

Fellows

CSIR FELLOWS can be appointed only by the President and CEO of the CSIR. The stature of a CSIR Fellow should be of such a high level both locally and internationally that the appointment cannot be disputed. A CSIR Fellow should be a recognised leader internationally in a particular field, and preferably also be recognised as such by scientists and engineers in other related or non-related fields. These people are responsible for enhancing the CSIR's image; networking and leadership; technology foresight and shaping the technology direction of the CSIR; and mentoring, coaching and contributing to the transformation of the organisation.

The following experts are currently CSIR FELLOWS

Francois Anderson,
CSIR Defence, Peace, Safety and Security

Dr Colin Kenyon,
CSIR Biosciences

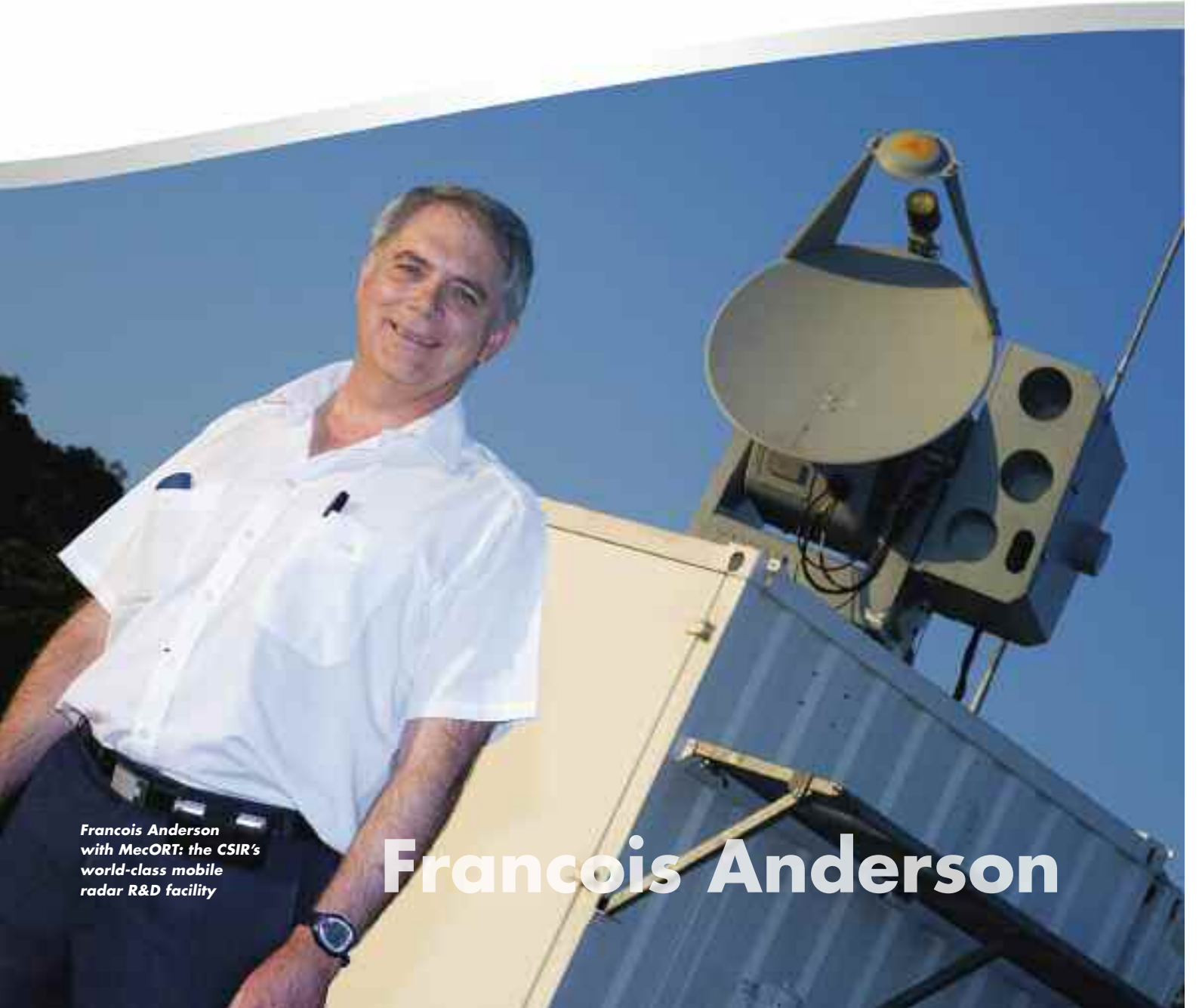
Professor Tshilidzi Marwala,
School of Electrical and Information
Engineering, University of the Witwatersrand

Dr John Napier
Associated with, among others, the
University of the Witwatersrand

Professor Phuti Ngoepe,
Materials Modelling Centre,
University of Limpopo

Dr Bob Scholes,
CSIR Natural Resources and the Environment

Dr Brian van Wilgen,
CSIR Natural Resources and the Environment



Francois Anderson
with MecORT: the CSIR's
world-class mobile
radar R&D facility

Francois Anderson

Home-grown CSIR Fellow – a trailblazer for science

“MY CLEVER OLD GRANNY used to say knowledge becomes education only when it is used in the service of one’s community,” he recalls. She also applied innovation to her daily activities – always finding ways to do things better or faster. This exposure to science and innovation shaped Tshilidzi’s belief that indigenous knowledge is important for innovation. “Innovation is the ability to come up with unique ways to solve our

daily problems. We cannot maximise our capacity to innovate if we neglect what is integral to our reference of knowledge. Our education system should create a culture of

science and innovation that also recognises indigenous knowledge,” he says.

“At Mbilwi Secondary School in the heartland of Limpopo, our motto was ‘Excellence through hard work’,” he smiles. His sharp intellect and keen interest in science opened doors – when he was in matric, Tshilidzi entered the National Science Olympiad, and as a winner, represented South Africa at the London International Youth Science Fortnight. He used the opportunity to visit the University College of London and Oxford University where he gained an appreciation of the importance of engineering and science for the development of modern society.

A grandmother who had no formal education but who could explain natural phenomena using indigenous knowledge – that is what sparked Tshilidzi Marwala’s interest in science at a young age.

Tshilidzi Marwala



“Our education system should create a culture of science and innovation that also recognises indigenous knowledge.”

Today, at the age of 35, CSIR Fellow Professor Tshilidzi Marwala holds the Carl and Emily Fuchs Chair of Systems and Control Engineering, as well as the South Africa Research Chair in Systems Engineering at the University of the Witwatersrand (Wits). He also heads the Control and Systems Group at the School of Electrical and Information Engineering at the university. He serves on the boards of the State Information Technology Agency, Statistics South Africa and the National Advisory Council on Innovation, among others.

Tshilidzi is the recipient of numerous awards, most notably the highest national award given to a South African by President Thabo Mbeki, the Order of Mapungubwe, which he received in 2004. He is the youngest recipient of this award, which has also been bestowed on Nobel Prize winners Sydney Brenner, Nelson Mandela, FW de Klerk and JM Coetzee. The citation read by Mr Mbeki stated: “Through hard work and personal application, this young South African from deep rural South Africa, has excelled in his chosen field of study, transporting himself to the cutting edge of his profession. By realising his childhood dream of contributing to the development of his country and continent, he has become a living example of what liberation means for personal and national development. He is an inspiration to all South Africans.”

Tshilidzi’s research interests include the theory and application of computational intelligence to engineering, computer science, finance, social science and medicine. He has developed computer tools for monitoring the health of bridges, buildings and machines, with most recent research milestones being the development of a computer model that detects epilepsy and another that predicts intercountry conflict from variables such as the strength of interstate alliances and distances between countries. In the medical field, his research also finds application in determining how different interventions impact on the spread of HIV.



He holds a BSc in mechanical engineering (*magna cum laude*) from Case Western Reserve University, USA, and completed an MSc at the University of Pretoria while working at the CSIR as project engineer in the field of mining. He obtained a PhD in computation intelligence from the University of Cambridge, after which he worked at the University of London’s Imperial College of Science, Technology and Medicine as a postdoctoral research associate. Tshilidzi has completed the Programme for Leadership Development at Harvard Business School, Cambridge. Last year, he was a visiting fellow at Harvard University, while holding the same position this year at Wolfson College, University of Cambridge.

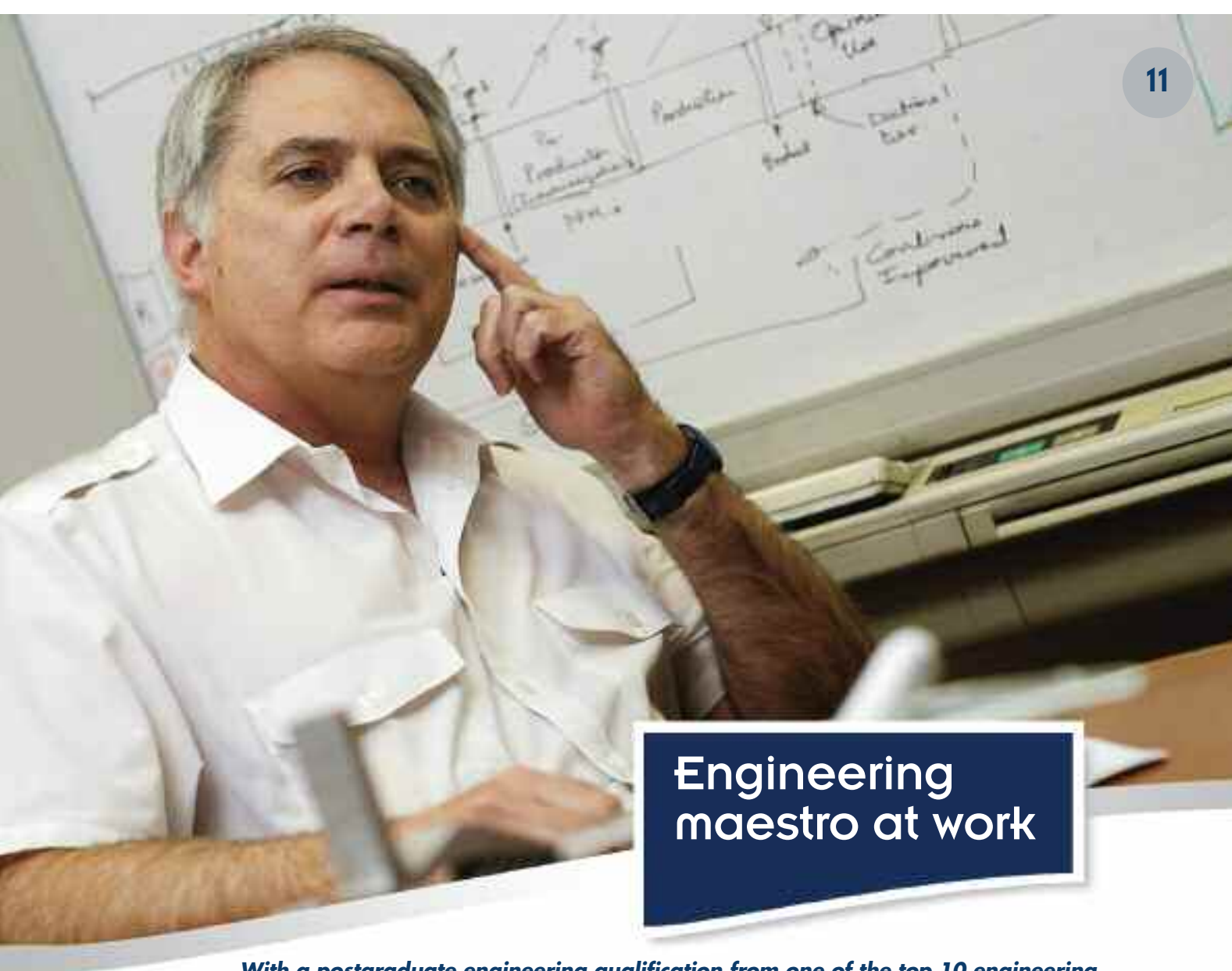
This young, but seasoned, researcher has published more than 150 articles in international journals, conference proceedings and book chapters. Human capacity development is high on his agenda, having already successfully supervised 30 postgraduate students at Master’s and doctoral levels. His book, titled *Computational Intelligence for Modelling Complex Systems*, is due for publication in June this year by Research India Publishers.

“Innovation is the ability to come up with unique ways to solve our daily problems.”



“A growing economy like South Africa’s needs the innovation that science brings in finding solutions to its problems, and also to exploit opportunities. For innovation to occur and contribute to our economy, we need ‘seed people’ – young scientists who innovate, whether in the private sector or academia,” he explains. “Young researchers must realise that our society necessarily must transit to a developed society where the standard of living is high, unemployment is low and our contribution to the global development is high. This can be achieved only if our young researchers learn to think in multiple dimensions, realise the interconnectedness of the modern globalised world and understand that hard work is a necessary condition for success in any endeavour,” he advises.

– Hilda van Rooyen



Engineering maestro at work

With a postgraduate engineering qualification from one of the top 10 engineering universities in the USA and a career at the CSIR of more than 30 years, Francois Anderson has an impressive list of past achievements to his name. He was appointed as a CSIR Fellow in 1994 and reappointed in 2004. As an active participant in the R&D environment, he heads up the AwareNet project, which is aimed at developing a capability in persistent area surveillance systems to monitor illegal activities on South Africa's borders. His profile and experience as a Fellow position him well to comment on the importance of human capital development.

"Knowledge and insights gained at each level are useful to inform more in-depth understanding and contributions at the other levels."

To be a Fellow...

CSIR FELLOWS have a highly complex and responsible role. It requires the ability to interact with stakeholders and role players, and demands real knowledge and understanding to promote the CSIR in a credible and responsible manner as a leading national science council in South Africa.

A complementary but distinctly different role is to provide internal leadership.

As such, Francois is involved at all levels within the organisation: from research groups, competency areas and units, to group executives and the President and CEO, Dr Sibusiso Sibisi. "Knowledge and insights gained at each level are useful to inform more in-depth understanding and contributions at the other levels," he comments. The goal of the Fellows is to help create an R&D environment in which researchers can deliver on the CSIR's mandate.

An additional role is to assist in technology foresight or the interpretation of knowledge



AwareNet

THE MULTI-YEAR AWARENET R&D project is aimed at developing a capability in persistent area surveillance systems to monitor illegal activities on South Africa's borders. The current project involves R&D in the fields of radar, electro-optical sensors, radio frequency surveillance systems, signal processing, advanced computing, artificial intelligence and systems engineering. Data will be transmitted as real-time information from elevated, quasi-stationary platforms to the ground control station for data fusion, threat estimation and information segmentation before being transmitted to user control centres.

and technical trends at the global level. Francois regards the CSIR's mandate as the organisational touchstone and an inflexible guide that validates or invalidates, affirms or discounts the organisation's choice of strategy.

The mandate requires the CSIR to tackle and solve real-world problems. Often the only solution is a multidisciplinary approach. In this respect, the Fellows play an important role through their experience and exposure to a number of disciplines. The interface at which multiple disciplines meet, is the richest part in which to find unusual and unexpected solutions.

The Right Stuff* at the CSIR

"Human capital development is vital if we are to find and develop the right sort of creative, knowledgeable people, who can solve problems in line with our mandate," Francois stresses.

Francois sees these as qualified people with a passion for technical problem solving, whose growth and development must be nurtured and supported through early career stages right up to the point where they become leaders in the science, engineering and technology infrastructure of the country. He cites the example of two of his successful colleagues, André Nepgen (Executive Director of CSIR Defence, Peace, Safety and Security) and Johan Strydom (Manager of R&D Outcomes with the same unit) who 'grew up' in the CSIR. Other inspiring examples of

early careers at the CSIR are Professor Johannes Cloete who performed pioneering work in microwave engineering and later worked as a professor at the universities of Pretoria and Stellenbosch; Ad Sparrius, the father of systems engineering in South Africa; Dr Dirk Baker, an expert in antennas formerly of Grintek and now a consultant to local and international companies, and Dr Brian Armstrong, now British Telecom's General Manager of Middle East and Africa, to mention a few. "Although their departure may have been a loss to the CSIR, the value of their contributions in their current positions to South Africa cannot be overestimated."

Keep them coming: the student pipeline

How does one achieve a well-trained body of scientists and engineers? The student pipeline, says Francois, holds the key, and starts with exciting learners at school level. It should carry through with bursaries and opportunities for vacation work, followed by support during final-year project selection and execution and support for postgraduate studies.

For those young engineers and scientists moving into a first position at the CSIR, an open door to a network of high-level mentorship and coaching is in place. The outcomes over a period of five to seven years are high levels of confidence and a sound technical basis. Such well-rounded engineers and scientists either remain within the organisation or leave to be absorbed in industry or academia.

The benefit of an inspiring role model and the virtuous relationship that develops from

this interaction assist this process. He learnt a great deal from his own father, Dr Fred Anderson, a well-respected member of the CSIR research community some decades ago, for 30 years. "He was a well-rounded engineer to whom the solution of problems came naturally." He would like to see similar ongoing interaction with and support to young people.

A culture of sharing and learning

For the young engineer starting out, the unique values within CSIR Defence, Peace, Safety and Security define the working environment. These manifest in cooperation and mutual support and result in enjoyment, self-fulfilment and a clear sense of direction and identity. Francois applauds this as the ideal climate in which to achieve professional development through integrity and teamwork.

He is very proud to recognise several generations of engineers at the CSIR. He emphasises the value of passing on knowledge and encouraging each individual to develop a broad base of multidisciplinary knowledge and skills as well as a sound understanding of specific application areas.

Francois's palpable love of his work spills over into his spare time. He pursues a range of hobbies, including the flying of radio-controlled gliders. (He relies on the expertise of the CSIR's John Monk, who is an expert on unmanned aerial vehicles.) Photography and music (he is a former clarinet player) ensure that Francois's spare time is as enriching as that at work. **— Biffy van Rooyen**

* *The Right Stuff* recounts in a book by Tom Wolfe, which was later made into a film, the story of the first seven astronauts selected for the NASA space programme.