



National Science and Technology Forum

Science and Technology Awards 2002

Honouring Role Models in Science, Engineering and Technology (SET)

Chief Executive Officer's

Message

Our awards for outstanding contributions to Science, Engineering and Technology to individuals and organisations are intended to encourage other individuals and organisations to greater efforts and those who are productive to share their discoveries and developments. This is the fifth year of our awards and once again we have seen an increase (23%) in the number of nominations received compared to last year.

It is only through the efforts of individuals, either on their own, or collectively in organisations, that science and technology will flourish. The evidence of the contributions has to be looked for in the outputs, but it is not the outputs as such that are recognised by us. There are many other awards that recognise outputs. It is either the individual or the organisation that we recognise. Of course organisations are driven by the individuals in them, and sometimes the organisation and a leading individual become almost indistinguishable. In making the adjudications, the panel has to be sensitive to this and in choosing one, recognition is due to the other and others who may have contributed. A further award in another category would be a duplication and, as such, is avoided.

Where the panel considered that a nomination would be more appropriate in a category other than the one chosen, they have considered them in that category. The periods of time to be considered for the different categories differ and thus when this is done, the information supplied may be inadequate for a proper consideration to be made. However the adjudicators have made due allowance for this, where possible. Nevertheless nominators should pay attention to the need to supply adequate detail, or complete two motivations, where more than one category is selected by the nominator for their nominee.

The panel has again been able to make their selections without calling for interviews. The panel does not have the resources to seek out supplementary information which is not presented. This serves to underline the importance of a properly completed and motivated nomination, in harmony with the trend in evidence throughout the National System of Innovation, where an interview cannot take the place of a carefully prepared and scientifically substantiated document, whether this be an application for funding, a thesis for a higher degree, or a motivation for a NRF rating.

It remains a surprise that some nominators do not give adequate attention to the criteria and the reasons why these have been chosen. As said we wish amongst other things to encourage the dissemination of knowledge. Da Vinci's great engineering work was hidden away for the most part of a century by which time most of his ideas had been overtaken. The maritime expertise of the Chinese from the 15th Century, about which we are only now beginning to learn, was lost to the world due to political action.

How different the history of the world might have been, had these technologies been shared at the time.

We have again invited, as guests of the NSTF at the dinner, learners, teachers and schools from each of the provinces who have excelled in

mathematics and science. These include:

- ! Top Female Matriculants as identified by the Department of Education, being: Ms Kenosi K Rapoo (Gauteng), Ms Brenda E Mpaphuli (Limpopo), Ms Zibuyile Mncwabe (KZN), Ms Boitumelo S Motshwanedi (North West), Ms Anima Osei-Amankwah (Eastern Cape), Ms Matseliso Thabane (Free State), Ms Vuyisile Manqele (Mpumalanga), Ms Faith Z Gwangqa (Western Cape), Ms Precious D Melakeco (Northern Cape).
- ! The Best Teachers in Mathematics and Science in South Africa, as identified by the Sowetan/Telkom/Protec Teacher of the Year Awards were named as follows: Mr Frans C Murphy (Northern Cape), Mr M P Masango (Limpopo), Mr M L Zulu (Mpumalanga), Mr Steve Maditjana (North West), Mr A Makhubedu (Gauteng), Mr Martin Tshabalala (Free State), Mrs Maryna de Lange (Western Cape), Mr Z R Sonkwala (Eastern Cape), Mr T Mchunu (KZN), and Mr Felang Pebane (Retired Teacher of the Year).
- ! Top Schools in Mathematics and Science in South Africa were named as follows: Mbilwi High (Limpopo), Makgetse High (North West), Metlife-Raucall Senior (Gauteng), Zingiza Senior Secondary (Eastern Cape), Leseding High (Free State), Kasselsvlei Comprehensive High (Western Cape), Inkomazi Senior Secondary (Mpumalanga), Mshweshwe High (KZN), Carlton Van Heerden High (Northern Cape).
- ! Furthermore, the Department of Science and Technology (DST) has expanded its role in the NSTF's Awards to largely support and encourage girls in S&T. The top ten girls recognised in this category are: Expo for Young Scientists - Kimantha Naidoo, Lavanya Naidoo and Londiwe Ntuli; Mathematics Olympiad - Tamara von Glehn, Marietjie Venter and Ishara Sukhraj; Science Olympiad - Lidia Auret, Virlene Goliath and Jane Stamp; Technology Olympiad - Jenna Keightley

The NSTF is indebted to the Foundation for Education, Science and Technology (FEST) for their assistance in the administration surrounding this event.

Our thanks are due also to the adjudication panel and indeed to all who have contributed to making this event a success, not the least being the nominators who of course are unheralded but essential to the process and the nominees who put themselves on the line.

Finally, a special thanks to our sponsors, listed elsewhere, without whose help this would not have been possible.

Dr James Hlongwane,
CEO - National Science
and Technology Forum



To Celebrate South African Genius



An Acknowledgement

of
Achievement

The NSTF AWARDS for 2002 acknowledge outstanding contributions in the field of Science, Engineering and Technology (SET) in the following six categories:

Those **individuals** who have made the most significant contribution in SET, thereby establishing themselves as role models:

- Over a Lifetime, or
- Through Research and Innovation over the last two years, or
- Through Activities other than Research and Innovation over the last two years; and

Those **organisations** which have made the most significant contribution to SET:

- A Not-for-Profit organisation over the last three years
- An SMME over the last three years, and
- A corporate organisation in the last ten years.

The criteria for the selection of the award winners are summarised as:

- Contribution to the advancement of science / technological innovation / new knowledge generated;
- Practical application / implementation;
- The relevance to South Africa and its people;
- The commercial impact and contribution to S&T policy;
- Promotion of Public Understanding of S&T;
- Promotion of education in this field as a contribution to the Public Understanding of S&T;
- Social and economic sustainability; and
- National and international recognition.

These criteria were expanded on fully, as were the definitions of the categories, on the nomination form, which was set out in NASTEF, provided on the Internet and made widely available from September 2002.

Members of the

Adjudication

Panel

Business Sector and Co-ordinator of the Panel

Denis Hunt (SACOB)

Education Sector

Prof P. D. F. Kok (TNG)

State Utilities Sector

Dr Themba Mdlalose (NECSA)

Government Departments

Dr Shaheen Khotu (Department of Health)

Science Councils

Dr Francis Petersen (Mintek)

Professional Bodies

Dr Christine Rey (SASPP)

Labour

Dr Rob Toms (Transvaal Museum)

NGOs and Civil Society

Andrew Molope (Atteridgeville Education Centre Trust)

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A finalist, by our definition, is an entrant considered eligible for the award; who qualifies to be considered in the category; and has made a sufficiently outstanding contribution. The adjudicators reviewed the appropriateness of the category selected and then considered nominations in categories other than those selected by the nominators where they considered that the nomination was more appropriate. A nominee was restricted to winning one award.

In the Category: **An individual over a lifetime****Prof Lawrence Hunter****Department of Textile Science, UPE**

Contribution: Pioneering research over some 36 years in textiles and playing a leading role in textile education and training. He has substantially advanced the knowledge and understanding of the relationship between the properties of South African natural fibres (principally wool, mohair and cotton) and their performance during textile processing, yarn and fabric manufacturing and end product behaviour.

Dr Michael J Kahn**Executive Director Knowledge Management, HSRC, Cape Town**

Contribution: A career, devoted over the last twelve years, to the challenge of the building up of a science, mathematics and technology cadre in South Africa through the development of enabling policies for the State - he has had a hand in all of them in this field at some level - through organisations such as NGOs and education programmes, the most significant possibly being SYSTEM (Student and Youth into Science, Technology, Engineering and Mathematics) and more recently as an advisor to the Minister of ACST.

Dr Kelvin Kemm**STRATEK, Pretoria**

Contribution: For a career which began as a research scientist in the nuclear field, then a project manager, then a SET educational systems designer, and latterly as a technology consultant, he is best known for his forceful advocacy of a common sense approach to science and technology, particularly in environmental matters, through public and school lectures, through his TV series "Impact, Halley's Comet" and "Curiosity Feeds the Cat" (altogether some 200 items), in the media such as his nine year old column in Engineering News, and on the radio, thereby making substantial contributions to the public understanding of science and technology.

Dr A J Ribbink**Programmes Director, SA Institute for Aquatic Diversity, Grahamstown**

Contribution: Through his leadership in multidisciplinary projects in the conservation of aquatic resources he has empowered others to achieve outputs in which the inter-relationships of the physical and biological environments were integrated to build conservation and management strategies. The projects include: extensive work on the rock-frequenting fish of the Malawi Basin (the lake is now a World Heritage Site largely due to his efforts); GEF and WWF programmes in this region; conservation strategies for small unique insular dolomitic aquatic ecosystems, and more recently the current Coelacanth programme.

Prof J (Koos) F van Staden**Dept of Chemistry, University of Pretoria**

Contribution: Through unique pioneering work on flow injection analysis (FIA) and sequential injection analysis (SIA), and now SFIA (sequential flow injection analysis), which he helped to invent, Prof van Staden has created a world-class centre of excellence in flow analysis and process analytical chemistry. Many practical applications have resulted. Typically, the use of these methods in biomedical applications has been pursued with important benefits in view for the control of African diseases such as malaria, AIDS and hepatitis B.

Prof Roy Siegfried**Retired Professor Emeritus UCT, Extraordinary Professor, University of Stellenbosch**

Contribution: Work in the field of biology characterised by a role in transforming biology from a descriptive base to the analytical and practical problem-solving levels of today. He has put the Percy Fitzpatrick Institute at UCT and its Dept of Zoology at the forefront of environmental research. His concept of directed themes in research, one such theme being that of "the sustainable environment", was offered at UCT in advance of its acceptance or acceptance of the concept by the FRD. He pioneered work on the use of radio-telemetry in his field. Results of his efforts may be found in the Benguela Ecology Programme, Fynbos and Karoo Biome as well as the numerous organisations that he has served, not the least being those pertinent to Biology in the Antarctic.

In the Category: **An individual through research and innovation over the last two years****Dr Charles Henry Horn****Head Gastro Intestinal Micro- and Bio-technology, ARC, Irene**

Contribution: The development and commercialisation of potent biotherapeutics (i.e. natural remedies) designed to stimulate the immune system to prevent the adaptation of pathogens to antibiotics with the objective of the restoration of the natural flora of the digestive tract. Results are to be found in the protection of infants against various infections, young children in rural areas against rotavirus diarrhoea, women against vaginal candidiasis, assistance to patients treated for cancer with heavy antibiotics, AIDS patients and in important areas of veterinary medicine and animal husbandry, providing, for example, crucial support to the export of animal products to the EU.

Prof Sarah Howie**Associate Professor Curriculum Studies and Director of Centre for Evaluation, UP**

Contribution: For her research work, focussed on the development of the teaching and learning of maths and science in schools nationally, initially at the HSRC and now at the Centre for Evaluation at UP, being the first in South Africa based on statistical methods, which allowed comparison between learners in RSA with others in countries abroad, between provinces, and which explored the all-important relationship between language and mathematics. Her work has informed the development of the Maths, Science and Technology Strategy, and has focussed on the plight of previously disadvantaged individuals in the school system arousing interest in several countries abroad.



Dr Winston Leukes

Senior Lecturer and Head of Biotechnology, Rhodes University

Contribution: For the development of two fixed film bioreactors for the continuous production of natural products by micro-organisms. The work now patented locally and abroad represents major breakthroughs in bio-process engineering: the first for the production of antibiotics and other secondary metabolites stimulating the natural environment of a number of bacteria at high yields and productivities without genetic engineering or mutations of the production strain. The second, a continuous fixed-bed tower reactor using yeast to produce a honey wine with a fermentation time of several hours in place of, months, is a shining example of IKS adaptation - a design based on ancient San bushmen techniques.

Prof Tshilidzi Marwala

Associate Professor, Wits University

Contribution: Advanced applications of computational intelligence techniques employing neural networks, fuzzy logic and evolutionary computing. His work has included a model of the stock market, condition monitoring in mechanical and aerospace structures (a probabilistic method was used here to increase confidence levels), scaled conjugate gradient and Bayesian training of neural networks for fault identification in cylinders and others based on finite element techniques. Outputs of the work are found in the new ISO standard on condition monitoring, an assessment of highway bridges in Florida, and an assessment of the condition of railways in the UK.

Dr Marius van der Merwe

Entrepreneur / Designer, Cape Town

Contribution: As an inventor with a creative mind and an urge to succeed, he has invented and developed, and through Harwill Medical, has commercialised, various devices for application in the medical world. His outputs include a safety syringe (SAFSYR); a safety scalpel (SAFBLADE); a PAP smear device (CERVITULA); LUCA, a range of devices for infants including a pacifier; PEGGO, a peg which grips in three directions; and a foetal scalp electrode for use during birth.

In the Category: An individual through activities other than research and innovation over the last two years

Prof Peter Clayton

Professor, Computer Science, Rhodes University

Contribution: To capacity building and the public understanding of Science and Technology through a number of activities e.g. the growth of his own research group in the ICT field, building a partnership with Fort Hare, stimulating a research culture on that campus in the ICT field through school programmes in the poorer areas of Grahamstown and participation in many PUSET forums, most notably the SASOL SciFest, which grew to 558 events in 2002 and was attended by 45 000 participants, of which he is a founding member and chair for the past three years of the Advisory Committee. Credit is due also to the Festival and its director.

Dr Valerie Corfield

Ass Prof, Medical Biochemistry, University of Stellenbosch, Chief Specialist, SA Medical Research Council

Contribution: In the field of PUSET through engaging the public at many levels including junior and senior school learners, those already in tertiary education and the man in the street. Specifically she has developed and presented a series of interactive and highly "edutaining" biomedical workshops and talks which have been adapted for onward transmission by others. The focus has been on the molecular genetics of inherited

heart disease (her own specialist area of research) and more recently on food technology, a DNA Workshop, advances in technology, the Human Genome Project and HIV/AIDS.

Mrs Marina Joubert

Manager, Science Communication, FEST

Contribution: To science communication, evidenced principally through the championing and successful arrangement of the 7th International Conference on Public Communication of Science and Technology, PCST-7, held in Cape Town from 5th to 7th December 2002, the first to be held in Africa. Some 409 delegates from 41 countries attended, which contributed significantly to raising the profile of science and technology and its communication needs in SA. Aside from this, her work includes the management and initiation of numerous other communication activities: SA Science Lens, the first science photography competition in SA and various other competitions, the production of Archimedes and EasyScience; activities associated with SAASTE, and other national organisations in support of science communication.

Mr K M (Lebs) Mphahlele

Chief Education Specialist, Department of Education

Contribution: For the co-ordination of the development and rolling out of the national strategy for Maths, Science and Technology Education and the development, reviewing, streamlining and strengthening of Curriculum 2005 and other projects such as the flag-ship project of the DoE "SYSTEM", and the formation of SAASTE and his own research on "The Science Vacuum in Peoples Education: Why?" and the phenomenon that some PDI schools, despite adversities, do well in S&T.

Mr David Nicholls

CEO, PBMR (Pty) Ltd

Contribution: Through his leadership of the PBMR project, he has provided the inspiration and vision to a team of professionals to develop a strong business case for the use of HTGR technology to help meet the world's energy needs and to capitalise on South Africa's strengths and opportunities to provide the base for this development, and to drive the project to the point of acceptance and implementation. This recognition also serves to recognise the work on a model of the turbine system at the Faculty of Engineering, Potchefstroom University.

In the Category: A Not-for-Profit Organisation over the last three years

Africabio, Centurion

Contribution: This stakeholders association has provided the forum for informed debate on biotechnology issues and the promotion of its safe, responsible and ethical use with significant contributions in the areas of education, to the development of national curricula and the undertaking of an extensive education programme, and in PUSET having produced a number of publications and position papers. Small-scale farmers have been empowered through training and advice: the growth of the sector has been facilitated through start-up companies and involvement with the co-ordination of Biotechnology Regional Innovation Centres; participation in the development of state policy through the implementation of the GMO Act 1997 and the Biosafety Protocol has been effected; and the development of the all-important National Biotechnology Strategy and its subsequent roll-out has been a major area of effort to begin to realise the potential offered to the national economic growth by this sector.

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Coaltech 2020, CSIR Miningtek

Contribution: A unique and innovative collaborative research programme formed by the major coal mining companies, Eskom, the Universities, the CSIR and organised labour to address the research needs of the coal mining industry to enable it to remain competitive, sustainable and safe, well into the 21st Century. The elements of the programme are carried out in institutions or in collaborative projects but managed by Coaltech. Practical results have been seen in alternative water treatment processes, irrigation of crops with waste water, the beneficiation and briquetting of fine and ultra-fine coal, the preparation of mine closure guidelines and the measurement of greenhouse gases with promising work in progress on underground methods that has the benefit of being available to all the players.

Deepmine Collaborative Research Programme

Contribution: This programme was set up as a collaboration between Universities, the industry and research organisations to establish the basis on which mining at ultra-deep levels (3-5kms) could be carried out. The programme ran over four years and some R66m was spent. The results have established that it is technically feasible, but at present, uneconomic. The full field of work was covered, in some cases with trials and in some cases, simulations, with significant contributions to the literature and to PUSET. The results of the work are available to the entire industry for application when the time is ripe to mine this significant part of the largest reserves of gold in the world.

MTN ScienCentre, Cape Town

Contribution: The first, world-class, financially viable, science centre in South Africa, which is being used by DACST as the model to demonstrate the method for the establishment and operation of such a centre and its interactive exhibits. Such centres have been shown worldwide to be a cost effective means of strengthening a science culture. Displays have been sold to centres abroad. Various partner organisations such as ORT-STEP, SUNSTEP and Gateway to Discovery, among others, use the centre as a foundation for their work. The centre runs a full programme throughout the year, which incorporates teaching laboratories, lectures, audio-visual displays, travelling exhibitions, excursions, quizzes, S & T Workshops, science camps and other special events, not the least being an exhibition on cricket during the World Cup.

SEDIBA Project in the School for Science, Maths and Technology Education; University of Potchefstroom

Contribution: Established in 1996 aimed at the upgrading of science and maths teachers through full-time, part-time and distance study, this programme has achieved success in terms of the number of students who have completed courses (546 diplomas awarded by 2002, an enrolment in 2002 of 630), and the education research that has been conducted into cognitive problems experienced. Research has resulted in the production of study material and the development of a chemistry set which has achieved recognition as a contribution to S & T. It is claimed that by enhancing teaching capability, some 120 000 learners have been reached. The programme has focused on the North West province but now has a satellite in Gauteng on the Vanderbijlpark campus and links with the Free State. This arms length project has attracted significant sponsorship from Industry and now also enjoys direct support from the Departments of Education in the three provinces.

Sasol Scifest, Grahamstown

Contribution: The Sasol Scifest, an annual Festival of Science, Engineering and Technology which takes place over 7 days in March - 2002 saw the 6th Festival with 558 events on offer - makes amongst the largest

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contributions to the promotion of PUSET in SA, reaching 45 000 delegates a year, and over 6000 more through a travelling show. The Festival offers innovative interactive exhibits, field trips, quizzes and competitions, shows, workshops, talks and demonstrations, special programmes for science and maths teachers, previously disadvantaged learners and pre-schoolers and many other events. The impact on the level of enthusiasm for SET subjects in schools is huge. The long-term effect on the number of pupils choosing to pursue SET oriented careers is believed to be significant.

In the Category: An SMME

Over the last three years

BreatheTex Corporation (Pty) Ltd, Port Elizabeth

Contribution: The development (in partnership with the CSIR) and the implementation of a technology for the lamination of membranes onto fabrics to manufacture waterproof, breathable, fire-retardant fabrics for high performance applications in the military, leisure sports, medical and protective clothing markets. The technology and the associated machinery are unique to South Africa and the products have a high potential export growth, having achieved significant success and recognition to date. 2002 saw penetration into markets of the EU, the installation of a new fabric finishing plant, and new product development.

Fundamo (Pty) Ltd, Bellville Cape Town

Contribution: By utilising established technology and concepts employed in Internet security and applying these to the GSM (Global System for Mobile Communications) environment, Fundamo have provided next generation financial transaction capability on existing mobile phone handsets. The technology can be integrated with external services and systems and is supported by banking systems and regulatory expertise. The employment of transactional know-how, as is applied in ATMs, is unique and since the cellphone is available to many South Africans who do not have access to conventional banking, can bring to them the benefits of banking. Two deployments have been licensed in SA and one in Zambia.

Hazleton Pumps SA, Centurion

Contribution: The design, development and manufacture of specialised pumps: a vertical spindle froth pump designed for a Russian company employing an innovative concept to manage froth without developing air pockets, and a range of submersible stainless steel pumps with unique features. These innovations were all made possible by the prevailing economic conditions, and the application of design and manufacturing capacity.

Intermap (Pty) Ltd, Pietermaritzburg, KZN

Contribution: The development of an approach to the solution of business management problems incorporating an integration of techniques used in Geographic Information Systems (GIS), web internet design, and interpretative logic, whereby organisations are assisted to map or visualise information about their businesses using workflow principles. Web based platforms have been designed: eTRACK for business process management; eMAP to present meaningful

displays of spatially located business information together with current information sourced directly from business systems in real time. Both of these are now implemented with clients in both the private and government sectors in KZN.

Röth Medical Components (Pty) Ltd, Cape Town

Contribution: The design, development, patenting, and manufacturing of new technology orthopaedic implants and associated medical devices and surgical instruments, which have been recognised internationally for the quality of the output, founded on a world-class machining shop. Röth's innovation and dominance of both the local and global medical industries in this field has worldwide recognition. The products include external fixators for orthopaedic applications, a pedicular screw spinal system, a bone harvesting device, and a femoral drill guide.

In the Category: A corporate organisation (or Dept or Division) over the last ten years

Avian Demography Unit, University of Cape Town

Contribution: The collection, analysis and presentation of data on birds, their habitats and activity as a science in its own right and an indicator of environmental health. On this basis it has designed and constructed innovative responses to policy and planning issues, to international treaties and agreements and to disaster management, the latter being the occasions which attract most public interest. Features of the ongoing work of the unit are the SA Bird Atlas Project, the SA Bird Ringing Unit and participation in the Co-ordinated Water Bird Counts, monitoring in 2002 at close to 400 wetlands throughout the country and various others, much of which has achieved international recognition.

Exotic Diseases Division, ARC Onderstepoort Veterinary Institute, Pretoria

Contribution: For its quiet, dedicated leadership of the national effort to manage foot and mouth disease (FMD) and African Swine Fever (ASF) and hence for the containment thereof with significant benefit to the economy. The three types of FMD maintained by buffalo have been evolving into numerous sub-types over the last century and pose, together with ASF, constant threat to livestock. Diagnosis of the diseases is made through application of new scientific innovations and the careful and systematic analysis of clinical material collected across Southern Africa. By the tracking of buffalo strains, the pattern of disease outbreaks are tracked and the necessary vaccines are supplied, to match the outbreaks, strains of the diseases are isolated, new vaccines developed and new techniques in vaccine development researched. As an indicator, the FMD outbreak in 2000-2001 cost the state R90m (5 foci or areas of concentration) with an estimated loss in exports of R800m. In the UK at the time the losses were £2,8bn with 2030 foci reported.

Peldev, the Fluorochemical Technology Division, NECSA, Pelindaba

Contribution: By capitalising on the availability of several fluorochemical materials as feedstock, advanced technologies have been developed on the Pelindaba site for the manufacture of fluorochemical products and the supply of fully commissioned plants on a turnkey basis. This has grown over ten years into a major business. The uniqueness is evident in the fact that less than five companies worldwide handle the same range of products. The turnover has increased from R20m in 1993 to R160m in 2002 with significant contributions to the knowledge base and capacity in the field.

Research Development & Demonstration Division, Eskom, Germiston

Contribution: For its active focus over the last ten years on the extension of research into new and innovative technologies in its field, targeting an overall positive return on investment at a time when many organisations are reducing such investment. Eskom links into the work of overseas researchers in the USA, Germany, Italy and the UK, to avoid duplication of effort. The nomination focussed on its programme in the field of renewable energy technologies in support of national priorities which covered both the bulk supply of renewable energy as well as rural and off-grid applications. The work has covered a range of initiatives: a resource database for the country; the schools and clinics projects based on PV systems; various solar grid and off-grid systems with a project at the demonstration model stage; three wind turbines have been erected in the Cape; various biomass options - a model in the Eastern Cape is planned - and an ocean energy programme has been started.

Plant Star, Measurement and Control Division, Mintek, Randburg

Contribution: For the development and commercialisation worldwide over the last ten years of divisional products (e.g. for furnace control, flotation control, milling control and plant-wide control, the latter being an advanced process management system under the name Plantstar) which were primarily designed for application in the harsh environment of the minerals processing and metallurgical industry in South Africa. An aggressive marketing approach, targeting the same industry abroad, has been singularly successful in generating sales in upwards of nine countries and earning income which has contributed substantially to the sustainability of the Mintek operation itself.

Telkom SA Ltd (Centre of Excellence Programmes)

Contribution: In partnership with its telecommunications suppliers, fourteen Centres of Excellence have been established throughout South Africa, based at various tertiary education institutions, in some cases working together. The programme is an initiative to empower tomorrow's leaders and to increase the pool of expertise available to the telecommunications and IT industries, by leveraging more investment for research and development from industry and government, and operates through the THRIP programme. A further objective is to extend the research environment itself with focus on the sharing of findings through SATNAC and striving for excellence. Independently, Telkom, through its Foundation, has a programme focused on high schools.

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