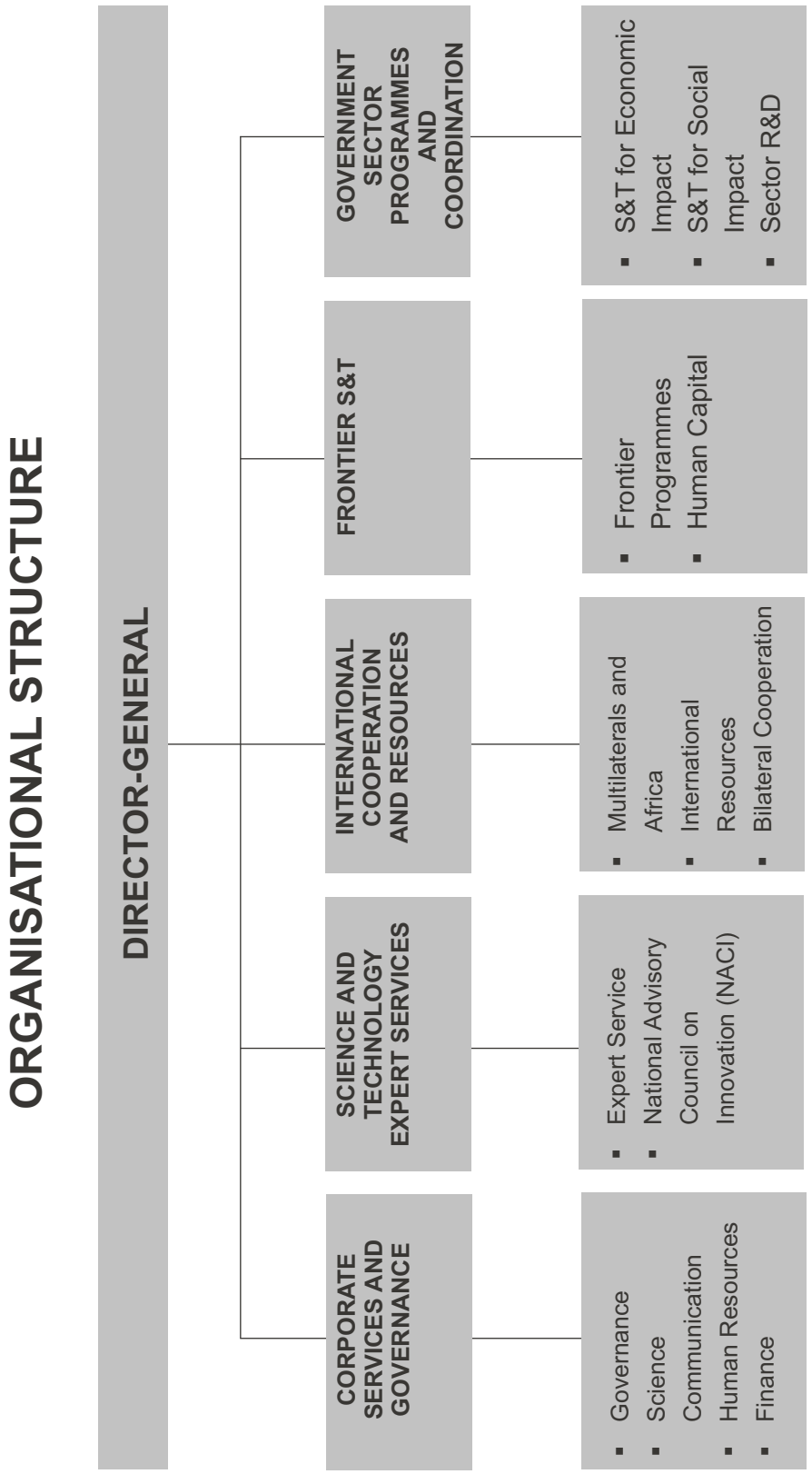
Academy of Science of South Africa (ASAAF)

The Academy of Science of South Africa Act (67 of 2001) provides for the establishment of the Academy. ASSAf's objectives are to promote common ground in scientific thinking across all disciplines, to encourage and promote innovative and independent scientific thinking, to promote the optimum development of the intellectual capacity of all people and to link South Africa with scientific communities at the highest levels, in particular within Africa.

National Energy Research Institute (jointly with DME)

The DST and the Department of Minerals and Energy were mandated by cabinet to oversee the process of establishing the NERI. National Treasury approved a budget of R10 million towards the establishment of NERI for the 2004/2005 financial year. Forty per cent of the budget was utilised for the establishment of NERI and the formulation of the National Energy R&D Strategy and 60% went to the Flagship research programmes. In June 2004, Cabinet approved a governance model for NERI as a subsidiary of CEF (Pty) Ltd.

4. APPENDIX 1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INTERNATIONAL COOPERATION AND RESOURCES
Multilaterals and Africa
International Resources
Bilateral Cooperation
FRONTIER S&T
Frontier Programmes
Human Capital
GOVERNMENT SECTOR PROGRAMMES AND COORDINATION
S&T for Economic Impact
S&T for Social Impact
Sector R&D

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Department of Science and Technology
Private Bag X 894, Pretoria, 0001, South Africa
Tel: 012 843 6300, www.dst.gov.za

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