UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

2012 Research Report

UP 2025

Vision

To be a leading research-intensive university in Africa, recognised internationally for its quality, relevance and impact, and also for developing people, creating knowledge and making a difference locally and globally.

Mission

In pursuing recognition and excellence in its core functions of research, and teaching and learning, and integrating engagement with society and the community into these, the University of Pretoria will use quality, relevance, diversity and sustainability as its navigational markers.

Goals

- To be a leading research-intensive university in Africa
- To strengthen the University's international profile and visibility
- To strengthen the University's impact on South Africa's economic and social development
- To pursue excellence in teaching and learning
- To increase access, throughput and diversity

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Message from the Vice-Chancellor

Research is a central feature of the University of Pretoria's long-term strategy, *UP2025*. Therefore, it is very pleasing that, in the first year of implementing this strategy, there was a significant improvement in the overall research performance. As will be seen in this report, there was an upward trend in the total number of research publications, and, overall, the University of Pretoria (UP) was the biggest contributor to the total national research output.

Also pleasing is the fact that the University enhanced its impact through intensifying its focus on issues that are of direct relevance to social and economic development, such as energy efficiency, food security, women's health and education. Increasing investments from industry have enabled the University to strengthen its capacity to undertake research that will contribute to South Africa's economic competitiveness, such as minerals processing, mining safety and broadband wireless communication. One of the most significant ways a research university contributes to development is through its graduates, particularly at the highest level of doctoral study. Many studies have shown that South Africa, and indeed the African region as a whole, needs to give urgent attention to increasing the per capita output of doctoral graduates.

Developing the next generation of scholars is a priority for UP, so it is gratifying that last year UP once again produced the highest number of master's and doctoral graduates among all South African universities. There is no doubt that additional investments to support research and postgraduate education are producing positive results. There is a new dynamism associated with research at the University. The growing momentum of the Institutional Research Themes (IRTs) has encouraged a number of new multidisciplinary research projects. In 2012, UP hosted an increasing number of visiting international scholars, academic conferences and expert lecturers. Through the UP Expert Lecture Series, academics shared their research with the public, covering issues such as practical theology, stem cell research and the welding industry in South Africa.

It is heartening to look back at 2012 as a year in which the University's academic community showed a keen sense of responsiveness towards meeting the goals of our strategy, *UP 2025*. The improvements in research output reflected in this report are due to the hard work and dedication of the UP staff and students to whom I am most grateful. On behalf of the University community, I wish to express our sincere gratitude for the generous support we receive from government, industry, research agencies and donors. Thank you for supporting our effort to be a leading research university that makes a difference locally and globally.

Prof Cheryl de la Rey

Report by the Vice-Principal

The research performance of the University of Pretoria is a reflection of the many contributions and outstanding achievements of our academics and, as Vice-Principal, it is my pleasure to report on the pleasing progress made in research at the University in 2012. The focus of our research activities in 2012 has been on increasing research productivity and impact, building our strategic focus areas, supporting our active researchers, and improving our postgraduate education.

In 2012, we made significant progress in a number of areas. The number of scholarly articles published by our researchers each year represents a major measure of our annual research productivity. Our total number of journal publications increased by almost 9% and UP once again produced the highest number of weighted research outputs among all public universities in the national publication count, with the majority of articles published in accredited international journals. (Details of our 2012 research publications are provided on the CD included at the back of this report.)

In our goal of developing the research-intensive identity of the University by supporting and developing the profile of our research staff, we have continued to focus on the achievement by UP researchers of National Research Foundation (NRF) ratings and on increasing the number of academic staff with qualifications at the doctoral level. The introduction in 2012 of the UP Academic Development Grant Programme has assisted more than 40 members of the University's academic staff in achieving doctoral degrees.

Using international measures of performance, ten of our top-performing researchers were listed in the Thomson Reuters ISI Essential Indicators in 2012, reflecting their status among the top 1% of scientists globally, and UP's ranking among the top 1% of institutions internationally has strengthened with respect to its research productivity and output.

We have seen expansion in several areas of specialisation through the award of four new South African Research Chairs Initiative (SARChI) chairs and three new chairs in engineering, adding to our already considerable suite of current industry-funded chairs in various disciplines. We are proud to be co-hosting a new Chair in Electronic Defence Research with the CSIR as a partner, and to have been awarded the first Monnet Chair at an African university, in Regional Integration and Governance Studies in the Faculty of Humanities.

The University is widely recognised for contributing to human capital development nationally through its postgraduate education programmes. The University has focused on growing its postgraduate numbers and providing good support for its graduate students. In 2012, the University enrolled 12 650 honours, master's and doctoral students, and awarded 5 870 higher degrees, including 198 doctorates. Equally important in the development of research capacity is the role of postdoctoral fellows. The introduction in 2012 of the UP Vice-Chancellor's Postdoctoral Fellowship Programme allowed us to double the number of postdoctoral fellows at UP by the end of 2012.

The University views internationalisation as an integral part of its academic mission and seeks to develop global networks to sustain the relevance and quality of its research, with strategic international collaborations and partnerships assisting to increase the visibility and impact of its research. In 2012, we increased the proportion of international students at postgraduate levels to 14% of the total, and the number of international postdoctoral fellows to 83. The UP Visiting Professor Programme now enables long-term visits to the University by distinguished academics from institutions abroad whose research expertise holds specific interest for the University of Pretoria.

In an environment of increasing demand for financial resources, the capacity to secure third-stream income is a sign of research competitiveness at national and international levels, and bringing into the University sufficient external funds to support and develop its research activity remains a challenge. Through the shared endeavours of our researchers, their collaborators and our research support office, the research funding received in 2012 from national and international external sources was almost R330 million. In addition, the University itself contributed substantially to research development, providing more than R135 million of its own resources to support research, innovation and postgraduate training. I would like to express our appreciation to our numerous funders and support agencies.

The role of the Department of Research and Innovation Support (DRIS) is key in supporting and enhancing the research activities of the University and I wish to thank the members of staff in the Department for their continued hard work. During 2012, we welcomed Dr Carol Nonkwelo as the new Director of the Department of Research and Innovation Support. We also thank Dr Patricia Smit, who acted as the Director for an interim period, for her very valuable contribution.

Lastly, I congratulate and thank the researchers, students and support staff of the University for a successful year of building towards research excellence.

Prof Stephanie Burton

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Research overview

Research is central to the identity of the University of Pretoria. During 2012, the focus for research was on increasing research productivity and impact, building on our areas of research strength, developing our researchers, and enhancing postgraduate education. This section provides some highlights of the University of Pretoria's research performance and progress in 2012.

Research performance

Measuring our 2012 research performance in terms of the recognised indicators of publications and higher degrees awarded to postgraduates, we are proud to report on the positive development achieved in 2012.

- The total research output of the University, incorporating journal publications, master's graduations and doctoral degrees, increased by 5.5%.
- The number of journal article publication units produced by UP researchers increased by 8.7%, to a total of 1 277.4 in 2012.
- The number of article units published in the internationally recognised, accredited journals listed in the International Science Index (ISI) and International Bibliography of the Social Sciences (IBSS) journals increased to 73% as a percentage of the overall publication output.
- The number of weighted master's and doctoral output units increased from 1 288.2 in 2011 to 1 315.7 in 2012. (Weighted M and D graduate output is the sum of the research master's and doctoral graduates with weights of 1 and 3 assigned to research M and D graduates respectively.)

Table 1: Research output units earned per faculty for articles published in accredited journals in 2012

Faculty	Publication units
Humanities	140.29
Natural and Agricultural Sciences	309.6
Law	102
Theology	113
Economic and Management Sciences	93.61
Veterinary Science	89.57
Education	46.96
Health Sciences	180.62
Engineering, Built Environment and IT	184.39
Gordon Institute of Business Science	13.22
Inter-faculty	4.1
Total	**1 277.36**

- In 2012, UP improved its ranked position among the top universities internationally in two of the world ranking systems. In the Leiden rankings, it moved from 660 to 526, and in the Webometrics rankings, it moved from 489 to 470. The University also retained its position in the QS world rankings.
- The University has maintained its position among the top 1% internationally in six of the 22 Essential Science Indicator (ESI) field categories in terms of output and citations, with a significant increase from 2011 to 2012 in the research output of journal articles in the six listed fields, as well as in the average number of citations per paper.
- ESI fields in which the University of Pretoria was ranked among the top 1% in 2011−2012 were the following:
  - Agricultural Sciences
  - Clinical Medicine
  - Engineering
  - Environment/Ecology
  - Plant and Animal Science
  - Social Sciences, General

UP researchers

The academic researchers are central to the University's research enterprise, and we prioritise support to our researchers in seeking to develop their research careers and improve their qualifications and research ratings.

- The total number of National Research Foundation (NRF)-rated researchers increased by 10% in 2012, with 333 academic staff now holding NRF ratings.
- Among the UP academic staff, 50.2% now have doctoral degrees.

Funding for research

In 2012, UP researchers and research partners secured R330 million from external funders. The University also contributed R135 million in internal funding to support research capacity and equipment, innovation, publications, scholarships and fellowships, and research development.

- Research grants, including funding from the NRF, the Technology and Human Resources for Industry Programme (THRIP), the Medical Research Council (MRC) and other funders, amounted to R114 million.
- Research contracts from national partners and sponsors totalled R92 million.
- International funders awarded R95.3 million.

Research focus areas

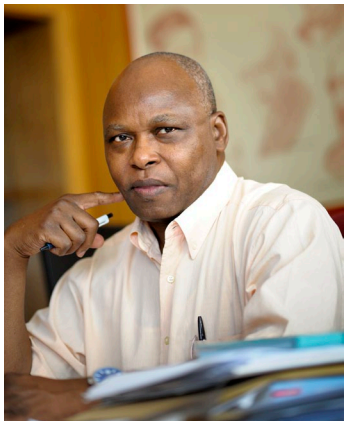
Building on existing research strengths and in support of strong multidisciplinary research groups, the University introduced four Institutional Research Themes (IRTs) and three Faculty Research Themes (FRTs) in 2011. These all flourished in 2012 and have begun to demonstrate their impact in a number of ways, including through raising the level of multidisciplinary research and research collaboration, leveraging the seed funds provided by the University to attract external funding, and increasing the numbers of postgraduate students and postdoctoral fellows.

Institutional Research Themes:
- Animal and Zoonotic Diseases
- Energy
- Food, Nutrition and Wellbeing
- Genomics

Faculty Research Themes:
- Cellular and Molecular Medicine
- International and Comparative Law
- Sustainable Control of Malaria

Research chairs

In 2012, a number of new research chairs were introduced across disciplinary fields and in various faculties. The number of South African Research Chairs Initiative (SARChI) chairs at the University of Pretoria grew to 11 with the awarding of four new chairs in 2012. Three of these chairs have been filled to date:

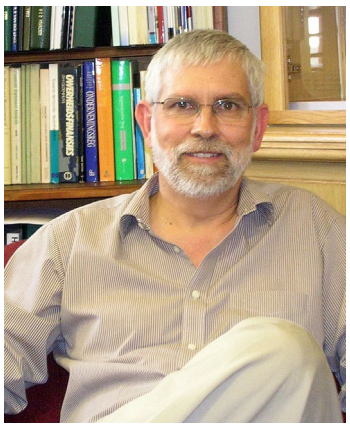


The SARChI Chair in Mathematical Models and Methods in Bio-engineering and Biosciences (Prof Jean Lubuma)

The focus of this research programme is the mathematical modelling of biological processes, which are extremely relevant to the needs of South Africa, and a range of mathematical specialisations. These include mathematical epidemiology and, more specifically, the identification of adequate scientific, engineering or medical responses to new diseases and old forms of new diseases, such as malaria, tuberculosis, cancer, HIV/AIDS and other communicable diseases that pose great threats to development in South Africa and other countries.

The SARChI Chair in Sustainable Malaria Control (Prof Lyn-Marie Birkholtz)

This research programme, which is undertaken by the team under the leadership of Prof Birkholtz, is internationally competitive and trendsetting. Nationally, it is pioneering and influential in the commitment of South Africa's attempt to eliminate malaria from its borders by 2018, and will also contribute to the global Malaria Eradication Agenda. It focuses both on the pathogenic and transmission forms of the parasite to ensure sustainability in malaria control and elimination.



The SARChI Chair in Tax Policy and Governance (Prof Riël Franzsen)

This research programme focuses on real estate transfer taxes, urban and rural local government institutions and finances, and property and land tax policy, laws and administration. With more than 50 countries having recently reformed or currently reforming their property tax systems to expand their revenue bases and/or ensure more accountable local governance, this research programme is of great relevance.

The following SARChI chairs were established prior to 2012:

- The SARChI Chair in Fluoro-material Science and Process Integration (Prof Philip Crouse)
- The SARChI Chair in Carbon Technology and Material (Prof Brian Rand)
- The SARChI Chair in Mammal Behavioural Ecology and Physiology (Prof Nigel Bennett)
- The SARChI Chair in International Development Law and African Economic Relations (Prof Frans Viljoen – interim chairholder)
- The SARChI Chair in Statistics (Prof Subhabrata Chakraborti)
- The SARChI Chair in Artificial Intelligence (Prof Andries Engelbrecht)
- The SARChI Chair in Complex Systems (Prof Pavel Selyshchev)

Additional research chairs

Four new industry-funded research chairs were established in the Faculty of Engineering, Built Environment and Information Technology in 2012:

- The Exxaro Chair in Energy Efficiency (Prof Xiaohua Xia)
- The Bateman Chair in Mineral Processing (Dr Natasia Naudé)
- The CBI Electric Low-voltage Chair in Power Electronics
- The Sasol Mining Chair for Safety, Health and Environment

The University's partnership with the Council for Scientific and Industrial Research (CSIR) was further cemented in 2012 with the establishment of the Chair in Electronic Defence Research. Prof Warren du Plessis, who joined UP in 2012, holds this Chair.

Prof Lorenzo Fioramonti in the Faculty of Humanities was awarded the Jean Monnet Chair in Regional Integration and Governance Studies, the first of these chairs to be awarded to an academic researcher at an African university.

Postgraduate education

Related to research performance is the key objective to plan for the provision of excellent postgraduate education at UP. Therefore, several mechanisms were put in place in 2012 to increase efficiency levels and supervisory capacity.

In recognition of the importance of postgraduate education and postdoctoral training in contributing to the research productivity of the institution, the University of Pretoria established the Graduate Support Hub (GSH) in 2012. The GSH staff work with the Vice-Principal: Research and Postgraduate Education, faculties and other departments to support postgraduate students and fellows, to contribute to positive research training experiences and promote the international recognition of UP as a research university.

More than 4 300 postgraduate level qualifications were awarded to graduates in 2012, of which 200 were doctoral degrees.

Postdoctoral fellows

The introduction of the prestigious Vice-Chancellor's Postdoctoral Fellowships in 2012 resulted in a doubling of the number of postdoctoral fellows. The University hosted 157 postdoctoral fellows in 2012.

The UP Postdoctoral Association (UPPA) was formed in 2012 with the aim of providing support to UP postdoctoral fellows by fostering a sense of community among postdoctoral fellows at UP, raising the profile of postdoctoral fellows on the various campuses, and facilitating support for professional research training and career development.

Internationalisation

Internationalisation at UP involves staff and student exchange programmes, international postdoctoral fellows and academic staff, as well as the enrolment of international postgraduate students to support internationalisation.

In 2012, the University had some 400 international partnerships at institutional and faculty levels, formalised through agreements with universities and institutions located across the globe in diverse regions. These include the African continent, Central and Eastern Europe, Scandinavia and the Baltic countries, Asia, Oceania and the Middle East, North and South America, and Canada.

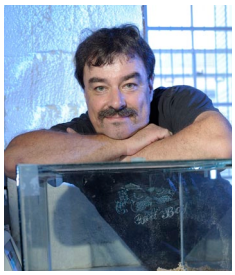
New partnerships in 2012 focused on the establishment of agreements that would support the strategic goals of the University and enhance its international profile through research collaboration with influential partners. Thus, new international inter-institutional agreements were signed with two partners in Africa (in New Guinea and with the Pan-African Parliament), with 13 leading institutions in Europe (including Belgium, France, Finland, the Netherlands, Germany, Romania, Russia and Switzerland), and with three leading institutions in Australasia.

The University is a third country partner in the EUROSA Consortium as part of the Erasmus Mundus initiative. In 2012, nine UP postgraduate students and staff were recipients of EUROSA II mobility scholarships.

Research awards

In 2012, several UP researchers were recognised for their research excellence and significant contributions by receiving national, regional and international awards.

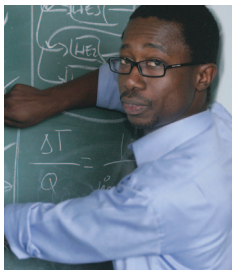
Prof Mike Wingfield, Director of the Forestry and Agricultural Biotechnology Institute (FABI), was awarded the prestigious Johanna Westerdijk Award by the Centraalbureau voor Schimmelcultures (CBS) Fungal Biodiversity Centre in Utrecht for his outstanding contribution to the culture collection of its centre. Prof Wingfield was also awarded an honorary doctorate from the University of British Columbia in Canada.



Prof Nigel Bennett, the SARChI Chair of Mammal Behavioural Ecology and Physiology, was awarded the Havenga Prize for Biological Sciences by the Suid-Afrikaanse Akademie vir Wetenskap en Kuns. The Havenga Prize is awarded each year for original research in the natural sciences and/or in the field of technology.

Prof Kobus Eloff was awarded the National Science and Technology Forum (NSTF)-BHP Billiton Award for his contribution to science, engineering, technology and innovation (SETI) through research capacity development over the past 5 to 10 years.

Prof Jolanda Roux was awarded the NSTF-BHP Billiton award for her outstanding contribution to building capacity in tree health management and mycology in Africa.



Prof Thokozani Majozi was awarded the Young Scientist's National Award of the African Union (AU) Academy of Sciences for the Developing World (TWAS).

Prof Patrick Eriksson, Head of the Department of Geology, was honoured by TWAS for his fundamental contribution to the understanding of Precambrian sedimentation systems within a broader chronological and geodynamic framework.

Dr Christine Maritz-Olivier of the Department of Genetics was the recipient of the Best Biotechnology Research Award for 2012 at the annual Gauteng Department of Agriculture and Rural Development Symposium.

Prof Saurabh Sinha was awarded the 2012 Institute for Electrical and Electronics Engineers (IEEE) Meritorious Service Citation Award by the IEEE Educational Activities Board (EAB). He is the first South African to receive this award.

Chancellor's Award for Research

The Chancellor's Award in the category Research recognises exceptional achievement in the field of research aimed at the advancement of science and the associated promotion of the interests of the University of Pretoria.

Prof Sue Nicolson received this award for 2012.

Prof Sue Nicolson (centre) receives the Chancellor's Award for Research from Prof Wiseman Nkuhlu, Chancellor of the University of Pretoria (left) and Prof Cheryl de la Rey, Vice-Chancellor and Principal.

Exceptional Academic Achievers

This annual award is bestowed on senior academics who have already achieved the status of professor, are regarded highly by their peers and have consistently excelled in the areas of undergraduate and postgraduate teaching and learning, research, community service and administration over a period of time. This also includes current A-rated researchers of the NRF. In 2012, the following academics received this award:

The Exceptional Academic Achievers for 2012: Back (from left): Prof Andrew McKechnie, Prof Robert Pattison, Prof Theo Bothma, Prof Johann Kirsten, Prof Zander Myburgh, Prof Maryna Steyn, Prof Josua Meyer and Prof Xiaohua Xia.
Front (from left): Prof Andries Engelbrecht, Prof Karin van Marle, Prof Teresa Coutinho, Prof Danie Auret, Prof Jean Lubuma, Prof Cheryl de la Rey (Vice-Chancellor and Principal), Prof John Taylor, Prof Madeleine du Toit and Prof Ian Craig.

Prof Danie Auret
Prof Nigel Benett
Prof Theo Bothma
Prof Teresa Coutinho
Prof Ian Craig
Prof Madeleine du Toit
Prof Andries Engelbrecht
Prof Johann Kirsten
Prof Jean Lubuma
Prof Andrew McKechnie
Prof Josua Meyer
Prof Robert Millar
Prof Zander Myburg
Prof Louis Nel
Prof Robert Pattison
Prof Maryna Steyn
Prof John Taylor
Prof Karin van Marle
Prof Charles van Onselen
Prof Frans Viljoen
Prof Mike Wingfield
Prof Xiaohua Xia

Exceptional Young Researchers

Young emerging researchers are important to the University and are recognised for their research productivity and potential. This award is given to exceptional young achievers in the field of research, as measured against the University's strategic goal of achieving academic excellence, international competition and local relevance. NRF P-rated researchers are automatically awarded Exceptional Young Researcher status. The exceptional young academics for 2012 were as follows:

The Exceptional Young Researchers for 2012 (from left): Prof Bernard Slippers, Prof Marietjie Oosthuizen, Prof Christine Maritz-Olivier, Prof Lyn-Marie Birkholtz, Dr Folorunso Oludayo Fasina, Prof Lorenzo Fioramonti, Prof De Wet Swanepoel and Prof Cheryl de la Rey (Vice-Chancellor and Principal).

Prof Lyn-Marie Birkholtz
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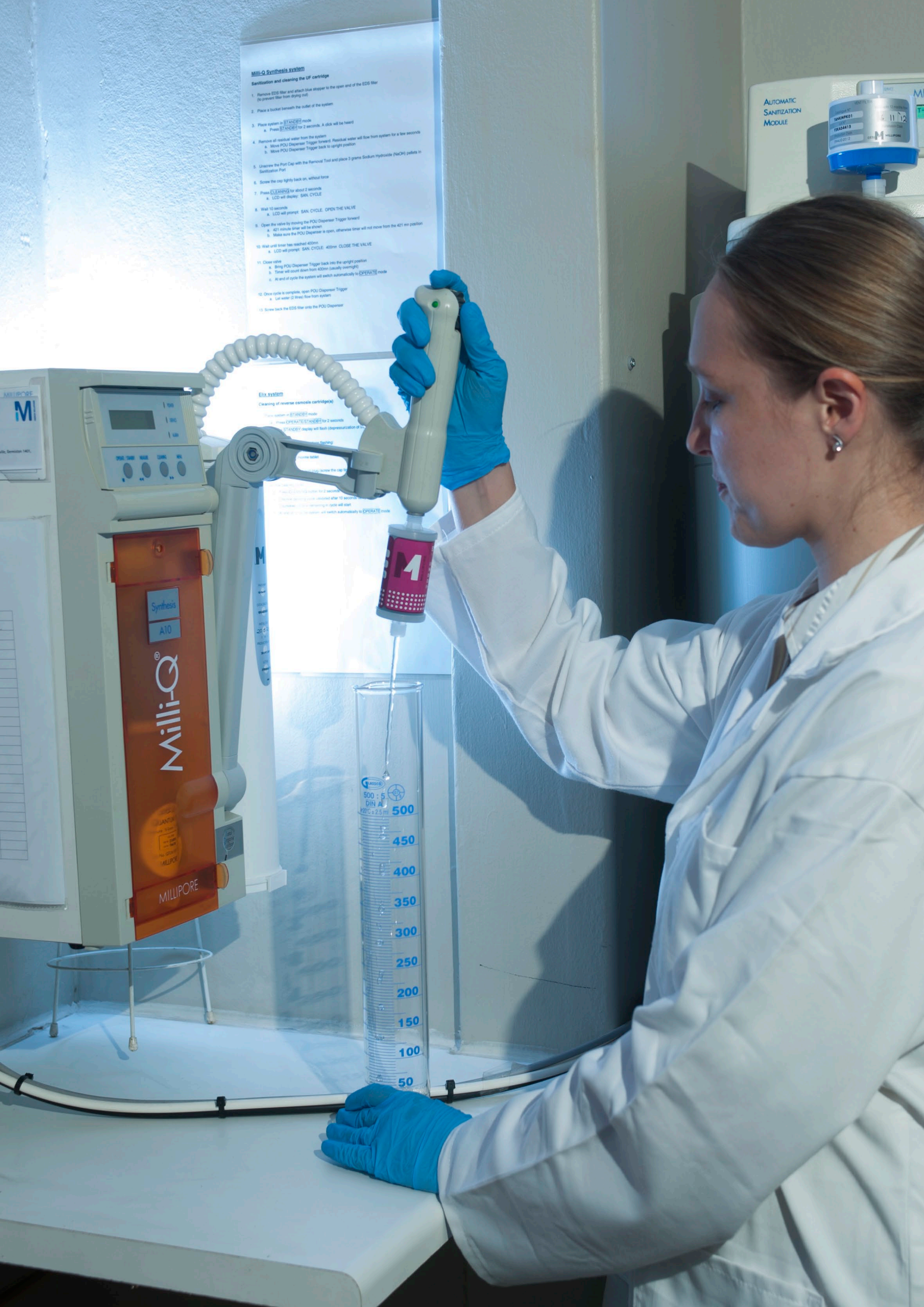
Prof Lorenzo Fioramonti
Prof Christine Maritz-Olivier
Prof Marietjie Oosthuizen
Prof Bernard Slippers
Prof De Wet Swanepoel


Milli-Q Synthesis system
Sanitization and cleaning the UF cartridge
Elix system
Cleaning of reverse osmosis cartridge(s)
Automatic
Sanitization
Module
Synthesis
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Faculty highlights

FACULTY OF ECONOMIC AND MANAGEMENT SCIENCES

The Faculty of Economic and Management Sciences aims to position itself at the cutting edge of economic, financial and management education and research in the national, African and global context.

Dean: Prof Elsabe Loots

The Faculty has embarked on a number of initiatives over the past two years to support research, build capacity and increase the quantity and quality of research outputs. The year under review was an excellent one for the Faculty, with a number of significant research accomplishments that contributed to the realisation of its vision, and also the academic goals of the University of Pretoria. In 2012, 75% of the Faculty's output was in the form of journal articles and international publications also increased significantly. I particularly wish to acknowledge the significant contribution of the Department of Economics to the publication outputs in terms of numbers and quality.

Five staff members received new National Research Foundation (NRF) ratings, and two received B ratings. This is a reflection of the Faculty's international standing, bringing the total number of NRF-rated researchers in the Faculty to 16. With four B rated researchers among this number, the Faculty has the highest number of NRF B rated researchers in the economic and management sciences in the country.

Prof Riël Franzsen, Director of the African Tax Institute (ATI), was nominated as the Chairholder of the NRF's South African Research Chairs Initiative (SARChI) Chair in Tax Policy and Governance at the University of Pretoria. The Chair will strengthen existing international networks in the field and will enhance collaborative research projects and the potential for the recruitment of postdoctoral students and fellows.

Prof Rangan Gupta of the Department of Economics was ranked as the 16th Top Young Economist in the world by IDEAS, the largest bibliographic database dedicated to Economics. This particular component of the rankings considers only the youngest economists who are registered with Research Papers in Economics (RePEc), a collaborative effort of hundreds of volunteers in 75 countries.

A number of exciting research projects were launched that promise to make major contributions to knowledge and practice. The Albert Luthuli Centre for Responsible Leadership (ALCR), in partnership with the Uongozi Institute of African Leadership for Sustainable Development in Tanzania, embarked on a research study to identify the key enablers and disablers of top-level leadership in more than ten countries across the continent.

The Department of Taxation launched the South African Tax Educators' Association and members of the association of tax academics from several South African universities will collaborate on research, research training, postgraduate supervision and publications in the field of taxation. Three young academics in the Department of Accounting received grants from the International Association for Accounting Education and Research and the Association of Chartered Certified Accountants. The grants are part of a major initiative to support research teams in transnational economies to build research skills capacity in accounting. Cecile Jansen van Rensburg, Stephen Coetzee and Astrid Schmulian will use the funds to examine students' learning comprehension of International Financial Reporting Standards.

The Faculty's research accomplishments in 2012 could not have been achieved without the hard work of heads of department, academics, administrative staff and postgraduate students.

Prof Elsabe Loots

The state of internal auditing in South Africa

Prof Philna Coetzee of the Department of Auditing has been doing extensive research on the internal auditing occupation, especially in a South African context. In 2012, she explored specific features of the internal audit function in South Africa that affect the demand for internal auditors in this country.

Despite South Africa being considered a developing country, internal auditing has developed a robust presence in both the private and public sectors. The common body of knowledge (CBOK) research conducted by the Research Foundation of the Institute of Internal Auditors (IIA) shows that local internal audit functions compare well with other more developed regions around the world.

Research conducted individually and with collaborators aimed to determine the position of and methodology followed by internal auditing in South Africa, and its relation to other African and global counterparts.

As part of the research, the CBOK study was customised for South African internal auditors and a number of articles, based on these CBOK studies, were published in the *Southern African Journal of Accountability and Auditing Research* to investigate and discuss various aspects of internal auditing in South Africa.

A further study compared the views of chief audit executives of large listed companies with those of the audit committee chairs and the chief executive officers.

In addition, for internal auditors to address this changing environment and the demands of chief executives, a new approach is needed in the way internal audit engagements are being performed.

To this end, a risk-based internal audit model was developed and tested to ensure that audit engagements are performed more economically and efficiently.

Determinants, spillovers and predictability of South African stock returns

Prof Rangan Gupta in the Department of Economics has been focusing on assessing the predictability, spillover effects and determinants of stock returns in South Africa. Seven papers, co-authored with Mampho P Modise and Dr Goodness C Aye, have resulted from this research.

The importance of this work stems from the fact that major global economies are still experiencing weak recoveries following the recent recession. The likelihood that the global economy may experience a double-dip recession, driven by the poor performance of advanced economies, stresses the need for predicting the behaviour of leading indicators, such as stock returns and equity premium. An understanding of market behaviour helps in guiding both policy and trading decisions.

A number of econometric models were used to investigate the determinants, predictability and spillovers of stock returns, utility gains and forecasting

The results show that stock returns are determined by certain financial and macroeconomic variables, and that South African stock returns react differently to different types of oil shocks – suggesting that the cause of the oil price shock is crucial in determining policy. The combination model forecasts outperform the benchmark model, which highlights the importance of using information from various predictors together, rather than individually.

“Dr Roula Inglesi-Lotz of the Department of Economics is investigating trends in energy efficiency in South Africa.”

Energy efficiency and electricity intensity

Dr Roula Inglesi-Lotz of the Department of Economics has been investigating the trends in energy efficiency in South Africa, particularly the impact of structural changes and the use efficiency of the country's energy intensity.

The global relevance of her work stems from the fact that, in a world in which the terms "climate change" and "carbon footprint" are common concepts, the improvement of energy efficiency has been accepted as one of the most cost-effective approaches to sustainable economic development and the reduction of continuously increasing energy consumption. It is also an important means for decreasing greenhouse gas emissions that originate from fossil fuel-based electricity generation and consumption. South Africa has room for improvement when it comes to energy efficiency.

Knowledge of the evolution of energy efficiency – the ratio between energy consumption and economic output – and intensity is imperative, because energy policy-makers should know how energy demand will increase or decrease if the economy faces critical changes in its structure and management.

The study by Dr Inglesi-Lotz showed that the industrial sector consumed the biggest proportion of energy, although its portion of energy use declined from 2000 to 2008. It should be noted that although a sector consumes a high share of energy, it can still be an efficient sector, depending on its production. The residential sector's energy consumption did not exceed 10% in 1995 and 20% in 2000, but rose to 25% in 2007 to 2008.

Structural changes played an important role in increasing economy-wide energy efficiency, but the intensity of the energy usage was a contributing factor to the trend of decreasing energy efficiency.

It was concluded that the accountable institutions in South Africa lacked a consistent framework for planning the expansion, stability or discouragement of targeted industries. This, together with the past energy pricing policies, led to structural changes that affected the country's energy efficiency adversely.

> "The study revealed that although the industrial sector consumes the most energy, it can still be an efficient sector, depending on its production."


“Prof Riël Franzsen is the chairholder of the new SARChI Chair in Tax Policy and Governance.”

Property taxation: challenges and opportunities

Prof Franzsen conducts research on the policy and institutional aspects of property taxation. Tax administration and tax compliance issues are becoming further areas of focus. He also holds the SARChI Chair in Tax Policy and Governance, which focuses on real estate transfer taxes, urban and rural local government institutions and finances, and property and land tax policy, laws and administration. With more than 50 countries having recently reformed or currently reforming their property tax systems to expand their revenue bases and/or ensure more accountable local governance, this research programme is of great relevance.

Although income taxes and comprehensive consumption taxes (such as value-added tax) are much more important taxes from a revenue point of view, there are very few countries in the world in which a property tax (ie a recurrent tax on the ownership or occupation of land and/or buildings) is not part of the overall tax system. In many countries (Australia, Brazil, Canada, Kenya, South Africa, Tanzania, the United Kingdom, the United States and Zambia), property tax is the most important source of tax revenue at the local government level.

A key area of Prof Franzsen's research, especially in developing countries where there are often serious capacity constraints and skills shortages in respect of property valuation, is the choice of an appropriate tax base. Should jurisdiction opt for area-based or value-based systems?

> "The African Tax Institute at the University of Pretoria has 14 researchers from 12 African countries who are collating data on property taxation in more than 40 countries in Africa."

The former is simpler and allows for self-assessment, but the base is not buoyant. A value-based system, on the other hand, is costly and difficult to maintain and, although buoyant if regular revaluations are undertaken, is inequitable and unfair if it falls into disrepair. Many of the post-colonial systems in Africa still provide for a rental or market value tax base, even though property markets are in many instances poorly developed and there is a paucity of valuation expertise. More than 50 countries worldwide, whether developing or developed, have recently undergone, or are currently undergoing property tax reforms. This makes it both a challenging and a rewarding field for research.

Since 2007, Prof Franzsen has been managing a joint venture research project between the African Tax Institute, based at the University of Pretoria, and the Lincoln Institute of Land Policy. To date, 14 researchers from 12 African countries have participated in this project, collecting and collating data on property taxation in more than 40 African countries. Apart from the more than 30 working papers already published on the Lincoln Institute's web page, a book for the subject specialist is due for publication in 2014.

FACULTY OF EDUCATION

Dean: Prof Irma Eloff

In 2012, the Faculty of Education at the University of Pretoria turned 75 years old and a long history of excellence in education research was celebrated. Over the decades, some of South Africa's leading scholars in education have found a professional home in the Faculty: scholars such as Prof Barend F Nel, who received an honorary doctorate from the University of Ghent in 1959 in recognition of his research in education, and Prof Willem A Landman, whose multiple publications are still being translated into English – years after he published them. More recently, the Faculty was home to Prof Jonathan Jansen, widely regarded as one of South Africa's leading education experts.

The 75-year celebrations highlighted the fact that education research across the globe is becoming increasingly important and that its relevance transcends personal academic careers. As governments and education departments make decisions about education, it is critical that choices are based on sound empirical evidence and reliable education statistics and analyses. The role of the Faculty of Education as a key role-player in education is therefore of considerable importance.

In keeping with the University's academic goal of strengthening its international profile, the Faculty received international recognition when education as a scientific field at UP was ranked in the top 150 in the world in the QS World University Rankings. The ranking, which is based on peer review and international citations of research, acknowledges the importance of global competitiveness for researchers.

To sustain this status, the Faculty's research drive continued to increase significantly in 2012. The number of NRF-rated researchers grew yet again when another six academic staff members received NRF ratings. Prof William Fraser, Prof Johan Beckmann and Prof Chika Sehoole received C2 ratings, while Prof Rinelle Evans, Prof Chaya Herman and Dr Rian de Villiers received C3 ratings. The Faculty now has 18 rated researchers. It also celebrated the fact that Dr Lindelani Mnguni, lecturer in the Department of Science, Mathematics and Technology Education, was selected as one of the top 200 young South Africans by *Mail & Guardian*.

The Faculty forged growing international partnerships in education. Most notably, collaborative ties were initiated between UP and the North East Normal University in Changchung, China. The Faculty, represented by the Dean, also signed the Oxford Declaration at the World Literacy Summit in Oxford in April. Long-term collaborative partnerships also exist with various international institutions in the USA, Europe, the United Kingdom, Australia and Africa, which continued to grow in 2012.

Several books were published by researchers in the Faculty, including *Complex classroom encounters*, published by Prof Rinelle Evans, with Ailie Cleghorn.

In December, the international reading literacy results were released by the team of researchers at the Centre for Evaluation and Assessment (CEA). The co-directors of the Progress in International Reading Literacy Study (PIRLS), Dr Surette van Staden and Prof Sarah Howie, presented the findings on the literacy levels of approximately 19 000 South African children in grades 4 and 5. These findings provide a clear direction on the growing need for a substantial intervention to address the literacy needs of school-going children.

The Faculty has active research teams in a variety of research focus areas: higher education, early childhood, mathematics education, food, nutrition and wellbeing, language and literacy, assessment, social justice and resilience.

The research on food, nutrition and wellbeing is an Institutional Research Theme (IRT) on which the Faculty works together with the faculties of Health Sciences, Natural and Agricultural Sciences and Veterinary Science. This IRT consists of various subthemes, and Prof Ronél Ferreira, Head of the Department of Educational Psychology, heads the subtheme on food consumption behaviour for improved health and wellbeing.

Other staff members of the Faculty are also involved in this IRT.

Other research projects conducted by members of the Faculty focused on early childhood education, the role of mothers as educators, career counselling and mathematics education:

Prof Venitha Pillay of the Department of Education Management and Policy Studies conducted an international study on the way in which motherhood influences academics and their work.

Prof Kobus Maree, associated with the Department of Educational Psychology, collaborated with international scholars on developing career counselling tools that will improve the way in which career counselling is done to make it lifelong, holistic and contextual and to make provision for adequate self-construction.

Dr Ina Joubert of the Department of Early Childhood Education conducted a longitudinal study with primary school learners to provide them with a voice in the context of education for democracy.

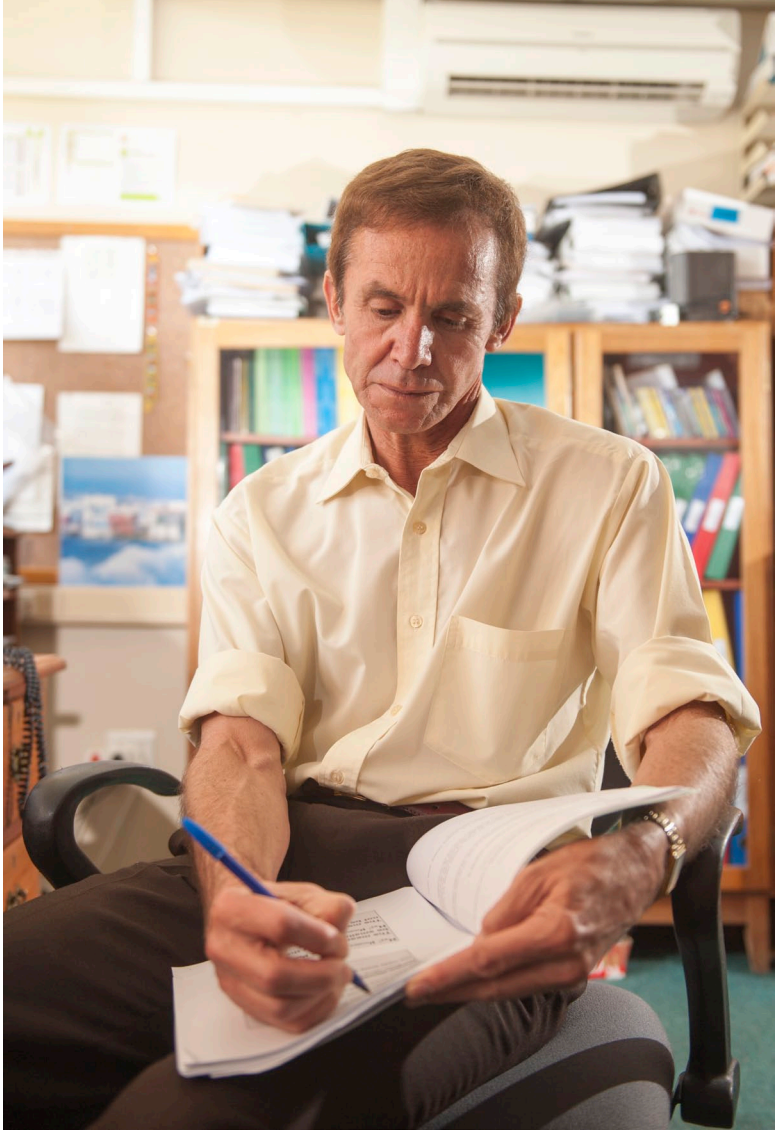
The research focus of Dr Gerrit Stols, associated with the Department of Science, Mathematics and Technology Education, was on improving the use of ICT in the mathematics classroom.

Dr Batseba Mofolo-Mbokane conducted a research study on mathematics education.

The Faculty of Education will continue to build on its solid foundations for knowledge creation in education, so that the next 75 years will be equally, and hopefully even more fruitful than the preceding 75 years.

Prof Irma Eloff

Changing the landscape of career counselling



Prof Kobus Maree of the Department of Educational Psychology – together with international scholars – is working on projects that are changing the way in which career counselling is practised. They originate from, build on and promote the aims of the Career Construction for Life Designing Counselling Model. This is the term used by international colleagues for the first coordinated counselling theory, which is structured to be lifelong, holistic and contextual, and to make provision for adequate self-construction.

The need for research in this field stems from the fundamental and ongoing changes in the world of work caused, among other things, by global economies.

Career counsellors have various career approaches at their disposal. The services used are determined by clients' idiosyncratic needs, and include vocational *guidance* to identify occupational fit, career *education* to foster vocational development, and career *counselling* to design a work life. Each of these three career interventions is useful and valuable for its envisioned aim.

Prof Maree's research aims to enable people to author their career and life stories, and to design successful lives and make social contributions; an approach that strongly considers issues such as subjectivity, personal growth, discovery and improving the sense of self during career construction.

Prof Maree and his students conducted a number of qualitatively-quantitatively-orientated research projects on the model of career adaptability and the methods of life-design counselling in South Africa. These studies dealt with, for instance, the impact of life-design counselling on adolescents from minority groups who experienced a need for career counselling, the adaptability needs of members of minority groups, as well as determining the factor structure of the Career Adapt-Abilities Inventory, as well as the link between the quantitative and qualitative assessment of career adaptability.

Furthermore, he adapted the Career Adapt-Abilities Scale for use in South African contexts, administered the instrument for use with different populations and developed norm tables.

Although more studies need to be conducted before one can conclude with 'relative' certainty that the proposed strategy is viable in the South African context, it seems clear at this relatively early stage that the process of life design is transferable across cultures and useful in South African contexts.

Experiences of academic mothers

Prof Venitha Pillay of the Department of Education Management and Policy Studies is investigating the experiences of mothers working in higher education. She found that becoming a mother is a watershed experience for any woman – it has an effect on one's career and forces one to review one's priorities in life. Still, in order to be self-fulfilled individuals, as well as for financial reasons, many mothers continue with their careers.

Her preliminary research, in which she documented the experiences of three 'new' mothers at a South African university, led to the publication of a book, *Academic mothers.* The term "academic mother" is a juxtaposition, as Western philosophers describe thinking, and by implication the academic realm, as rational, unemotional and logical, while motherhood is traditionally associated with nurturing, loving and emotion.

The study revealed that the notion of *balancing* motherhood and work, where balancing implies an equilibrium, is not feasible. The study suggested that the way in which participants related to their work had changed since they became mothers, and indeed motherhood often led to greater productivity and deeper insights into scholarly work.

Prof Pillay made the case that it is not a struggle about drawing emotion or motherhood into thinking, but about implicating and inscribing such aspects of self into thinking, epistemology and scholarship.

This project is being followed by an international study on academic mothers in the developing world, specifically India, Brazil and South Africa. In all three countries, women studied made a conscious decision to be mothers and academics.

The overall findings indicate that academic success brings power, and participants had the desire to be successful academics. However, even distinguished female academics still emphasise the unplanned and non-ambitious shaping of their careers and often mute their academic aspirations and foreground family. Family seems to be simultaneously a site of empowerment and disempowerment. Scholarly ambition and family are symbiotic in the academic mother, and centralising the family legitimises the academic goal.

Giving a voice to tomorrow's adults

The research of Dr Ina Joubert in the Department of Early Childhood Education aims to empower young children by making their voices known, especially in a more political context.

According to Dr Joubert: "Many people, especially South Africans, still see children as little beings who should be seen and not heard. However, the preamble to the Constitution – on which the country's democracy is based – states that it aims to establish a society based on democratic values, social justice and fundamental human rights, improve the quality of life of all citizens and free the potential of each person. These aims include young children."

This research builds on a previous project, the results of which were published in *South Africa is my best world. The voices of child citizens in a democratic South Africa*, published by Peter Lang.

This is a longitudinal study with a cohort of children (from their Grade 1 to 4 school years) that was conducted to determine how eight-year-old children's experiences of their home environment can assist educators in improving these children's citizenship practice. In their Grade 2 year, she gave them each a disposable camera with which to photograph everything in their neighbourhood that was important to them, as well as things they disliked.

The direct results of this study indicated that the cameras empowered the children, and their voices came through very strongly. The things of importance to them were their friends, homes, the places where they felt safe and where they played, and the people who helped them. They did not like people who disobeyed the rules and dirty places.They expressed their needs for better roads, sport and recreational facilities, improved education and more classrooms.

> "This study will assist educators to improve junior primary learners' citizenship practice by considering the learners' experiences of their home environment."

Raising the standard of Mathematics education

Through her experience as a lecturer in the Department of Science, Mathematics and Technology Education at the University of Pretoria, and as a Mathematics lecturer at a Further Education and Training (FET) college, Dr Batseba Mofolo-Mbokane found that students experienced problems with aspects of Mathematics. She then started a preliminary study on learning difficulties with volumes of solids of revolution (a section in integration) at the N6 level of their engineering studies.

The results of the preliminary study were the starting point of her research focus on FET college Mathematics (learning, teaching and assessment), which led to her PhD work and research beyond that. She is currently involved with further research dealing with FET Mathematics college lecturers as a Research Development Project (RDP) sponsored by the University of Pretoria.

Approximately 12 lecturers from the four campuses of the Tshwane South College in Pretoria are taking part in the study. Some of the students are enrolled for engineering courses to complete their National Curriculum (Vocational) (NC(V)) qualification.

The aim of this project is to develop professional learning communities and to enhance the learning of Mathematics at the NC(V) levels 2, 3 and 4 through in-service training. Lecturers meet with Dr Mofolo-Mbokane once a week. They engage fully in terms of pedagogical content knowledge on the topics in which the lecturers encounter difficulties.

These meetings enable Dr Mofolo-Mbokane to identify and discuss the misconceptions that the lecturers and the students have, as well as ways in which they can be addressed.

This is done by discussing different teaching methods that may enhance learning and by re-learning the Mathematics content. Both experienced and inexperienced lecturers attend the sessions, so that the participants can engage meaningfully with the content and share their experiences.

The main aim of this research is to determine FET lecturers' mathematical and pedagogical knowledge, challenges faced by lecturers and students, as well as the impact of developing learning communities that enhance lecturers' competency in content and pedagogical knowledge, and that enhance students' learning culture and their love of Mathematics. This is a community engagement project aimed at capacity-building at FET colleges through the University of Pretoria.

Dr Mofolo-Mbokane has already published some of her research results in a paper in the *International Journal of Mathematical Education in Science and Technology,* entitled "Learning difficulties with solids of revolution: Classroom observations".

FACULTY OF ENGINEERING, BUILT ENVIRONMENT AND INFORMATION TECHNOLOGY

Dean: Prof Roelf Sandenbergh

In its pursuit of the institutional goal of excellence in teaching and learning, the Faculty of Engineering, Built Environment and Information Technology views research as an essential and integral part of its activities. This is cultivated at undergraduate level, and staff members play an important role in building students' capacity to become excellent researchers. The Faculty's inquiry-based teaching leads to research activities at undergraduate level in the form of group and individual project-based research activities, which in turn lead to more formal courses in research methodologies and basic and applied research at postgraduate level. Academic staff members are strongly encouraged to develop their research skills and research agendas to position themselves for NRF-rating evaluation and to lead their own research groups, consisting mainly of postgraduate students.

The research agenda of the Faculty is aligned with the needs of industry, government and the professions, with the aim to also make significant contributions internationally. This supports a number of the University's academic goals, such as to strengthen its international profile and visibility, and to strengthen its impact on South Africa's economic and social development.

In turn, industry support for research conducted by the Faculty increased significantly in the form of sponsorships for research chairs, students and laboratories. The Faculty's research activities are supported by excellent laboratory and support services, which were augmented by new state-of-the-art teaching and research facilities in the Engineering 3 Building. Major research infrastructure additions include a geotechnical centrifuge to facilitate research in geotechnical engineering and a wafer prober to make direct evaluation of microchips possible in support of the mm-wave spectrum research by the Department of Electrical, Electronic and Computer Engineering. This research has a potential application in the Square Kilometre Array (SKA) project, which entails the development of a radio telescope in collaboration with Australia.

Researchers in the Faculty once again significantly increased their publication and conference presentation outputs – registering a record number of citations and making a significant impact during 2012. Departments were encouraged to develop and consolidate research activities and to promote the alignment of student research with that of supervisors, especially in the professional graduate programmes, to increase the quality and impact of research outputs. The quest remains to improve both the participation of staff in research activities and the number and quality of the research outputs.

International peer review of the Faculty's research activities was increased by the appointment of leading researchers as external examiners for theses, encouraging peer review of staff through the NRF-rating system, and encouraging the publication of research in leading

international journals. The Faculty is focusing on positioning staff for NRF-rating applications and has been able to maintain the number of staff members that hold NRF ratings in a competitive environment.

Research entities such as the Department of Science and Technology (DST) research chairs in the Faculty, including Fluoro-material Science and Process Integration, Carbon Technology and Materials, and Artificial Intelligence, as well as the National Hub for Energy Efficiency and Demand-side Management (EEDSM), the Industrial Metals and Minerals Research Institute (IMMRI), the South African Institute of Welding (SAIW) Centre for Welding Engineering and industry-sponsored chairs, are functioning well and made significant contributions to building a research ethos in the Faculty.

In addition, five new industry-sponsored chairs were established during 2012: the Sasol Chair in Health, Safety and the Environment, the Bateman Chair in Minerals Processing, the Exxaro Chair in Energy Efficiency, the Chair in Electronic Defence, and the CBI Electric Low-voltage Chair in Power Electronics. The research on, and development of, mobile applications was strengthened with the establishment of the BlackBerry Apps Laboratory as part of the e-Skills Institute initiative. The African Centre of Excellence for Information Ethics was established with the support of the Department of Communications to further education and research in this field on the African continent. The Specialist Centre in Plant Asset Management was established in the Department of Mechanical and Aeronautical Engineering as part of the Eskom Power Plant Engineering Institute.

Furthermore, the Faculty hosts the interfaculty Institutional Research Theme in Energy, in which an interdisciplinary approach to energy research is promoted and supported. An interdisciplinary research theme in Green and Sustainable Construction was established in the School for the Built Environment.

The ongoing development, application and commercialisation of research are priorities for the Faculty. Excellent progress was made with the development of silicon-based light-emitting devices, initiated in the Carl and Emily Fuchs Institute for Microelectronics (CEFIM) and further developed through a joint initiative with the South African Intellectual Property (SAIP) Fund as the INSiAVA initiative. This research has the potential to enhance the performance of electronic devices significantly by using silicon-based light sources for data communication and visual displays.

The Faculty is encouraged by the very significant progress it made with its research initiatives during 2012. Research is now well established as a core activity in the Faculty, and although it has to be balanced with the many other demands placed on the Faculty, the foundations for sustained growth into the future are established. The support and investment of government and the University in the future growth of the Faculty are encouraging, and the completion of additional facilities will significantly increase teaching and research capabilities in the near future.

Prof Roelf Sandenbergh

Closing up the broadband divide

Prof Sunil Maharaj, Head of the Department of Electrical, Electronic and Computer Engineering at the University of Pretoria and also of the SENTECH Chair in Broadband Wireless Multimedia Communications (BWMC), has conducted pioneering work in the field of broadband wireless communication.

Broadband, or high-speed internet access, allows users to access the internet and internet-related services at significantly higher speeds than those available through dial-up internet access services. Broadband speeds vary significantly, depending on the particular type and level of service ordered, and may range from as low as 200 kbps to 30 gigabits per second (Gbps). Current challenges in this area include the development of “green radios” to increase power consumption, the opportunity for spectrum sensing and cognitive radio, the digital divide and the radio frequency spectrum regulatory landscape, and innovation in software applications and localisation.

These challenges are driving the work of the SENTECH Chair in BWMC. Its mission is to participate in leading research activities on broadband wireless communications, and to deliver world-class research and educational outputs for the benefit of SENTECH, the University of Pretoria, other industry sponsors and South Africa in general. A number of innovative research projects are currently underway, including the investigation of multiple-input/multiple-output (MIMO) channel modelling for a wideband indoor environment.

The questions on the future of broadband are whether the end of the road is near in terms of increasing throughput, and what will be next. The answer lies in the development of millimetre-wave (mm wave) communications, which could possibly lead to next-generation (5G or 6G) mm-mobile broadband (MMB). It will enable scientists to explore a new spectrum for mobile broadband communication. Some of the current applications of mm-wave include radio astronomy, wireless backhauls, intersatellite links, high-resolution radar and security screening.

Through the innovative and internationally relevant research being conducted in the field of broadband wireless multimedia communications, Prof Maharaj hopes that the University of Pretoria will contribute to bridging the digital divide, and ensure that the broadband divide does not become the next evil in our society: that our citizens and communities are not disadvantaged due to their lack of access to a high-speed digital connection.

> “The SENTECH Chair in Broadband Wireless Multimedia Communication participates in leading research activities in order to deliver world-class research and educational outputs.”

“Prof Sunil Maharaj and the Broadband Wireless Multimedia Communications Group have filed a patent for their novel method to increase high-speed internet access.”

Building an ethical information society

In May 2012, the African Centre of Excellence for Information Ethics (ACEIE) was established at the University of Pretoria. This collaborative initiative between the South African Department of Communications, the United Nations Education, Scientific and Cultural Organisation (UNESCO) and various universities across Africa is housed by the Department of Information Science in the School of Information Technology, and is led by Coetzee Bester.

Information ethics is a descriptive and emancipatory discipline that studies the changes in the relationships between people and the world due to information and communication technologies. In Africa, this field provides a unique platform for building an information and knowledge society driven by critical reflection on ethos and values within the African context. It addresses opportunities and challenges unique to the development of African societies.

The establishment of this Centre was necessitated by various converging factors. The rollout of broadband in South Africa and Africa made information more readily available. The growth in communication and information management capacity has contributed significantly to the development and management of e-skills, e-governance and information ethics, and the challenges related to these. It was found that students were not properly introduced to information ethics and did not fully understand the concept and purpose, or the practice of this discipline.

One of the main objectives of the ACEIE is to develop a curriculum for teaching information ethics in Africa. During the first three years of its existence, the Centre will develop a curriculum structure and implement the content at universities in Africa. A group of more than 30 international academics are working together on this pilot project.

> “The national Department of Communications awarded R7.4 million to the Centre to support the establishment of other ethics centres in Africa, to organise conferences, and to support research and training in information ethics.”

According to a memorandum of agreement between the University of Pretoria and the national Department of Communications, which made R7.4 million available over three years, the Centre will also perform the following functions:

- Support the establishment of other ethics centres in Africa through the African Ethics Research Centre Network.
- Convene, coordinate and administer an ethics conference and follow up on the implementation of conference resolutions.
- Facilitate the hosting of Ethics Award ceremonies in collaboration with other partners.
- Focus on research and training in information ethics.

Other functions of the Centre include the development of short courses for government officials at provinicial level and support for collaborative relationships with UNESCO, the E-skills Hub and the Department of Information Science.

Throughout 2012, various academics were approached to conduct research on the impact or importance of information ethics in their field of expertise. These academics will have the opportunity to publish their articles in the 2013 *Innovation Journal,* a special edition of which is focused on information ethics.

Sustainability in the built environment

In her research related to green and sustainable construction, Prof Chrisna du Plessis of the Department of Construction Economics in the School for the Built Environment has identified three sustainability paradigms in the built environment.

The concept of sustainability has grown from a set of diverse but equally valid and often interlinked streams of thought. These streams of thought are the products of larger societal concerns that came to shape the agendas of governments, business and civil society after World War II. From that time onwards, the scale of human needs and the impact of meeting those needs on the ability of ecological systems to continue to meet these needs have reached critical dimensions.

The responses to this crisis laid the foundations for different sustainability paradigms, also in the built environment. The first of these evolved in public policy. It was driven by the United Nations and was based on developing a set of common criteria, indicators and strategies through international consensus. The second paradigm has its roots in the private sector, as businesses responded to the risks, pressures and opportunities of an environmental agenda. However, both these paradigms were criticised for perpetuating the structures of the society that created the crisis in the first place.

The third paradigm, however, calls for profound and radical changes to the structures of society, including the dominant world view, in order for the earth to remain fit for human habitation. This paradigm underlies concepts such as transformative resilience and regenerative design and development. It holds that human development needs can only be met sustainably if ecological conditions are such that all life can flourish and continue to evolve.

The regenerative sustainability paradigm represents a shift to a holistic living systems world view. This paradigm attempts to address the dysfunctional man-nature relationship by entering into a co-creative partnership with nature. It aims to restore and regenerate the global social-ecological system through a set of localised ecological design and engineering practices rooted in the context and its social-ecological narratives.

Currently the regenerative paradigm seems to offer a way for humans to engage with nature in two significant ways. It will build the adaptive capacity to survive the perturbations of global change, and it will increase the regenerative capacity of the world to create conditions under which humans and others can thrive.

Measuring energy efficiency

The South African National Energy Development Institute (SANEDI) National Hub for Energy Efficiency and Demand-side Management (EEDSM) was established at the University of Pretoria in 2008. It is a joint initiative between the University, and the national Department of Science and Technology, and the former Department of Minerals and Energy. Prof Xiaohua Xia, an A-rated researcher in the Department of Electrical, Electronic and Computer Engineering at the University of Pretoria, is the Director of the Hub.

In recent years, Prof Xia's research group has made continuous contributions to the national EEDSM programme by conducting research activities on measurement and verification (M&V), energy system modelling, and management and optimisation.

An article entitled "Mathematical description for the measurement and verification of energy efficiency improvement", developed by Prof Xia and his colleague, Prof Jiangfeng Zhang, has recently been published in an international peer-reviewed energy journal. This was the first paper to be published that presents a mathematical description of the energy efficiency M&V problem, bringing the basic M&V concepts, propositions, techniques and methodology into a scientific framework.

In this paper, the mathematical definitions for baseline and baseline adjustment are given, and the M&V plan development is formulated as an M&V modelling problem. This approach provides a fruitful source of research problems by which an optimal M&V plan can be determined under various practical constraints.

Another article, entitled "Optimal sampling plan for clean development mechanism energy efficiency lighting projects", has been published by Prof Xia, Prof Zhang and a

PhD candidate, Mr Xianming Ye. This article presents a case study to develop an optimal M&V plan. It proposes the metering cost minimisation models for handling the M&V uncertainties with minimal metering costs under the case study of energy-efficient lighting projects. By using the proposed optimisation model, the overall accuracy of the project can be maintained by sacrificing the confidence/precision criteria of the groups with high uncertainty, while improving the accuracy in the groups with low uncertainty. The proposed model largely reduces the metering costs of the sampling, while still maintaining the accuracy requirements of the project.

The research on this topic has culminated in the publication of a book, *Energy efficiency measurement and verification practices*, which summarises the success stories and lessons learnt in M&V best practice in South Africa in the past 10 years.

FACULTY OF HEALTH SCIENCES

The University of Pretoria's Faculty of Health Sciences is committed to increasing its research contribution to society, and building on its unique identity, strengths and relevance. This vision is informed by the University's goals of being a leading research-intensive university in Africa, strengthening its international profile and visibility, pursuing excellence in teaching and learning and strengthening the University's impact on South Africa's social and economic development.

Dean: Prof Eric Buch

In the 2012 academic year, the Faculty continued to build its value as a home of first choice for all South African students and staff and to offer a value-based option, with a strong culture of teaching and learning, a commitment to patient care and a deepening of research of value to society. Prof Tiaan de Jager was appointed as Deputy Dean: Research in January 2012 and will continue to push the Faculty's boundaries of medical knowledge, benefiting society with scientific breakthroughs and world-class research in a wide range of disciplines.

During the year, a number of measures were developed to accelerate research and to ensure that the Faculty makes its contribution to the University, becoming renowned in Africa for its research. The Faculty had a research output of 295 publications, achieving 181.51 accredited units for subsidy. This was a significant increase from the 139.92 units in 2011. With the necessary support systems being put in place, this number will continue to grow. The Faculty is also growing its research partnerships with top international universities and researchers.

Many staff members excelled during the year. Prof Riana Bornman was first runner-up in the L'Oreal Women in Science Awards for her research on the development of rural women. Prof Louw Roos published an article on the genetics of schizophrenia in *Nature*, one of the highest ranked journals in the world. Prof Ronnie Anderson, Director of the Medical Research Council (MRC) Unit for Inflammation and Immunity, published several high-impact papers in Institute of Scientific Information (ISI)-listed journals. Prof Bob Pattinson had his directorship of the Maternal and Infant Health Care Unit renewed after a very positive evaluation by the MRC. Prof Pattinson also received a prestigious B1 rating from the National Research Foundation (NRF), while Prof Maryna Steyn, Director of the Forensic Anthropology Research Centre, now has a B3 rating. Three more staff members improved their ratings and one member was rated for the first time, bringing the total number of NRF-rated researchers in the Faculty to 21.

The Faculty established the Institute of Cellular and Molecular Medicine in 2012, directed by Prof Michael Pepper, and invested in infrastructure to support its activities. More staff and students also joined the initiatives of the Centre for Sustainable Malaria Control under the directorship of Prof Tiaan de Jager. Both are Faculty Research Themes (FRTs) of the University,

thereby garnering additional funds for their work. The Faculty is also a partner in Institutional Research Themes (IRTs) on Food, Nutrition and Wellbeing, Genomics and Biotechnology and Management of Animal and Zoonotic Diseases.

The University's investment in a biosafety level 3 laboratory to take forward arbovirus research coincided with the appointment of Prof Bob Swanepoel, a world leader in the field.

The Faculty continued to secure more grants than ever before for research and postgraduate training, topped by a grant in excess of R20 million to Prof Bob Pattinson for a reduction in maternal and neonatal deaths in rural South Africa and Prof Mavis Mulaudzi for advancing nursing research and care in women's health and indigenous knowledge. Prof Lekan Ayo-Yusuf, Head of the Clinical Unit in the Department of Community Dentistry, received two more grants for research on tobacco control in Africa from the American Cancer Society (ACS) and the Mayo Clinic in the USA.

The Faculty continues to contribute new knowledge in many fields, ranging from laboratory-based cutting-edge science to finding solutions to health care burdens. The Environmental Chemical Pollution and Health Research Unit was established in 2012 in recognition of its groundbreaking research on endocrine-disrupting chemicals and health. Other laboratory research includes the immunopathogenesis and immunopharmacotherapy of diseases such as severe pneumococcal disease and rheumatoid arthritis, the novel use of nuclear medicine methodologies in Aids and tuberculosis (TB), cell-based therapies to achieve an HIV-resistant immune system and exploring the therapeutic potential of mesenchymal stem cells and platelets, and the morphology of fibrin networks in strokes and burn wounds.

Drug discovery includes substances from traditional African medicines, and an array of clinical trials continue to be conducted, including tests for affordable new cancer treatments. The unique genetic characteristics of schizophrenia and mitochondrial diseases in South Africans were recorded, and in cervical cancer, unique viral types of the human papilloma virus were found. The role of the mouth as a cellular reservoir for HIV persistence was described, as was the immuno-histochemical profile of oral plasmablastic lymphoma and the identification of early molecular markers of malignancy in the mouth. Researchers in the Faculty discovered previously unknown arbovirus infections, intermediate hosts and reservoirs. Unique techniques for safe *in vitro* fertilisation in HIV-positive women were developed. Paediatric respiratory disease was studied from pathophysiology-through-to-enhanced treatment and the Faculty is working towards a simple method for diagnosing TB using mycolic acid as a marker.

A national data set was established to explore types of exposure and risks to oral health disease. Health strategies are being researched to reduce mortality and morbidity in mothers and infants, including obstetric emergencies and foetal alcohol syndrome, and also on diabetes mellitus and tobacco-related diseases. Research on a range of chemical and biological sustainable malaria control methods is under way, while the impact of endocrine disruptor chemicals (EDCs) on male reproductive health was described and national water quality guidelines were studied. Research into treatments for complex cases of disability is matched by a neuro-integrated clinical expert rehabilitation programme.

The hallmark of the Faculty's research remains its focus on health and health care challenges facing South Africa and Africa.

Prof Eric Buch

New sports research

The Sports Medicine Section in the Faculty of Health Sciences, under the leadership of Dr Christa Janse van Rensburg, expanded its research activity in 2012.

One of its main focus areas was the use of heart rate variability (HRV) quantification as an indicator of the exercise effects in normal and patient groups, the field in which both Dr Janse van Rensburg and Dr Rina Grant obtained their PhDs.

The Sports Medicine Section used HRV to quantify exercise-induced changes after 12 weeks of basic training, compared to 20 weeks, for the South African National Defence Force (SANDF). “We found that cardio-respiratory fitness did not increase during the 12- to 20-week period. However, HRV analysis indicated that healthy cardiac conditioning occurred during this period,” explains Dr Grant.

Last year, the Sports Medicine Section also started the first of a four-year-long research project for a medical aid fund, where the Section formed a multidisciplinary research group to investigate conventional methods for health-related fitness and exercise ability. “The overall aim of the study is to change bad lifestyle habits into healthier ones for the benefit of both the fund and its members, and increasing members’ quality of life and functionality during old age.”

The Section also completed another project for Momentum, investigating and summarising overuse-cycling injuries in amateur cyclists participating in the Momentum 94.7 Cycle Challenge. This is the second largest cycle race in the country. “This subject has not been widely researched and most of the research has been conducted in Europe and America.”

The team also worked with the Basetsana women’s soccer team at UP’s High Performance Centre (hpc), investigating injuries in correlation with the team’s training pattern and how far along they were in the season. “The aim is to reduce players’ need for medical intervention due to injury and to adapt training programmes to aid better performance. This research will be extended to other sporting disciplines in the near future.”

One of the Section’s new research focus areas will be the use of autonomic nervous system (ANS) testing to determine the return-to-play time after concussion in athletes. The Section is also collaborating with the Faculty of Veterinary Science to investigate stress levels in horses with the aid of HRV quantification.

Focus on paediatric asthma and pulmonary disorders

For the Paediatric Pulmonology Unit at the Steve Biko Academic Hospital, 2012 has been an eventful and successful research year. The Unit conducts research in the fields of asthma, allergies, chronic lung disease (bronchiectasis and cystic fibrosis) and HIV-related lung disease. Several ongoing collaborative projects have been initiated within the University and internationally.

The projects include the following:

- Collaborative work on non-cystic fibrosis bronchiectasis with the Sofia Children's Hospital in Rotterdam, the Netherlands, focusing on chest radiology, and the validation of magnetic resonance imaging (MRI) and computed tomography (CT) scanning as a surrogate endpoint for bronchiectasis research. This research is done in collaboration with the Department of Radiology at the University of Pretoria.
- Collaborative work with the Catholic University in Leuven, Belgium, on the identification of novel inflammatory markers in childhood bronchiectasis.
- Collaborative work on cystic fibrosis in the South African population with a research focus in non-Caucasians with collaboration on molecular genetics with the Institute of Cellular and Molecular Medicine (ICMM). This work will help identify potentially novel cystic fibrosis causing mutations in Africa. Another research focus in cystic fibrosis is on new identification methods for airway pathogens, in collaboration with the Department of Medical Microbiology.

Prof Refiloe Masekela, Director of the Chronic Lung Disease and Cystic Fibrosis clinics, is a principal investigator in the Genomics Institutional Research Theme (IRT) in collaboration with the Department of Microbiology and Plant Pathology and the Forestry and Agricultural Biotechnology Institute (FABI) in the Faculty of Natural and Agricultural Sciences. She is working on DNA sequencing-based technology for the detection of airway microbiota in children with HIV-related bronchiectasis.

Prof Masekela is the first South African to become a Fellow of Paediatric Pulmonology by examination. She was invited to participate as a Fellow in the Higher Education and Leadership Ministries (HELM) Leadership Academy in 2012. She served as Chair of the National Asthma Education Programme and as primary or senior author on five high-impact factor articles.

Prof Robin Green, Head of the Department of Paediatrics and Child Health, is the current chairperson of the Allergy Society of South Africa and has been instrumental in introducing the monthly *Allergy Newsletter*, which deals with allergic problems in both adults and children. Other research focus areas include acute lung disease in HIV-infected infants (particularly cytomegalovirus infection). Prof Green has been co-author and senior author of a number of articles.

New Unit targets endocrine-disrupting chemicals

Years of collaboration between the Department of Urology's Andrology and Endocrine-disrupting Chemical (EDC) and Toxicology laboratories in the School of Health Systems and Public Health culminated in the establishment of the Environmental Chemical Pollution and Health (ECPH) Research Unit in the Faculty of Health Sciences in 2012.

"The overall aim of this Unit is to conduct research on the occurrence, health effects and projected future impacts of chemicals, especially endocrine-disrupting chemicals (EDCs) on environmental pollution and health in South Africa and Africa. This includes the initiation of activities to minimise the health effects such chemicals and pollution may pose to present and future generations," explains Dr Natalie Aneck-Hahn, Director of the ECPH Research Unit.

The EDC Laboratory offers a comprehensive battery of relevant bioassays for estrogenic and androgenic activity in environmental samples and specific chemicals, and the Toxicology Laboratory is primarily a research facility focusing on the assessment of reproductive health in humans and wildlife. The Unit has links to the Centre for Sustainable Malaria Control, the One Health initiative, the Institute for Food, Nutrition and Wellbeing, the Institute for Cellular and Molecular Medicine and the University of Pretoria Water Institute through research associates and collaborators on a number of projects.

As early as its year of establishment, the Unit saw important research outputs.

In 2009, the World Health Organisation (WHO) and the United Nations Environmental Programme (UNEP) started to develop and update the 2002 global assessment of the state-of-the-science of endocrine disruptors of the International Programme on Chemical Safety (IPCS). Together, the WHO and UNEP set up a group of highly respected international experts in the field of endocrine disruption research, and Prof Riana Bornman was invited to be a member of the working group. The final draft of the global assessment report was accepted for publication.

Prof Tiaan de Jager was a co-author of the human reproduction update, which encompassed a guideline publication entitled *What should it take to describe a substance or product as "sperm-safe"*. The team was led by Dr David Mortimer and included researchers and physicians from universities, university hospitals and fertility laboratories in Australia, South Africa, Sweden, the United Kingdom and the USA.

The Global Water Research Coalition approached Dr Aneck-Hahn and the EDC Laboratory to take part in a large international study to compile an EDC Toolbox II bioassay guideline that would assist stakeholders in the water sector to establish water quality test guidelines.

"The exposure effects of EDCs are a global problem and there is limited research taking place in South Africa. Therefore, the Unit, with its specialised bioassays, has the potential to form an integral part of water quality research," says Dr Aneck-Hahn.

Dr Natalie Aneck-Hahn and the staff of the Environmental Chemical Pollution and Health Research Unit are investigating the effects of endocrine-disrupting chemicals.

Oncology Unit focuses on women's health

The Women's Cancer Research Group, comprising researchers from the departments of Obstetrics and Gynaecology (Gynaecologic Oncology Unit) and Medical Virology and Anatomic Pathology at the University of Pretoria, has conducted the largest study sponsored by the Cancer Association of South Africa (CANSA) to date, when it screened 2 000 women around Tshwane to study the epidemiology of cervical cancer precursor disease.

Prof Greta Dreyer, gynaecological oncologist at the University of Pretoria, reports that cervical cancer is a common malignancy in South Africa that is often diagnosed too late. "It is caused by a sexually transmitted virus (HPV) and affects women of all ages and social status. It remains a major cause of cancer mortality," says Prof Dreyer.

The prevalence of abnormal cytology (cancer precursors), HPV infection and the different viral types involved were described in the most recent publication from this study. In a major breakthrough, the project demonstrated that urban and peri-urban women accept effective cancer screening by self-sampling. Self-sampling will now be taken to the Eastern Cape to evaluate rural women's acceptance and uptake.

Implementing cervical cancer vaccines is also very important. In the multicentric Vaccine and Cervical Cancer Screen Study 1 (VACCS1), the team successfully rolled out HPV vaccines to more than 2 000 primary school girls in the Western Cape and Gauteng, and also offered screening to their female guardians and mothers for the first time in the world.

The study was supported by the Cancer Research Initiative of South Africa (CARISA), the First for Women Trust and vaccine companies. In the follow-up VACCS2, 500 girls in the Tshwane area were vaccinated. The team works with teams from the University of Stellenbosch and the Vrije Universiteit of Amsterdam, and collaborates with the National Health Laboratory Service and independent laboratories in South Africa, the Netherlands and Oslo.

The Familial Cancer Centre (FCC) was established following research to explain the widespread prevalence of breast and related cancers in local and Afrikaner families. It offers the services of genetic and psychological counselling, and women's cancer care and prevention.

Women with an inherited mutation run very high lifetime breast and ovarian cancer risks. After locating uniquely South African mutations in the BRCA1 and BRCA2 genes, the test for these genetic mistakes was commercialised and is now widely available.

"The Women's Cancer Research Group assesses genetic risk using a detailed family tree and recommending the most appropriate and cost-effective laboratory tests. Once a genetic mistake has been identified, we counsel and discuss the implications of the finding. Predictive testing is offered to unaffected family members to accurately estimate their future cancer risk," says Prof Dreyer.

“Prof Greta Dreyer and the Women’s Cancer Research Group screened 2 000 women to study the epidemiology of cervical cancer precursor disease.”

ICMM goes back to basics with stem cell research

The Institute for Cellular and Molecular Medicine (ICMM), under the directorship of Prof Michael Pepper of the Department of Immunology, is currently involved in two important lines of research: stem cell and human genome research.

The topic of stem cell research has been hotly debated in society over recent years, with various religious and ethical concerns being raised. No doubt its application will change the face of human health in the future.

“Research is being conducted specifically in the area of communicable diseases, where a gene therapy and stem cell approach is being developed for the treatment of patients who are HIV positive,” explains Prof Pepper.

This work is being conducted with the groups of Prof Karl-Heinz Krause from the University of Geneva and Prof Roberto Speck from the University of Zurich. In the non-communicable diseases area, work is being done on haematological diseases (including cancer) that require bone marrow transplants.

A large investment has been made in the field of mesenchymal stem cells, and it is likely that several clinical trials will be launched in the next two to three years using these cells.

The group has also completed a feasibility study on the establishment of a public cord blood stem cell bank, a much-needed resource in South Africa.

“A significant contribution has been made to the all-important national legislation affecting stem cells and to beginning to find solutions to the problem of stem cell tourism, where emotionally vulnerable patients are exploited by unscrupulous individuals selling unproven so-called ‘stem cell’ treatments.”

The group has a large number of post-graduate students and publishes regularly in the stem cell and genetics/genomics fields.

The ICMM is a virtual institute with a core component in the Department of Immunology in the Pathology Building on the Prinshof Campus. Its objective is to promote cutting-edge, high-impact research in human health, with the patient being the ultimate beneficiary.

The ICMM provides a vehicle through which 20 research groups in seven of UP’s faculties are united in a transdisciplinary approach to address many of the major health problems (and their solutions) that face the country.

Research themes on which the ICMM focuses include infectious diseases, cancer and the neurosciences, with cell therapy (stem cells) and genomics as cross-cutting disciplines.

The Institute is involved in projects on human tissue legislation, since many of the areas in which research is being conducted have complex ethical, legal and social components.

The Institute also presents a short course on bio-entrepreneurship, which has been attended by approximately 300 people from all over the country to date.

FACULTY OF HUMANITIES

The rapidly changing and globalising world that we currently inhabit confronts us with a range of social, political, environmental and economic problems, some more intractable than others. It is increasingly acknowledged that the humanities are well suited to producing the types of research that can generate appropriate solutions to many of these problems. The Faculty of Humanities appreciates the potential value of the research that can be generated by the humanities. This forms the basis of the functioning and the research endeavours and aspirations of the Faculty of Humanities at the University of Pretoria.

Dean: Prof Norman Duncan

During 2012, the Faculty produced 161 journal articles, 59 book chapters and eight books. These outputs represent a significant improvement on the Faculty's outputs of the preceding three years. Moreover, the Faculty's publications continued to reflect the rich diversity of the research and creative endeavours of its constituent departments.

Some of the key research outputs produced by the Faculty included the publication of the volume *Community Psychology in South Africa* by Prof Maretha Visser and Anne Moleko of the Department of Psychology, and the book *Doing social research: A global context* by Prof Claire Wagner, also of the Department of Psychology. The completion of the volume *Temporalities* by Prof Russell West-Pavlov, research associate in the Department of English, published as part of the prestigious *Critical Idiom* series by Routledge, as well as Prof Lorenzo Fioramonti of the Department of Political Studies' widely cited book *Gross domestic problem: The politics behind the world's most powerful number,* published by Zed Books, constituted two further critical highlights of the Faculty's research and publication outputs during 2012.

The Faculty is working hard to contribute to the achievement of the University's academic goal of being a leading research-intensive university in Africa. In addition to the consolidation of the existing Faculty Research Theme of Human Economy, two further themes were established early in 2012: Southern Modernities, and Conflict and Peace. Three more themes were conceptualised by the end of 2012: Visual Technologies and Childhood Resilience, and an Institutional Research Theme (IRT), the Capital Cities Project, was proposed. It is expected that the Faculty's research outputs will grow significantly, both quantitatively and qualitatively, in the next few years.

The abovementioned research themes are interdisciplinary in nature. The Faculty is committed to interdisciplinary research, as it believes that it is through interdisciplinary collaboration that research outputs, as well as the quality and social value of research, will be increased.

During 2012, the Faculty reached various other research-related milestones. The Human Economy Project further consolidated its status as one of the key nodes of research activity in the Faculty. By mid-2012, the project was hosting 10 postdoctoral fellows and six doctoral candidates. In addition to several individual publications by the researchers and fellows attached to the project, an edited volume was produced, which is the first in the *Human Economy* series for which the project has a contract with an international publisher.

Strengthening the University's international profile and visibility has been identified as an academic goal of the University. The Institutional and Faculty Research Themes enabled the Faculty to expand and consolidate its international collaborative research initiatives significantly. These initiatives ensured a regular flow of international researchers to the Faculty, such as Keith Hart (Co-director of the Human Economy Programme and visiting professor of the Centre for the Advancement of Scholarship), Dr Sophie Chevalier (a lecturer in Social Anthropology at the University of Franche-Comté, Besançon, France), Prof Heidi Hoffer (Director of Design and resident designer at the Oklahoma State University, USA) and Dr Tove Skutnabb-Kangas (a retired professor in Linguistics from Denmark).

Other significant international research collaborations initiated in 2012 include the Centre for Augmentative and Alternative Communication's collaboration with Swedish academics on a research project on the human rights of children with mild intellectual disability, the collaboration of the Department of Historical and Heritage Studies with academics in France and the United Kingdom on a research project entitled "The comparative history of political engagement in Western and Africa countries", and the Department of Social Work and Criminology's collaboration with Kenyan academics on a project on substance abuse.

Several staff members completed their PhD studies, including staff in the Department of Archaeology and Anthropology, the Department of English, the Unit for Academic Literacy and the Centre for Augmentative and Alternative Communication. These academics' achievements have enabled the Faculty to move closer to its objective of ensuring that at least 58% of all academics in the Faculty hold a doctoral qualification by 2016. This is in keeping with the University's academic goal of pursuing excellence in teaching and learning.

Prof Lorenzo Fioramonti was awarded the Chair in Regional Integration and Governance Studies. This is particularly noteworthy, as it was the first time that this Chair was awarded to an African university. The year also witnessed the establishment of the Centre for Governance Innovation in the Department of Political Sciences, and Prof Fioramonti was appointed as the Centre's first director.

The Faculty received several research grants, including a substantial NRF Blues Skies Research Programme Grant, as well as a large NRF African Origins Platform Grant, both awarded to Prof Innocent Pikirayi, Head of the Department of Archaeology and Anthropology. The Faculty also received two sizeable Andrew W Mellon Foundation grants for staff research capacitation and advancing the Faculty's endeavours to foster interdisciplinary research.

Several exciting research-related endeavours developed in the arts, as exemplified by the Department of Drama's hosting of the Fifth Annual Africa Research Conference on Applied Drama and Theatre and the research of the Department of Visual Arts on social media networks and online self-expression.

The year also saw the establishment of a range of initiatives that hold the promise of even greater research productivity in the humanities at the University of Pretoria in the years ahead.

Prof Norman Duncan

Southern Modernities

The Department of Afrikaans launched the multidisciplinary and interfaculty initiative, Southern Modernities, aimed at achieving a critical perspective on modernity as a European concept. Prof Andries Visagie is co-convenor of this research project.

In support of this initiative, papers were presented by Prof Willie Burger (Afrikaans Literature), Prof Elfriede Dreyer (Visual Arts) and Prof Russel West-Pavlov (English Literature). The initiative was given further impetus in April with a one-day conference, *Patryspoort na buite* (porthole to the outside world), referencing the portholes that appear on the University's crest.

"Southern Modernities critically engage with 'alternative modernities' in an attempt to link differing and variegated modernities across the southern hemisphere. The conference posed some compelling questions on modernism and modernity in the global south," explains Prof Andries Visagie.

The conference included discussions on the following topics:

- The various manifestations of modernist concerns in contemporary literature, art and music from the south
- Interrogations of the southern-northern binary and the influential position of European and American thinking about modernity/modernism
- Hybrid modernities that co-exist in the global south
- The presumed reliance of modernity on the colonial other as a premise for self-definition
- Globalisation as a possible basis for a revival of particular strands present in modernism/modernity
- Points of articulation between the various "posts" and "isms": modernism, post-modernism, post-colonialism and post-humanism

- Established and emerging new universals within the arts and philosophy in relation to (southern) modernities
- Southern modernities and the boundaries between humans and non-humans (e.g. animals and technology)
- Apocalyptic, utopian and dystopian thinking in the arts and philosophy

Prof Willie Burger presented the first paper on Ingrid Winterbach's novel *Die benederyk*. His paper was followed by a presentation by Prof Thys Human on the same novel.

Participants from other universities and institutions included Dr Franci Vosloo from the University of Stellenbosch and Ms Martjie Bosman from Protea Books.

Papers by Prof Russel West-Pavlov (English) and Mr Mark Kourie (Philosophy) explored interesting aspects of modernity that go beyond the confines of Afrikaans and Dutch literature.

Language Lab improves the learning experience

Thanks to a generous donation of R6 million from the Minister of Higher Education, supplemented by R3 million from the University of Pretoria, the Language Laboratory in the Faculty of Humanities is progressing well with an extensive upgrade project that will benefit the teaching and development of African languages in particular.

In 2012, Prof Danie Prinsloo of the Department of African Languages and Prof Stephan Mühr of the Department of Modern European Languages embarked on research to upgrade the language laboratories to state-of-the-art teaching facilities, mainly in respect of digitalisation and the adaptation of audio tapes to electronic format to be used in the computer lab. They visited universities in the United Kingdom, Europe, Australia and the USA to study best practices in relation to modern language laboratories. Although they discovered that most traditional language laboratories are in the process of being upgraded to computer labs, there were no outstanding state-of-the-art examples.

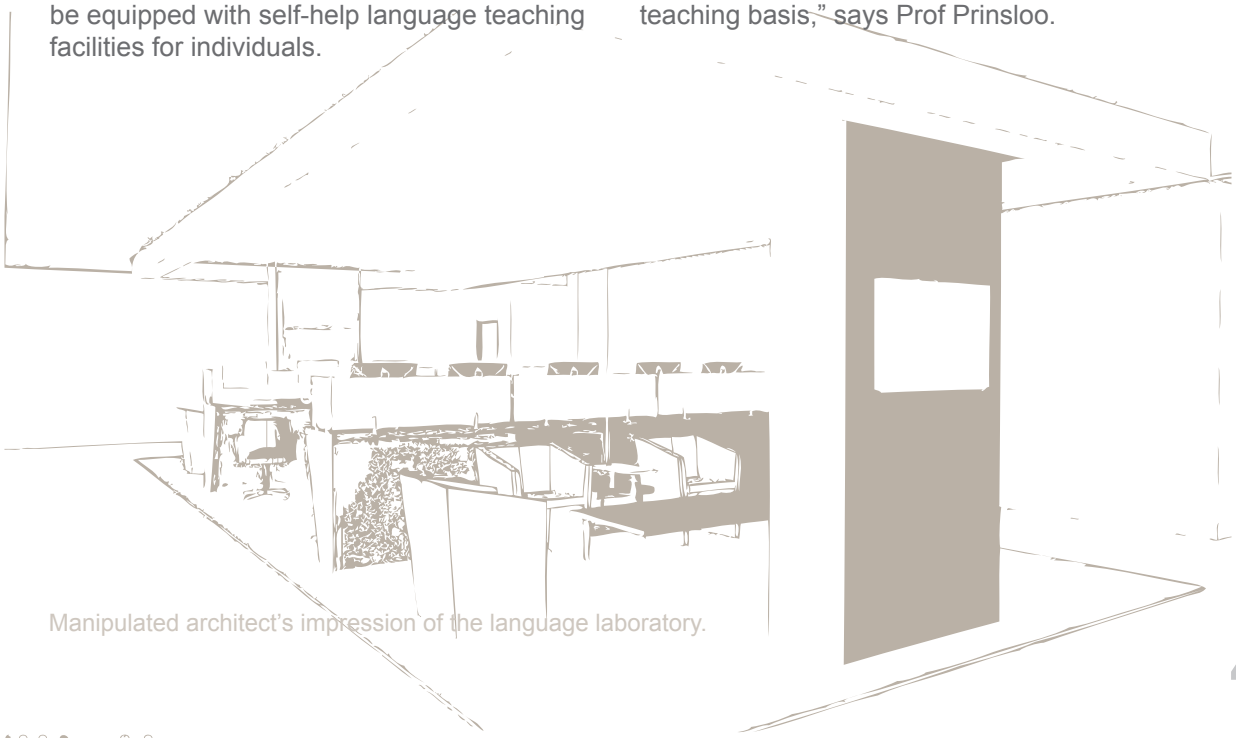
Following the donation, it was decided to upgrade the entire second level of the Humanities Building to a new language laboratory complex, which will, among other things, consist of a modern training facility for translators and interpreters, three fully equipped computer labs and a text resource centre.

The foyer area has been redesigned and will be equipped with self-help language teaching facilities for individuals.

"It was, however, important to learn that a resource centre should form an integral part of a modern language laboratory. The Department of African Languages, therefore, embarked on an initiative to base all its corpus collection activities in the language labs.

The computer lab was mainly used by students to study a variety of online language sources and the audio lab was used for the presentation of practical courses in African languages with special emphasis on learning the correct pronunciation, as well as exercises to become fluent in the language," explains Prof Prinsloo.

The focus of the new Language Laboratory will be on innovative and dedicated training in all languages, with specific attention to the African languages. "Training will be facilitated by academic departments and the campus company, Continuing Education at University of Pretoria (CE at UP), and will vary from formal academic language teaching to obtain a qualification in the language modules offered by the Cluster of Languages in the Faculty, to individual training on a self-teaching basis," says Prof Prinsloo.



Manipulated architect's impression of the language laboratory.

Research aids the early detection of hearing loss

Researchers in the University's Department of Speech-Language Pathology and Audiology are conducting research to address the serious national dilemma of close to 3.2 million South Africans who suffer from disabling hearing loss, according to the estimates of the World Health Organisation (WHO). This disability has far-reaching effects, especially for children with hearing loss that is not identified early on in life. Consequences of late detection include delayed language and speech development, which in turn often leads to reduced literacy, poor academic and vocational outcomes and significant socio-emotional issues.

"According to current evidence, close to 6 000 babies annually, or 17 babies daily, are born in South Africa with permanent hearing loss," says Prof De Wet Swanepoel, a professor in Audiology and a senior research associate at the Ear Science Institute in Australia.

Recent national surveys led by Prof Swanepoel have indicated that less than 10% of South African newborns are granted the opportunity to have their hearing screened within the first year of life. This means that the critical window of opportunity for optimal language outcomes through auditory input is forfeited for the majority of children with hearing loss.

"The unfortunate implication of this late detection is that in most cases these children are assigned to a life of seclusion, socio-emotional consequences and limited academic achievement and opportunities for active participation in the economy.

"A specific area of interest for me has been to evaluate and develop models to ensure earlier identification of hearing loss towards fostering optimal outcomes for children with hearing loss in South Africa. These models include the use of immunisation clinics and now also maternal obstetric units, which have demonstrated significant promise above conventional hospital-based models," says Prof Swanepoel.

The models have been proposed to the Department of Health for implementation in the new Early Hearing Detection and Intervention (EHDI) initiative for the public health care sector.

Prof Swanepoel's research and clinical interests span the field of early identification and diagnosis of hearing loss, objective measures of auditory functioning, and ear and hearing telehealth for underserved areas.

His work in these fields has earned him several accolades over the past few years, including an Exceptional Young Researcher Award from the University of Pretoria and a President's rating from the National Research Foundation.

“Prof De Wet Swanepoel of the Department of Speech-Language Pathology and Audiology focuses on the early detection of infant hearing loss through a newborn-hearing screening programme.”

Prof Lize Kriel and Sam Moifatswane are involved in a project on the Hoffmann Collection of Northern Sotho Cultural Heritage.

Form and function: transforming correspondence into imagery

In mid-2012, Prof Lize Kriel, an NRF-rated researcher and a Fellow of the Alexander von Humboldt Foundation, was seconded from the University's Department of Historical and Heritage Studies to the Department of Visual Arts in order to teach Visual Culture Studies.

Her current field of study is the written correspondence between European and African missionaries in 19th-century Transvaal as images, trying to make sense of the way content and appearance jointly contributed to the changing meanings ascribed to these letters over time.

"My interest lies in knowledge production in colonial contexts, and the ensuing cultures of reading, writing and printing," explains Prof Kriel.

In 2012, she contributed a chapter "Colin Rae's Malaboch: the power of the book in the (mis)representation of Kgalusi Sekete Mmaleboho" a reworked version of an article previously published in the *South African Historical Journal,* to the book *Print, text and book cultures in South Africa* (Wits University Press), edited by Andrew van der Vlies.

Prof Kriel shows that books are not always what they purport to be. She explains how relatively unreliable and biased information about the Hananwa leader Mmaleboho became legitimated over the past century through the form in which it had been published.

In another ongoing project, Prof Kriel traces the transcontinental circulation of letters between Christian women in East Africa, South Africa, East and West Germany from the 1930s until the 1970s.

Together with Hans Lessing, Julia Besten, Christian Hohmann and Tilman Dedering, Prof Kriel edited *The German Protestant Church in colonial Southern Africa: The impact of overseas work from the beginnings until the 1920s* (Cluster Publications and Harrasowitz, 2012) (German version 2011). In her contribution to this book, written with Maren Bodenstein, she looked into the role of women in Settler communities in the aftermath of the German Empire: an exploration of "'ascribed, resisted and embraced identities' in print and in memory".

Together with Sam Moifatswane (now retired from the National Cultural History Museum), Prof Kriel is also involved in a project on the Hoffmann Collection of Northern Sotho Cultural Heritage, coordinated by Dr Annekie Joubert of the Institute for African and Asian Studies of the Humboldt University, Berlin. In this project, Prof Kriel investigates the production, circulation and consumption of Berlin missionary Carl Hoffmann's ethnographic, religious and biographical writings, illustrations and photographs in academic journals, popular magazines and books among Northern Sotho, Afrikaans, English and German audiences over the first six decades of the 20th century.

In 2012, she was the South African partner of a German-South African Year of Science research project on the Hoffmann Collection.

FACULTY OF LAW

Dean: Prof André Boraine

The Faculty of Law is committed to playing a significant role in legal research in South Africa and Africa. Various initiatives are continuously being considered to improve the quantity and quality of the Faculty's research outputs in order to move closer to the goal of the University of Pretoria to become a leading research-intensive university in Africa. In 2012, the Faculty published more than 110 articles in accredited journals – more than any other year. This is not only attributable to publications by full-time members of staff, but also to the contributions of students, part-time members of staff and extraordinary professors.

Apart from increasing the number of publications, the Faculty also endeavours to increase its number of publications in international journals in order to strengthen the University's international visibility. In this regard, members of the Centre for Human Rights published 14 journal articles internationally, and Dr Adem Abebe and Prof Charles Fombad managed to publish two articles in international ISI-listed journals. A new research focus initiative in 2012 was the hosting of the Law and Poverty Conference, which led to a number of publications.

The Department of Jurisprudence produced 14 journal publications. Two of the researchers featured in this report have significant achievements in this regard. Joel Modiri, a final-year LLB student, who is also a tutor in the Department, published three articles in accredited journals, and Prof Karin van Marle acquired 2.5 units in international Institute of Scientific Information (ISI)-listed journals. A number of postgraduate students in this Department also published articles.

The Department of Mercantile Law produced 28 journal publications. Dr Femida Cassim, another prominent academic, had two articles published in accredited international law journals, one of which is on the ISI list, namely the *Journal of African Law*, published by Cambridge University Press on behalf of the University of London. Her other article appeared in *Business Law International*, an IBSS-listed journal published in the United Kingdom on behalf of the International Bar Association. Dr Cassim is currently completing her PhD in Mercantile Law. Her extensive research on the new Companies Act has been quoted and/or cited with approval in four judgments of the High Court and two judgments of the Supreme Court of Appeal. The Head of the Department, Prof Stefan van Eck, published an article on the currently contested issue of labour brokers in South Africa and Namibia in the *International Journal of Comparative Labour Law and Industrial Relations,* published by Kluwer Law International.

The 12 publications by the Department of Procedural Law included two publications in the international *Commonwealth Law Bulletin* and the *Oxford University Commonwealth Law Journal* respectively.

The Department of Public Law produced three textbooks, and the newly appointed Head, Prof Pieter Carstens, was invited to publish a chapter entitled “Medical malpractice and compensation in South Africa” in the *European Yearbook for Tort and Insurance Law*. A particular highlight was the establishment of the Centre for Law and Medicine, in conjunction with the Faculty of Health Sciences, which will function under the auspices of the Department of Public Law. The Centre conducts research to obtain insight on legal problems that include medical law and ethics, medical jurisprudence and health care law, and forensic medicine, to generate, promote and provide expertise concerning these medico-legal fields, and to contribute to the development of law and medicine in Africa.

The Department of Private Law also conducts its research through two centres housed in the Department. The Constitutional Court vindicated the points of view raised by Prof Johan Scott in various publications: that the true basis of state liability in cases of intentional police delicts are vicarious in nature. Apart from 27 publications by members of this Department, the Centre for Child Law focused on research to promote children’s right to a basic education. The theoretical basis for the research is a framework derived from the United Nations Social and Economic Council, which is known as “the four A’s framework”, namely availability, accessibility, acceptability and adaptability. The research has been used in court cases that reached the Constitutional Court early in 2013. In one of the cases, school governing bodies had prevented girls who had given birth from attending school for a full year. This affects accessibility and adaptability. The Centre for Child Law’s research was not only embodied in submissions to the court in the learner pregnancy policy case, but also in cases regarding admissions policy, infrastructure backlogs, government funding of independent schools and a lack of teachers in certain provinces. Prof Ann Skelton, Director of the Centre, who was recently appointed to the United Nations Educational, Scientific and Cultural Organisation (UNESCO) Chair in Education Law, published an article entitled “How far will the courts go in ensuring the right to a basic education?” in the 2012 *Southern African Public Law Journal*. The article examines recent case law to determine how the courts are likely to interpret the right to a basic education.

In 2012, the Centre for Intellectual Property Law contributed seven articles in accredited journals, as well as several papers at international conferences. In addition, Judge Louis Harms, a former Deputy President of the Supreme Court of Appeal and incumbent of the Adams and Adams Chair in Intellectual Property Law, published the third edition of his book on the enforcement of intellectual property rights. Seven of the Centre’s doctoral students (six of whom are foreign students) are conducting research on topics ranging from the protection of indigenous knowledge and the impact of patent laws on access to medicine, to aspects relating to the World Intellectual Property Organisation (WIPO) and the Agreement on Trade-related Aspects of Intellectual Property Rights (TRIPS). Prof Steve Cornelius, Director of the Centre for Intellectual Property Law and the academic who holds the best NRF rating in the Department, had an exceptional year. In 2012, at the age of 42, his publication record reached the 20 mark for textbooks or chapters in textbooks and passed the 50 mark for journal articles. His textbook chapter published in 2012, entitled “The significance of signature for the validity of a contract in South African law” recently formed the basis of advocates’ arguments in an appeal to the Pretoria High Court. The judgment is expected soon.

The Faculty is extremely proud of the work of its members, which promotes justice and our understanding of justice in various fields in our country, Africa and the rest of the world.

Prof André Boraine

Law research focuses on transforming jurisprudence

The general area of research of Prof Karin van Marle, Head of the Department of Jurisprudence, has been the field of jurisprudence, legal philosophy and legal theory with a specific focus on reflecting critically on the features of a post-apartheid jurisprudence, but also to reconfigure such jurisprudence.

“Over the past three years, the pervasiveness of instrumentalist and functionalist aims overtaking the potential of critical theory has become more prominent. I have explored how instrumentalist and functionalist views affect discourses on transformation, reconciliation and reparation within the post-apartheid legal, political and social context,” explains Prof van Marle, a recipient of an Exceptional Young Researcher Award (2003) and Exceptional Academic Achiever Award (2010), both from the University of Pretoria.

Prof Van Marle has also reflected on how feminist theory, and particularly feminist jurisprudence, were influenced and sometimes overtaken by empirical method to the detriment of conceptual development and more pertinently the ideal of justice. Lately, she has contemplated the relationship between law and the humanities and social sciences in the post-apartheid context.

“To the extent that law has been involved with the humanities at all, it has unfortunately been in a purely functionalist manner”.

Prof van Marle’s research includes a focus on how South African legal scholars have also made use of, particularly, the social sciences (sociology, political science and psychology) to make law stronger rather than investigating the critical possibilities offered by the humanities (philosophy, critical theory and literature).

Prof Van Marle has been a fellow of the Stellenbosch Institute for Advanced Study (STIAS) since 2007, where her most recent STIAS endeavour in 2010 involved a group of international scholars in a project, *Genres of critique*, which explores the potential of aesthetic forms for critique.

Over the years, Prof Van Marle has published widely in national and international accredited journals, including the *Stellenbosch Law Review*, *Feminist Legal Studies*, *The Florida Journal of International Law* and *Griffiths Law Review*. Four doctoral students and eight LLM research students have completed their degrees under her supervision.


“The research of Prof Karin van Marle in the Department of Jurisprudence focuses on reconfiguring post-apartheid jurisprudence.”

Post-apartheid law and legal theory

Law, critique and politicised identity, developing an indigenous post-apartheid critical race jurisprudence, and new directions in legal theory have been the subjects of research undertaken by Joel Modiri, a tutor and researcher in the Department of Jurisprudence.

The different ways that law is implicated in the construction, perpetuation and rationalisation of racial and gender hierarchies, and conversely the extent to which law can be used as a tool to remedy and eradicate the injuries of racial and gender inequality, are investigated in Mr Modiri's research. Thus, a core part of the research also entails a consideration of concepts such as power, freedom, equality, dignity, democracy, community, culture, history, ideology, transformation and justice.

To further this exploration, an argument is made in support of developing a South African-based critical race theory as a way of putting race back on the agenda in legal discourse and equality jurisprudence.

To this end, the research examines competing philosophical and sociological theorisations of race and racialism, and tentatively embarks on a critical race reading of the South African Constitutional Court's racial equality jurisprudence. "Law and legal theory should move closer to critical race jurisprudence through delineating a number of 'racial themes' that could deepen the conversation on race in South African critical legal thought. These themes include a comparison of the relationship between race and law in South Africa and the USA, a study of whiteness and white subjectivities and the tension between the Constitution and alternative accounts of memory," says Mr Modiri.

"All the questions and reflections that frame the study on politics, identity and the law are finally raised again, more generally in making the case for an approach to legal education that is attentive to the historical and social realities of post-apartheid South African society. We also draw on the insights of critical legal theory to place social transformation at the heart of the LLB curriculum," he concludes.

The law of sport

Prof Steve Cornelius, Director of the Centre for Intellectual Property Law and Co-Director of the Centre for Sports and Entertainment Law, attached to the Department of Private Law and a B-rated researcher, is widely respected for his research in the field of sports law.

With the prominent focus on sports locally and internationally and the huge amounts that are invested annually, the fields of sports law, sports-related intellectual property rights and sportspeople's obligations are receiving more and more prominence.

Prof Cornelius's first area of focus was to analyse and reflect on the law and principles relating to the interpretation of contracts, and how the new constitutional dispensation, with its more liberal approach to interpretation, has influenced the interpretation of contracts.

His seminal work, *Principles of the interpretation of contracts in South Africa*, has been cited on several occasions by the high courts in South Africa. It reflects on the admissibility of evidence to assist a court with the interpretation of a contract, the various expressed, tacit and implied terms that constitute a contract, as well as the presumptions, rules and principles that guide the process of interpretation. "Because legal relationships in sport are mostly based on contracts, my other focus relates to the concept of fair play in sport and the legal implications of corruption, match-fixing, doping and other forms of cheating in sport, as well as equal opportunities and affirmative action in sport. These are issues that have hit headlines often over the past few years. Lance Armstrong's doping scandal and the match-fixing allegations that have tainted the sport of cricket for some time are just two examples," says Prof Cornelius.

His articles on doping have highlighted shortcomings in the current anti-doping regime. Based on this research, he has been appointed to a task team that is reviewing the South African Institute for Drug Free Sport Act, Act No 14 of 1997, and the regulations made thereunder.

> "Prof Steve Cornelius has been appointed to a task team to review the South African Institute for Drug Free Sport Act, Act No 14 of 1997."

“Dr Femida Cassim of the Department of Mercantile Law focuses on the implications of the new Companies Act.”

New Companies Act in the spotlight

The implications of the new Companies Act have been the focus of research conducted by Dr Femida Cassim, a senior lecturer in Mercantile Law.

"The new Companies Act has overhauled the South African system of company law. I aim to analyse fundamental corporate law concepts and the many innovative and controversial provisions of the new Act, taking into account comparative foreign law of other leading jurisdictions. My purpose is to provide guidance to legal practitioners, judges, academics and law reformers, as well as company directors, other professionals, and students of law and commerce,'" says Dr Cassim.

Her research projects have proved to be successful contributions to the legal, commerce and accounting community. *Contemporary Company Law,* a scholarly work on the new Companies Act to which she contributed six of the 21 chapters, is prescribed at numerous leading universities at both undergraduate and postgraduate level, and is extensively relied on by leading advocates, attorneys, and even the judiciary.

Dr Cassim's research and her contribution to the book has recently been quoted and cited with approval in four judgments of the High Court and two judgments of the Supreme Court of Appeal. The work has also been cited in several articles published in the *Business Report* newspaper. An award-winning financial journalist has referred to the book as "a brilliant analysis" and as "the most accessible and comprehensive account of the Companies Act".

Dr Cassim, who holds an MBChB (cum laude) from the University of the Witwatersrand, as well as an LLB and LLM, both obtained cum laude, is currently completing her PhD thesis at the University of Cape Town.

Her research in this respect concerns the effectiveness of the remedies that the Companies Act confers on the minority shareholders of a company to deter directors of companies from plundering the company's resources for their own benefit.

FACULTY OF NATURAL AND AGRICULTURAL SCIENCES

Dean: Prof Anton Ströh

The Faculty of Natural and Agricultural Sciences strives to be the leading science faculty on the African continent by contributing significantly through its postgraduate research to some of the major challenges of the continent. These challenges relate to poverty and food, energy and water security, climate change and its impact on agriculture, animal and human health, as well as economic sustainability.

The Faculty is one of the most diverse science faculties in South Africa, and is well positioned to strengthen the University of Pretoria's international profile and visibility. According to the Institute of Scientific Information (ISI) Web of Knowledge field rankings, it is highly recognised internationally in the fields of agriculture, environment and ecology, as well as in the plant and animal sciences. In plant and animal sciences, the University produces by far the highest number of articles in South Africa and is listed among the top 60 universities worldwide in relation to the total number of outputs in this field. The Faculty also has significant expertise in the physical and mathematical sciences, with strong connections to the mining and mineral industries, including Sasol and the South African Nuclear Energy Corporation (Necsa).

The strong research ethos of the Faculty – in response to the University's academic goal of being a leading research-intensive university – is re-emphasised by the fact that 137 of its scientists are formally recognised by the peer evaluation system of the National Research Foundation (NRF) for the high quality and impact of their research nationally and internationally. Many of the academics and researchers in the Faculty are internationally recognised as leaders in their respective fields.

During 2012, the Faculty contributed significantly to the production of high-quality, internationally recognised research publications. The 309 Department of Higher Education and Training (DHET) units recorded constitute approximately 25% of the total publication output of the University of Pretoria and 95% of these publication units are in ISI-ranked journals. It is noteworthy that, through the Faculty's research endeavours for the year under review, 177 master's and 59 doctoral degrees were awarded, and the Faculty increased its postdoctoral fellows from 50 in 2011 to 78 in 2012. In addition to this, it awarded an honorary doctoral degree to Prof Santosh M Warrier (Kochi University, Japan), one of the world's leading geological scientists.

In 2012, the Faculty strengthened its collaboration initiatives with other faculties at the University. The Institute for Food, Nutrition and Wellbeing was officially launched on 28 May 2012, with Prof Sheryl Hendriks as the Director. The Institute gives momentum to the fight against hunger, malnutrition and disease by offering more than 100 researchers from five faculties and more than 30 academic departments, units and centres an opportunity to work beyond traditional knowledge boundaries.

The Institutional Research Theme (IRT) in Genomics was officially launched on 23 October 2012. Prof Don Cowan is the Director and the IRT has a core membership of 28 academic and over 50 research staff members across the faculties of Natural and Agricultural Sciences, Health Sciences and Veterinary Science.

The official launch of the South African Forestry Company Limited (SAFCOL) Forestry Chair took place on 17 January 2012. The Chair coordinates the fast-growing Forest Science Postgraduate Programme. The launch coincided with the inauguration of the new R120 million Plant Sciences Complex in which the Programme is housed.

The official handover by the African Centre for Gene Technologies (ACGT) of the Policy and Support Actions for Southern African Natural Product Partnership's (POL-SABINA) rain shelter took place at the Mimosa research station of the Tea Research Foundation of Central Africa (TRFCA) in Malawi in May 2012. The project was funded by the European Union as part of the African, Caribbean and Pacific Group of States Science and Technology Programme (ACP S&T).

Although it is not possible to mention all the special awards for recognition of our scientists, it is appropriate to note the following outstanding achievements:

The Suid-Afrikaanse Akademie vir Wetenskap en Kuns bestowed the Havenga Prize for Biological Sciences on Prof Nigel Bennett of the Department of Zoology and Entomology.

Prof Mike Wingfield, Founding Director of the Forestry and Agricultural Biotechnology Institute (FABI), was awarded the prestigious Johanna Westerdijk Award by the Centraalbureau voor Schimmelcultures (CBS) Fungal Biodiversity Centre, as well as an honorary doctorate from the University of British Columbia in 2012.

Prof Patrick Eriksson, associated with the Department of Geology, has been honoured by the Academy of Sciences for the Developing World (TWAS) for his fundamental contribution to the understanding of Precambrian sedimentation systems within a broader chronological and geodynamic framework.

Dr Christine Maritz-Olivier of the Department of Genetics was the recipient of the Best Biotechnology Research Award for 2012 at the annual Gauteng Department of Agriculture and Rural Development (GDARD) Symposium.

Prof Jolanda Roux received the National Science and Technology Forum (NSTF)-BHP-Billiton award for a female researcher who has made an outstanding contribution to science, engineering, technology and innovation (SETI) through research capacity development over the last five to ten years.

Prof Brenda Wingfield, associated with the Department of Genetics, has been elected to the Council of the Academy of Science for South Africa (ASSAf) for the 2012 to 2016 cycle, while Prof Robert (Bob) Millar, Director of the Mammal Research Institute (MRI), was inaugurated as a member of ASSAf.

Dr Carina Visser of the Department of Animal and Wildlife was elected as Vice-President of the Board of Directors of the International Goat Association (IGA) during the XI International Conference on Goats in Las Palmas, Gran Canaria.

Prof John Taylor of the Department of Food Science has been elected as a Fellow of the Academy of the International Association for Cereal Science and Technology (ICC).

Awards to our students include the following:

Gerda Fourie, a PhD student at FABI, received the 2012 L'Oréal-UNESCO Award for Women in Science from sub-Saharan Africa.

Ryan Reisinger, a PhD student in the Department of Zoology and Entomology, was awarded the Junior Captain Scott Medal for Zoological Sciences by the South African Academy of Science and Arts.

Theodor Loots, a student in the Department of Mathematics and Applied Mathematics, was awarded the Southern African Association for the Advancement of Science (S^2A^3) Bronze Medal for the work he did in his master's degree. He was born with about 5% sight.

Nadia Swanepoel, a PhD student in the Department of Animal and Wildlife Sciences, was awarded a California Animal Nutrition Conference (CANC) scholarship.

Sindisiwe Nondaba, a first-year MSc student, was awarded a fellowship from the Department of Science and Technology (DST).

Cynthia Joan Henley-Smith, a PhD student in Medicinal Plant Science, was awarded the Gen Foundation Grant for the advancement of her studies.

Being people-centred, the Faculty continuously seeks opportunities to recruit and appoint highly recognised researchers to strengthen existing research teams or to introduce new and relevant research focuses:

Prof Don Cowan, an international researcher of note and the former Director of the Institute for Microbial Biotechnology and Metagenomics at the University of the Western Cape (UWC), was appointed to lead the newly established Genomics Research Institute (GRI).

Prof Rivka Kfir, former CEO of the Water Research Commission, joined the University of Pretoria Water Institute and will play an important role in positioning the Institute in the national and international academic, governance and stakeholder environments.

Four new heads of department were appointed during the year under review: Prof Debra Meyer (Biochemistry), Prof Chris Theron (Physics), Prof Elna Buys (Food Science) and Prof Chris Chimimba (Zoology and Entomology).

Research highlights include the following:

Ms Yvette Naudé (a PhD student) and Prof Egmont Rohwer of the Department of Chemistry have developed a novel technique to investigate DDT in indoor air and in soil.

Dr Trevor McIntyre, postdoctoral researcher at the MRI in the Department of Zoology and Entomology, is conducting studies on the feeding habits of elephant seals.

Prof Bob Millar has not only published over 350 papers which have received over 10 000 citations, but has also recently published two articles in the prestigious *New England Journal of Medicine*, which is one of the highest ranked journals in the world based on its impact factor of 53.298. He received an A rating from the NRF.

Prof Zander Myburg of the Department of Genetics and FABI presented the results of the Eucalyptus Genome Project at the International Plant and Animal Genome Conference in San Diego, California, in January 2012. The Forest Molecular Genetics Programme is using a range of molecular biology and genomics technologies for gene discovery and functional genetics research and the development of molecular breeding tools for the genetic improvement of trees.

The Faculty of Natural and Agricultural Sciences has the depth and breadth of knowledge, and the capacity to have a significant impact on the country, Africa and the world and to benefit everyone and everything existing in the environment.

Prof Anton Ströh

A breakthrough in the detection of DDT

Ms Yvette Naudé, a PhD student, and Prof Egmont Rohwer of the Department of Chemistry have developed a novel ”green” technique to investigate and detect DDT in indoor air and in soil. Instead of using conventional solvent extraction methods, the research team uses silicone rubber in a unique way to isolate DDT from air and soil. This solvent-free technique is simple, cheap, fast, environmentally friendly and ultra-sensitive.

Since World War II, DDT (dichlorodiphenyl-trichloroethane) has been used worldwide on a variety of crops to control malaria, typhus, body lice, and bubonic plague. A bad rap because of its harmful effects on human health and the ecology has seen the use of DDT being discontinued in many countries, among others the USA. However, due to its efficacy and relative inexpensiveness, this organochlorine insecticide has not been banned in South America, Africa and Asia.

In certain areas of South Africa, DDT is still used today to control the malaria mosquito, where traditional dwellings are sprayed on the inside with DDT. Contaminated dust inside the dwellings presents an additional pathway for exposure to DDT, because dust may well be inhaled and swallowed.

Furthermore, the researchers developed a one-step air sampling method to collect both gas phase DDT and adsorbed DDT on airborne dust particles, unlike conventional methods that entail two separate sampling steps. In addition, a new environmental forensic tool to evaluate commercial DDT composition was developed.

As a substitute for the present expensive methods, the team devised an approach whereby conventional chromatographic equipment is used to first isolate the chiral compounds *o,p'*-DDT and *o,p'*-DDD (present as impurities in commercial DDT and in environmental samples).

The isolated compounds are then analysed on a chiral column to measure their respective enantiomeric ratio.

Subsequently, the team discovered that DDT:DDD ratios in indoor air and soil were unusual in that they did not match the ideal, certified ingredient composition of commercial DDT.

Ms Naudé and Prof Rohwer demonstrated the power of their new environmental forensic tool when they found that these unusual DDT:DDD ratios were not due to environmental degradation, but rather seemed to be the result of inferior DDT products used for indoor residual spraying. The insecticidal efficacy of these DDT products is unconfirmed.

“Prof Zander Myburg of the Department of Genetics and FABI has performed genome analysis to uncover the genomic diversity of the *eucalyptus*.”

Finding green alternatives for fossil fuel

Worldwide, fossil fuel reserves are diminishing and, coupled with the reality of accelerated global warming, finding sustainable and green alternatives for fossil fuel and derived materials has become a matter of urgency. As part of these research efforts, Prof Zander Myburg of the Department of Genetics and the Forestry and Agricultural Biotechnology Institute (FABI) and his team are focusing on understanding the genetics and biology of wood formation to enhance wood quality for industrial processing into fibre products and biomaterials such as chemical cellulose.

Prof Myburg was the principal investigator of a project funded by the United States Department of Energy (US-DOE) to decipher the genome of *Eucalyptus grandis*, a fast-growing forest tree considered to be a potential bio-energy and biomaterials crop.

The genome analyses performed by Prof Myburg and his research team, together with international collaborators, uncovered the tremendous genomic diversity of eucalypts, which underlies their wide adaptability and the expansion and identity of gene families involved in woody biomass production. *Eucalyptus* trees grow very fast and can deliver the necessary biomass for making these bioproducts.

As a contribution to this project, next-generation DNA sequencing technology was used to produce the first transcriptome sequence (more than 18 800 expressed genes) of a *Eucalyptus* plantation tree in South Africa.

In January 2012, Prof Myburg, who also holds the Chair in Forest Genomics and Biotechnology at the University, presented the results of the *Eucalyptus* Genome Project at the International Plant and Animal Genome Conference in San Diego, California.

“The main chemical component of wood is cellulose, while glucose is the building block of cellulose. Glucose can be used for energy in the production of biofuels and other renewable products, which is why research on plants rich in cellulose has become so important. The USA has announced that it wants to replace about 30% of its fossil fuels with biofuels and other alternative energy sources within the next 20 years,’’ explains Prof Myburg.

Unlike seasonal crops, trees can be harvested at any time and provide a stable supply of biomass. Wood processing is also well established in the pulp and paper industry and similar processing can be used to isolate the cellulose from the wood for biofuels and other products.

”Molecular genetics is fundamental to carbon fixation in woody plants and to the pulp and paper manufacturing processes of our industrial partners, Sappi and Mondi. We are addressing important scientific questions such as the genetic control of carbon allocation into cellulose, hemi-cellulose and lignin, the major biopolymers in wood fibre. For example, we have isolated the cellulose synthase (CesA) genes of *Eucalyptus* trees, as well as the transcription factors that drive the expression of these genes in wood-forming tissues. Future research in the Forest Molecular Genetics Programme will use systems biology approaches to gain an integrated understanding of cellwall biopolymer production in trees, and disease resistance mechanisms, which will be essential to protect future biomass crops,” concludes Prof Myburg.

Elephant seals keep diving deeper

Elephant seals may have to dive deeper to find enough food if current ocean-warming trends continue. According to Dr Trevor McIntyre, postdoctoral researcher at the Mammal Research Institute (MRI) in the Department of Zoology and Entomology, it was recently reported in the *Marine Ecology Progress Series* that the southern elephant seals, *Mirounga leonina*, from Marion Island are seemingly diving deeper and spending less time at targeted depths when diving in warmer waters.

This is ascribed to potential prey species occurring at deeper depths where their specific thermal preferences are met. The results in this manuscript form part of some of the outcomes from an intensive satellite tagging programme jointly undertaken by Prof Marthán Bester's research group at the MRI and colleagues from the Alfred Wegener Institute for Polar and Marine Research in Germany, as well as the University of Cape Town. For this, they deployed more than 70 satellite-relay data loggers on elephant seals hauled out at Marion Island. These tags are glued to the heads of immobilised seals and provide information on the positions and dive characteristics of seals, as well as environmental variables such as water temperature and conductivity via the Argos satellite system.

The results of this investigation suggest that the elephant seals of Marion Island will be forced to undertake more extreme dives and thereby incur greater physiological costs, should ocean warming continue. Southern elephant seals regularly exceed their so-called "calculated aerobic dive limits", diving continuously for prolonged periods (dives lasting on average anywhere between 20 and 30 minutes and separated by times at the sea surface of no longer than 2.5 minutes on average).

Dr McIntyre and his collaborators suggest that the Marion Island elephant seals are possibly already operating closer to their physiological limit, since seals from this population seem to be generally diving deeper and for longer periods in comparison to other populations. Coupled with shorter life spans recorded for seals from this population, it is hypothesised that there may be some physiological costs involved in what is described as a "deeper-diving, shorter-life" hypothesis.

This is something the researchers now plan to investigate in more detail, given the continued tracking of elephant seals at sea and an existing long-term mark resighting programme on Marion Island. This long-term data set provides a unique opportunity in that it is possible to start linking at-sea behaviour (through continued satellite tracking) with lifetime consequences in terms of survival and reproductive success.


“The research team of Dr Trevor McIntyre of the Mammal Research Institute is examining the effect of global warming on the southern elephant seals.”

Reproduction and the influence of the environment

Internationally renowned researcher in neuroendocrinology, Prof Robert (Bob) Millar, Director of the Mammal Research Institute (MRI) in the Department of Zoology and Entomology, has recently received an A rating from the National Research Foundation (NRF).

His research focuses on the mechanisms whereby diverse internal factors (such as sex hormones, stress hormones, infection, glucose, lipids and other metabolites) and external factors (such as day length, temperature, stress, chemicals and foods) signal to the brain, which then integrates this information to regulate reproduction. The area is known as the neuroendocrinology of reproduction and encompasses diverse neural networks that convey the environmental information to neurones that elaborate a hormone, gonadotropin-releasing-hormone (GnRH), which stimulates pituitary gonadotropins, which in turn stimulate the testes and ovaries. Examples of environmental factors affecting reproduction are nutritional deprivation related to the eating disorder anorexia nervosa and the loss of menstrual cycles due to weight loss in long-distance runners, which both result from a reduction in GnRH production and secretion.

Prof Millar is a pioneer in research on GnRH. He was the first to discover novel GnRH structures, the GnRH precursor and the GnRH receptors. These have contributed to the development of a billion-dollar market in GnRH drugs for the treatment of a range of diseases such as prostatic and other cancers, as well as endometriosis and polycystic ovarian disease, which afflict up to 30% of women.

Although it was clear that the GnRH was a master-brain hormone that controls reproduction, researchers had no idea how the diverse factors mentioned above regulated the GnRH neuron, as it lacked receptors for the regulators. This conundrum has recently been solved by the discovery that mutations in genes encoding two brain hormones and their receptors led to a failure in humans to progress through puberty. The hormones Kisspeptin and Neurokinin B are now a major focus of Prof Millar's research, directed at understanding their role in the physiology of reproduction and in developing new drugs for treating diseases of human reproductive tissues.

> "The Mammal Research Institute at UP focuses on the mechanisms of internal and external factors regulating reproduction."

Prof Millar's contribution to these advances in knowledge has been published in many publications, including two recent articles in the prestigious *New England Journal of Medicine,* which has one of the highest impact factors of all journals.

These articles and others described mutations in the human GnRH, Kisspeptin and Neorokinin B genes that result in a failure to advance through puberty.

Prof Millar was also solicited to publish these findings in an article in *Nature Reviews, Endocrinology*. He is now using this clinical knowledge to understand how environmental stresses, such as food deprivation, infection (for example, tuberculosis) and high temperatures resulting from climate change impinge on the neuroendocrine system to affect reproduction in wildlife and livestock, and how responses to Kisspeptin and Neurokinin B are a sensitive index of stress and disease.

He is also developing a contraceptive vaccine directed against these hormones as an alternative to the castration of livestock and companion animals.

FACULTY OF THEOLOGY

The Faculty of Theology has a competitive research and postgraduate record. This is reflected by the increasing number of staff members rated by the National Research Foundation (NRF) – currently standing at 15; the competitive research output of publications in Institute for Scientific Information (ISI)-listed journals; and the increasing number of postdoctoral fellows.

In 2012, the Faculty engaged in interdisciplinary and transdisciplinary research on social cohesion, with a focus on the problem of poverty, the challenge of reconciliation and the need for restorative justice, involving key role-players in different sectors of society, industry and academia.

The Faculty has a multireligious, multidisciplinary and an interdisciplinary programme of biblical and religious studies. Apart from increasing students' levels of knowledge about the different world religions, the programme is intended to create an ethos of interreligious dialogue, tolerance and mutual respect in the Faculty and at the University of Pretoria at large.

Dean: Prof Johan Buitendag

During 2012, three international seminars on the Pentateuch, Psalms and Prophets were organised, while special lectures were presented by Prof Eckart Otto (an extraordinary professor from Munich), Prof James A Loader (an extraordinary professor from Vienna) and Prof Ulrich Berges (an extraordinary professor from Bonn). The Department published extensively: 17 articles in accredited journals, six conference proceedings, four chapters in books and three books. Emeritus Professor Andries Breytenbach was pivotal in the IsiNdebele translation of *The Bible*, which appeared in 2012.

The Department of Church History and Church Polity presented the first South African Congress on Augustine of Hippo and the Manichaean Christianity. This resulted in a series of scholarly articles published in scientific journals. A book will be published internationally by academic publishing house Brill. Prof Graham Duncan has been working in the area of Protestant responses to the Second Vatican Council 50 years on and has drawn parallels between the increasing conservatism of the Roman Catholic hierarchy, the persecution of academic theologians and the decline in ecumenical commitment.

The Department of Science of Religion and Missiology hosted the Second Interreligious Forum Conference entitled *Religion and Ecology*. The Department hosted a conference in association with Radboud University in Nijmegen on the missional church in changing contexts. Two members of the Department, Prof Nelus Niemandt and Prof Thias Kgatla, attended the 13th International Association for Mission Studies (IAMS) Conference in Toronto and presented papers on the theme *Migration, religion and identity: Missiological theoretical issues*.

The Head of the Department of Practical Theology, Prof Yolanda Dreyer, held her inaugural address with a paper entitled “Transvaluation of values in practical theology – a circular movement”. Prof Julian Müller presented the eighth lecture in the UP Expert Lecture Series on 5 September 2012 with a lecture entitled “(Practical) theology: A story of doubt and imagination”.

A very active collaboration exists between the Department of Practical Theology and several international scholars, such as Prof Marcel Barnard, well-known liturgy scholar of the Protestant University in Nairobi, and Dr Abamfo Atiemo of the University of Ghana. Prof Leonora Tubbs Tisdale of Yale University presented a seminar with the Worship in Africa Research Group (WARG). Two monographs were published by Prof Johann Meylahn and Prof Dreyer of the Department.

The Department of Dogmatics and Christian Ethics had a productive research year, with 21 accredited journal publications, five contributions to books and one monograph by Dr Willem Fourie. The Department is distinguishing itself in interdisciplinary research.

Prof Danie Veldsman read a paper on the significance of evolutionary biology for theological reflection at the University’s 3rd Neuroscience Day, and Dr Vuyani Vellem read a paper in Brazil at an international conference on alternative economic architecture.

With the support of the New Partnership for Africa’s Development (NEPAD) and the United Nations Development Programme (UNDP), Dr Fourie paid a visit to Dar es Salaam as part of a project on leadership in Africa. A very special occasion for the Department was the honorary doctorate awarded to Prof Klaus Nürnberger, professor emeritus and senior research associate at the University of KwaZulu-Natal, by the University of Pretoria.

There were several highlights in the Department of New Testament Studies. Prof Gert Steyn received a B rating from the NRF, as well as an Exceptional Academic Achiever Award from the University. He also held his inaugural lecture on Paul’s interpretation of Yehoshua ben Yoseph through the Scriptures of Israel, and hosted a highly successful international conference on Moses in second-temple Judaism and early Christianity. He was invited to present a paper on Philo and the Septuagint in Wuppertal, Germany.

Prof Ernest van Eck was invited to lecture in Cameroon for a number of weeks and was invited to read a paper on the parables at the Society of Biblical Literature (SBL) Conference in Chicago. Prof Kobus Kok was promoted to associate professor and was invited to lecture in Nijmegen, the Netherlands, while conducting research there. Dr Elijah Mahlangu completed two books.

In keeping with the University’s academic goals to increase access, throughput and diversity and to strengthen the University’s international profile and visibility, the Faculty will keep on strengthening its postgraduate programmes and research, increase the number of postgraduate students, and improve the conditions under which postgraduate students perform.

Prof Johan Buitendag

Exploring the South African ritual-liturgical landscape

Prof Cas Wepener, Associate Professor in the Department of Practical Theology, focuses his research efforts on religious practices in their particular context, with a special emphasis on religious rituals and Christian liturgy. He has described a ritual-liturgical landscape in South Africa that cannot really be equated with that of any other country.

“Ritual expressions of religion and spirituality range from high masses celebrated in cathedrals, sermons preached in reformed worship services, pilgrimages to holy men or places and the ritual slaughtering and sacrificing of animals. All these rituals and many more form part of the South African ritual-liturgical landscape,” explains Prof Wepener.

This poses challenges to the traditional theological discipline of Liturgical Studies, but at the same time provides research possibilities that challenge on all fronts. In terms of epistemology, methodology and sources, this discipline is currently being reinvented and, in South Africa, must happen in a unique way, which includes, among other things, a fair amount of labour-intensive research initiatives by means of the ethnographic style of research of actually performed rituals.

Prof Wepener’s research engages this ritual-liturgical landscape between the poles of more fixed inner-ecclesial ritual expressions to more fluid expressions of which some are not necessarily connected to official ecclesial liturgy and which some will not designate with the term liturgy, but rather more generally as ritual.

“What these phenomena share is that they are all ritual and/or liturgical expressions of religion and spirituality, and are core elements of South African culture(s). As such, they are important lenses regarding the beliefs and values they embody,” concludes Prof Wepener.

Mission and ethics in Early Christianity

The research of Prof Kobus Kok in the Department of New Testament Studies focuses on the dynamic relationship between mission and ethics in the New Testament and Early Christianity.

“This relates to investigations into the way Early Christianity constructed its social identity in times of conflict and change, and how social boundary markers were created and maintained, but also creatively transcended,” explains Prof Kok.

Mission refers to the self-understanding of early Christians that they were taken up in the *Missio Dei*, and deals with the expansion of “Christianity” and its attractional and incarnational ethos. Ethics is understood as the systematised reflection on the implicit motivation for action, following the ancient philosopher Aristotle, and ethos is understood as institutionalised behaviour within a particular group.

“Every group has inclusive and exclusive social boundary markers (ethos). Inclusive social ethos is shared with the rest of society and enables integration with society. Exclusive social ethos refers to those boundary markers that differentiate the group from outsiders and serves to strengthen identity to the inside,” says Prof Kok.

When the “Christian” movement started, the first followers were still part of Judaism and had not yet developed into a distinct “religion”.

“It is, in fact, anachronistic to call the first followers of Jesus ‘Christians’. The Greek term ‘Christianoi’ (Christians) was only coined towards the end of the first century, probably long after the death of the first apostles and leaders like Paul,” says Prof Kok.

Only in the second century did Christian authors start referring to themselves as a separate religion or group. Prof Kok thus investigates how the “parting of the ways” between Judaism and the movement that would later be called Christianity, took place.

The research process revealed the complexity and possibility of multiple identities within the ancient self and the necessity to explore this cutting-edge research area. Prof Kok used the insights of the polyphonic dialogicality of Bakhtin and Dialogical Self Theory, drawing on the former to investigate the possibility that early Christians struggled with a multiplicity or polyphony of selves as they went about the construction of early Christian identity in dialogue with their previous identity or identities before conversion to this new movement.

The latest research results of the project will be published in a book, *Sensitivity to outsiders,* authored with Mohr Siebeck of Tuebingen.

New insights into the parables of Jesus

In research conducted by Prof Ernest van Eck of the Department of New Testament Studies on the interpretation of the parables of Jesus the Galilean, important conclusions were drawn and historical gaps in parable research were filled in. Some of his most important findings include the fact that texts consist of different contextual, referential and textual worlds, and that, with regard to the Synoptics, this pertains to the way in which the evangelists (in and for their contexts) reinterpreted the words and deeds of the historical Jesus of Nazareth.

"Through my research I realised that when one is interested in the life and work of the Jesus who grew up and conducted most of his public activities in Galilee, somewhere between 6 BCE/4 CE and 30 CE, the exegete should make a definite distinction between, for example, the Markan Jesus and the historical Jesus," explains Prof Van Eck.

Little has been done in interpreting the parables of the historical Jesus, since most scholars read the parables in their literary context, which means they are studied as the parables of the Lukan or Markan Jesus. Very few parable scholars employ social-scientific criticism in interpreting the parables.

Prof van Eck used a different approach. "Jesus told his parables in first-century Palestine, which was an advanced agrarian society under the control of the Roman Empire. A reading of the parables that does not take this socio-economic and political backdrop seriously tends to be anachronistic," he says.

Interesting findings that have been yielded include Prof van Eck's reading of the parable of the Tenants (Gospel of Thomas 65/ Mark 12:1–12 and par), which indicates that Jesus proclaimed non-violence; the parable of the Feast (Luke 14:16b–23), which proclaims radical inclusivity; and the parable of the mustard seed (Luke 13:18–19), which questions religious respectability as understood by the Kingdom of the Temple, and undermines imperial interests of the Kingdom of Rome.

His research on the parables typifies Jesus as a social prophet proclaiming social justice, and shows that reading the parables in their historical socio-political and economic context has a serious impact on their possible meanings. In essence, his research has emphasised the importance of the basic point of departure of social-scientific criticism, namely that a text is always the product of its social context; thus, if one wants to understand a text, one should first understand the social context that produced the text.

> "The research of Prof Ernest van Eck accentuates the importance of understanding the social context that produced a text."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A NEW ENGLISH TRANSLATION OF THE SEPTUAGINT
SEPTUAGINT

Cutting-edge research on the Septuagint in New Testament Studies

Prof Gert Steyn of the Department of New Testament Studies focuses his research efforts particularly on the nexus of Hellenistic Judaism and Early Christianity, and especially the roles that "the" Septuagint – the LXX, i.e. the Greek translation of the Old Testament – and Philo of Alexandria played in the textual history of the New Testament and on the hermeneutics of its authors.

This requires meticulous work based on the ancient manuscripts and the painstaking reconstruction of some of the earliest versions of the LXX through his analytical work on the explicit quotations in the *Corpus Philonicum* and the *Novum Testamentum*.

"My research is thus conducted against the backdrop of the Graeco-Roman contexts of that time and my approach includes mainly historical, philological, sociological and hermeneutical dimensions," says Prof Steyn.

Previous research by Prof Steyn on the LXX quotations in the Acts of the Apostles led to the discovery that one cannot merely compare "the" LXX and "the" New Testament, as these are eclectic and reconstructed texts in printed editions. One should rather compare the *manuscripts* of these collections with each other.

Weaknesses of former comparative approaches that compared text editions were clearly pointed out after minute text-critical work on the *Textvorlage* of the quotations in the Acts of the Apostles, which in turn led to his main research project over the last few years, namely a quest for the assumed Septuagint *Vorlage* (base text or original pretext) of the explicit quotations in the book of Hebrews – an appropriate case study due to its high frequency of explicit quotations.

Prof Steyn currently pursues research on the intertextual field of Septuagint Studies in the text forms of the LXX Torah quotations within the *Corpus Philonicum* and the New Testament in collaboration with colleagues from abroad.

"Ultimately, my aim is to produce a four-volume synopsis of textual variants on the Old Testament (LXX) quotations in the New Testament," concludes Prof Steyn.

> "Prof Gert Steyn of the Department of New Testament Studies aims to produce a four-volume synopsis of textual variants on the Old Testament quotations in the New Testament."

FACULTY OF VETERINARY SCIENCE

Dean: Prof Gerry Swan

In 2012, the Faculty of Veterinary Science came to the end of a very successful five-year plan that formed part of the strategic plan of the University of Pretoria. Both plans emphasised the importance of increasing the quality and quantity of research outputs in support of the University's objective to become a research-intensive institution. This can only be achieved by developing effective postgraduate programmes supervised by world-class staff members without neglecting the basic responsibility of providing the highest quality of undergraduate training.

Measuring the growth of the research outputs over the five-year period it is useful to evaluate the success of the plan. Subsidy-earning units, which reflect the number of scientific publications by staff members and students, increased from 65,31 to 89,79, representing a growth of 37,5%. The budget for postgraduate bursaries almost doubled from R386 000 to R610 640, benefiting mostly PhD students. The number of staff members rated by the National Research Foundation (NRF) increased from 17 in 2008 to 26 in 2012, a growth of 52,9%. A significant achievement is the fact that the research output per academic staff member was one of the highest in the University in 2012.

The mandate of the Faculty of Veterinary Science is the protection of animal health, which often also impacts on human health, thereby stimulating economic growth and food security. An efficient research programme must therefore meet the needs of society, but remain relevant to a constantly changing environment and contribute to internationally recognised new knowledge. The Faculty concentrates its research on the following areas:

- **Molecular studies on infectious and parasitic diseases of animals:** A research focus utilising biotechnology for the development of improved diagnostic techniques and vaccines for animal diseases and for the study of their pathogenesis.
- **Phytomedicine and ethno-veterinary medicine:** An established multidisciplinary and collaborative research programme focusing on the development of extracts from plants with antimicrobial or anti-parasitic activity for use in animal production.
- **Wildlife and environmental health:** An inclusive research focus with contributions from all five departments of the Faculty, including studies on tuberculosis in buffalo, immune-contraception in elephants, theileriosis in roan and sable, the toxicity of non-steroidal anti-inflammatories in vultures and endocrine disruptors in the environment.
- **Veterinary aspects of food safety and food security:** An established research focus, which includes programmes in veterinary public health, community development, epidemiology and risk assessment and poultry health.
- **Equine and companion animal health and welfare:** Research that focuses on infectious and other diseases of horses and other companion animals with an important impact on trade and sports medicine (racing industry) or on the welfare and management of these animals.

- **Anatomical and physiological studies on animals:** Studies focusing on the basic knowledge about the structure and functions of various animals, which is required for any further investigations. At present the emphasis is on wildlife and exotic livestock.

An important initiative was the implementation of selected Institutional Research Themes (IRTs), chosen on the basis of the existing strengths of the University and their potential to stimulate interfaculty and international collaboration as a method to promote research. Five themes were initially approved for special funding, and the Faculty actively collaborates in three of these: Animal and Zoonotic Diseases, Genomics, and Food, Nutrition and Wellbeing. Six proposals submitted for each of the first two IRTs were approved for funding in 2012/13.

A second milestone was the allocation of its first Research Chair, for Poultry Health and Production, with the financial support of the poultry industry, and the appointment of Prof Celia Abolnik as incumbent of the Chair.

The signing of a Memorandum of Agreement for the establishment of the Tshwane Animal Health Biocluster was a major event. The agreement was sealed between the Technology Innovation Agency (TIA), the Agricultural Research Council (ARC), the Council for Scientific and Industrial Research (CSIR), Onderstepoort Biological Products (OBP), the NRF and the University of Pretoria. The purpose of the agreement is to stimulate collaboration between these six bodies in the development of commercially viable technologies for the control of animal diseases that are of major social and economic importance for South Africa and the entire Southern African region. In the first round of applications for funding, nine proposals were successful, amounting to a total of R23 902 255.

During 2012, 82 research protocols were approved by the University's Research Committee. The themes involved serve to illustrate how research is influenced by social and broader needs and opportunities. Five projects support the protection of rhinoceros, ranging from the genetic identification of individual animals, anatomical features, susceptibility to various diseases and the treatment and prognosis of animals injured during poaching. The Veterinary Genetics Laboratory (VGL), headed by Dr Cindy Harper, made a major contribution in the war against rhino poaching by means of the Rhino DNA Index System, which is a database with DNA samples of all rhinoceros in South Africa, Zimbabwe, Kenya, Botswana and Namibia. The research on ways to protect rhinoceros continues.

The pollution of the environment, especially of river systems by mine effluents, was addressed in studies on its effect on the reproduction of domestic and wild animals, the pansteatitis problem in crocodiles and on using catfish cultures to measure pollution.

Prof Kobus Eloff, Manager of the Phytomedicine Programme, received a Gold Medal from the Academy of Science of South Africa (ASSAf). He was the first person to receive gold medals from both ASSAf and the South African Academy for Science and the Arts. Earlier in 2012, Prof Eloff also received the NSTF-BHP-Billiton Award for an outstanding contribution to science, engineering, technology and innovation through research capacity development over the last five to ten years.

Six new projects were initiated in the Mnisi area, involving the training of emerging small-scale farmers and research at the animal/human/wildlife interface. The research incorporates diseases such as tuberculosis, brucellosis, foot-and-mouth disease, rabies, tick-borne diseases and the development of acaricide resistance by ticks. Studies on vaccine development and improvement included work on Rift Valley fever, anthrax and African horse sickness.

The Faculty is proud of its accomplishments and unique national role, and is confident that it will continue to contribute to establishing the University as the leader in veterinary research on the continent.

Prof Gerry Swan

How the ratite tongue prevents choking

Dr Martina Crole of the Department of Anatomy and Physiology in the Faculty of Veterinary Science has studied the ratite tongue and laryngeal mound to establish why birds do not choke, as birds do not have an epiglottis and the glottis of ratites is very wide. In this novel research, she used fresh specimens that were still flexible and could be manipulated by using forceps and her fingers (as opposed to preserved specimens that cannot be manipulated in this way).

In the case of the ostrich (*Struthio camelus*) and emu (*Dromaius novaehollandiae*), the glottis is situated on an elevated structure, the laryngeal mound. It is imperative that the glottis should be protected and closed during swallowing, but in the absence of an epiglottis, the question arises as to how these birds avoid inhalation of food and other matter.

During the study, it became clear that specific morphological peculiarities of the tongue were perfectly specialised to assist in the closure and protection of the wide glottis. Numerous authors have noted the pocket in the tongue body of the ostrich and the prominent, triangular tongue root of the emu, but the function of these adaptations has eluded them.

It became apparent that in the ostrich, when the glottis was closed and the tongue body retracted, the smooth tongue root became highly folded and the rostral portion of the laryngeal mound was encased by the pocket in the base of the tongue body. In this position, the lingual papillae also hooked over the most rostral laryngeal projections. However, in the emu, retraction of the tongue body over the closed glottis resulted in the prominent, triangular tongue root sliding over the rostral portion of the laryngeal mound.

In both species, these actions resulted in the rostral portion of the laryngeal mound and weakest point of the adducted glottis being enclosed and stabilised. This unique anatomical mechanism was named the linguo-laryngeal apparatus.

“Numerous authors have noted the pocket in the tongue body of the ostrich and the prominent, triangular tongue root of the emu, but the function of these adaptations has eluded them.”

New research on poultry diseases

The South African Poultry Association (SAPA) and the Faculty of Veterinary Science have launched the Poultry Disease Management Agency (PDMA) and Poultry Research Chair at Onderstepoort. Prof Celia Abolnik of the Department of Production Animal Studies has been appointed as the first incumbent of the Chair.

The Chair conducts research into issues that affect South Africa's poultry industry, with a current emphasis on poultry diseases, such as avian influenza, Newcastle disease, infectious bronchitis virus, salmonellosis and mycoplasmosis.

It works closely with the PDMA, poultry specialists in the Department, diagnosticians in the Faculty, collaborators across the country and world experts in specific diseases.

Focus areas, guided by the needs of the industry, are taken up by postgraduate students as projects towards their master's and PhD degrees.

The major goals for the first year were to source funding for projects, set up a molecular research laboratory, recruit postgraduate students and upgrade the existing poultry facilities. Four successful grant applications with a cumulative value R7.9 million include a grant on the Institutional Research Theme (IRT) of Animal and Zoonotic Diseases for avian influenza surveillance, and three Tshwane Animal Health Cluster (TAHC) grants to establish expanded Influenza A Antigen and Antisera panels, conduct full genome sequencing of poultry mycoplasmas to develop molecular tests that differentiate vaccines from field strains, and develop H5- and H7-specific ostrich enzyme-linked immunosorbent assays (ELISAs).

> Prof Celia Abolnik holds the Chair in Poultry Research at UP.

A smaller grant was secured from SAPA to investigate mycoplasma on hair samples. The study was completed and has been submitted for publication. Several postgraduate students have also conducted laboratory work on H6N2 influenza and infectious bronchitis virus sequencing projects. Two students completed their master's degrees and published dissertations on serological surveys of the Newcastle Disease Virus (NDV) in Zambia and the genomics of the West Nile Virus in South Africa respectively.

The isolation of the pathogens is vital, and rapid full genome sequencing is now possible using random amplification deep sequencing approaches, coupled with advanced genomic analysis. The technology is particularly powerful in that the direct sequencing of clinical specimens is also being performed, which has proved useful in cases where the cause of disease in poultry flocks has not been identified by the national laboratories using conventional technology. A good example is the recent discovery of Avian Gyrovirus 2 in a chicken flock with 100% mortality and neurological symptoms. This was the first report of this virus on the African continent.

The University supports national diagnostic laboratories by conducting deep sequencing analysis on samples that have been problematic using conventional techniques. Low pathogenic avian influenza of the H7N1 serotype was identified in a sacred ibis sample from Gauteng, and several of the ostrich and chicken isolates from outbreaks in late 2012 have been serotyped and pathotyped. The entire South African avian influenza virus collection since 1991 has been resequenced, and a major published review of the molecular epidemiology of the disease in southern Africa is being planned with the Faculty's collaborators.

The management of African swine fever

African swine fever (ASF) is the greatest limitation to the development of the pig industry in Africa, as well as in parts of Asia and Europe. In an attempt to develop a risk-based approach to understanding the epidemiology of ASF and controlling the disease, Dr Dayo Fasina, a senior lecturer in the Department of Production Animal Science specialising in porcine health and production, conducted a research project on Nigerian piggeries to determine the risk factors associated with the disease.

In order to promote biosecurity practices on farms and raise awareness among farmers, a study was also done on the cost implications of the disease for smallholders. In addition, Dr Fasina and his team assessed the claims of the effectiveness of ethnoveterinary preparations in the management of ASF during fatal outbreaks. Risk factors were divided into farm environment and management practices, and self-reported biosecurity practices.

From the study, it emerged that the presence of an abattoir in pig communities was the factor that influenced ASF infection the most. This can be ascribed to the fact that sick pigs are presented for slaughter at abattoirs first, and farmers often participate in processes on abattoir floors, with the consequent risk of farm infection. The second factor was the presence of an infected farm in the neighbourhood.

The other risks that were identified include the routine purchase of mostly untested pigs, the keeping of other livestock alongside pigs, wild birds having free access to pig pens, tools and implements that are routinely shared between pig farmers (and not cleaned and disinfected), free access to feed stores by rats and purchasing feed from a commercial source.

In a second study, a financial model and costing were used to estimate the economic benefits of effective biosecurity against ASF. A possible reason for the persistence of the virus in the Nigerian pig population is a lack of, or poorly implemented biosecurity measures.

The results of the study suggest that pig production is a profitable venture that can generate a profit of approximately US$109 637 per annum, and that an outbreak of ASF has the potential to cause losses of up to US$910 837 in a single year. (The huge loss in the first year is due to the actual plus potential losses that the farms will incur. Actual loss will be much smaller, but the potential value of the animals, the potential offspring, potential profits and other potential benefits will significantly increase the value.)

It was indicated that a full implementation of biosecurity measures would result in a 9.7% reduction in total annual profit, but this was justified in view of the substantial costs incurred in the event of an ASF outbreak.

Testing of the plant *Ancistrocladus uncinatus* against the ASF virus *in vitro* suggested some degree of effectiveness of this plant-based treatment, but a certain cytotoxicity was also observed, which is currently a limitation to the broader adoption of the phytochemicals found in this plant.

It will become necessary to further assess and determine the cytotoxic constituents of the plant and find ways to eliminate them.

Further collaborative work in this regard and on other aspects of ASF research are ongoing.

Subsistence farming to ensure food security

Dr Darryn Knobel, a senior lecturer in the Department of Veterinary Tropical Diseases, has conducted a longitudinal study to determine how communal farming can contribute to food security. This study was prompted by the fact that food security is a topic of worldwide concern.

Although South Africa has so far managed to meet its national food requirements, the country is plagued by the inequality in household food security. Progress has, however, been made in this regard, with social grants to vulnerable households dramatically having reduced the number of households experiencing hunger. However, grants are increasingly seen as being unsustainable.

South Africa's Integrated Food Security Strategy, which was adopted in 2002, aims to eradicate hunger, malnutrition and food insecurity by 2015. One of its objectives is to increase the participation of food-insecure households, particularly those in rural areas, in agricultural activities.

As small-scale agricultural activity may be a significant contributor to food security and livelihoods (if policy recognises its value) and since little is known about the smallholder and subsistence sector in South Africa, Dr Knobel launched a Health and Demographic Surveillance System (HDSS) in livestock in a Demographic Surveillance Area (DSA). For the purposes of this study, this is the defined geographic area of Mnisi in Bushbuck Ridge, Mpumalanga.

Mnisi is the ideal location for this study for a number of reasons. In the first instance, the University's Faculty of Veterinary Science is already involved with the Mnisi community by way of a community engagement initiative. Furthermore, 75% of Mnisi's boundary is shared with wildlife reserves. Although 14 400 cattle are communally owned by 1 300 farmers, productivity is constrained by factors related to the community's proximity to wildlife reservoirs of economically important cattle diseases, of which foot-and-mouth disease is the most prominent.

An HDSS measures demographic and health variables on a longitudinal basis at regular intervals in the DSA. It follows up the entire population of such an area, collects vital baseline information, and provides a platform for the design and evaluation of a wide range of health, social, economic and behavioural interventions and research studies. The overall objective of the HDSS is to assist policy-makers in setting priorities and allocating resources more efficiently. More specifically, the HDSS aims to accurately measure productivity and rates of disease to identify determinants of health and productivity and to provide a platform for testing interventions.

If such a platform can be created, the outputs of the project are potentially enormous. It would provide a framework for student projects of any scope, and collaborations can be formed with research groups interested in specific topics. The outcomes of such research can provide valuable information for policy-makers in order to formulate strategies and policies.

From an economic point of view, it will also be beneficial. Apart from creating jobs (nine of the top ten employment generators in the economy are in agribusiness), communal livestock owners can supply low-cost meat to the processing sector. The communal sector can be enabled to optimise its production efficiency through low-cost interventions, while it ensures sustainability through the conservation of the natural resource base on which it depends.

GORDON INSTITUTE OF BUSINESS SCIENCE

Dean: Prof Nick Binedell

Over the years, the Gordon Institute of Business Science (GIBS) has sought to integrate and manage the dynamics between the need for research and teaching that is locally relevant and addresses specific South African challenges and needs, while ensuring that the quality of programmes and research interests remain globally relevant.

GIBS has been consistently rated as one of the top five business schools in South Africa by the *Financial Mail*. It is ranked 49th overall in the *Financial Times*' annual ranking of open executive education – the only African business school to be placed in the top 50 in this category.

In terms of its teaching, GIBS has long seen this tension as a potentially productive one, and offered both types of interventions. Prof Helena Barnard has published evidence that, in terms of research, there is not a trade-off between local relevance and global excellence. On the contrary: in a paper that uses National Research Foundation (NRF) ratings as evidence, Prof Barnard and her co-authors demonstrate that the world-leading scholars in South Africa remain deeply connected to the local knowledge system. In fact, they tend to be more productive than less esteemed colleagues, suggesting that the perceived tension between "quality" and "quantity" of research does not exist in the South African context.

Another influence informing scholarship at GIBS is the potential tension between theory and practice. In professional schools such as medicine, law and business, much research is, by definition, applied but management scholars, especially in North America and Europe, have often privileged the creation of theory over practically relevant knowledge creation. The Enron scandal and global economic crisis have challenged such a view, and as the leading business schools worldwide try and reposition their research to take greater cognisance of practice, GIBS is particularly well positioned to do quality research.

In January 2013, GIBS hosted the first-ever meeting of the Academy of Management – the leading scholarly association for management scholars – outside of North America. The competitive call for proposals for the hosting of the conference called for a conference that innovated what a conference could be. GIBS won the bid with a proposal that sought to connect scholars with practitioners.

A substantial part of 2012 was dedicated to the design and development of a novel conference format: The traditional conference presentations were combined with visits from leaders in businesses and NGOs, and with learning journeys to investigate first-hand how business and management take place in a rapidly changing economic and social context. The conference attracted considerable attention both in the press and in the academic community, and GIBS continues to reap the success of the conference in terms of new academic contacts and research collaborations.

One of the big challenges GIBS seeks to address relates to energy and alignment in organisations, and in terms of research, this translates into a concern for leadership and leadership development.

Prof Margie Sutherland and Prof Karl Hofmeyr co-authored an article with an MBA student (Kobus Louw), on the topic of productive organisational energy. This renewable resource is often the differentiator between successful and mediocre organisations, and by better understanding where that "magic" ingredient in organisations comes from, it is possible to create that resource.

Dr Mandla Adonisi continued his work on corporate entrepreneurship, also highlighting the conditions under which people are willing to "go the extra mile" in their organisation.

Another important theme GIBS seeks to address is in the area of competitiveness, including a focus on international competitiveness and the role of business in society.

GIBS is deepening the quality and increasing the extent of outputs in this theme, and is proud of a co-authored paper of three faculty members, Prof Nicola Kleyn, Michael Goldman and Kerry Chipp, in one of the leading journals that aims to bridge the gap between theory and practice, the *California Management Review*.

Their paper investigates the development of a strong corporate ethical identity among suppliers, and identifies the factors that contribute to the formation of an ethical identity.

Another output contributing to GIBS's standing as a leading institution worldwide in the area of business and management research in Africa is the book *New markets new mindsets*, written by Prof Kleyn, Dr Tashmia Ismail and Gwen Ansell of GIBS.

GIBS is pleased that 2012 marked clear progress in the development of a knowledge base to support its work in other areas.

Prof Nick Binedell

Bridging the divide between global excellence and local relevance

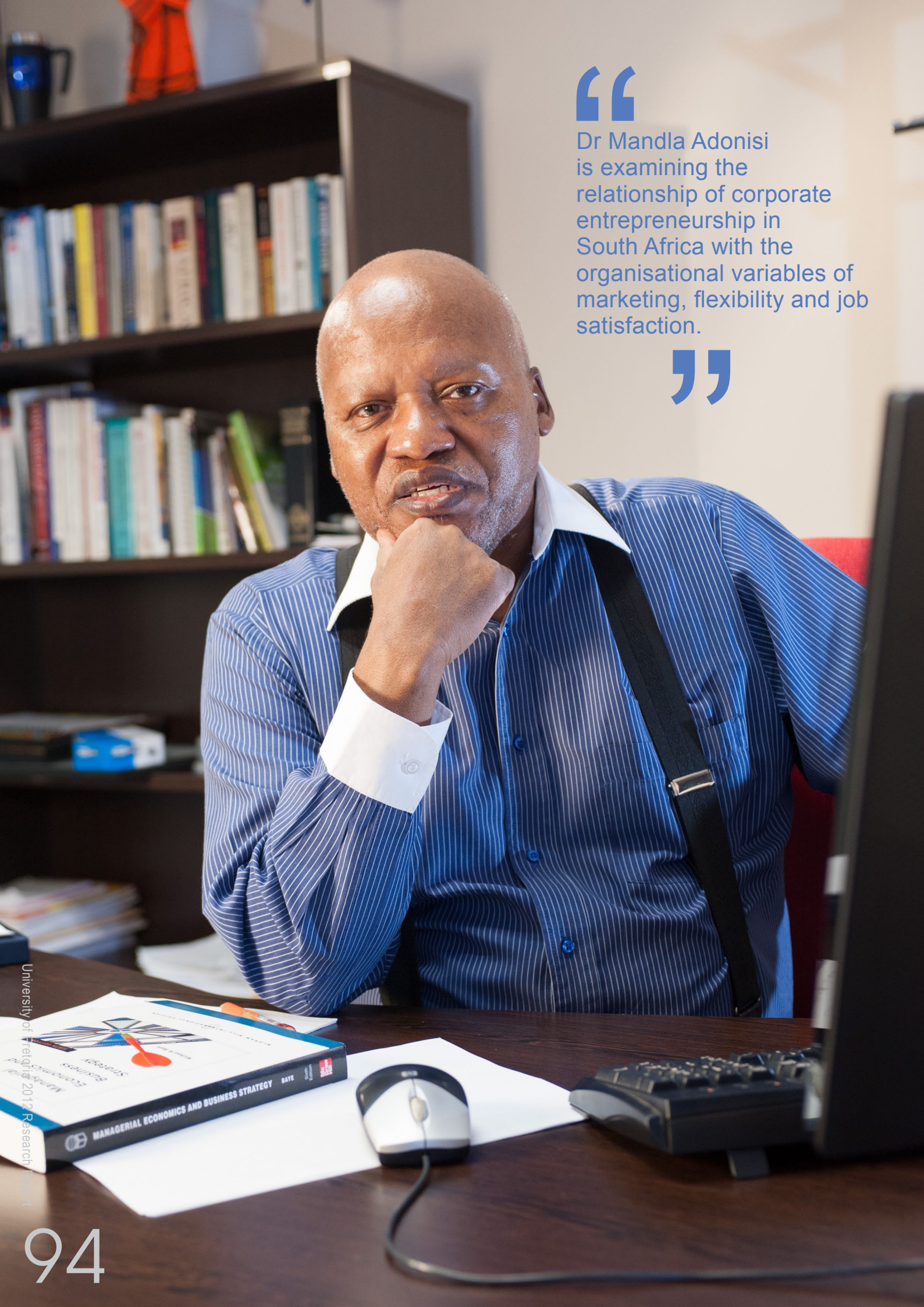
Prof Helena Barnard, a Y-rated researcher and Associate Professor at the Gordon Institute of Business Science (GIBS), has been considering the question whether tertiary institutions in the developing world place too much emphasis on attracting and producing top-notch, world-leading researchers, at the expense of globally less acknowledged, but still competent researchers, on the one hand, and the local relevance of their work on the other.

According to the findings of research conducted in South Africa in 2012, the answer to this question, thankfully, is no on both accounts. This research was conducted in collaboration with Robin Cowan of the United Nations University's Maastricht Economic and Social Research and Training Institute on Innovation and Technology (UNU-MERIT) and Moritz Müller of the Swiss Federal Institute of Technology (ETH), Zurich. Their research provides conclusive evidence that world-leading research done in a developing country has a direct benefit for other researchers in their home country. "Developing countries benefit from access to more advanced sources of science and technology through global connectedness, provided the new knowledge can be shared locally. World-leading researchers from developing countries are ideally placed to act as conduits for local knowledge-sharing, because they are at the frontier of knowledge creation through their international standing," says Prof Barnard.

The research priorities of a developing country may differ considerably from those of the international research community. Thus, there is a risk that researchers who can be described as “world-leading” may have achieved their international recognition at the expense of locally relevant research. Finally, collaboration requires time and effort, and sometimes co-authorships with less competent partners can slow down researcher productivity. World-leading researchers from the developing world who are engaged in the leading global knowledge networks of their field may, because of practical considerations, not have time to collaborate with local researchers. “In all three areas, it is assumed that there has to be some form of trade-off, and that when world-class researchers opt for global connectedness, local connectedness is sacrificed.”

However, evidence suggests that this assumption is not true. Indeed, the research provides evidence that in a country that is behind the technological frontier, world-class researchers act as important conduits of knowledge into the local academic research community. The more competent the researchers, the better connected they are beyond the local research community in a global network, and they seem better able to manage collaborative relationships. The main difference between the higher and lower-rated researchers is that higher-rated researchers are more prolific producers of articles than their counterparts.

> “Prof Helena Barnard provides evidence that world-leading research done in a developing country has a direct benefit for other researchers in their home country.”



Dr Mandla Adonisi is examining the relationship of corporate entrepreneurship in South Africa with the organisational variables of marketing, flexibility and job satisfaction.

Corporate entrepreneurship holds the key to economic success

In an economic climate where there are high levels of unemployment, an entrepreneurial spirit in the workplace is widely regarded as crucial to secure the growth and survival of an organisation. Indications are that South Africa, as a rapidly developing country, exhibits rather low levels of entrepreneurship.

Dr Mandla Adonisi, a senior lecturer at the Gordon Institute for Business Science (GIBS) in the areas of organisation development, leadership and strategy, together with corresponding author, Prof René van Wyk, investigated the relationship of corporate entrepreneurship in a sample of 333 managers at four different industries in South Africa with the organisational variables of marketing, flexibility and job satisfaction.

“The profound dynamic changes that the South African business environment is going through and the low level of business development in the country beg for entrepreneurial innovation. These changes were in part exacerbated by the global economic recession, which continues to have devastating effects. Although South Africa has been able to lessen its impact, many industries are still reeling under the effects. In addition, the entry of international heavyweights, such as Wal-Mart, to the local market has created new challenges in the retail sector. Entrepreneurship at the corporate level in South Africa has to be nurtured to advance economic growth and help eliminate the high unemployment crisis the country faces,” explains Dr Adonisi.

To survive in the global market and advance entrepreneurship, the variables that seem to play a progressive role in its execution need to be explored. A key factor in entrepreneurial development and global competitiveness is market orientation. To stimulate the South African economy, management should pay attention to the fundamental role that an active market orientation, flexible operations and the nurturing of job satisfaction play in the development of intrapreneurship.

“We have seen significant relationships with different market orientation, flexibility, and job satisfaction factors. Our suggestion is that organisations should nurture their corporate entrepreneurial strategies by fostering their orientation towards marketing, flexibility and job satisfaction,” says Dr Adonisi.

Corporate entrepreneurship and economic growth are best served by the collaborative relationship between market orientation, flexibility and job satisfaction. The implication for South African businesses is that they need to upgrade their innovative expertise on an ongoing basis.

“Employees are critical in the design, production and marketing of products. A flexible operational culture with a vigilant market orientation and the experience of job satisfaction is crucial to the creation and sustenance of corporate entrepreneurial cultures,” concludes Dr Adonisi.

Corporate ethical identity needs consistent focus

A research team from GIBS, comprising Prof Nicola Kleyn and senior lecturers Kerry Chipp and Michael Goldman, were contracted by South African Breweries (SAB) Ltd to conduct research regarding the perceptions of the corporate's suppliers of its efforts to manage its ethical identity. The research team's findings were captured in a paper that was accepted for publication by the *California Management Review*, a leading *Financial Times*-ranked business journal.

Underlying this study was the fact that organisations seeking to build a consistent image and reputation must align many types of identities, one of which is conceived identity. This refers to the collective stakeholder images of the organisation. Every stakeholder develops a picture of the organisation, driven in part by perceptions of conduct on the part of the corporation. Organisations can therefore not focus only on the management of conduct inside the organisation, but must ensure that they understand how their stakeholders build perceptions of their corporate identity. Perceptions of an organisation's ethical conduct are an important aspect of conceived identity. The process of building an ethical identity is sometimes referred to as "ethicalisation".

"The growing complexity of the supplier environment, coupled with the boundary-spanning role played by supply managers, has given rise to a number of complex ethical dilemmas.

Despite the importance of building strong relationships with suppliers, founded on ethical principles, a review of the academic literature indicated that supplier perceptions of ethical identity had received little attention. Accordingly, results from the study of 430 suppliers of a range of business products and services to SAB were quantitatively analysed and used to develop a framework to guide organisations seeking to build an ethical identity," explains Prof Kleyn.

Six factors were found to drive supplier perceptions of ethical identity: trusted relationships, perceptions of organisational citizenship, the development and enforcement of ethical policy across the organisation, contracting procedures, the provision of information to suppliers, and reliable administration. These factors all influence the formation of ethical perceptions.

"Results clearly indicated that the optimal management of ethical identity requires consistent focus from both executive leadership and functional managers.

"Our findings show that simply developing ethical policies and codes is not enough to build an ethical identity – the process begins with a focus on ethics in the boardroom that needs to be cascaded throughout the organisation," concludes Prof Kleyn.

University of Pretoria 2012 Research Report


WORLD CUP
DRY CLEANERS
WORLD CUP DRY CLEANERS
Mahin Shortys Hawkers
Peanuts
& Raisins
3kg
Montina
YMCMB

Looking at markets from a new angle

In 2008, the Gordon Institute of Business Science (GIBS) became a partner of the Base of the Pyramid (BoP) Learning Laboratory (South Africa), an organisation established through a grant from the WK Kellogg Foundation, dedicated to promoting sustainable development at the base of the income pyramid through private sector initiatives. Dr Tashmia Ismail and Prof Nicola Kleyn worked with professional writer and editor, Gwen Ansell, to capture the insights gathered from BoP Hub members who shared a common quest to operate successfully in the low-income market context.

The GIBS BoP Hub was formed following the hosting of a number of colloquia and an academic research conference. Its purpose is to provide corporates with an opportunity to interact with each other and with other stakeholders, such as government, NGOs, entrepreneurs and consumers, who enable low-income markets to function.

Information gathered from semi-structured interviews with corporates seeking to develop business models to serve BoP markets was augmented with secondary information, as well as expert input on the drivers of corporate failure and success in the low-income market context.

The results of the research are published in a book, *New markets, new mindsets*. Findings show that, in addition to building a profound understanding of the context and actors in low-income markets, firms seeking to operate successfully and ethically in these markets need to discard many of their traditional assumptions and business models.

A reflection on the practices of low-income market champions, such as Danone, Massmart, Capitec Bank and Blue Label Telecoms, shows the importance of not only building a deep understanding of the low-income context and stakeholders, but of shifting organisational assumptions and business models that were designed for consumers living in very different environments.

In addition to market sensing and business model innovation, the results show that building partnerships for value delivery, as well as re-evaluating traditional approaches to measuring success, are important requirements for firms seeking to create new and sustainable markets in previously underserved communities.

> “The findings of research conducted at GIBS show that firms that seek to operate successfully and ethically in low-income markets need to discard many of their traditional assumptions and business models.”

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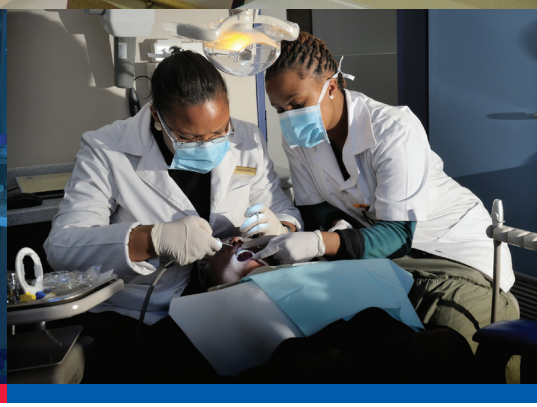
A detailed list of University of Pretoria publications is available on the enclosed CD.



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