



The Who's Who

*of Science, Engineering, Technology
and Innovation in South Africa*

2012/13 NSTF-BHP Billiton Awards

***Today's research ...
tomorrow's innovation***

*National Science and Technology Forum
in partnership with BHP Billiton*



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- Council for Geoscience
- CSIR, Materials Science & Manufacturing
- Department of Agriculture, Forestry and Fisheries
- Mintek
- North-West University, Faculty of Engineering
- SABS Design Institute
- South African Council for Natural Scientific Professions (SACNASP)
- South African Medical Research Council (MRC)
- South African Nuclear Energy Corporation (Necsa)
- University of Cape Town
- University of Johannesburg
- University of Pretoria
- University of South Africa (Unisa)
- University of Stellenbosch
- University of the Witwatersrand

Community Support (Seats)

- North-West University, Hypertension in Africa Research Team
- North-West University, Research, Innovation and Technology Institute
- Square Kilometre Array (SKA) Africa
- University of the Free State
- University of KwaZulu-Natal
- Unisa



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The National Science and Technology Forum

The National Science and Technology Forum (NSTF) is the stakeholder body for all science, engineering, technology and innovation (SETI) organisations in South Africa. It is incorporated as a non-profit company in terms of the Companies Act and is registered as a non-profit organisation (NPO No. 92042) with the Department of Social Development.

In existence since 1995, the NSTF:

- Plays a powerful consultative and lobbying role in policy matters relating to SETI
- Organises related workshops, symposia, and discussion forums to facilitate consultation
- Organises the prestigious NSTF-BHP Billiton Awards (co-sponsored by BHP Billiton since 2011)
- Runs projects in partnership with its members, including a bursary programme, initiatives to assist young graduates, disseminating news and information, as well as making bursary and career information more accessible to young people and schools.

What can the NSTF do for your organisation?

- It is a platform to express the views of management, members and employees regarding SETI policies and a vehicle for organisations to give expert input into government policy
- Members’ activities in SETI become more widely known
- Members remain updated on SETI policy
- The NSTF-BHP Billiton Awards allow organisations to celebrate their achievements and attain public recognition within the context of a wider SETI community
- Organisations can become involved in activities that motivate and enrich the experience of mathematics and science learners
- The www.sciencebursaries.org.za web portal allows members to register and upload bursaries free of charge, and gives them total control to edit and update their bursary information on the site.

S.E.T. for economic growth



Message from the NSTF Chairperson



It is wonderful to be able to welcome you to this 15th event where the National Science and Technology Forum (NSTF) proudly honours the 'Who's Who' of South Africa's SETI community. This is also the third year that this is done in partnership with BHP Billiton for which we are also very grateful. I hope that you will enjoy celebrating the accomplishments of our friends and colleagues as much as I always do.

"Africa is rising". This statement echoed around the continent as the African Union celebrated its 50th anniversary. As a country and a continent we have much to celebrate, but it is important not only to look back but also to look forward. We need to plan for the next 50 years and even beyond that. There is no question that for Africa and South Africa to prosper, we will need scientists, technologists and engineers. The NSTF-BHP Billiton Awards promote those who excel in these fields and in so doing, we highlight potential careers for school leavers and university graduates. The NSTF has been doing this for 15 years and the impact is already very evident. We certainly must plan to continue these award events for at least another 50 years.

The NSTF-BHP Billiton Awards event is a significant highlight in the science calendar of South Africa. Along with our major co-sponsor, BHP Billiton, and many other partners and sponsors, the NSTF is happy to once again celebrate the achievements of the men and women that sustain science, engineering and technology in the country. We celebrate not only the top achievers in our science system, but also the research teams and organisations that provide essential 'pillars' of science and innovation in the country. Importantly, a number of our awards also highlight the achievements of younger scientists and those involved in capacity building, as well as communication and outreach efforts. I congratulate the finalists and the winners of the 2012/13 NSTF-BHP Billiton Awards. We rejoice with you and thank you for your superb contributions to science and technology in South Africa.

We are again most grateful to those people who have taken the time to prepare nominations for the awards that will be presented.

We are also indebted to our adjudication panel, led by Denis Hunt, which has worked tirelessly to select this year's winners. As the competition for these awards has increased annually, this has also meant that the task of the adjudicators has become increasingly difficult. Their wisdom, insight and deliberations in making what are often difficult choices, is important and sincerely appreciated.

The success of the NSTF-BHP Billiton Awards event is in no small way due to the superb services provided by our Executive Director, Ms Jansie Niehaus, Mrs Wilna Eksteen, the NSTF Secretariat, and the Awards Publicity Committee chaired by Ms Marie Ashpole of the South African Institution of Civil Engineering. This great team, along with the volunteers of the National Youth Service Programme, have worked tremendously hard, and largely behind the scenes, to make the event a spectacular success.

The official patron of the awards celebration is the Honourable Minister of Science and Technology, Mr Derek Hanekom. We look forward to engaging with him in this capacity. We thank him and his Department sincerely for their enthusiastic support of the NSTF.

My position as Chairperson of the NSTF has come to an end after an exciting six years. This is thus the last time that I will have the pleasure of welcoming guests and nominees to our annual awards event. I have thoroughly enjoyed leading the NSTF and am most grateful to the many people who have supported me in this role. Thank you for your support and please join me in welcoming Prof. Muhammad Ali Dhansay of the South African Medical Research Council as the new Chairperson of the NSTF.

Prof. Brenda Wingfield
Chairperson, NSTF



Co-branding Sponsor's Message



People are the foundation of our business and underpin the success of BHP Billiton worldwide. We value our employees and encourage the development of talented and motivated individuals to support the continued performance and growth of our diverse operations.

BHP Billiton is a company that is diversified not only by commodity, but geography and markets too. We need a workforce with skills that best reflect the communities in which our assets are located and our employees live. We are committed to fostering skills and building capacity in the pursuit of this objective.

As a proud sponsor of the National Science and Technology Forum Awards (NSTF), BHP Billiton is acutely aware of the importance of skills advancement in the science, engineering and technological fields to meet the demands of South Africa's expanding economy.

This year the theme of the Awards Gala Dinner is biotechnology. Biotechnology – separated into four fields: medicine, agriculture, biotechnology and marine life – is set to make a meaningful impact on the human race in the future. It may help to reduce pesticide use, increase water conservation and contribute overall towards balancing our ecosystem. BHP Billiton has great respect for the advances being made in biotechnology and we are committed to supporting initiatives that encourage and reward such innovation.

We own and operate a diverse range of businesses in different countries and ecosystems around the world and we believe our actions in environmental management contribute in some measure to balancing said ecosystems. We look at opportunities such as conservation to deliver lasting environmental benefits and continue to improve our understanding of the sources, scope and extent of our resource use, environmental emissions, and impacts and transparently report our performance.

Our overarching goal for environmental management is to avoid or, where this is not possible, minimise our impacts while contributing to mitigation through lasting environmental benefits across the regions where we operate.

But, ultimately, people are at the core of our business and it is the development of talented and motivated individuals that underpins BHP Billiton's continued performance and growth.

Recognising the importance of continuing to develop and nurture skills, BHP Billiton has fostered a partnership with the NSTF which provides us with a unique opportunity to promote a better understanding and appreciation of science and technology in the wider community.

We are always in need of mining engineers, geologists, metallurgists and a host of other technical skills to help us succeed, thereby developing the economy and contributing to the socio-economic wellbeing of the communities within which we operate. Accordingly, we support various community-focused organisations including providing many rewarding career opportunities in these fields.

Two such programmes of which we are justifiably proud are:

- The Learner Incubator Programme in the Northern Cape Province which seeks to increase the number of physical science and mathematics passes by providing supplementary education classes to Grade 10, 11 and 12 learners. In 2011, its third year of operation, the 150 students in the programme achieved a 100 % pass in matric, 100% pass in mathematics and 90% pass in science. Learner Incubator Programme learners achieved pass-rates higher than the district or provincial average in all categories
- The BHP Billiton Career Centre at the Sci-Bono Discovery Centre in Johannesburg was established in 2004. It provides career education, guidance and counselling to promote careers primarily, but not exclusively, with a link to mathematics, science, engineering and technology.

Our Foundations for Graduates Programme is an award-winning, two-year programme designed to transition our graduates from study to work and provide them with development opportunities in their early working years. Each year, approximately 500 new graduates from a variety of disciplines participate in the programme.

BHP Billiton remains committed to respecting and fostering the environments and communities in which we work. This commitment to sustainable development has led to vast investments across a broad range of projects in Southern Africa. These projects are committed to making a long-term difference in the areas of health, social and youth development, education, environment and enterprise development.

Our ambition is to see some of the learners from our community programmes become recipients of the NSTF-BHP Billiton Awards. The NSTF-BHP Billiton Awards make a significant contribution in recognising excellence in science, engineering and technology, and nurturing outstanding and specialised talent for the future. It is this talent that will drive the scientific, technological and engineering development of our country and help South Africa achieve its goal of long-term economic and environmental sustainability.

We are pleased to once again celebrate the tireless work and efforts of the NSTF and their endeavours in recognising the burgeoning talent that the country has to offer. The NSTF could not, however, have accomplished this feat without the help of government.

We applaud the Minister of Science and Technology, the Honourable Mr Derek Hanekom, and his Department for the work they do in promoting the development of science, engineering and technical skills in South Africa.

Dr Xolani Mkhwanazi
Chairman, BHP Billiton SA

Adjudication of the Awards

An adjudication panel of independent judges, representing all sectors within the NSTF as well as the award partners, reviewed the nominations to establish the finalists and the winners. A panel of experts was appointed to assist the adjudication panel by reviewing and providing validation of the selections made.

Panel Members

Chair of the Panel:	Mr Denis Hunt, South African Chamber of Commerce and Industry (SACCI) ¹
Business Sector:	Ms Karen Nel, Design Biologix ²
Education Sector:	Prof. Chris Chimimba, University of Pretoria and 2007/8 NSTF Award Winner ³
State-Owned Companies Sector:	Mr Barry McColl, Eskom Research and Innovation Centre ⁴
Professional Bodies (Scientists):	Prof. Jan Kramers, Geological Society of South Africa (GSSA) ⁵
Professional Bodies (Engineers):	Prof. Susan Adendorff, South African Institute for Industrial Engineering (SAIIE) ⁶
Civil Societies, NGOs and Labour Sectors:	Dr Sello Rapule, Programme for Technological Careers (PROTEC) ⁷
Science Councils and Statutory Bodies:	Dr Inga Jacobs, South African Water Research Commission (WRC) ⁸

Note: The Government Sector elected some years ago not to be represented on the panel of adjudicators.

For the TW Kambule Awards for Research and its Outputs and Emerging Researchers Categories:

National Research Foundation (NRF) Dr Thandi Mgwedi⁹

For the Researchers for Research Capacity Development Awards:

Eskom Mr Yashin Brijmohan¹⁰

For the Science Communicators Category:

South African Agency for Science and Technology Advancement (SAASTA), NRF Mr Lorenzo Raynard¹¹

For the Research Leading to Innovation Category for Small, Medium and Micro Enterprises (SMMEs):

Technology and Human Resource for Industry Programme (THRIP), an initiative of the Department of Trade and Industry Dr Zolani Dyosi¹²

Review Panel of Experts:

Prof. Wieland Gevers 2003/04 NSTF Award Winner and past Deputy Vice-Chancellor, University of Cape Town
Prof. Robin Crewe Past Vice-Principal, Research and Post-Graduate Studies, University of Pretoria



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The Finalists: Individuals

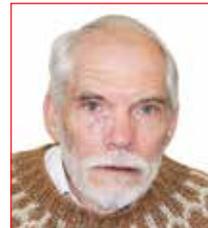
Recognising an individual for an outstanding contribution to science, engineering, technology and innovation (SETI) over a lifetime

Professor Neil Coville

Professor Emeritus: School of Chemistry, University of the Witwatersrand

For his use of catalysts to create new molecules, new reaction pathways and to generate materials that can be used in industry

During his career, Professor Coville has made and studied many catalyst systems. These studies have resulted in the production of information for the design, characterisation and evaluation of catalysts used in industrial processes, such as making chemicals and fuels (the Sasol Fischer-Tropsch process); carbon nano-structured materials used to make sensors, solar cells and memory devices; and inorganic catalysts.



Professor Robert Millar

Professor and Director: Mammal Research Unit, University of Pretoria and Director: University of Cape Town/MRC Receptor Biology Group

For his work as an international leader in neuro-endocrinology and numerous discoveries which have been translated into effective treatments for reproductive diseases and cancers

Professor Millar has discovered novel hormones and receptors, developed analogue drugs and brought them to the point of being available to mankind for the treatment of diverse diseases such as endometriosis and cancers of reproductive tissues, as well as for in vitro fertilisation.



Professor John Pettifor

Professor Emeritus: Faculty of Health Sciences and Honorary Professorial Researcher: Department of Paediatrics, University of the Witwatersrand

For his research which has focused on the prevention of rickets in children living in developing countries through ensuring adequate calcium intakes

Professor Pettifor has been at the forefront of paediatric bone research for over 30 years, focussing on the interrelationship between low dietary calcium intake and vitamin D deficiency, and the causation of deforming bone disease evident in children in developing countries who have habitually low dietary calcium intakes. His findings, particularly in relation to the prevention and the development of rickets, have resulted in primary and secondary prevention programmes being introduced in Africa, India and in parts of Bangladesh.



Professor Dan Stein

Professor and Head of Department: Department of Psychiatry and Mental Health, University of Cape Town and Director: MRC Unit on Anxiety Disorders, University of Stellenbosch

For his unique contribution to advancing basic and clinical neuroscience in Africa

Professor Stein has made a unique contribution to the advancement of basic and clinical neuroscience in the African context. His research has ranged from laboratory research on animal models, through clinical investigations on the neurobiology and treatment of common mental disorders, and on to epidemiological and public mental health research. Despite the fact that mental disorders are the third largest contributor to SA's burden of disease, people with mental disorders remain stigmatised, and research on these conditions has been relatively neglected worldwide. Prof. Stein has demonstrated their prevalence by showing that they are associated with specific alterations in brain circuitry, and by developing efficacious and cost-effective interventions.



TW Kambule Award: Recognising an outstanding contribution to SETI through research and its outputs over the last 5 to 10 years – proudly sponsored by the NRF for the past decade

Professor Graeme Cumming

Pola Pasvolsky Professor of Conservation Biology: University of Cape Town

For his far-ranging research on the theory and application of complexity theory in ecological and social-ecological systems, particularly in relation to the conservation and management of natural resources

Professor Cumming's primary contributions include the development of new theoretical frameworks for analysing linked systems of people and nature; in-depth analyses of specific conservation problems, such as the impacts of agriculture on South African birds and of elephants on savannah woodland communities; and the development of new approaches to modelling and quantifying broad-scale pattern-process interactions.



Professor James Darkwa

Professor of Chemistry: University of Johannesburg

For his work in making catalysts and potential drugs from precious metals like palladium, platinum and gold

Professor Darkwa's research involves synthesis of metal compounds such as platinum and gold and their applications as catalysts for biodegradable plastics and as potential drugs for cancer, malaria and tuberculosis. His work is focused on finding curative drugs for diseases.



Professor Johan Kock

Distinguished Professor: Microbial, Biochemical and Food Biotechnology, University of the Free State

For exposing a new world in Biology where cells are 'dissected' into nanometer thin 'slices' while at the same time the elemental composition and 3D ultra structure of each 'slice' and eventually the whole cell are determined

Professor Kock has developed a new imaging nanotechnology called Auger-architectonics, which applies Auger atom electron physics coupled to scanning electron microscopy and Argon-etching to cell structure exploration, thereby exposing a new world in 3D and element composition architecture. In 2012, his Auger-architectonics was used to structurally and chemically expose and map new cell inclusions i.e. gas bubbles ('lungs') inside eukaryotic cells. This is considered a paradigm with vast implications for biology and medicine.



Professor Andrew McKechnie

Professor: Department of Zoology and Entomology, University of Pretoria

For his research on climate change impacts and conservation strategies for birds and bats in hot environments

Birds and bats inhabiting very hot environments are among the organisms most vulnerable to the impacts of climate change. Recent years have seen catastrophic mortality during extreme heat waves. Professor McKechnie, together with Dr Blair Wolf and the late Professor Phil Hockey, has established a research programme that identifies those species most vulnerable to these impacts and models the consequences in terms of the ecosystem service provided by these animals. In addition, conservation strategies are developed for these species. This research has far-reaching implications for our capacity to predict how birds, bats and other animals will respond in a rapidly-warming world.



Professor Alta Schutte

Professor and Director: Hypertension in Africa Research Team, North-West University

For significant contributions towards improved physiological understanding of the development of hypertension in black South Africans and the initiation of research programmes on the early detection of hypertension

Professor Schutte's clinical and epidemiological research addresses health disparities pertaining to cardiovascular disease development in South Africans. Her research has contributed to a better understanding of the role of environmental influences, and also of ethnic-specific physiological differences in the vascular wall, as a result of which black populations are predisposed to the development of vascular dysfunction, and ultimately cardiovascular disease.





Professor Karen Sliwa-Hahnle (see also Category: Capacity Developers)

Professor and Director: Hatter Institute for Cardiovascular Research in Africa, Department of Medicine, University of Cape Town and Director: Soweto Cardiovascular Research Unit, University of the Witwatersrand

For improving the cardiovascular health of Africans, through capacity training

Professor Sliwa-Hahnle, a specialist physician, expert in tropical diseases and a clinical cardiologist has focused on immune activation and left ventricular remodelling in idiopathic and peripartum cardiomyopathy (PPCM). Descriptive studies, under her leadership, into the basic mechanism have resulted in a promising new therapy for PPCM. As Chair of the Working Group on PPCM of the European Society of Cardiology, leading a worldwide registry of 1,000 women with this condition, she developed a major series of studies on cardiac diseases in African populations, both in South Africa and in nine other African countries.



Professor Marietjie Venter

Professor and Head of the Zoonoses Research Unit: University of Pretoria and Centre for Respiratory Diseases and Meningitis, National Institute for Communicable Diseases, Johannesburg

For defining the role of several viruses as causes of pneumonia and neurological disease in humans and animals

Professor Venter and her research group have, over the last ten years, identified several emerging viruses through molecular epidemiological investigations and development of new diagnostic tools and virus discovery techniques. They defined Respiratory Syncytial virus as the major cause of pneumonia in children and described the molecular epidemiology of the Influenza pandemic as well as other emerging respiratory viruses. Her work established West Nile virus (WNV) as well as several unknown neurological viruses as the cause of death in horses and wildlife across the country and showed that WNV has been overlooked as a cause of neurological disease in hospitals in South Africa.



Professor Xiaohua Xia

Professor: Department of Electrical, Electronic and Computer Engineering; Director: National Hub for Energy Efficiency and Demand Side Management and Director: Centre for New Energy Systems, University of Pretoria

For contributions to the modelling and control of complex systems

Professor Xia's research is based on control systems and the application thereof in engineering, biology, medicine and education. His research includes modelling and control of complex systems; applied research in the control of heavy haul trains; and cellular level modelling of the dynamics of biomedical systems. He has played an essential role in the UNESCO programme of mainstreaming of HIV/AIDS for Physical, Biological and Engineering Sciences in five African countries. As Director of the National Hub for Energy Efficiency, he is driving national innovation and capacity and enterprise development in energy efficiency and demand side management.



Professor Lindiwe Zungu

Professor: Department of Health Studies, Unisa

For her innovative, quality research on enhancing the occupational health and safety of vulnerable workers in hazardous industries

Professor Zungu's work includes developing comprehensive and systematic guidelines to assist the South African mining industry in selecting and providing appropriate and suitable personal protective equipment for women in mining, where none existed in this previously male-dominated industry. Her innovative strategy to address the unique health and safety needs of women in mining included the adoption of a comprehensive approach that incorporated inputs from industry key stakeholders and all sectors having a bearing on the provision and use of protective equipment. Her work has added valuable knowledge to an area that has been sparsely studied in South Africa.



TW Kambule Award: Recognising an emerging researcher for an outstanding contribution to SETI through research and its outputs – over a period of up to six years after the award of a PhD or equivalent in research – proudly sponsored by the NRF for the past decade

Professor Olalekan Ayo-Yusuf

Associate Professor and Head: Clinical Unit, Community Dentistry, University of Pretoria

For ground-breaking research on snuff tobacco and providing evidence as a basis for public health policy

Professor Ayo-Yusuf's research has focussed on snuff, its use in South Africa and tobacco control in general, and he was instrumental in bringing attention to this traditional form of nicotine-delivery, used predominantly by poor women in South Africa. His recent publication on the risk assessment of the carcinogenic potential of snuff products and on industry's perspective on snuff for smokers, provided new perspectives to support regulation. He serves on the World Health Organization's tobacco regulation scientific group and has trained approximately 400 healthcare providers across Africa in tobacco dependence treatment.



Dr Marieka Gryzenhout

Senior Lecturer: Department of Plant Sciences, University of the Free State

For her research on the systematics, pathology, ecology and mycogeography of fungi

Dr Gryzenhout has used systematics to study the pathological significance, mycogeography and movement, biodiversity and ecological significance of fungi in plants. She is passionate in promoting mycology (study of fungi) among fellow scientists and the public, and has written numerous popular articles, a book and has given public lectures.



Professor Wanda Markotter

Associate Professor: Department of Microbiology and Plant Pathology, University of Pretoria

For her contribution in understanding the epidemiology and pathogenicity of rabies related lyssa viruses in Africa and the development of new diagnostic tools for rabies

Professor Markotter's work on the epidemiology of rabies-related lyssa viruses associated with bat species in Africa led to new knowledge of the distribution and diversity of African viruses that cause rabies. Pathogenesis studies indicated that the public and veterinary health impacts of these viruses were previously underestimated. Outputs of her research have been the development of new diagnostic tools to detect the diversity of viruses causing rabies on the African continent. These tools are also suitable for application in low resource settings to increase surveillance.



Dr Mark Peters

Senior Researcher: Material and Process Synthesis (MaPS), Unisa

For his research into Industrial Separation Processes

Dr Peters has published two research-based books internationally in the field of Industrial Separations Processes. The first was based on his PhD thesis on Membrane Process Design; the second represents a culmination of research in Distillation Design from the COMPS Group, where he was an integral member of the design team for the innovative BeauTi-fuel (small-scale, mobile, waste-to-fuel and electricity) system.



Professor Saurabh Sinha

Group Head: Electronics and Micro-electronics, Built Environment and Information Technology (EBIT), Faculty of Engineering, University of Pretoria and Director: Carl and Emily Fuchs Institute for Micro-electronics, University of Pretoria

For pioneering the field of mm-Wave Integrated Circuits in Africa

Professor Sinha initiated the mm-Wave integrated circuit research focus facility at the University of Pretoria, attracting over R10 million in funding to enable and support the laboratory as well as over 20 postgraduate students. The technology, if realised, carries the potential to address the limited bandwidth capacity in the country and, in this way, supports global challenges for development.





Dr John Terblanche

Senior Lecturer: Department of Conservation Ecology and Entomology, Faculty of Agrisciences, University of Stellenbosch

For the provision critical knowledge on insect responses to climate change for management and intervention planning

Dr Terblanche's contributions to understanding insect responses to climate change and environmental adaptation have been substantial. His work has shown commitment to producing locally relevant knowledge with international importance, and has been aimed at improving the livelihoods of Africans on the continent. Much of this research has provided information directly important to policymakers and managers that can be used to better manage and predict potential changes in insect populations. His work has focused across a range of zoonotic disease vectors, pests of agriculture and invasive species and has provided numerous insights into the generalities and complexities of climate-related changes in population dynamics.



Recognising an individual for an outstanding contribution to SETI through management and related activities over the last 5 to 10 years

Tracy Cheetham

General Manager: Infrastructure and Site Operations, Square Kilometre Array (SKA) SA

For her contribution to proving to the world that South Africa has the capacity and expertise to build a world-class mega-telescope through the successful delivery of infrastructure for the SKA programme

Tracy Cheetham is responsible for the design and delivery of the extensive infrastructure (e.g. roads, buildings, power, and data handling) in South Africa's remote radio astronomy reserve in the Karoo. Her impressive achievements delivering the infrastructure for the KAT-7 telescope, and progress with the infrastructure for the MeerKAT radio telescope, contributed to proving that South Africa has the capacity and expertise to build a world-class mega telescope with its infrastructure, and helped to secure the SKA bid for Africa. The infrastructure already constructed for KAT-7 and MeerKAT will be used and expanded upon for the two phases of the Square Kilometre Array radio telescope.



Kim de Boer

General Manager: People Support and Development, Communications and Project Secretariat, SKA SA Project

For her visionary role in, and dedication to developing and nurturing science and engineering research capacity for the MeerKAT and the SKA in South Africa and the rest of the African continent

Since 2005, Kim de Boer has managed the successful SKA SA human capacity development programme, which has created unrivalled capacity in radio astronomy and the engineering disciplines relevant to radio astronomy. To date, the project has supported more than 400 postdoctoral fellows and postgraduate and undergraduate students, as well as five research chairs, to further increase the number of researchers and supervisors able to supervise postgraduate students, manage SKA- and MeerKAT-related research projects and contribute to undergraduate course development in radio astronomy. Ms de Boer set policies in place to ensure that a significant and growing number of black students and women are included, as well as historically disadvantaged students from the Northern Cape Province.



Willem Esterhuysen

MeerKAT Project Manager

For the setting of an international benchmark on Project Management and System Engineering for delivering science instruments

Mr Esterhuysen manages the design and construction of South Africa's SKA pathfinder, the 64-dish MeerKAT telescope, as well as its successfully completed engineering test bed, KAT-7. He and his team contributed towards proving South Africa's ability to deliver sophisticated instruments, as well as supporting software and electronics, within challenging budgets and timeframes. This was a vital contribution to the country's winning of the SKA bid. Leading radio astronomers around the world are already lined up to use the MeerKAT and eager students to use the offices in Cape Town. The fact that MeerKAT will be integrated into SKA Phase 1 is further recognition of the impressive achievements of Esterhuysen and the rest of the MeerKAT team.



Dr Bernie Fanaroff

Project Director, SKA SA Project

For his role in leading South Africa's successful bid to host the Square Kilometre Array

Dr Fanaroff took on the challenge ten years ago to lead South Africa's ambitious bid to host the largest scientific instrument ever – the SKA – in Africa, with a major part built inside South Africa's borders. He has pursued this dream tirelessly and relentlessly, against incredibly tough competition from Australia. On 25 May 2012 the international SKA organisation announced that the majority share (more than 70%) of the Square Kilometre Array would be built in South Africa and its partner countries in Africa. This is a major victory for African science and will boost the continent's science capacity and contribution for the next 20–30 years.



Erna Hattingh

Project Manager: SSHAC Level 3 Probabilistic Seismic Hazard Analysis, Council for Geoscience

For her probabilistic seismic hazard analysis (PSHA) of the Thyspunt new-build nuclear site

Ms Hattingh's work was undertaken to characterise the nature of possible earthquake-induced ground motions at the Thyspunt new-build nuclear site. The study was conducted following the SSHAC Level 3 process for conducting multiple-expert assessments in the face of uncertainty, as approved by the US Nuclear Regulatory Commission. The study involved an extensive team of geologists, seismologists and engineers from South Africa working in conjunction with international experts, mainly from Europe and the United States, to conduct a state-of-the-art PSHA based on an extensive database and sophisticated scientific analyses, including cosmogenic dating of geological samples and interpretation of historical earthquake records.



Dr Adrian Tiplady

SKA Site Bid Manager, Johannesburg

For his key role, as Site Bid Manager, in successfully securing the majority share of the SKA project for South Africa and Africa

As Site Bid Manager for the SKA SA Project, Dr Tiplady managed intensive studies of the radio frequency environment in the Northern Cape over several years, and took the lead in high-level negotiations with stakeholders in government, industry and agriculture. His efforts played a key role in the establishment of a radio astronomy reserve in the Karoo, protected by the Astronomy Geographic Advantage Act (Act 21 of 2007). Dr Tiplady presented South Africa's bid on the world science stage over a period of several years.



Dr Robert Tshikudo (see also Category: Capacity Developers)

Director and Head: Nanotechnology Innovation Centre, Mintek

For the establishment and management of a world-class nanotechnology innovation centre

Applying the principles of the National System of Innovation, the Mintek Nanotechnology Innovation Centre (NIC), led by Dr Tshikudo (Centre Director) and Dr Makhafola (Chairman), made significant progress in developing research platforms, promoting collaborative networks, addressing human capacity, establishing world-class research infrastructure and developing innovative nanotechnology-based systems and devices for health diagnostics and therapeutics and water treatment applications. Some of the innovative nanomaterials and diagnostic prototype devices have reached the industrialisation and commercialisation stages.





Recognising a researcher for an outstanding contribution to SETI through research capacity development over the last 5 to 10 years – proudly sponsored by Eskom for a decade

Professor Lesley Cornish

Professor (Physical Metallurgy): School of Chemical and Metallurgical Engineering and Director: DST/NRF Centre of Excellence in Strong Materials, University of the Witwatersrand

For her role as instigator of the African Materials Science and Engineering Network (AMSEN) and supervisor of many students from South Africa and Africa

Professor Cornish was the prime instigator of the African Materials Science and Engineering Network (AMSEN) funded by Carnegie-IAS. AMSEN was one of five networks chosen from 48 applications, and includes a university each in South Africa, Namibia, Kenya, Nigeria and Botswana. The rationale is to develop the next generation of academics through collaborative research. There are 10 research teams, 29 academics, and 20 students. Each student has at least two supervisors across the network, and students write reports and make presentations. Even before AMSEN, she supervised more than 20 black students, including Scarce Skills students from different African countries.



Professor Mark Laing

Professor: Plant Pathology and Director: African Centre for Crop Improvement, University of KwaZulu-Natal

For his leading role in the graduation of 55 MSc and 66 PhD students in countries across Africa in subjects that directly affect food security, with strong emphasis on applied outcomes of value to farmers

The African Centre for Crop Improvement (ACCI), founded and directed by Professor Mark Laing, has recruited 97 PhD students from 14 African countries and has, to date, graduated 41 of these, 55 MSc and 25 PhD of these as their supervisor or co-supervisor. The students have released 28 new crop varieties with many more in the final stages of testing. The students' publication record is substantial mostly in the field of plant pathology, and biological control in particular.



Professor Karen Sliwa-Hahnle (see Category: Individual Researchers)

Professor and Director: Hatter Institute for Cardiovascular Research in Africa, Department of Medicine, University of Cape Town and Director: Soweto Cardiovascular Research Unit, University of the Witwatersrand



Dr Robert Tshikudo (see Category: Management and Related Activities)

Director and Head: Nanotechnology Innovation Centre, Mintek



Professor Emile van Zyl

Professor: Department of Microbiology and Senior Chair of Energy Research: Biofuels, University of Stellenbosch

For directly, co-supervising and overseeing Masters and Doctoral students in the School of Energy Research: Biofuels

Professor Van Zyl has significant international recognition in yeast biotechnology and was awarded the DST Senior Chair of Energy Research (ScoER): Biofuels in 2007. Under his direct supervision and co-supervision 36 Masters and 22 Doctoral studies were completed (21% black and 53% female). An additional 20 Masters and 3 Doctoral studies were completed (39% black and 22% female) in the School of Energy Research (ScoER) under his broader leadership. Prof. Van Zyl has played a strategic role in drafting a bio-energy policy and framework for Africa together with NEPAD and the African Union.



Recognising an individual or team for an outstanding contribution to SETI through science communication for outreach and creating awareness over the last 5 years – proudly sponsored by SAASTA since 2007

Aqualibrium Civil Engineering Team comprising:

- **Professor Jakobus Ernst van Zyl**

Associate Professor: Department of Civil Engineering, University of Cape Town

- **Marie Ashpole**

Outreach Officer: Media and Events, SAICE

- **Fridah Mahlangu**

Career Guidance Officer: SAICE



For the educational Aqualibrium Water Competition

The Aqualibrium Water Competition is a fun, educational outreach and learning activity in which people of all ages can participate. The competition requires the distribution of three litres of water equally between three small reservoirs placed randomly on a 16-point grid. Participants work in teams to design, build and operate a pipe-network of different diameters and connector pieces. The competition is used to teach learners and others the importance of water quality, quantity, conservation, protecting the environment, how safe drinking water gets to people, what Civil Engineers do and how they use Mathematics and Physics in their work.



Professor David Block

Professor: Applied Mathematics and Astronomy, University of the Witwatersrand

For his pioneering discoveries which are reshaping astronomical paradigms, and his imprint on human culture which is a legacy to all South Africans

Professor Block is to South Africa what Carl Sagan was to American astronomy. He has been intimately involved in the communication of science, particularly astronomy, to the public for over 30 years. His outreach activities span the complete spectrum from the writing of books, television interviews (including the BBC), radio interviews, newspaper interviews, public lectures and outreaches to school learners and to their teachers.



Professor Michael Sean Pepper

Professor: Department of Immunology, Director: Institute for Cellular and Molecular Medicine, University of Pretoria and Associate Professor: Department of Human Genetics and Development, Faculty of Medicine, University of Geneva

For his exceptional communication skills which inspire a passion for science, technology and innovation, in particular in the fields of medical science and ethical entrepreneurship.

Through his extensive involvement in lecturing, radio, television and print media, and his background in medicine, science, bio-entrepreneurship and law, Professor Pepper has raised public awareness of many SETI issues and their impact on almost every facet of our existence. His communication skills are well-known, as is his remarkable ability to render complex issues such as stem cells and the human genome accessible to people from all walks of life.



Professor Peet van Schalkwyk

Associate Professor: Department of Mechanical Engineering, North-West University

For his computer animations, used to teach abstract concepts in mathematics and physical science

Professor van Schalkwyk has developed a series of unique computer animations in mathematics and physical science for school learners and tertiary students which offer valuable techniques to make abstract mathematical and scientific concepts easier to comprehend. His animations, developed over the last seven years, are interactive, and make use of virtual 3D objects in real time, with which teachers and learners can undertake experiments. His work provides learning aids which cultivate an appreciation for the subject area and which link the abstract with reality, thus allowing learners to realise the applicability to, and relevance of, life around them.





The Finalists: Individuals or Teams in an Organisation

Recognising an individual or a team for an outstanding contribution to SETI through research leading to innovation in a:

- Corporate organisation or institution; or
- Small, medium or micro enterprise – proudly sponsored by THRIP, an initiative of the dti, for a decade; or
- Non-governmental, community-based or non-profit organisation

Adaptive Real-Time Internet Streaming Technology (ARTIST) Team – a collaborative effort between the CSIR, University of Cape Town (UCT) and East Coast Access and funded by the Technology Innovation Agency (TIA)

Team leader: Dr Keith Ferguson, Chief Engineer and Research Group Leader: CSIR

For the ARTIST Project that has led to the development of a new technology platform that enables viewers to watch live content on their mobile devices from anywhere in the world with minimal interruption to their video stream

The Adaptive Real-Time Internet Streaming Technology (ARTIST) Project has led to a new, patented technology that opens the opportunity to build a new Pan African mobile Internet Protocol Television industry. The low-bandwidth video broadcast platform has been licensed to a start-up, Tuluntulu (Pty) Ltd, to build a sustainable, commercially competitive enterprise. Tuluntulu's vision is to become the No. 1 mobile video content gateway in low bandwidth/congested environments, by making the watching of streamed video on mobile devices a reality for millions of people globally.



Air-cooled Heat Exchangers and Cooling Towers Team

Team leader: Professor Hanno Reuter, Deputy Head: Thermofluids Division, Department of Mechanical and Mechatronic Engineering, University of Stellenbosch

For performance enhancement technologies for thermal power and industrial process plant cooling systems

Through rigorous research, development and experience gained through consulting work for leading power plant and cooling system suppliers worldwide, a new cooling tower splash fill, water distribution system and inlet design and a hybrid, air-cooled, steam condenser dephlegmator design have been developed for performance enhancement of thermal power (fossil, nuclear and solar) and industrial process plants and two patents filed. These technologies ultimately increase power-plant efficiency and reduce the life-cycle costs due to low additional capital cost and significantly reduced operating costs.



Biodx Biological Technologies (Pty) Ltd – CSIR Green Team

Team leaders: Dr Lucia Steenkamp, CSIR Biosciences Division and Mr Humberto Rodrigues, CEO, Biodx

For the development of a 'Green' disinfectant able to kill 99.9% of bacteria and other micro-organisms

Research led to a formulated disinfectant product which combines two ingredients, one of which is natural citrus juice. The formulated product has excellent disinfectant activity and has been found to kill 99.9% of pathogenic bacteria and other micro-organisms in a very short time, ranging from a few minutes to a few hours. The product is chlorine free and can be marketed as a 'Green' product which is non-toxic. The product has obtained three SABS SANS marks for quality. The product is currently being investigated by different international detergent companies with a view to licensing of the technology and numerous sales have resulted.



JS1 Development Team, Jonker Sailplanes

Team leader and Head of Engineering: Dr Attie Jonker

For the development of the JS1C Open Class sailplane

The JS1C sailplane was developed from the award-winning JS1 sailplane as a competitive Open Class Sailplane for the 2012 World Gliding Championships in Uvalde Texas USA. A high intensity development programme was started where the wing of the JS1 was re-designed and extended to 21 m in an attempt to increase the performance. The first JS1C undertook its maiden flight in March 2012, one year after the development programme started. Four planes took part in the World Gliding Championships and all finished in the top 10, with one finishing third overall.



Mintek Slipcam Development Team

Team leader: Mr Dominic Jordan, Furnace Control Unit, Mintek

For the development and demonstration of a non-contact, vision-based measurement of electrode slip for use with Söderberg electrodes used extensively by smelting furnaces in South Africa: Slipcam

The invention overcomes the difficulties encountered with traditional measurement devices which require direct contact with the electrode which results in frequent electrical and mechanical failure due to the harsh environment in the proximity of the electrode. The 'Non-Contact Slip Measurement' Slipcam device has been patented.



Ultrasonic Broken Rail Detection, Institute for Maritime Technology (IMT) – CSIR Team

Team leaders: Dr Phillip Loveday, Materials Science and Manufacturing Operating Unit: CSIR and Francois Burger, IMT

For the development of a real time system that alerts heavy freight railway operators to railway line breakages via Ultrasonic Broken Rail Detection (UBRD) technology, enabling immediate action that saves lives, prevents structural damage and saves money

The team developed a world-first solution that detects breaks on Transnet's heavy freight railway lines. It is a tailored solution that prevents costly derailments of trains. The UBRD system is able to detect rail breaks remotely and in real time by sending and receiving high frequency sound along the rails. Operators are able to take immediate action that saves lives, structural damage and money. The positive impact of this solution surpasses conventional, manually intensive inspection techniques. The system has great export potential and is currently undergoing tests on foreign rail networks.





The Brilliants Programme for Our Future Innovators

The NSTF Brilliants Programme gives recognition to 18 First Year Students studying in the sciences and engineering – a young man and woman from each of the nine provinces – who obtained top marks in Mathematics and Physical Science in the National Senior Certificate Examinations of the previous year. The programme aims to:

- Encourage top students to complete their science, engineering or technology studies, and to pursue a career in the sciences, engineering or technology
- Recognise top performers who have received very little recognition, especially in disadvantaged areas and schools, and reward them with the sponsored 'prize' of travel to Emperor's Palace, accommodation in a hotel, recognition by the Deputy Minister of Basic Education, attendance at the Awards Gala Dinner, and a special programme during their visit
- Identify top performers studying without bursaries, simply because they did not know to apply for bursaries in Grade 12, and assist them to find bursaries
- Inspire and motivate such young talented people, with exposure to the NSTF-BHP Billiton Awards, contact with potential role models and mentors, and advice from expert speakers who can address their concerns.

The Brilliants Programme has been running for the past eight years. It has proved to be a valuable project, because (among other reasons) deserving, previously disadvantaged students are assisted in obtaining bursaries. **The THRIP Programme, funded by the Department of Trade and Industry**, has graciously committed to providing bursaries every year for at least two students, who may also be Brilliants Awardees.

Selection of Brilliants Awardees

The list of top performers in Physical Science in the National Senior Certificate is requested from each of the Provincial Education Departments. The NSTF selects a young man and a young woman from each province, based on their performance in Mathematics and Physical Science, as well as their chosen field of study.

Speakers' Programme

A Speakers' Programme is arranged especially for the students. The purpose of the programme is to motivate students to continue with their studies, and to prepare themselves for available opportunities in careers in science, engineering and technology on completion of their studies. If the students do not yet have bursary support, we strive to assist them to access bursaries. We encourage them to continue with their chosen field of study, and to find their way to an appropriate career path. Topics addressed include:

- How to discover your career path and prepare for the workplace
- How to develop your personal life through acquiring life skills (self development, assertiveness, time and financial management, planning for the future, etc.)
- Challenges that students face every day and how to overcome these.

Pre-ceremony

A Pre-ceremony is organised for the students directly before the Awards Gala Dinner, addressed by the Deputy Minister of Basic Education, the Chairman of BHP Billiton South Africa, and the NSTF Chairman. The students receive certificates, and individual photographs are taken with the celebrities.

Top 18 Matriculants

Eastern Cape

Miss Dimpo Phiri Sandisiwe High School University of Cape Town BSc Extended Degree Programme (Majoring in Chemistry)	Mr Uviwe Dywili Mzomhle Senior Secondary School University of Johannesburg BEng (Electrical & Electrical with Information Technology)
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Free State

Miss Jacqui Ras Eunice High School University of the Free State Medicine	Mr Kananelo Ignatious Moloji Sasamala Secondary School University of Pretoria BEng (Civil Engineering)
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Gauteng

Miss Zanele Mahlangu Tembisa Secondary High School University of Pretoria BEng (Chemical Engineering)	Mr Johannes Kabelo Selokela Sikhululekile High School University of Pretoria BEng (Mechanical Engineering)
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KwaZulu-Natal

Miss Nonkululeko Buthelezi Tisand Technical High School University of Cape Town BSc (Geology)	Mr Dineshen Iyer Umzinto Secondary School University of KwaZulu-Natal BSc Eng (Chemical Engineering)
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Limpopo

Miss Mahlogonolo Makgomu Modipane St Bede Senior Secondary School University of Cape Town Medicine	Mr Modike Collen Mankuru Makgofe High School University of Pretoria BEng (Mining Engineering)
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Mpumalanga

Miss Sarah Mahlangu Kwamhlanga Secondary School University of Pretoria BEng (Chemical Engineering)	Mr Eric Vusi Moloko Mphanama Secondary School University of Pretoria BEng (Mining Engineering)
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North West

Miss Tshegofatso Michelle Lobelo Sol Plaatje Secondary School University of Cape Town BSc (Mechanical and Electronics)	Mr Loftus Tobie de Clercq Hoër Volksskool North-West University BEng (Chemical Engineering)
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Northern Cape

Miss Nomhle Beauty Mnanzana Hoër Tegniese Skool Kimberley Central University of Technology National Diploma (Electrical Engineering)	Mr Dumisani Justice Ngwenza Hoërskool Noord-Kaap University of Cape Town BSc Eng (Chemical Engineering)
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Western Cape

Miss Khadija Brey Wynberg Girls High School University of Cape Town BSc (Majoring in Applied Maths)	Mr Ihsaan Bassier Rondebosch Boys High School University of Cape Town BSc (Majoring in Applied Maths)
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THRIP Bursary Recipients

Northern Cape

Mr Dumisani Justice Ngwenza Hoërskool Noord-Kaap University of Cape Town BSc Eng (Chemical Engineering)	Mr Shane Everson Kingsley Hoërskool Noord-Kaap University of Witwatersrand BSc (Biomedical Science)
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Mpumalanga

Mr Mmeli Nathaniel Skosana Osizweni Secondary School University of Johannesburg BEng (Mechanical Engineering)	Mr Sabelo Sylvester Mbiza Sitintile Secondary School University of Pretoria BSc (Biological Science)
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Share 'n Dare Programme

The **NSTF Share 'n Dare Programme** allows the NSTF-BHP Billiton **Award Winners to be 'ambassadors' for science, engineering and technology** during the year that they receive their award. The programme creates platforms for sharing knowledge with the youth and communities, and inspiring young people to pursue studies and careers in science, engineering or technology. The aims of the programme are to:

- Promote science, engineering, technology and innovation among students at tertiary institutions and among high school learners visiting science centres in South Africa
- Enhance public understanding and the knowledge of communities;
- Clarify NSTF-BHP Billiton Award Winners' fields of expertise among students and learners
- Highlight career opportunities in science, engineering and technology for students and learners
- Evaluate the application of a convergence of ICTs for knowledge transfer and sharing.

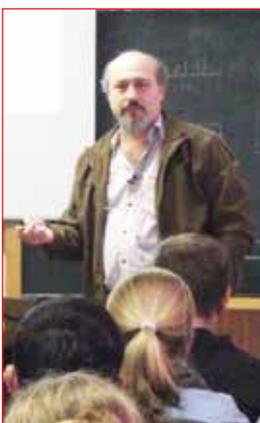
The NSTF has contracted the **Web and Media Technologies Platform of the SA Medical Research Council (MRC)** for the past six years, to implement an ongoing project to profile NSTF-BHP Billiton Award Winners as ambassadors of science, engineering and technology among students and learners across South Africa.

This project is inspired by literature, which highlights the worldwide trends of decreasing interest among learners to study in science

and technology disciplines. The project is based on the concept of Community Informatics (where Information and Communication Technologies (ICTs) are used to build communities). The NSTF calls the project the Share 'n Dare Programme, as the Award Winners *share* their knowledge and experiences, and *dare* young people to follow in their footsteps. It focuses specifically on creating awareness of the importance of science and technology among students and high school learners to encourage the scientists and engineers of the future.

Award Winners are invited to participate in a range of knowledge-sharing activities, bringing them in direct contact with students and learners, as well as knowledge transfer opportunities using ICTs. These include:

- Presenting career talks to high school learners at science centres. (Video casts of the university and science centre talks are published on the Awards Website www.nstfawards.org.za)
- Conducting special lectures at universities
- Motivational speeches to first year students at orientation events at universities
- Audio interviews with award winners (published as podcasts on the Awards Website)
- Campus radio interviews
- Community radio talk shows in the home languages of the Awards Winners.





Past Winners

NSTF-BHP Billiton Award winners for 2011/12 were:



Contribution to SETI over a lifetime

Professor David Glasser

Professor of Chemical Engineering and Director: Centre of Material and Process Synthesis, University of the Witwatersrand



Eskom-sponsored Award for a researcher (female) for research capacity development over the last 5 to 10 years

Professor Jolanda Roux

Researcher: Forestry and Agricultural Biotechnology Institute (FABI), University of Pretoria



Contribution to SETI through management and related activities over the last 5 to 10 years or less

Professor Bongani M Mayosi

Professor of Medicine, Chief Physician, Grootte Schuur Hospital, and Head of Department of Medicine, University of Cape Town



Eskom-sponsored Award for a researcher (male) for research capacity development over the last 5 to 10 years

Professor Jakobus (Kobus) Eloff

Professor and Head: Phytomedicine Programme, Onderstepoort, University of Pretoria



NRF-sponsored TW Kambule Award for research over the last 5 to 10 years

Professor Leon MT Dicks

Professor: Department of Microbiology, University of Stellenbosch



SAASTA-sponsored Award for communication for outreach and creating awareness over the last 5 years

Professor Valerie A Corfield

Chief Medical Scientist and Associate Professor: University of Stellenbosch, and Independent Science Communication Consultant



NRF-sponsored TW Kambule Award for research over the last 5 to 10 years

Professor Heather J Zar

Professor and Head of Department: Paediatrics and Child Health, Red Cross Children's Hospital, University of Cape Town



Research leading to innovation by a corporate organisation

Pavement Design and Construction Team – Built Environment Division, CSIR



NRF-sponsored TW Kambule Award for an emerging researcher for research and its outputs over the 6 years after award of a PhD

Professor Yahya Choonara

Associate Professor of Pharmaceutics and Research Manager: Wits Advanced Drug Delivery Platform, University of the Witwatersrand



THRIP and the dti-sponsored Award for research leading to innovation by a small, medium or micro enterprise

The PantoScanner Team – CapeRay Medical (Pty) Ltd



NRF-sponsored TW Kambule Award for an emerging researcher for research and its outputs over the 6 years after award of a PhD

Dr Amanda Weltman

Senior Lecturer: Department of Mathematics, University of Cape Town



Research leading to innovation by a non-governmental, community-based or non-profit organisation

Namaqualand Restoration Initiative Project and Nurture, Restore, Innovate



NSTF-BHP Billiton Awards, a flagship project of the National Science and Technology Forum since 1998, in partnership with BHP Billiton since 2011

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