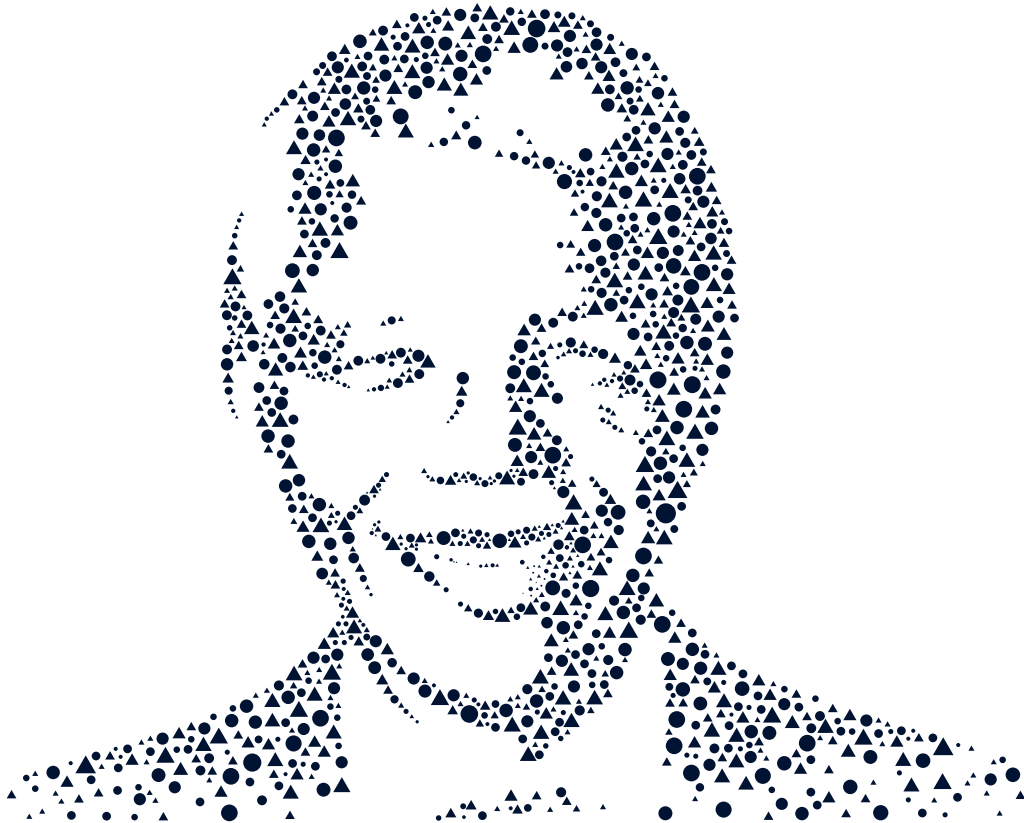


NELSON MANDELA

UNIVERSITY



Research & Innovation Report  
2017/18

100

YEARS OF MANDELA

# Contents

Message from the Vice-Chancellor: A Unique Opportunity in our Evolution	2
Message from the Deputy Vice-Chancellor Research and Engagement: Our Expanding Research Reach	5
<b>Faculty of Arts: Highlights</b>	11
Karoo – a Visual Journey, a Baseline Document	13
A People and Ecology Approach to Sewage and the City	16
New SARChi Chair: Professor Andrea Hurst	18
New Fellowship: Professor Nomalanga Mkhize	19
New Fellowship: Dr Babalwa Magoqwana	20
<b>Faculty of Business and Economic Sciences: Highlights</b>	21
Leading Economic Catalysts and Greenfields	23
Redefining Engagement in Higher Education	26
<b>Faculty of Engineering, the Built Environment and IT: Highlights</b>	28
Age of the Drone and Autonomous Underwater Vehicle	30
Aiming for Radical Advances in Human Potential	34
A New Era of Electric Vehicles and Lithium-ion Batteries	37
<b>Faculty of Education: Highlights</b>	39
Growing Africa's Master's and PhDs in Education	41
Working Class Schools as Communities of Practice	44
The Case for isiXhosa	46
<b>Faculty of Health Sciences: Highlights</b>	48
South Africa's Rocketing Codeine Consumption	50
Malnutrition in Hospitalised Adults	52
70 Years of Child Development	54
<b>Faculty of Law: Highlights</b>	56
Postgraduate LLBs on The Rise	58
Research Growth and the Competitive Edge	61
The Oceans and Africa's Maritime Domain	64
<b>Faculty of Science: Highlights</b>	67
What Caused the Knysna Wildfire?	69
Organic & Natural Food Systems – Imperative for Climate Change	72
SA's Sea Turtles Might Be Refugees	75
Awards 2017	77
Facts and figures: 2017	93



**Professor Sibongile Muthwa**

## VC's Report

# Message from the Vice-Chancellor: A Unique Opportunity in our Evolution

All universities have the scholarships of learning, teaching and research, as well as engagement, as their foundational missions in a world, a continent and a nation in transition. At the same time, the higher education sector broadly, and our university in particular, is in a state of change. We, as Nelson Mandela University, see this as a unique opportunity in our evolution. We believe it is up to us to define the trajectory we take in the context of national, continental and global challenges. It is up to us to determine how we deploy our work in keeping with the foundational missions, in the service of society.

Essential to this trajectory is a fundamental question: What are universities for? This question has confronted higher

education for centuries. Given our own historical moment in the wake of the Fallist movement and the hard realities of our broader socio-economic, politico-cultural and environmental challenges, it is back at the top of the agenda.

Any attempt to answer this question necessarily requires, among other things, a reframing of the research frontiers between the humanities and science, given that the commanding challenges facing our country, continent and the world cannot be solved by the one or the other of these on their own. Our university remains strong in the STEM areas. We will continue to grow these and to defend our gains, but as part of our intended evolution we need to reposition our work in the humanities.

In terms of our posture, our scholars and researchers have to be prepared to experiment with models that are rooted in communal legitimisation of knowledge, and which tap into the wisdom of all people. The Centre for the Community School, run by Dr Bruce Damons, is a fine example of this perspective, where action research in poor, working class schools supports community engagement that leads not only to the development of scholarship but enhances community agency. This, in turn, creates an enabling environment for learning to occur. This is the kind of social justice and humanism that Nelson Mandela stood for, and for which we must stand, as the university that carries his name.

In his recent inaugural address, Professor André Keet, who holds our new Chair in Critical Studies in Higher Education Transformation (CriSHET), spoke about the title of professor, and the meaning attached to the achievement of a professorship – a phenomenon which is equally applicable to many of our researchers and scholars. Of the positions we hold in the university, he said: "It gives us the power to do harm and good. In this time of transformation, it gives us the power to make transformative choices. What makes me hopeful is that the university's original essence is not disciplinary, it is transformability. What we call the 'decolonial turn' in higher education is a call to reanimate transformability, to unearth epistemic freedom as a key notion in the decolonisation of knowledge. Knowledge itself holds vast transformative reserves that need to find institutional expression within our universities today."

Many of us at Nelson Mandela University and other universities in our country, continent and globe are hard at work with transformative processes, with only trifling success so far in my view, and much work to be done.

The Executive Dean of our Faculty of Science, Professor Azwinndini Muronga, defines transformability in a number of ways in the faculty's vision and strategy. He says: "It talks to the need for the ongoing decolonisation of the curriculum process, including the introduction of the history and philosophy of science into the curriculum, and it talks to the need for diversity. As a leader, I am addressing diversity from a positive angle, showing that there are better results from diverse opinions. Hence, I talk about diversity and inclusion in the broad sense – diverse opinions, diverse cultures and offerings of programmes that are coherent and relevant within the Faculty of Science. At the same time transformability means that we need to include 'sciencepreneurship' and innovation in the curriculum. Preparing our students for the fourth industrial revolution includes preparing them for the jobs of the future, as many of the jobs they

are being prepared for today will no longer exist by the time they graduate. Hence, research and the curriculum need to be reviewed in the context of the fourth industrial revolution."

Our new institutional research themes, the product of a wide consultative process, speak both to the present and the future, namely, our existing knowledge asset base, as well as our aspirations. They speak to what we have chosen to be and how we are positioning ourselves in terms of our research priorities in the higher education sector. As a university we have settled on the following organising themes to steer our differentiating scholarly contribution:

- Ocean and Coastal Sciences
- Social Justice and Democracy
- Environmental Stewardship and Sustainable Livelihoods
- Innovation and the Digital Economy
- Origins, Culture, Heritage and Memory, and
- Humanising Pedagogies

"... our scholars and researchers have to be prepared to experiment with models that are rooted in communal legitimisation of knowledge, and which tap into the wisdom of all people."

– Professor Sibongile Muthwa

In the process of transformability we are exploring new models and research fields, and we are growing our research partnerships with universities across the globe. Important to our redirection is the focus on advancing the African footprint of our internationalisation, research and engagement strategy that frames our relationship with our continent as an African university. We will be deliberately growing our African collaborations and partnerships to align with Madiba's own intellectual and social justice project, which was first and foremost framed around his African identity.

We already have several African partnerships representing all our faculties and most research

Chairs. Professor Mike Roberts' SARChI Chair in Ocean Science and Marine Food Security creates a bridge of marine scientists and doctoral fellows that extends from Nelson Mandela University to universities along the eastern coast of Africa (known as the Western Indian Ocean or WIO), to Southampton University in the UK. These scientists are directly engaging with communities who rely on the oceans for food at a time when the oceans are warming, the marine environment is deteriorating from high levels of pollution and overfishing, and food insecurity is rapidly rising.

To find answers on how to address this requires an intensive transdisciplinary research approach. Two large case studies in South Africa and East Africa officially started on 1 October 2017. The South African case study, based at our university, is investigating the



18-month squid fishery collapse in 2013 and 2014, which caused substantial economic and social suffering in the Eastern Cape, with some 30 000 squid fishery dependents having no livelihoods. The fishery has since recovered but it is critical to understand why it happened and whether it can happen again. The researchers are investigating the ocean physics and climate-impacting ecosystems on the Agulhas Bank between Algoa Bay and Knysna.

All this offers some of the answers as to what universities are for, namely, the expansion of human understanding; pushing forward the frontiers of knowledge in all sciences and the humanities to cultivate humanity and to contribute to the well-being of our city, our province, our nation, our continent, our world.

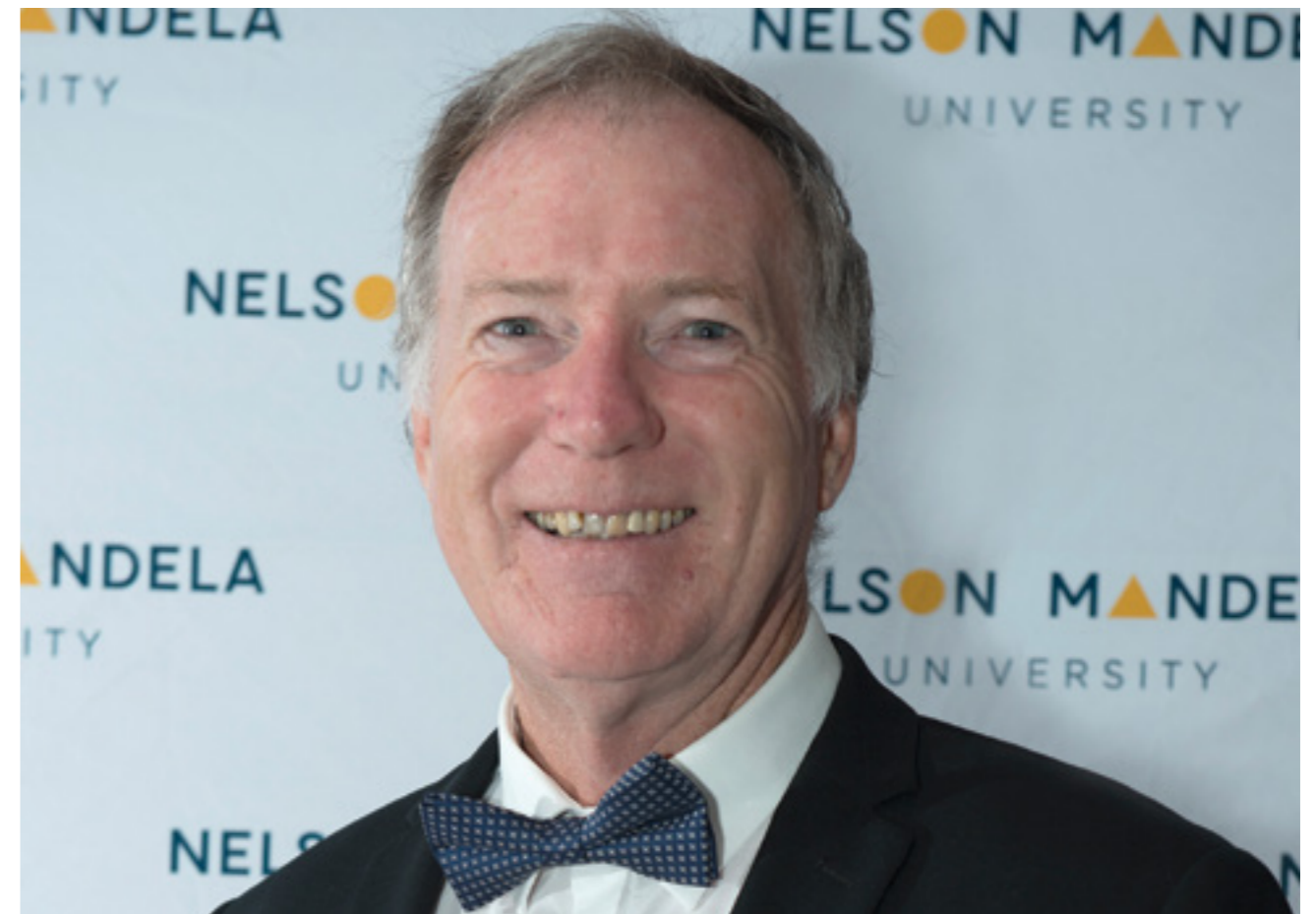
The key challenge facing all South African universities is to develop a strong postgraduate pipeline and to sustain the development of the next generation of academics. Research capacity and culture has to be inculcated early at undergraduate levels, a quest made more difficult by the fact that many students entering higher education are often insufficiently prepared, due to the generally poor schooling system. This has required us to strengthen instructional support and foundational programmes, as well as

to enhance existing early warning systems to ensure that all our students are in a conducive environment not only to complete their qualifications on time, but for many of them to achieve high quality passes that position them to access postgraduate studies, thus strengthening our pipeline.

It is important to document and recognise the research achievements of our university in reports such as this. Much as we rightly celebrate these achievements, we also need to identify areas that require improvement. In this regard, our general research outputs leave considerable room for growth and development. This is an area that will be receiving focused attention.

In conclusion, I take this opportunity to congratulate all our researchers, several of whose work is showcased in this report. In doing this, I wish to emphasise again the importance of reframing the relationship between science and the humanities, and reiterate our ambition to work beyond disciplinary borders to evolve a scholarship that will truly *change the world*.

**Professor Sibongile Muthwa**  
Vice-Chancellor



**Professor Andrew Leitch**

## DVC: Research and Engagement's Report

### Message from the Deputy Vice-Chancellor: Our Expanding Research Reach

I would like to start this year's message by welcoming our new Director of Research Management, Dr Kwezi Mzilikazi, with whom our university has a longstanding relationship. She was a senior lecturer in our Zoology Department and rose to become an eminent evolutionary physiologist, researching how small mammals cope with challenges posed by their environment, with the aim of better predicting their response to global climate change.

In 2006/7 Dr Mzilikazi was awarded the highly prestigious Humboldt Fellowship, to pursue postdoctoral research at Marburg University, Germany. She was subsequently selected as an honorary ambassador scientist for the Humboldt Foundation, which sponsors outstandingly qualified researchers and integrates them in a global network

of research excellence. Her ability and her international network contribute strongly to our strategic focus in growing our research pipeline, particularly in transdisciplinary fields within our new institutional research themes.

Also newly appointed is Dr Nqobile Gumede, director of our Innovation Office. Dr Gumede was previously at the National Research Foundation. Dr Gumede's passion is to participate in the creation of a larger, more effective innovation system in South Africa, which has been identified in the National Development Plan Vision 2030 as one of the key actions needed to bring about transformation of the South African economy. She has a wealth of experience from her time spent at various national entities and institutions.



One of our distinctive research themes for Nelson Mandela University is Ocean and Coastal Sciences, and our Ocean Sciences Campus, the first of its kind in Africa, was launched in September 2017. Three SARCHI Chairs on the Ocean Sciences Campus are proactively partnering African scholars from universities across the continent.

The Faculty of Law's Professor Patrick Vrancken, holder of the Chair in the Law of the Sea and Development in Africa, co-authored chapters with several young African scholars in the first book to collate the legal aspects of ocean governance in African countries. Prof Vrancken is the co-editor of this seminal 800-page book published in 2017, titled *The Law of the Sea – The African Union and its Member States*.

Science and Marine Food Security, based on the Ocean Sciences Campus. The Chair is jointly hosted by Nelson Mandela University and the United Kingdom's leading marine science research and technology institutions: the University of Southampton (UoS) and the Southampton-based National Oceanography Centre (NOC). The Chair creates an innovation bridge from South Africa, all the way up the eastern coast of Africa, and on to the United Kingdom, with the University of Southampton and Nelson Mandela University as the central hubs.

Then there is the Nelson Mandela University-based Fisheries Law Enforcement Academy called FishFORCE, headed by the Faculty of Law's Professor Hennie van As. Launched in 2016, FishFORCE has been generously funded by the Norwegian government in

Another significant partnership we have entered into is with Brunel University in the UK. In 2017 we were approached by Brunel University to be part of a large submission to the UK's Global Challenge Research Fund. The proposal is titled *Waste and Society*, and is focused on researching the reduction in marine waste from unsustainable human activities on land, using the Swartkops Estuary as a case study. It's an exciting project that closely links the sciences and the humanities.

We are deliberately advancing trans- and multidisciplinary research across the university, particularly between STEMI and humanities research. An example of this, covered in this report, is the partnership between our Africa Earth Observatory Network and the Earth Stewardship Science Research Institute

(AEON-ESSRI), and Ms Nadia van der Walt, a master's student in technology from our Department of Visual Arts, School of Music, Art and Design.

Her photographs and environmental documentary video, titled *Karoo (2017)* contributed to a baseline visual record of the Karoo Shale Gas Baseline Research Programme currently being undertaken by AEON. AEON is a transdisciplinary research institute and one of their key projects was to establish a scientific baseline of the Karoo Basin prior to possible hydraulic fracturing – or “fracking” – for shale gas. As AEON Professor Maarten de Wit explains, with this baseline, any contamination or damage as a result of fracking can then be scientifically tested and proven beyond reasonable doubt.



**Dr Kwezi Mzilikazi, Director of Research Management**

The Marine Spatial Planning Research Group, led by the holder of the SARCHI Chair in Marine Spatial Planning, Professor Mandy Lombard, submitted proposals to the Global Challenges Research Fund, the UK Aid SPHEIR funding instrument and the NRF and Canada's International Development Research Centre, to work in Kenya, Madagascar, Comoros, Mozambique, Tanzania, Reunion and the French Indian Ocean Territories. Through the Institute for Coastal and Marine Research, the Chair is involved in an ongoing project in Angola to identify Ecologically or Biologically Significant Marine Areas (EBSAs), funded by the Marine Spatial Management and Governance Programme (MARISMA) of the Benguela Current Commission.

The Faculty of Science's Professor Mike Roberts is leading a new research chair, called the UK-SA Bilateral Chair in Ocean



**Dr Nqobile Gumede, Director of the Innovation Office**

response to the urgent need to build fisheries law enforcement capacity in developing countries. The academy has been highly active with training in 2017 and it has since established partner academies in Indonesia and Kenya, with Tanzania to follow.

We have put a lot of work into identifying suitable research partners on the continent and globally, and this is growing most satisfactorily year on year, as is our research stature. We are also pleased to share that the number of our NRF-rated researchers has increased from 72 in 2013 to 88 in 2017. One of our newly recognised researchers is Honorary Professor Curtis Marean, who recently received his A-rating from the NRF. His pioneering research on the evolution of early modern humans is conducted in our African Centre for Coastal Palaeoscience.



Engaged research in its various forms is increasingly recognised as a research imperative in our society. One of many examples of this is the world-first scientific assessment on livestock predation and its management in South Africa. Predation of livestock in South Africa has been estimated to cost in excess of R1 billion in losses per year and has complex social, economic and ecological drivers and consequences. For this scientific assessment, which will be launched towards the end of 2018, Professor Graham Kerley and the Centre for African Conservation Ecology, partnered with the Department of Environmental Affairs; the Department of Agriculture, Forestry and Fisheries (through the Red Meat Research Development Planning Committee); Cape Wool; and the SA Mohair Growers Association. The assessment will form the basis for national policy and management of livestock predation issues.

Special mention must also be made of another significant research and engagement project: KaziBantu. This is a collaborative programme between the University of Basel, the Swiss Institute of Tropical and Public Health, and Mandela University (through our Faculty of Health Sciences). The programme was launched in 2017 and is funded by the Novartis Foundation (Switzerland). The research addresses the diet, physical health and mental development of children in some of the impoverished primary schools in our Metro. The vision is to extend the programme to other regions of our country and also other countries on the continent.

From the humanities side, our latest SARChI Chair "Identities and Social Cohesion in Africa", was granted in 2017 and launched in April 2018. The chair holder is philosophy professor Andrea Hurst who is part of the new wave of philosophical revival, which is seeing increasing numbers of postgraduates focusing on decolonised notions of philosophy. The Chair is gathering a group of alternative thinkers in the arts from several South African universities to collectively consider what the arts can offer to our concepts of our ourselves and the spaces we inhabit. Also linked to this new wave is the Centre for Philosophy in Africa, a new research centre that has been approved for establishment.

We are excited to have had Professor André Keet join the University in 2017, in a newly created Council-funded Chair: Critical Studies in Higher Education Transformation (CriSHET). In the short time he has been at our University, Prof Keet has already made an incredible impact with his scholarly focus on transformation.

The growing energy in Mandela University is increasingly being noticed globally, and we have appointed a number of eminent persons as Honorary, Adjunct and Visiting Professors. One of these is Adjunct Professor Gloria Campaner, a world renowned concert

pianist from Italy who will spend time each year at Mandela University, running piano workshops for our music students.

Our university's commitment to addressing the many sustainability challenges confronting our society and world has resulted in numerous programmes and partnerships, including our participation in a major international research programme approved last year, called the South Africa Sweden University Forum (SASUF). The programme is a partnership between several South African and Swedish universities, funded jointly by the Swedish government (through their STINT programme), the Department of Higher Education and Training (DHET) and the National Research Foundation. As part of the partnership, six themes have been identified and these will form the basis of our international collaboration with Sweden.

These and many other research partnerships offer fertile platforms for postgraduate students and future researchers. The awarding of Nelson Mandela University postgraduate bursaries and scholarships is driven by two main criteria: academic excellence and financial need. Academic excellence remains the primary criterion for awarding postgraduate bursaries. However, in response to the needs highlighted by students in 2016, we have brought in the added criterion of financial need. This includes the "missing middle" cohort of students.

The funding allocation from Council, along with the Nelson Mandela University Trust, was able to award over 600 students with postgraduate bursaries in 2016 and 2017. Our application to the DHET for the University Capacity Development Grant (UCDG), submitted towards the end of 2017, was approved, and R26m has been allocated for 2018. The grant provides funding to enable our university to prepare a transformation agenda for the development of the next cohort of academics.

We have an exciting increase in next generation academics and many rising stars in all our disciplines who are fuelling the future of the rising star that is Nelson Mandela University. Our namesake, in his 100th year, would no doubt have offered a timeless quote for all this if he was still with us in person. In honour of him, I end with this quote, which we shared widely at the launch of our name in 2017:

*If there is one appeal I could make, it is that young people must take it upon themselves to ensure that they receive the highest education possible so that they can represent us well in future as future leaders – Nelson Mandela from the documentary Mandela in America, 1990.*

**Professor Andrew Leitch**  
**Deputy Vice-Chancellor: Research and Engagement**

"... our Ocean Sciences Campus, the first of its kind in Africa, was launched in September 2017."

– Professor Andrew Leitch

## Institutional Research Themes

**It is important that Nelson Mandela University has defined Institutional Research Themes for positioning the unique advantage of the University to prospective students and external stakeholders. During 2017, we began the process of redefining the Themes. After an extensive process of consultation across the University, the following six Institutional Research Themes were approved:**



### 1. Ocean and Coastal Sciences

Humanity is dependent on the oceans and coasts from climate regulation to food provisioning. Cultures have been shaped by oceans together with global economies. Society and oceans have evolved together to what we know. Today we are faced with global to local crises spanning from climate change to poverty and resource conflicts, a threat to oceans and humanities. Nelson Mandela University, taking cognisance of the importance of oceans, is promoting ocean science as an institutional research theme. The term "Oceans and Coasts" refers to estuaries, shallow water coastal systems, coastal wetlands, coastlines, marine business, coastal communities and pelagic systems. Research is encouraged from both a disciplinary and transdisciplinary perspective to address key systemic questions that can inform policy, promote sustainable governance, influence management approaches and contribute to new knowledge.

### 2. Social justice and Democracy

The Constitution of the Republic of South Africa, 1996, was adopted as the supreme law of the country so as to heal the divisions of the past and establish a society based on democratic values, social justice and fundamental human rights. The Constitution's preamble also promises to lay the foundations for a democratic and open society in which government is based on the will of the people and every citizen is equally protected by law. This Theme focuses research on matters closely connected to the values that underly the Constitution, and which underpin the functioning of Nelson Mandela University, such as:

- human dignity, the achievement of equality and the advancement of human rights and freedoms, including an array of socio-economic rights;
- non-racialism and non-sexism;
- ubuntu;
- supremacy of the constitution and the rule of law; and
- universal adult suffrage and a multi-party system of democratic government.

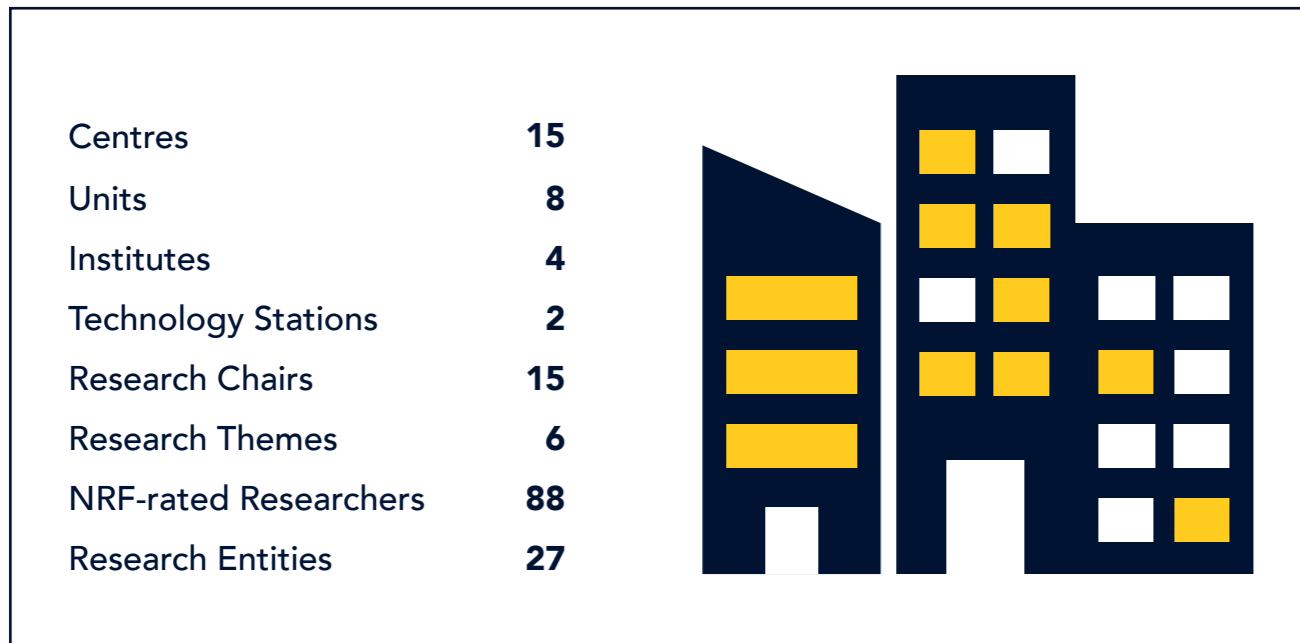
### 3. Environmental Stewardship and Sustainable Livelihoods

Building on the key research strengths of our natural scientists who have been researching fields such as Conservation Biology for many years, this Theme will also enable our academics in resource economics to address questions of sustainability – both for our region as well as nationally and across the African continent. Sustainable Human Settlements is a focus area for our School of the Built Environment that will also speak to this Theme. The Theme will also include the inspiring research taking place in our Faculty of Health Sciences, where projects are specially focused on vulnerable communities challenged by the high levels of poverty.

### 4. Innovation and the Digital Economy

This Theme aims to address not only the use of digital technologies in general but also the impact it has on the transformation of industries. To stay competitive, manufacturers need to sustain global economic momentum while developing new digital and Industrial Internet of Things (IIoT) capabilities and operating models. The broad objectives of this theme include the following:

- to promote a better understanding on the role of the digital economy in not only South Africa but Africa, particularly how digital technologies impact economies and transform both business practices and societies;
- to examine how institutions, policies and regulations, and human skills can be transformed to keep up with the quickening pace of digital transformation in Africa;
- to exchange views on the current state of the digital economy in Africa, including issues related to digital flows; e-commerce; financial technology; the role of education, skills, and innovation on digital economy; and implications of digital transformation on Africa's manufacturing economic landscape.



**5. Origins, Culture, Heritage and Memory**

Science tells us that modern humans, *Homo sapiens*, evolved on the South African coast somewhere between the Tsitsikamma and Cape Agulhas, and sometime between 200 000 and 140 000 years ago; all of humankind can trace its origins to this time and place. The focus on origins is critical to understanding the beginnings of humankind, the context in which early modern human beings emerged and the biological facets of evolution.

The focus on culture, heritage and memory is equally important. In the last 50 years, the United Nations (via UNESCO) has advanced the global management of tangible and intangible heritage, identifying and inscribing what it deems to be universally valued cultural artefacts and practices on its World Heritage List (WHL) and its List of Oral and Intangible Cultural Heritages. Heritage management and conservation, however, goes beyond the reach of global heritage organisations. It indicates the evolution of humanity and the resources early humans used to craft a socially meaningful existence. It also tells us about contemporary relations of power and the meaning of culture in society.

Social science focuses on 21st Century human cultural expression, especially questions about the construction of social identity, the deployment of culture and recollections of the past. Social scientists have studied heritage as a heavily contested concept, valuable to those in power and their quest for symbolic and economic power. Reflecting on historically inscribed identities (in monuments, sites and other tangible artefacts) historians and anthropologists are revealing an aspect of identity and community perhaps hidden, distorted or ignored as part of colonisation.

In countries such as South Africa, where a democracy is being forged, heritage and its management ought to be scrutinised, debated and diversely articulated. This process is necessary to establishing alter-narratives of the past, to critically and consciously

represent suppressed histories and to unearth valuable and often silenced knowledge. Involving a cross-disciplinary group of international and national researchers from palaeoanthropology to botany, social anthropology and history, the Theme on Origins, Culture, Heritage and Memory will enable our University to conduct research on tangible and intangible heritage in South Africa and the world.

**6. Humanising Pedagogies**

Conceptually, our understanding of humanising pedagogy has been derived from the work of Paulo Freire, who wrote “[c]oncern for humanisation leads at once to the recognition of dehumanisation”, a phenomenon which has had severe impact on generations of students within South African society. The central relevance of this concept within learning environments, including in Higher Education, has to be explored with a view to developing both theory and practices – praxes – which will enable people through the pedagogical encounter, especially our students, but also teachers and all university staff, to optimise their full human potential and all that they are able to contribute to society.

Nelson Mandela’s University’s Vision 2020 refers to the *principle* of humanising pedagogies as one of the signature concepts in relation to the strategic direction of the university. It has become “embedded in the strategic architecture” of Mandela University. As a “conscious design ... [and] as a transversal principle across the university’s social, physical, financial, academic, management and human resources landscapes” we have taken on the imperative to explore the practical expression of this concept in all its manifestations within spaces where learning happens as one of the university’s Research Themes.



**Professor Rose Boswell**

**Executive Dean’s Report**

**Faculty of Arts: Highlights**

An overview of the global higher education landscape suggests that the arts, humanities and social sciences are in decline. These fields of study have experienced waning access to global funding, leading to fewer research projects, fewer graduates and, consequently, a decrease in their contribution to knowledge production.

The situation is absurd because contemporary politics and economics, as well as the global environmental situation, indicate that the arts, humanities and social sciences can advance cross-cultural understanding, poverty reduction, gender equality, conservation and global peace. Internationally, social science and humanities scholars are at the forefront of critical analyses of boundary-making and identity in the United States, the complexities of migration and racialised otherness in Europe, the intricacies of economic inequality in Africa and the ethos of growth and prosperity in Asia.

As Nelson Mandela University harnesses its new name and identity, the Faculty of Arts is poised to advance research on these and other critical national and international social and political themes. How will South Africa manage the social and political consequences of its increasingly inflationary economy? What will humanities scholars have to say about the rise in gendered violence and violence against children and the elderly? How will our artists and philosophers engage with the ethics and aesthetics of instant, hyper-real news feeds and dark tourism?

Critical thinking on these themes has begun in the review of the faculty’s Strategic Plan (2018–2020). The plan, oriented towards advancing and deepening transformation in both ethos and praxis, emphasises reflexive engagement in both the global and local – specifying cross-disciplinary collaboration with science and health sciences, as well as new directions for learning in the field of indigenous knowledge systems, digital humanities and art.



The Faculty of Arts made significant efforts in 2017 to advance research qualifications and experience. The faculty consolidated its application for a Centre for Philosophy in Africa. The Centre aims to advance cross-disciplinary research and teaching on philosophies in the continent, encouraging critical perspectives on ethics, aesthetics and the politics of identity. Bearing in mind the level and form of inquiry that a centre of this nature requires, the faculty proposed an National Research Foundation (NRF) Research Chair on the theme of "Identity and Social Cohesion in Africa" and was successful. The incumbent for the Chair is Prof Andrea Hurst, an NRF-rated researcher, philosopher and prolific writer on issues of identity in southern Africa and beyond.

In addition to this accolade, the faculty has a number of rising research stars. The list includes Dr Babalwa Magoqwana (sociologist), who is researching gender relations and vernacular forms of identity expression in South Africa. Magoqwana received an NRF-First Rand Foundation Sabbatical Grant to advance this research. Prof Nomalanga Mkhize (historian), also situated in the School of Government and Social Sciences, secured a postdoctoral Sam Moyo fellowship, funded by the National Institute for Humanities and Social Sciences (NIHSS). The fellowship will enable Prof Mkhize to conduct research on the topical issue of land restitution in post-apartheid South Africa.

Efforts to advance staff and student research are also evident in the revised research policy of the faculty's Research Committee. The faculty supported the following staff: Dr Linda Kwatsha (isiXhosa), Dr Ruby Zauka

(applied language services), Prof Adrian Konik (philosophy); and prospective PhDs, Mary Duker (fine art), Brightness Mangolotho (public relations and communications), Nancy Morkel (English) and Sam Nzioki (journalism and philosophy). In 2017, five sabbatical support grants were made available for those taking research leave. In addition, funding support was extended to both students and staff attending conferences both nationally and internationally. In regard to the latter, the faculty supported the United Nations Student Association (UNASA) to engage with partners nationally to share perspectives on world peace and international cooperation. The faculty also completed its graduate student-driven Lotto project on heritage and identity in the Eastern Cape.

2017 was also a bumper year for senior graduations (MA and PhDs) in the Arts Faculty, at the winter graduations we had 93 master's, five MTEch and nine PhD degrees, three of which were awarded to staff members.

Research output is also evident in the innovative efforts to develop teaching in the faculty. Under the leadership and guidance of Dr Jacqueline Lück, the faculty's Teaching and Learning representative and Chair of its Teaching and Learning Committee, a diversity

of applications were made by academic staff to the Teaching Development and Innovation Fund (TDIF), advancing research in the domain of teaching and learning.

The interrelation of the core business of the university (teaching, research and engagement) also became evident in 2017. Worth mentioning are the stellar efforts of the School of Music, Art and Design (SoMAD) in their numerous exhibitions, multimodal installations and musical performances, many of which involve contributions from local schools and members of the public in Port Elizabeth and beyond.

Towards the end of 2017, the faculty revised its Memorandum of Understanding with the University of Tromsø in Norway, and established a new and exciting research and collaboration partner, the National Association for African American Studies (NAAAS). This encouraged the conceptualisation of a Nelson Mandela University Centenary event, the *Being Human(e) in the 21st Century* conference. With its partners, the faculty is bringing

together global and local scholars for scholarly exchange. Such partnerships are in line with efforts to advance its adjunct support. In this regard, the faculty appointed a number of adjunct professors and research associates including Adjunct Prof Denver Webb (history) who has already produced subsidy generating publications, Prof Arne Bjorhei (music) who is critical to the advancement of music education in our poorer communities, Prof Marc Neustetter (visual arts) who is advancing multimodal teaching and research in the visual arts. The Dean also contributed to the faculty's

outputs, publishing two accredited journal articles on the Indian Ocean region and launching a co-edited monograph titled *Postcolonial African Anthropologies* with University of Cape Town academic, Prof Francis Nyamnjoh.

In conclusion, the faculty's 2017 engagement included the project, "The Way of Water", an international art performance that took place simultaneously, in six coastal cities across the globe: Brooklyn (USA), San Luis Potosí (Mexico), Port Elizabeth (SA), Venice (Italy), Ouidah (Benin), and Zadar (Croatia). The performances were documented and screened internationally at universities and art galleries. The scope of the artistic project is to bring attention to the fragile marine environment. At Mandela University, the art performance was directed and coordinated by Dr Magda Minguzzi, with the late Ernst Struwig and Lucy Vosloo, and coordinators of the KhoiKhoi community, Chief Margaret Coetzee and Chief Xam ≠ Gaob Maleiba.

**Professor Rose Boswell**  
Executive Dean  
Faculty of Arts

" ... at the winter graduations we had 93 masters, five MTEch and nine PhD degrees ... "

– Professor Rose Boswell



**Aerial footage filmed from a drone pans the Karoo in a cinematic sequence that powerfully conveys the vast expanse. This is matched with evocative close-ups: Shot 1 homes in on the dew on a blade of grass as the sun is rising on a farm outside Cradock. Shot 4 shows spider webs between the blades of grass; Shot 19 features a bee pollinating an aloe on a farm outside Jansenville; Shot 24 captures water in a river outside Graaff-Reinet, Shot 26 a herd of cattle on a farm outside Graaff-Reinet and Shot 32 a windmill on a farm outside Tarkastad.**

## Karoo – a Visual Journey, a Baseline Document

"The images in this environmental documentary video, titled *Karoo (2017)* were filmed with the intent of showcasing the beauty of all the different elements within the Karoo. At the same time it documents in video and photographs a baseline visual record of the Karoo Shale Gas Baseline Research Programme currently being undertaken by the Africa Earth Observatory Network (AEON) and the Earth Stewardship Science Research Institute (ESSRI) at Mandela University," says Nadia van der Walt, who created five short videos and panoramic photographic landscapes in support of the videos as part of her Master's in Technology: Photography, in the Department of Visual Arts, at the School of Music, Art and Design.

She and two other technology master's graduates, one in ceramics and one in sculpture, exhibited their work in February 2018 at the University's Art Gallery, which is part of Mandela University's Bird Street Campus.

"I started working with AEON's Professor Maarten de Wit in my fourth year when the Massachusetts Institute of Technology (MIT) and the University of Massachusetts came to Mandela University to do a water project along the Eastern Cape coastline. Myself and two other students created a video for this work."



"AEON is a transdisciplinary research group and one of their key projects was to establish a scientific baseline of the Karoo Basin prior to possible hydraulic fracturing or 'fracking' for shale gas. Prof de Wit needed a video to be produced, documenting the work of the Karoo Shale Gas Baseline Research Programme. This really interested me and it became the subject of my master's," van der Walt explains.

The references for her cinematic techniques were two international environmental documentaries: *Chasing Ice* (2012) by Jeff Orlowski and *Home* (2009) by Yann Arthus-Bertrand. She explains in her thesis: "*Chasing Ice* (2012) follows the work of environmental photographer James Balog as he strives to record the natural environment of Earth's coldest parts before the glaciers disappear completely due to global warming. The use of aesthetically inspiring video recordings of the environment forces the viewer to come face to face with the natural habitat that will be lost due to global warming.

"*Home* (2009) is a film that deals with the diversity of life on Earth and how humanity is threatening the natural stability of the planet. The use of gripping images accompanied by disturbing statistics concerning climate change, forces the viewer to address the lack of sustainable behaviour on Earth."

As part of the filming and photography of *Karoo*, van der Walt learnt to pilot a drone for the aerial shots which establish the context and mood of the landscape: "I wanted to create a contemplative mood, where the viewer is lulled into the environment. I wanted to transport the viewer to the Karoo and, with extended, extensive views, to inspire them to think about what they were seeing."



She then focuses in on different elements within the Karoo environment: "I wanted to show its unique fauna and flora that are so typical of the Karoo. I have close-ups of spider webs, termites, cows, sheep, goats, birds, bees, water, windmills, sunsets, and the region's vastness – all the elements of life in the Karoo that many overlook. I wanted to deeply communicate this to people without forcing it in their faces."

At the same time she interviewed and documented the work being undertaken by the researchers in the Karoo Shale Gas Baseline Research Programme, notably groundwater monitoring, surface monitoring, and research on the geology and natural movement of the earth.

Inter alia, the video features:

AEON PhD student, Divan Stroebel, and his project, *Baseline Groundwater Hydrochemistry and Aquifer Connectivity of Selected Areas in the Eastern Cape Karoo Prior to Anticipated Hydraulic Fracturing of Shale Gas*, and continues by discussing the important role of groundwater monitoring within the Cradock community.

AEON PhD Nyaradzo Dhlwayo, who presents information on her study, *Capacity Building Framework as a Tool to Develop and Engage Local Communities in Scientific Research – the Case of the Karoo Shale Gas Project*. The project focuses on the training of local community members to monitor and sample the Karoo groundwater.

Van der Walt videos the community members brought into the project by AEON in the focal Karoo communities of Adelaide, Cradock, Graaff-Reinet and Jansenville.



"They welcomed the research, as we reassured them that we are from Mandela University, and that we are not affiliated to any of the companies applying to do shale gas mining in the Karoo."

Van der Walt says the combination of the visual and deeply scientific research that AEON undertakes, creates an essential baseline reference: "We can refer back to it at any time. We don't know if hydraulic fracturing will take place, but we don't want to be in the same position as the US where hydraulic fracturing has taken place and there was no baseline reference of what the groundwater was like before, for example, and therefore it is very difficult to prove that the water has been contaminated."

*The establishment of a baseline framework across the Karoo Basin will be of importance if legal action should occur regarding ecosystems deemed to be destroyed or groundwater contaminated. With a thorough knowledge of the geology, hydrogeology and ecosystems, possible contamination or damage as a result of hydraulic fracturing can be scientifically tested and "proven beyond reasonable doubt". – AEON, 2017.*

One of the highlights of her research, she says, was at her exhibition when an elderly woman started talking to her, not knowing she was the artist. "She told me that she is from the Karoo and had seen the exhibition advertised in the newspaper and wanted to come and see what it was all about. She got a bit tearful when I asked her what she thought about the work, and said that she really appreciated it, as many people often don't understand the Karoo. She told me that there are all these big debates about whether they are going to frack there or not, but what they don't stop to think about is that the Karoo is her home, it is many people's home and part of their entire being."





**Matthew Morris**

***In years past, spaces for people and spaces for infrastructure were not seen to be associated with each other. Our cities were set up to be divided and categorised. Large, centralised sewage treatment plants were originally constructed on the periphery of cities and in many cases were not well managed or ecologically considerate, leading to the current situation of derelict wastelands with people living in and around them, as urban expansion has far exceeded historic town planning.***

## A People and Ecology Approach to Sewage and the City

"It doesn't need to be like this; it cannot be like this today, and my design concentrates on decentralised 21st century sewage treatment facilities within our city, that looks to contribute to urban environments in creating better people spaces," says architecture graduate Matthew Morris, who was the recipient of the Corobrik regional award in 2017 for his master's project in the School of Architecture titled *The design of a decentralised sewage treatment facility for a settlement within Bethelsdorp, Port Elizabeth.*

Morris's project addresses the ecological problem of degrading sewage infrastructure and pollution in the Swartkops River Valley system, the edges of which are settled by people from

the highly populated urban area of northern Port Elizabeth. At the same time as proposing appropriate infrastructure, the design's explicit architectural intent is to create healthier, greener living environments for the residents.

"It is about creating innovative service infrastructure to deal with the sewage and pollution but then to evolve past this strictly utilitarian function to restore healthy natural environments that edge attractive green spaces for the residents," he explains.

"There are alternative, ecologically-based ways of treating sewage, that use far less energy compared to the traditional,

chemically based sewage treatment approach in large treatment works that too easily deteriorate, creating peripheral derelict wastelands. The international leading-edge approach is to create several smaller sewage treatment plant nodes within cities and ensure they are optimally functional, and surrounded by attractive green people spaces, which are lacking in the overcrowded Northern Areas of Port Elizabeth.

"The treatment plant nodes therefore create enjoyable community spaces that begin to integrate infrastructure to create a layered and more valuable urban fabric. The architectural intervention I proposed was that the primary facility should be centred on an existing church edging the highly polluted Chatty River – a subsidiary of the Swartkops River; in fact the church was the starting point for the project, as churches and other religious centres, together with schools, are natural gathering places for communities," Morris explains.

The scheme was set up within and throughout the Govan Mbeki ward or service area of Bethelsdorp. Morris divided Govan Mbeki into eight precincts, each with their own treatment plant nodes. "It creates a network of what I refer to as 'interception nodes' that can be extended beyond my primary project area into other areas of this community and wider contexts," says Morris.

"The nodes can be developed as a continuously growing, ward-scale network instead of the current municipal-scale facility, which is heavily polluting water sources such as the Swartkops estuary because of the degradation and overburdening of the system.

"With the multiple node sewage treatment system, the system is cost effective, it manages waste within communities closer to the source, and it limits the amount of waste overflowing into natural systems, which is far more sustainable than constantly trying to clean up the waste. We can also use certain species of plants in the treatment process to revitalise the Swartkops ecosystem."

The design integrates the urban, environmental and structural, with clever inclusions, such as places to play, catch taxis, gather, and embrace nature, as well as spaces for urban agriculture, where appropriately treated biomass supports rich, fertile growing conditions. The urban agriculture side helps to address the dire economic issues within the fabric of Bethelsdorp through the by-products of the sewage treatment process, giving the facility a greater intrinsic value by layering the activities that contribute to the daily lives of the community.

Being a master's submission, Morris's design is a theoretical model but it exemplifies the thinking that should be applied to bring together people, quality of life and the environment in the Nelson Mandela Bay Municipality, where the natural habitat accounts for 62% of the metropole. As the metropolitan municipality with the highest proportion of natural landscape in the country, Nelson Mandela Bay presents itself as an ideal, best practice model for South Africa in the integration of the natural, social and infrastructural realms.

## The Living Machine® Approach to Sewage Treatment

Rather than making use of conventional chemicals to treat wastewater, "living machines" mimic the processes of a natural ecosystem, in which a dynamic set of interacting organisms cleanse the contaminated water.

Components of a natural ecosystem are assembled and collectively contain organisms from all five kingdoms of life: microscopic algae, fungi, bacteria, fauna and flora. Impurities are removed from the water through the digestion of various organisms as part of a nutrient cycle. Rather than accumulating as waste, these nutrients are used to create biomass to sustain life within the system. (John Todd, 2016, from his book *From Eco-Cities to Living Machines*)

Wetland ecosystems are typically imitated, as they contain a vast range of hydrophyte species (aquatic plants) that thrive in high nutrient environments, thus providing a habitat for various organisms to flourish. Such ecosystems are reproduced by the construction of retention gravel wetlands and aerated aquatic cells, with biodiversity as the base of their design. (Ask Nature, 2015, *Eco-machine Wastewater Management*)

The biological process of anaerobic (oxygen-free) or anoxic (low oxygen) digestion of suspended and settled solids often begins within a living machine, marginally regulating the flow of wastewater through the system and allowing for a smaller more compact system.



## New SARChi Chair

### Alternative Ways of Being Human

Professor Andrea Hurst: Chair of the new SARChi Chair in Identities and Social Cohesion in Africa

"This new Chair is about thinking and researching authentically alternative ways of being human and creating tangibly different spaces to those entrenched by colonialism and capitalist ideology," says philosophy Professor Andrea Hurst. She holds the new SARChi Chair in Identities and Social Cohesion in Africa, granted in 2017 and launched in April 2018.

The Chair's approach is through the lens of the arts; the visual arts, poetry, music and architecture, as Prof Hurst explains: "A key aspect of the research is to acquire insight (practical knowledge) into how aesthetic practices may contribute to identity and social cohesion. In pursuit of this, we are gathering a group of alternative thinkers in the arts from several South African universities to consider what the arts can offer to human concepts and spaces, linked by philosophy.

This, she adds, requires a re-envisioned process of knowledge production, given that the academy is traditionally "the seat of intellectualised, instrumental education, where theoretical knowledge production predominates, and aesthetics is underplayed".

Prof Hurst emphasises that the role of aesthetic practice in promoting a transformative, decolonised educational system should be taken seriously. Leading by example, the Chair is busy with experimental engagement in reflective, creative practice.

"This draws on a methodology that Professor Susan Finley from Washington State University's Department of Teaching and Learning, calls 'critical arts-based inquiry' whereby philosophers/social scientists and artists collaborate to create, facilitate and reflect upon aesthetic events. The idea is to engage reflectively with existing projects, and to create experimental events in transformative knowledge production that draw on aesthetic wisdom," she explains.

The Chair's knowledge references range from the ancient traditions of philosophy and African poetic wisdoms to the



post-structuralist 20th century philosophers, such as French philosopher, Jacques Derrida.

Prof Hurst says Derrida's complexity thinking articulated new ways of thinking that are useful in articulating where we find ourselves in higher education and South Africa today. He strongly challenged binary thinking, where, concepts such as freedom and security are posed as simple opposites. He argued that they, instead, form paradoxes, and, further, it is exactly when you uncover such paradoxical relations that you face true reality; for the world is uncertain and paradoxical by nature.

The Chair's first output is a special edition of the *South African Journal of Philosophy*, titled "Identities in Question", which Prof Hurst is guest editing, to be published at the end of 2018.

## New Fellowship

### Invisible History, Invisible Dispossession

Professor Nomalanga Mkhize: Recipient of the Sam Moyo Postdoctoral Fellowship in Land and Agrarian Reform, through the National Institute for the Humanities and Social Sciences

"The first ever land dispossession in South Africa's history was from the Khoikhoi and San people, in what was called the Cape Colony. Yet this has almost been made invisible in the popular history of the South African struggle, and also in the land question," says history professor Nomalanga Mkhize. In 2017 she was awarded the first Sam Moyo Postdoctoral Fellowship in Land and Agrarian Reform, through the National Institute for the Humanities and Social Sciences (NIHSS), supervised by Rhodes University history professor Enocent Msindo.

Prof Mkhize explains that "with land we are continuously looking at historical and contemporary political questions, which are paramount questions of our time." Adding to the complexity, she says, is that the government is not versed enough in the wide differentiations between types of land throughout South Africa.

"My work is to understand better the different types of land and terrain, including the type of farming this requires, and, at the same time to understand how history has produced specific kinds of land questions, and how the history of the land has been written or described by different people."

She offers the example of South African labour history, which has been focused on the industrial working class, urban labour unions, and their history of resistance. "This overlooks the earliest history of resistance from Khoikhoi and San people, who were forced into farm labour in the Cape Colony. They were the first people to lose everything, they were the first working class wage earners, albeit paid mostly in kind, and they were the first people to resist. The history of labour in South Africa needs to recognise this and put the agrarian working class from the 1700s to the fore."

Prof Mkhize elaborates on the creation of the proletariat in South Africa, which was completely tied to the dispossession of the Khoikhoi and San, as well as some Xhosa clans in the Cape and Karoo areas. "This was the first phase of labour



history; the second phase started when gold and diamonds were discovered. Therefore, capitalism and the formation of the South African state is not just about the mineral economy and the urban politics of the means of production, it is equally about land dispossession that started in the 1600s and 1700s, not with the frontier wars or the 1913 Land Act.

"The question is, how do you redistribute land or address the land issue in the former Cape Colony, where the ancestors of the Khoikhoi and San need to benefit from a just and restorative land solution? Additionally, are we training sufficient numbers of black farmers in the complexities of farming and land management, which differs enormously from the Karoo to KwaZulu-Natal, in other words, across South Africa's very diverse terrain? These are key historical and contemporary issues that need to be urgently addressed."

# New Fellowship

## uMakhulu as an Institution of Leadership and Knowledge

Dr Babalwa Magoqwana: Recipient of a National Research Foundation-FirstRand Foundation sabbatical award

“My late maternal grandmother uMakhulu Magoqwana inspired me – when I was a child growing up in the rural Eastern Cape she taught me all the vowels, she taught me about my clan names and about the local history and geography of the land,” says Dr Babalwa Magoqwana from the Department of Sociology & Anthropology (incorporating History).

“She told me our stories and folk tales, none of which I received in the education system – such was the gap between what I learnt at home and in the formal education system, where, if you are not certified, you are not recognised for your knowledge and you don’t become a knowledge producer.

“Yet we survive and cope with life because of the knowledge we have received from people who are not recognised in the system, in our schools and our universities. It propelled me to pursue scholarship that is healing for all of us, scholarship that restores the recognition of uMakhulu, given that recognition is part of dignity and healing.”

In 2017 Dr Magoqwana was awarded a National Research Foundation-FirstRand Foundation sabbatical award to pursue leading-edge research in repositioning uMakhulu as an institution of leadership and knowledge. This is part of the larger project of restoring women in South African society to the centre stage. Dr Magoqwana is using her sabbatical award to publish four articles and a book on a woman-centred vernacular sociology of the Eastern Cape.

“The Eastern Cape has a rich matriarchal history, yet this is not reflected in the masculinised political culture of contemporary South African – where women continue to be marginalised,” Dr Magoqwana explains. “Structurally, power is constituted as a very masculine affair with women positioned as ‘the weaker sex’, as perpetual kids whose vulnerability is constantly emphasised, hence we have a Ministry of Women and Children. This is not how it always was. My grandmother was far more in control than many women in our society today; the elderly women in society had far more power than they have today.”

She explains that uMakhulu’s leadership in the economy and the household was central to the sociology of precolonial



African society. Women kept their clan names, they did not take the man’s surname – this is a colonial inheritance.

Colonial patriarchal structures, religion and neo-traditionalism concealed as “African culture” systematically erased African women’s role and contribution in African societies.

“In precolonial societies throughout Africa women shared the work, roles and duties at all levels and they owned land. Colonialism dispossessed women of their land and introduced a genderisation of labour,” Dr Magoqwana continues.

“So we have to challenge how these histories have been written and re-establish women as co-partners and co-producers in society and the economy. Until this happens, until we educate our children differently and restore the dignity of women in our culture, restore the reverence for uMakhulu, the violence we see today will continue.”



Professor Hendrik Lloyd

## Acting Executive Dean’s Report

# Faculty of Business and Economic Sciences: Highlights

The Faculty of Business and Economic Sciences has a well-established strategic planning process which is used as a guide to inform and direct our research initiatives. The aim of this process is to create a supportive infrastructure and to establish an enabling environment for researchers to conduct their research. Our planning focuses on a number of critical areas, namely, building research capacity; embedding faculty and institutional research themes into all research; increasing the volume and impact of research output in the faculty; and facilitating transformation in the faculty through our research agenda.

Various actions have been undertaken to strengthen the faculty’s research agenda. These include, among others:

- Staff capacity development via training workshops and mentoring programmes;
- Research support functions in the faculty for researchers;
- Enhancing our pool of postgraduate supervisors by appointing research associates and postdoctoral fellows;
- Providing assistance to postgraduate students, especially at PhD level;
- Facilitating Memoranda of Understanding or Memoranda



- of Agreement with various stakeholders to enhance research collaboration, both nationally and internationally;
- Establishing various mechanisms to ensure throughput at postgraduate level and to foster the growth of the next cohort of researchers and academics in the field of commerce; and
- Acknowledging staff for their excellence in research by means of various in-faculty research awards.

Attracting funding into the faculty to further our research endeavours remains high on our priority list. One of our key projects in the faculty was funded via a range of external funding streams.

The project, *Transition Township: Action research on climate change and development alternatives – Piloting localised and sustainable township economies in Kwazakhele, Nelson Mandela Bay*, is led by Professor Janet Cherry and is currently being funded by the National Institute for the Humanities and Social Sciences, as it is also an academic project with postgraduate students linked to it.

Nelson Mandela University also has an agreement with Hope Africa, which is sponsoring an internship in conjunction with the project.

The Transition Township project builds on previous action research projects exploring the concept of sustainable human settlements and focuses on the idea of “retrofitting” for renewable energy and sustainable technologies in formal, working class townships. It is also pioneering an integrated model of local and localised economic development based on principles of community self-sufficiency and independence. It is through research and engagement projects such as this that the faculty wants to become more impactful and relevant in terms of its research agenda.

**Achievements for 2017**

Professor Paul Poisat from the Business School was named Faculty Researcher of the Year, while Professor Michelle Mey from the School for Industrial Psychology and Human Resources Management was named Faculty Integrative Researcher of

the Year. This latter award is fairly new in the faculty and was established to emphasise the importance of interdisciplinary studies in the faculty’s research projects.

A further highlight was the conferment of the first PhD in Accounting in the School of Accounting.

Our faculty also excelled in graduating research master’s and doctoral students, with 16 master’s and 29 doctoral degrees being conferred during the 2017 graduation ceremonies. In the same year, the faculty also generated numerous journal articles.

As a faculty, we are now at the point where all of our faculty’s schools contribute to its research output. For the future, the aim is not only to increase the number of research units, but also to pay specific attention to the quality and the impact of the research we conduct.

Currently, the faculty also has three research and engagement units, namely the Unit for Economic Development and Tourism, the Family Business Unit and the Unit for Positive Organisations. These units are used to facilitate the faculty’s engagement programmes, as well as to assist with our interdisciplinary research activities. The faculty is also in the process of appointing research associates and postdoctoral scholars to further strengthen our research and supervisory capacity.

With our people-centred approach to inspire and encourage every staff member to become research active, we are increasing not only the volume of research output, but also improving the quality thereof. I am extremely proud of the team that comprises the Faculty of Business and Economic Sciences and of the accolades received and the

achievements and the accomplishments we have achieved during the year. I am excited about our future plans and optimistic that the positive story will continue through the hard work, dedication and excellence of all my colleagues in the faculty.

**Professor Hendrik Lloyd**  
**Acting Executive Dean**  
*Faculty of Business and Economic Sciences*

“With our people-centred approach to inspire and encourage every staff member to become research active, we are increasing not only the volume of research output, but also improving the quality thereof.”

– Professor Hendrik Lloyd



**“Local and global research emphasises that small, medium and micro-sized enterprises (SMMEs) are the leading economic catalysts and employers today,” says the Director of the Nelson Mandela University Business School, Dr Randall Jones.**

## Leading Economic Catalysts and Greenfields

The Business School’s *Inclusive Development and Strategic Growth Strategy*, developed and launched in 2017, addresses its corporate citizenship contribution through a number of Strategic Development Projects (SDPs). These are all about making a meaningful contribution to socio-economic development, a central component of which is how the Business School can be more actively engaged in SMME development and entrepreneurial training programmes at the local development scale, in line with the national imperative.

our townships to a level where they can become part of the mainstream economy,” Dr Jonas explains.

“This requires the development of young entrepreneurs and industrialists in our townships who can be capacitated to grow in the entrepreneurial and industrial space. At the same time, our ambition is for existing township entrepreneurs to develop into significant suppliers and industrialists, such as to the automotive industry, and therefore grow as employers in our townships.

“We are researching and engaging with the Nelson Mandela Bay township economy, with the aim of becoming the ‘one-stop shop’ in terms of training and developing SMMEs in

“We want the township economy to become a manufacturing and producing economy, and not only a consuming economy as it largely is now. And though this is a township-

## MBA and PDBA 2017 Community Engagement

The growing number of homeless, destitute, uneducated and starving people in South Africa reflects the magnitude of the problems of the country's huge economic disparities. As part of its corporate social responsibility programme, the Business School's MBA and PDBA (Postgraduate Diploma in Business Administration) students engaged in a social responsibility project of their choice as one of their assignments. At a deeper level the assignment sensitised students to the needs of society, it helped them to understand their role as business leaders in becoming conscious leaders and developing a mindset that includes multiple stakeholders, including those beyond the boundaries of the organisation in which they are employed.

MBA and PDBA groups from Port Elizabeth, East London, Cape Town, Gauteng, and KwaZulu-Natal went beyond the call of duty in assisting the needy in their surrounds. They assisted over 51 charities, feeding schemes, shelters, schools, crèches and environmental projects. Initiatives included providing children with both necessities and luxuries, assisting feeding schemes, donating to animal shelters and participating in environmental clean-ups.

The Business School celebrates its PDBA and MBA students for their generosity and the commitment with which they embraced the project.

focused initiative, I want to emphasise that anyone from any of our communities with an SMME in Nelson Mandela Bay will be assisted with business services as part of this strategy."

A catalyst of the Business School's strategic growth and engagement strategy is the Greenfields Project, as Dr Randall explains: "The purpose of the programme is to support the emerging and priority economic sectors of the Nelson Mandela Bay Industrial Development Strategy such as agro-processing, tourism and hospitality, light manufacturing and logistics, as well as initiatives in the maritime and marine sphere, and in the fields of both renewable and nuclear energy, as well as oil and gas developments."

"We have a range of partnerships for this, including the maritime cluster – which comprises other faculties at our university – our municipality, the Nelson Mandela Bay Business Chamber and Transnet. As the name 'Greenfields suggests, we are looking at new opportunities, such as the ocean economy and the renewable sector, that have not yet been dominated by the formal economy. It offers the ideal window to bring in disadvantaged black business people and assist them in claiming a strong business stake in this sector."

To take this forward, the Business School is hosting an Oceans Economy open workshop in October 2018 where they are bringing in entrepreneurs to discuss insights into the opportunities and supply chain requirements in the Greenfields sector.

To contribute to the growth and development of young people's basic business skills, the Business School's Corporate Social

Responsibility team has partnered with the Glendinningvale-based Ray Mhlaba Skills Training Centre in offering disadvantaged 18 to 25-year-olds who have completed matric a one-day basic business principles workshop. Many of the participants are from the Eastern Province Child and Youth Care Centre (EP Children's Home), founded in 1889 and one of the oldest residential children's homes in South Africa. The Ray Mhlaba Skills Training Centre is closely affiliated with the EP Children's Home.

Twenty to 30 participants are trained over the course of a day. To date, 109 students have completed the Basic Business Principles (BBP) Workshop with the Business School and gained their BBP skills certificate.

"The programme is very practical, with students experiencing real life business problems such as borrowing money from the bank, handling difficult situations, such as employees going on strike, as well as selling to and dealing with happy and unhappy customers," Dr Jonas explains.

A student who was asked what they took away from this experience said: "Business is hard to learn but I have learnt so much. You don't realise how efficient and creative you need to be to run a business." Another student was asked whether they thought this programme would benefit others and responded, "Yes this programme could benefit a lot of people because it gives you a different understanding of the business world. You learn how to deal with many problems, from finance to selling. You also learn essential business skills, like how to sell and how to calculate your selling price."



**Dr Randall Jones**

"As with all our projects, it is about serving as a catalyst for greater economic inclusivity and a more equal stake in the economy," adds Dr Jonas. "The bigger vision is to grow an Entrepreneurship Consortium in the Nelson Mandela Bay Metro and the Eastern Cape, led by the Business School, and we are busy piloting this."

An initiative already in progress as a precursor to this, is the leading role of the Business School in the Student Entrepreneurship Working Group, which hosted a highly successful symposium with speakers from the National Department of Higher Education and Training and Business School alumni.

The Consortium will create a platform for empowerment and capacity building, by providing coaching and mentoring for emerging SMME business people and pursuing leading-edge

## Wilderness Leadership Experience

Nelson Mandela University Business School's Professor Paul Poisat champions the "beyond the classroom" leadership development component for the graduate school MBA programme. Through the renowned wilderness leadership experience at iMfolozi game reserve in KwaZulu-Natal, students explore the link between the natural environment, personal identity and leadership. Spending time in the wild, removed from the existential baggage of everyday life, students develop a new consciousness of self in this life-changing adventure.

research about the key drivers and enablers for successful entrepreneurship growth.

"In the Business School's Leadership Academy we already have short learning programmes that help us to roll out new opportunities and synergies within the Greenfields sector.

"We have lecturers in the Business School researching opportunities in the ocean economy, such as Nomsa Hadi, who is researching agro-processing for her PhD, and Dr Jessica Fraser who is supervising maritime doctoral students. In addition, we are currently developing a master's degree in Maritime Business Management, which we will launch in 2020, and which will partner with other faculties, chairs, centres and units across the University's ocean economy and ocean sciences domain."





**“The entire Faculty of Business and Economic Sciences has focused on developing our community engagement and outreach programmes over the last couple of years, with modules built into many of our courses, as well as voluntary initiatives where groups of students, postgraduates and lecturers engage in a range of community projects,” explains the Director of the School of Industrial Psychology and Human Resources, Professor Michelle Mey.**

## Redefining Engagement in Higher Education

Prof Mey emphasises the importance of engagement-focused higher education and research in the School, in line with Nelson Mandela University’s vision. She refers to a quote from Vice-Chancellor Professor Sibongile Muthwa’s inaugural address on 17 April 2018: “We need to redefine the purpose of engagement, and reposition engagement with communities to make a meaningful contribution to overcoming societal challenges. This is particularly important as we bear a special responsibility associated with the name Nelson Mandela to align our intellectual resources to the historic task of creating a non-racial, equal and democratic society”.

Prof Mey offers the example of the second year students in the Department of Human Resource Management who are

the “owners” of the *Pay-it-Forward* community engagement initiative. For *Pay-it-Forward*, the students identify community organisations that they believe can best benefit from engagement, with an emphasis on education and care.

“The concept of the *Pay-it-Forward* initiative was triggered about 10 years ago when my friend’s brother emigrated to Australia,” Prof Mey explains. “Soon after he started his new job there he developed a cancerous growth in his throat and was unable to work while receiving treatment, which left his family in a very difficult position. Despite the fact that he was so new, everyone in the company got together and sold a day’s leave to the company in order to raise money to assist his family over the Christmas period.”



**Professor Michelle Mey**

Prof Mey had already been thinking about a *Pay-it-Forward* engagement initiative, based on the book and movie of the same name, and the care of the Australians for a stranger from another continent consolidated it for her. “Twelve years ago I started challenging my students to give of their time and come up with an action plan that would help to change our part of the world for the better. At the outset it was an informal initiative but it has grown to the extent that I have handed it over to the second years as their own. It is not an add-on, it is part of the curriculum and inherent to the development of students as engaged, socially conscious humans who make a meaningful contribution to overcoming societal challenges.”

In 2017 these students spent time with children at homes and schools, teaching them new games, assisting with homework, tutoring and helping them with artwork. Some of the organisations with whom they have worked include the Jerusalem Home, Ubomi Obutsha Community Centre, Ithemba Day Care Centre, Protea Primary School, Human Dignity Centre, EP Child & Youth Care Centre, MTR Smit Children’s Home and Care Haven Psychiatric Centre. Students reflect on how these projects instil in them a sense of humility, compassion and gratitude, and that it inspires them to play their part in addressing some of our society’s acute socio-economic and educational problems.

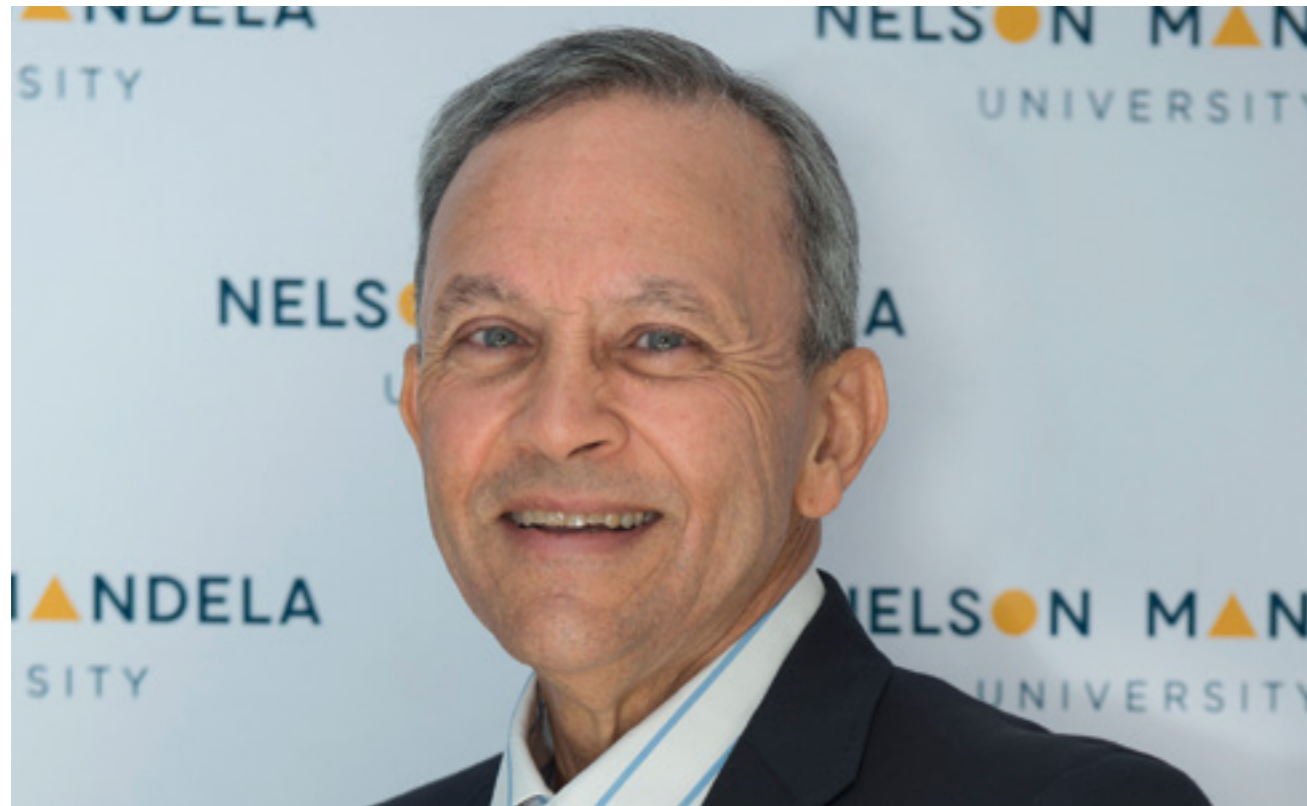
Other initiatives include graduates donating their text books to lighten the financial burden for undergraduate students, and graduates hosting career days at high schools to create awareness of Nelson Mandela University study options, entry requirements and funding opportunities. “High school learners are our future students, graduates and postgraduates, and it is critical that we engage them, as many do not have access to the information and requirements for university,” says Prof Mey.

In 2017, in partnership with the Society for Industrial and Organisational Psychology of South Africa (SIOPSA), a four-hour workshop was hosted for a group of 60 Grade 11 and 12 learners at Thamsanqa High School in Kwazakhele, Nelson Mandela Bay Metro. Many of the learners said it had inspired them to pursue higher education studies and they asked questions about the steps they should take. The School also takes part in Schools’ annual career expos where they offer information on career paths and university admission requirements.

Prof Mey explains that this and other engagement initiatives in the School and faculty are in line with Nelson Mandela University’s desired graduate attributes, which include a commitment to social awareness and responsible citizenship, as well as an acknowledgment of and respect for constitutional principles and values such as equity, humanity, diversity and social justice.

“Twelve years ago I started challenging my students to give of their time and come up with an action plan that would help to change our part of the world for the better.”

– Professor Michelle Mey



Dr Oswald Franks

## Executive Dean's Report

# Faculty of Engineering, the Built Environment and IT: Highlights

Researchers in the Faculty of Engineering, the Built Environment and Information Technology (EBEIT) are engaged in innovative work to develop solutions to real life challenges in society, industry and various scientific areas.

Increasingly, our researchers are working collaboratively among themselves and across disciplines with colleagues from health sciences, the natural sciences and a range of people from other areas. Through these collaborative initiatives we are able to contribute to addressing some of the more pressing challenges facing society.

Broader society benefits, as the knowledge produced is distributed and transferred to the public domain and industry through publications, conferences, teaching and partnerships.

It is my pleasure to share information about some of the innovative research work conducted within three of the entities in the EBEIT Faculty during 2017.

### Advanced Mechatronics Technology Centre (AMTC)

The AMTC is a community-engaged centre where faculty and staff, students, and partners collaborate to promote human capacity and community potential ([amtc.mandela.ac.za](http://amtc.mandela.ac.za)). Selected research projects conducted under the auspices of the AMTC include:

#### Unmanned Aerial Vehicles (UAVs/drones)

During 2017, researchers in the School of Engineering commenced work in the field of high payload, long endurance UAVs. "FrankenDrone" was the first aircraft developed. Flights of more than an hour with payloads as heavy as 5kg are possible. Further research into fixed wing and multirotor drones for cargo, surveillance and other uses will be ongoing.

#### Additive Manufacturing (3D printing)

Additive manufacturing of large items was the focus in 2017. Wind turbine blades as long as 3m were printed in standard

PLA materials. However, there were stability and shrinkage challenges. UV-cured resin showed promise with a few successful trials completed. Work on a six-metre-long concrete printer, capable of printing a small house, began in 2017 and is ongoing.

### Renewable Energy

The Renewable Energy Research Group (REERG) focused on six MerSeta funded industry-based research projects. One of the projects identified the high cost of electricity for heating air in certain manufacturing processes. Results from the research suggest that preheating intake air to existing air heaters, using a device developed by the students, leads to sustainable cost savings.

### eNtsa

eNtsa ([entsa.mandela.ac.za](http://entsa.mandela.ac.za)) is an engagement institute within the faculty that strives through its engineering solutions to enhance technology innovation in South Africa. Projects include:

### Advanced Design & Modelling

The Advanced Design & Modelling group provides a range of services from basic mechanical and computer-aided design (CAD) software through to advanced finite element analysis (FEA). Aligned with the CAD systems, the team uses NX Siemens advanced finite element software. In conjunction with these design and analysis services, the group is also involved in component failure investigations to determine root causes of failure.

### Small Punch Testing Facility

eNtsa developed and built ten small punch creep platforms for Eskom and Sasol. In 2017 these platforms tested disc samples extracted from plants nationally. From the data it became apparent that there is a significant amount of information contained within the WeldCore® samples, which contributes to understanding the creep state and remaining life steam lines. The WeldCore® technique includes X-ray tomography, metallurgical analysis, chemical analysis, hardness testing and small punch static testing. From the WeldCore® value chain, trends in rupture time and location of damage in the pipeline can be identified.

### Controls and Automation Group

The Controls and Automation Group provides solutions to meet industry requirements. Typically, projects include the electrical design, programming, wiring and commissioning of a custom CNC wood router for machining cricket bats. The Controls and Automation Group is currently embarking on research and development in marine and advance manufacturing.

### Composites Innovation Centre

The Composites Innovation Centre focused on the following during 2017:

- Aerospace: Finite Element Analysis of a lightweight wing structure
- Renewable Energy: Building a 3D printer capable of printing seven-metre-long turbine blades.
- Automotive: Developing a lightweight composite spare wheel.
- Marine and Boat Building: Profiling and designing the superstructure and determining the possible failure modes.

### uYilo eMobility Technology Innovation Programme (EMTIP)

The uYilo eMobility Technology Innovation Programme aims to promote and develop the electric mobility industry in South Africa.

uYilo incorporates a national accredited battery testing laboratory, an electric vehicle (EV) systems laboratory and a live vehicle testing environment. The battery testing laboratory is accredited for the testing of lead – acid batteries and has extended its scope to include lithium-ion cell testing.

### Centre for Community Technologies

The Centre for Community Technologies ([cct.mandela.ac.za](http://cct.mandela.ac.za)) is an engagement centre which focuses on the radical

development of technologies for the health, education and socio-economic empowerment of poor communities. Details of selected projects are as follows:

### Learn to Code

The Learn to Code engagement project upsills learners in marginalised communities through computer programming. Over 200 Grade 7 to Grade 10 learners in the city's northern areas (Schauderville, Korsten and Gelvandale) in Port Elizabeth are participating. They use the Scratch programming tool to stimulate active interest and participation in science, technology, engineering and maths (STEM) subjects.

### mHealth4Afrika

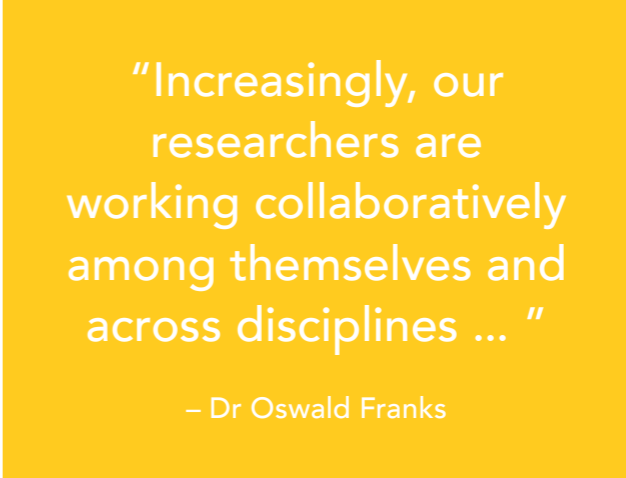
This is a research and innovation project co-funded by the European Commission, under Horizon 2020. It addresses an open source, multilingual mHealth platform for community-based maternal and newborn healthcare delivery in southern Africa, East Africa and Ethiopia.

### Common Good First

This EU-funded project is creating a digital network of social innovators who capture and showcase their projects in South Africa, connecting them to each other and to their peers, academics and higher education institutions around the world.

### Professor Oswald Franks

Executive Dean  
Faculty of Engineering, the Built Environment and IT



– Dr Oswald Franks





**Damian Mooney**

**Transdisciplinary deep-sea scientific research, package deliveries to ships, autonomous crime scene imaging – these are some of the capabilities of the drones and gliders being designed and developed by the Faculty of Engineering, the Built Environment and Information Technology (EBEIT) at Nelson Mandela University.**

## Age of the Drone and Autonomous Underwater Vehicle

“Drones, or unmanned aerial vehicles (UAVs), and gliders, also known as autonomous underwater vehicles (AUVs), are classified as Remotely Piloted Vehicles, and are rapidly gaining ground globally as they have revolutionary potential in their diverse applications,” says mechanical engineer, Damian Mooney, who is one of South Africa’s few specialists in Remotely Piloted Aircraft Systems (RPAS). He has been a commercial pilot for 20 years and is a member of the Mandela University Autonomous Operations (MAO) Group in the Faculty of EBEIT, which is working on a range of pioneering drones and gliders to support the research conducted by the university’s scientists and engineers.

“One of the inventions the MAO Group is working on is an automated, multirotor hovering drone, that can be airborne in 15 to 20 seconds from the moment a crime scene or danger alarm is triggered. It would steer itself to the scene and then take live footage for the police or security companies,” Mooney explains.

The image recognition capabilities, which need to be of the highest quality and resolution for the authorities to clearly identify people, has already been available for years as it is used in the military and by security companies. “The software is available but we want to integrate it in a different way –

instead of a person going to the hot spot and piloting the drone from there, this drone is completely automated from the time the alarm is triggered,” Mooney elaborates.

“We would require the necessary permission from the authorities, but at this stage we want to see if we can develop the technology. One of our master’s students in the MAO Group, Benjamin Nelson, is focusing his research on this and it should be ready by the end of the year.”

Currently, it is the permit aspect that is impeding the harnessing of the full potential of drones, not the technology, as the South African Civil Aviation Authority (SACAA) stipulates that an RPAS Operating Certificate is required, with certified drones and drone pilots.

No commercial drone permits have been granted to any university in South Africa or any company in the Eastern Cape, and MAO is working on getting Nelson Mandela University certified, but the process may take up to two years.

“In the meantime we are carrying on with our research and innovation,” Mooney explains.

“The potential is phenomenal as drones can be fitted with multispectral cameras and data-collecting capacity for a wide range of functions, including delivering blood and medical supplies to remote areas (similar to the work being done by Zipline in Central Africa). Drones can take 3D images of buildings for restoration, renovation or extension purposes, for marine science data capturing out at sea, marine and land surveys, such as dolphin and penguin surveys. Drones with thermal and infrared images can monitor livestock and help prevent stock theft, as well as conduct agricultural crop surveys to determine water, growth and health levels, and which crops need irrigation or spraying.”

### MAO and the Centre for African Conservation Ecology

The MAO team is currently working on projects with the director of the Centre for African Conservation Ecology at Mandela University, Distinguished Professor Graham Kerley.

One of the projects requires the use of drones to collect data from tagged big game, such as elephants and rhinos. Kerley

asked if they could come up with airborne, low-power cellphone technology that can cover a specific area and upload data from all the tagged animals in this area every second day.

Without this technology, the researchers on Kerley’s team have to physically locate the animals on the ground to upload the data, and because it is time-consuming, it is only happening once a month. The data, which includes the temperature and movements of the animal, is transmitted from a matchbox-sized device on the animal’s ear.

“The potential is phenomenal as drones can be fitted with multispectral cameras and data-collecting capacity for a wide range of functions, including delivering blood and medical supplies to remote areas ... ”

– Damian Mooney

### MAO and the Africa Earth Observatory Network (AEON)

With specialised instruments on board drones can be used to map and generate subterranean images for deep geophysics research, including surveying rock down to one kilometre below the surface. This was done last year by Professor Moctar Doucouré of the Africa Earth Observatory Network (AEON) of the Earth Stewardship Science Research Institute (ESSRI) at Mandela University. The drone carried up to 5kg of equipment, and was used to monitor the surface and ecosystem of the Karoo.

### FrankenDrone

Drones are also used for package deliveries to remote locations. MAO master’s student, James Sewell, is working on “FrankenDrone” – an autonomous aircraft that

can deliver a package on to the deck of moving ships out at sea, which do not have the ability to stop easily, as opposed to using a manned helicopter or airplane, which is far more expensive. FrankenDrone uses stereographic cameras to determine how fast the ship is travelling for an accurate “bomb drop”. Sewell will complete his project at the end of 2018, and the next master’s student will work on the next generation model.

FrankenDrone, which spans four metres across and has both a fuel and electric motor, can be rapidly deployed, with a 5kg payload capacity. It was manufactured in 2017 by one of the exchange students in the EBEIT Faculty’s Renewable Energy Lab – Sebastian Pietzka from Reutlingen University in Germany – and its flight potential is now being taken further.

“I named it FrankenDrone because there is there is a lot of mixing and matching of parts. Despite its looks, it’s such a practical drone





– each side is an independent aircraft with its own power, control surfaces and receiver modules, It's effectively two aircraft flying in tight formation, which means if there is a fault on one side it can still fly the mission."

**MAO and the UK-SA Bilateral Chair in Ocean Sciences**

Moving on to the autonomous underwater vehicles (AUVs), the MAO Group is working with marine scientist, Professor Mike Roberts, who is leading a new research chair, called the UK-SA Bilateral Chair in Ocean Science and Marine Food Security, based at Nelson Mandela University's new Ocean Sciences Campus.

The joint hosts of the Chair are Nelson Mandela University and the United Kingdom's leading marine science research and technology institutions: the University of Southampton (UoS) and the Southampton-based National Oceanography Centre (NOC), which are assisting with the expensive technology for data collection, including ships, automated subsea gliders, moorings, satellites and ocean models.

Automated subsea gliders are about 3.5m long and weigh a few hundred kilograms. These gliders gather critical deep-sea ocean information, such as on ocean physics and upwelling, which directly underpins marine food security and all levels of the food chain in the Western Indian Ocean (WIO). The WIO has the most serious food security problem on the planet. It extends all the way up the eastern coast of Africa, including Somalia, Kenya, Tanzania, Mozambique, South Africa, and the island states of Comoros, Madagascar, Seychelles, Mauritius and Réunion.

"What is currently missing from the WIO portrait is a lightweight glider alternative, which we believe we can offer the partnership," Mooney explains.

"A delegation from our research team went to the NOC-Southampton and to leading companies in Norway that manufacture AUVs, to be exposed to the latest AUV technology.

"It is very impressive but it relies on ships, which is the key problem faced by Prof Roberts and his team who have very limited access to research ships and gliders in South Africa and the WIO African coastal countries we partner. At present the data being captured is from gliders and sensors weighing anything from a few hundred kilograms to tons," continues Mooney.

"The logistics of getting these sensors out to sea often involves international research ship support, which is extremely costly and time consuming. Our goal is to come up with smaller sensors that we can get out to sea without ships. We are using this as an opportunity to innovate technology that solves our shortfall in large vessel support, in the same way that limited hardwire telephone infrastructure led to African countries developing some of the world's most advanced cellphone networks.

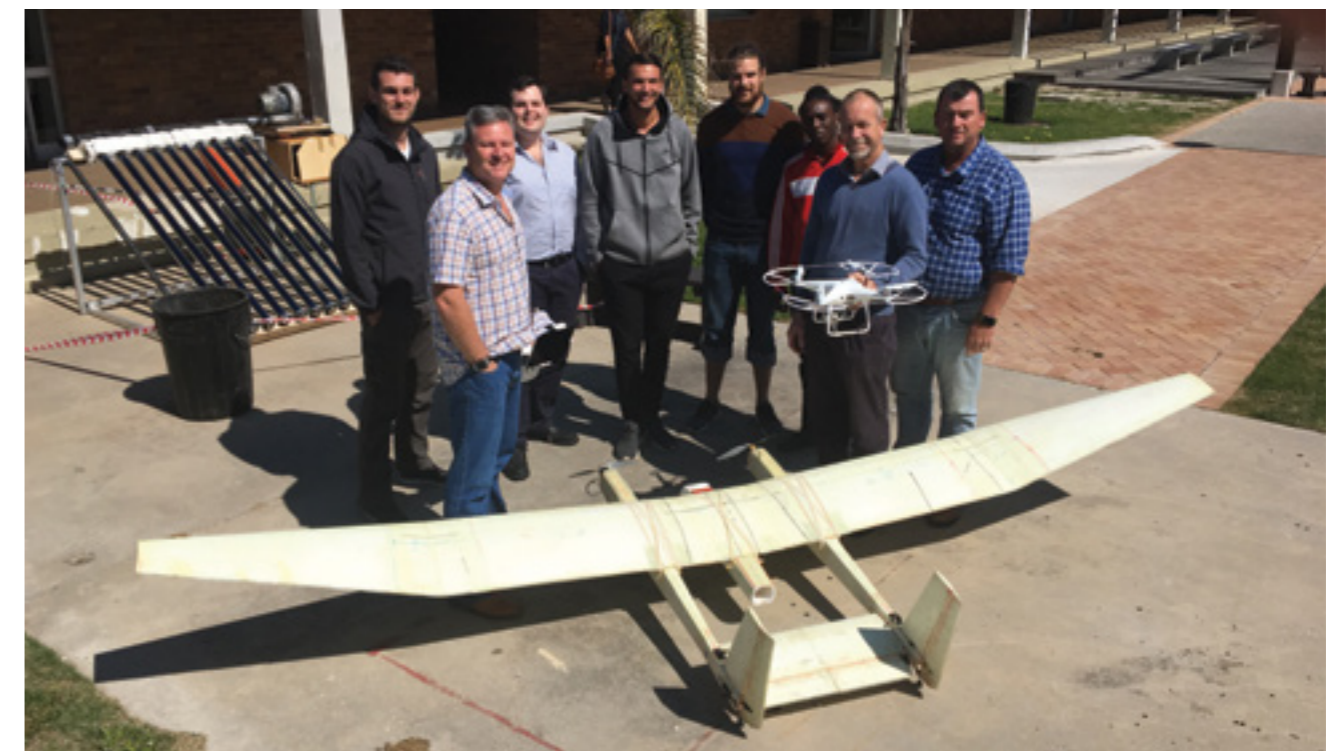
"Instead of trying to get a few big sensors that do all the work out at sea from ships, our research is about deploying large numbers of lighter, smaller sensors that can be transported in packs and deployed by airborne drones or smaller autonomous surface vessels. Instead of one autonomous glider or heavy sensor bundle trying to gather multiple types of data, each small sensor will have one very focused task to keep it small and transportable."

The possibility of having drones (surface or airborne) that remain on task for days at a time and act as relays back to home stations means the small sensors would also not need to carry and power bulky satellite communication modules; they could have smaller efficient wi-fi style modules and transmit much larger data packages back to base through the relay and bypass the satellite communications.

Mooney explains that a drone like FrankenDrone can also operate as a relay station for the sea gliders, essentially acting as an airborne wi-fi relay tower system: "Most gliders currently work on the iridium satellite system. When they go down to depths of 6000m, for example, there is no communication. When the glider returns to the surface, it has an antenna and it tries to make a link with the iridium satellite network, but it is not efficient as this satellite system was developed in the 1970s, so it is a bit like an old-fashioned dial-up modem.

"Researchers are therefore not getting rapid information, or information in the detail they need, and it is also very expensive, so our idea is the cost-effective wi-fi type system – which can feed real-time information – with the glider being programmed to deliver bigger data packages far more frequently.

"One of our students is currently working on a solar-powered system where FrankenDrone's wings are solar-powered by day and battery operated by night so that it can serve as an airborne communication station for days at a time. Our ultimate goal at Nelson Mandela University is to support our researchers and partners in the marine sector by developing and making available gliders and sensors that are suited to the South African and African challenges."







**Professor Darelle van Greunen**

**“Our motivation is to develop smart technologies that help to achieve radical advances in human potential and well-being within our most disadvantaged and at-risk communities”, is how Professor Darelle van Greunen, director of the Centre for Community Technologies (CCT), describes their work.**

## Aiming for Radical Advances in Human Potential

Situated in the School of Information and Communication Technology, the CCT was established by Prof Greunen in 2014 and has grown exponentially in the past four years. From a team of one, it now has an internal team of 19 postgraduates and lecturers, and a full-time business analyst and project manager. Externally, the CCT subcontracts a team of 27 Mandela University IT graduates now working as IT professionals in Port Elizabeth, which is fast gaining momentum as a “software city”.

The CCT’s agile, innovative solutions for a wide range of projects in the Eastern Cape, South Africa and several other African countries have attracted global partners, including

Glasgow Caledonian University, and funding from global organisations, such as the European Union and UNICEF.

### TB and GeoMapping

One of a range of smart technologies currently being developed by the CCT is an app to assist the Department of Health to better monitor and manage tuberculosis (TB) patients in the Nelson Mandela Bay Metro, and to curb the spread of TB. Once this app has been tried and tested, it can be made available to other regions, and adapted for the management of other diseases.

“The use of technologies in TB management is a top health priority for South Africa. At present there are no electronic health records in South Africa’s public sector to monitor and manage TB patients,” says Prof van Greunen. “The latest statistics from Stats SA cite TB as number one on the list of the 10 top causes of death in South Africa.”

Funded by the Discovery Foundation, the CCT named this project the “TB GeoMapping and eCompliance Solution”. It started in October 2017 and will be ready by the end of 2018. The CCT project team includes members of the Human Sciences Research Council (HSRC) who are working in the HIV/AIDS, STIs & TB (HAST) Research Programme; Professor Maggie Williams from Mandela University’s Faculty of Health Sciences, who specialises in clinical TB research; IBM Africa; and an Indian-based TB-focused non-profit organisation, Operation ASHA.

Patient information from the Department of Health’s TB patient record is entered, including the patient’s name, surname, ID number, phone number, address, gender, TB type, HIV status and infectious grading.

GeoMapping registers the GPS location of patients with drug-susceptible TB (DS-TB) in the Nelson Mandela Bay Metro using the built-in GPS capability of the phone, and heat maps are then generated to indicate where these patients are moving around in the community and beyond.

“With this information, healthcare professionals and healthcare workers (HCWs) can not only manage each patient, they can identify and respond to TB hotspots in the metro, and focus their attention on these hotspots to help curb the spreading of TB, through health interventions and educational and awareness campaigns,” explains Prof van Greunen.

Community Health Workers (CHW) and community clinic nurses are critical to the success of this solution. It is envisaged that each CHW and community clinic nurse would have the GeoMapping solution on a mobile device and an eCompliance thumbprint-recognition device that records the date, time and location of their visit to the patient, or the patient’s visit to the clinic. The aim is to confirm that the patient has received their medication; the CHW, nurse and patient would be required to give their thumbprint on each visit.

Prof van Greunen adds that a mood recorder, which allows the user to record their mood, activity and what they have eaten, is also being created for this app. Patients with chronic diseases such as TB, cancer, HIV and diabetes often suffer from depression. By recording their mood and the food they have eaten that day, they can be helped to better manage their emotions and to understand

which foods or drinks exacerbate their depression or feelings of unwellness. This information is made available in electronic report form for the CHW, doctor or nurse.

Adding to the TB management solution, IBM Africa is developing a wearable device for TB patients, probably in the form of a wristband. If two or more people with TB are in contact, it will track the duration of the contact, and flag the risk of inter-transferring different strains of TB. This will assist health professionals to improve their understanding of the TB history and evolution of each patient and community.

To inform people better about TB, the CCT has created a TB brochure in isiXhosa (the language most spoken in the Eastern Cape), which talks about the disease, how to identify the symptoms, and how early detection and treatment saves lives. It also explains what to do if you start experiencing TB symptoms or have been diagnosed with TB and where to get help and support, including contact details for TB healthcare centres. The brochure will also be available in digital format (audio and video).

### The KaziBantu Project (In isiXhosa, KaziBantu means Active People)

The CCT is partnering Professor Cheryl Walter from the Department of Human Movement Science in the KaziBantu project in the Nelson Mandela Metro.

KaziBantu is the next stage of the Disease, Activity and Schoolchildren’s Health (DASH) study (2014–2017), led by Prof

Walter and Professor Uwe Pühse from the Department of Sport, Exercise and Health at the University of Basel in Switzerland. DASH focused on children’s health in poorly resourced schools and the effect of common infections and malnutrition on their growth and learning ability.

“Our research showed that children infected with worms and parasites and children who do not receive treatment or proper nutrition experience growth and learning problems, including stunting and lower attention levels. This is one of the issues we started addressing through DASH,” says Prof Walter.

“On the positive side, our research also showed that children who are active for 60 minutes or more a day, irrespective of their background, are happier, healthier children.”

Over 1000 Grade 4 learners in eight, no-fee schools in the Nelson Mandela Bay Metro participated in DASH. All the children live in overcrowded communities. One of the participating communities was originally built for 6000 people, but now there are over 40 000

**“The use of technologies in TB management is a top health priority for South Africa.”**

– Professor Darelle van Greunen

people living there. The water and sanitation systems cannot cope, sewers frequently overflow, and infectious diseases are readily transmitted.

A range of recommended interventions was shared, including bi-annual deworming of the children, and providing low budget healthy meals in the place of cheap junk foods that are full of sugar and tartrazine. The master's students on the project helped the teachers to introduce two physical education lessons a week, a dance and exercise class, as many of the schools don't offer physical education.

DASH has since been scaled up into the Novartis Foundation-funded KaziBantu project, with interventions in the Nelson Mandela Metro across all grades, and it is also addressing teachers' health and health risks. The Novartis Foundation is interested in the project being scaled up by the team for the rest of South Africa and other countries in Africa.

"Within this project we are contributing the ICT component, such as the development of the KaziKidz portal – an educational and instructional tool for primary school teachers," Prof van Greunen explains. "It aims to enhance children's overall health in South African primary schools through a range of easy to use programmes, including physical fitness games, moving-to-music, and health, hygiene and nutrition education lessons. The aim is to

encourage children to lead healthier lives through the fun content, games, activities and music."

The CCT has also developed the KaziHealth app for the teachers at the participating schools, many of whom are suffering from stress-related issues and non-communicable diseases such as hypertension and diabetes.

"This app is a health promotion programme and self-management risk assessment tool," Prof van Greunen explains. "All the teachers participating in KaziBantu are given a full physical examination by the biokineticists at Mandela University's Biokinetics and Sport Science Centre, and the results are captured electronically.

"The teachers use the app to manage their risks by following the tips given on the app as well as engaging with apps that guide them in nutritional habits and physical activity, and managing stress. They also have face-to-face coaching sessions with members of the KaziBantu team.

"These apps all make use of gamification where people log up badges or trophies if they achieve certain targets. We are busy exploring different forms of encouragement that are shown to be motivating; it's the 'Vitality points' type of approach," says Prof van Greunen.



**The global growth of electric vehicles (EVs) includes the aligned demand for a crucial component: lithium-ion batteries.**

## A New Era of Electric Vehicles and Lithium-ion Batteries

Africa's first internationally accredited testing facility for lithium-ion batteries is situated at Nelson Mandela University. This has been achieved through the intensive facilitation and activities of the uYilo eMobility Technology Innovation Programme.

"uYilo supports battery research and development and the testing of lead-acid and lithium-ion batteries to international standards under the ISO 17025 Quality Management System. We received the lithium-ion accreditation in February 2018 through the South African National Accreditation System (SANAS)," says Hiten Parmar, the project leader and deputy director of the uYilo Programme, situated within the University's engineering, innovation and engagement entity, eNtso, which spans a number of disciplines, including engineering, information technology and chemistry.

The uYilo battery-testing laboratory also has SANAS accreditation for lead-acid battery testing (since 2015). He explains that lead-acid battery technologies do not meet the requirements for EVs; this has therefore accelerated the developments of the lithium-ion battery industry. The lead-acid battery is currently still being used in petrol and diesel vehicles.

"Any company or research and development entity can make use of our services, and, while there is no local manufacturing of EVs yet, we are aligning towards supporting facilities and services and helping to pave the way for a new era of sustainable energy, low carbon transport, and smart cities."

In March 2018 Parmar spoke at the Africa Clean Mobility Week, where 42 African countries met at the United Nations Environment Headquarters in Nairobi, Kenya, to explore opportunities for Africa to leapfrog to cleaner and more efficient mobility solutions.

"Within the next few years we are likely to see policies coming into effect around energy efficiency and green transport in South Africa and other African countries, with EVs increasingly populating our roads," says Parmar. "Globally there is an acceleration towards EVs. Japan today has more EV charging stations than fuel stations. In the UK, EV charging stations will exceed gas stations by 2020, and the Netherlands is planning to ban the sale of petrol and diesel engines from 2025."

### Umthi ugotywa usemanzi (start them young)

Afikile Sikwebu is the Educational Engagement Coordinator in the CCT.

He completed his BTech in Software Development at Nelson Mandela University and is currently registered for an MSc in Information Technology. This is an excerpt of the speech that he gave at the Mandela centenary celebrations:

"Technology has transformed the landscape and the way we do things, from taking orders at online stores, to how we use our smart TVs at home, our manner of play (online games), and the way we communicate with faraway loved ones. While technology changes at an astronomical pace, technology acceptance and use at the lower public education level, especially in townships and rural areas, is on the opposite end, leaving our learners as late adopters of technology and always playing a catch-up role. This is not because these learners are not capable; it is because of a lack of access and exposure.

"To address this challenge, the CCT introduced a Learn to Code programme to teach primary school children in under-

resourced schools to code. We meet with about 200 learners every week, some of whom have never used a computer. We expose the learners to computers and teach them to use computers in ways that are relevant and beneficial for their future career prospects. The Xhosa saying, *umthi ugotywa usemanzi* (start them young) stands true, as our youngest learners are only 10 years old.

"The learners are also introduced to physical computing whereby they design, build and programme their ideas out of recycled materials and microcontrollers to promote creativity, algorithmic thinking, design, problem solving and debugging, thus enhancing their STEM learning to include the arts. One example is the "Drone by Kite" project in which learners are challenged to build kites that are wide enough, strong enough, and light enough to carry a camera to take aerial videos. While some learners said it was impossible, others (mostly girls) have tried the idea and succeeded in carrying a cellphone on a kite, and taken footage with it!"





As a motor manufacturing hub, the Nelson Mandela Bay Metro, which includes Port Elizabeth and Uitenhage, is an ideal location for EV growth, and the uYilo Programme is working closely with industry and government as an initiative of the Technology Innovation Agency (TIA).

Hiten explains that South Africa now has 100 public EV charging stations nationally, and in 13 cities, mostly in public spaces such as shopping centres and office blocks, which means you can fast charge your vehicle while shopping or at work.

Between 2016 and 2018 the uYilo team successfully developed a smart grid pilot project for the energy-efficient charging of EVs through solar battery storage and energy management across a network of EV charging stations.

“We use a repurposed EV battery in the plot project,” Parmar explains. “EV batteries have a life of 10 to 15 years, at which point they drop to 80% health and can then be repurposed out of the vehicle for lower energy needs, such as stationary storage, either to charge EVs or for vehicle-to-home technology where you literally plug your EV into your home as an additional source of energy. You can also support the electricity grid network with your EV.”

Repurposed lithium-ion EV batteries can be used for lower energy purposes for several more years. They are then submitted to recycling processes where core materials can be extracted out of the batteries and put back into the battery manufacturing process.

In 2017 uYilo hosted an international Batteries and Electric Vehicles Seminar in Nelson Mandela Bay, and a second conference event is being hosted here in October 2018.

Keynote speakers at the 2018 conference include Christina Bu, Secretary General of the Norwegian EV Association (Norway’s EV drive is a major success); and Shmuel De-Leon of Shmuel De-Leon Energy in Israel, an international leader in lithium-ion batteries whose clients include the space, military, automotive, medical and industrial industries.

“Advancements in EV technology include increasing the distance achieved on one charge, and to be able to charge the EV within four minutes,” Hiten explains. “Currently, the AC standard chargers take four to eight hours to charge an EV battery, and DC fast chargers take about 20 minutes.”

EVs such as the Nissan Leaf (which already supports vehicle-to-grid functionality) and the BMW i3, can drive for up to 150km on one charge. The BMW i3 REX can drive for approximately 300km, 150 of which are on its 9-litre range extender petrol engine. The range is rapidly increasing, with the new Jaguar I-PACE available early in 2019 achieving 470km on one charge. In South Africa it currently costs R28 to recharge an EV for 150km, compared to R170 to refuel for the same distance in petrol vehicles.

EVs also have much faster acceleration than standard petrol and diesel cars, due the torque delivery of electric motors.

“We are lobbying government to reduce the total import taxes of 43% on EVs, which significantly pushes up the cost,” says Parmar. “EVs are not yet manufactured in South Africa and the supply chain for manufacturing still needs to be developed. It would necessarily include the main global players in lithium-ion batteries, such as Panasonic, Samsung and LG.”



Dr Muki Moeng

## Executive Dean’s Report

# Faculty of Education: Highlights

### Strategic Plans:

An important development is a partnership agreement with the Human Sciences Research Council (HSRC) to co-supervise master’s and doctoral students with members of the Faculty of Education. The director of the School for Education Research and Engagement, Professor Sylvan Blignaut, recently had discussions with Professor Sharlene Swartz, who is the Executive Director: Education and Skills Development at the HSRC. This partnership will enhance supervisory capacity in certain critical areas.

The new Chair for Critical Studies in Higher Education Transformation (CriSHET) will be working across faculties at the university, and we are working closely with them in regard to co-supervision and registering some of the postgraduates in our faculty.

### Key Projects

Our ongoing CER-MESA (East and South African German Centre of Excellence for Educational Research Methodologies and Management) partnership, sponsored by the German Academic Exchange Service (DAAD) is going well, with master’s and doctoral students from southern African countries meeting in our faculty with our German collaborators. A Capacity Building Programme for Lecturers and Supervisors (CABLES) sponsored by DAAD and hosted by CER-MESA took place at Nelson Mandela University from 13 to 21 August 2018. This programme is aimed at young and emerging supervisors who come from different DAAD-funded Centres of African Excellence in Africa. Six of our academic staff members participated in this programme.

We are continuing to work with the community of Cala in our school improvement project. The challenges facing the

schools in Cala require a multipronged approach with different faculties, units and departments from the university coming in at different points depending on the expertise required. Our Centre for the Community School (CCS) team visited Cala from 30 July to 3 August 2018 for school governing body and school management team training. A youth literacy programme is also underway in Cala.

In our efforts to assist with the improvement of the Technical and Vocational Education and Training (TVET) sector around the Eastern Cape we signed agreements with TVET colleges with regard to developing underqualified staff to improve their qualifications. We developed and had approved an Advanced Diploma in TVET that we will offer for the first time in 2019. We designed this diploma in consultation with TVET colleagues and as a result of this collaboration, we have a group of six master's students for whom we have managed to find bursaries. These students are supervised as a cohort and are investigating issues concerning teaching and learning in TVET colleges. We are confident that after graduation, these students will improve the quality of teaching and learning in their classrooms.

“... we signed agreements with TVET colleges with regard to developing underqualified staff to improve their qualifications.”

– Dr Muki Moeng

**Achievement and Awards**

Lecturer Dr Heloise Sathorar graduated with her PhD in April 2018. Her achievement brings the total number of academic staff with PhDs in the Faculty of Education to 28 out of 47 academics. We also had four master's students graduating during the April ceremony, which is the smaller of our graduation ceremonies.

**Highlights**

Four of the faculty's academic staff members participated in a workshop organised by CER-MESA in Oldenburg, Germany during June 2018. Eight of our international master's students who graduated in December 2017 through the CER-MESA programme presented the findings of their studies to the DAAD sponsors during the visit to Oldenburg. In July 2018 the Faculty of Education held a very successful two-day colloquium that was attended by more than 250 delegates from formal, informal and non-formal sectors of education. The colloquium took place at the Missionvale campus where we unpacked Madiba's famous “weapon” quote: “Education is the most powerful weapon we can use to change the world.” The outcome of the colloquium was intended to extend beyond the two days and beyond the rhetoric, in an attempt to forge inter- cross- and trans-category understandings, collaborations and endeavours. In our effort to be the legacy of Nelson Mandela, we interrogated the contextual relevance of Mandela's quote in the 21st century: a century that reflects realities of growing inequalities, injustices and hegemonies of knowledge. Our attempt was to problematise and reposition our understanding

of the “weapon” – education – within the drive for a decolonised education system.

Professor Nokhanyo Mayaba participated in the prestigious African-Swedish partnership that was launched in Pretoria in May 2018. The main purpose of the meeting in Pretoria was to formally launch the programme, and to provide a chance for researchers from South African and Swedish universities to meet and create research linkages. Each researcher from Nelson Mandela University was carefully selected to attend, as established researchers who will understand the need for establishing partnerships in one of the six defined themes. One of the themes of this partnership, *Transforming Higher Education Curricula: the nexus between academia and society*, speaks directly to what we are doing in the faculty. There are 22 South African universities and seven to eight Swedish universities involved in the programme.

Professor Shervani Pillay attended the Eastern Cape Research Conference from 26 to 28 July 2018. The first of its kind, the conference focused on

the challenges experienced by the Eastern Cape from a variety of perspectives, including climate change, natural resources and sustainability; health and well-being; urbanisation and migration; curricular and social transformation in higher education; digital technologies; rural development and land issues. Prof Pillay was a discussant for the Higher Education session, together with three other colleagues from the different universities in the Eastern Cape; Professor Derrick Swartz was the keynote speaker for the session, and Professor Crain Soudien the lead speaker.

Dr Heloise Sathorar was selected as one of the female staff from our university to attend the annual HERS-SA (Higher Education Resource Services-Southern Africa) ACADEMY, for the professional development of women leaders in higher education. The academy took place in Cape Town from 2 to 6 September, 2018. Mandela University's Vice-Chancellor, Professor Sibongile Muthwa, as well as the Minister for Higher Education, Ms Naledi Pandor, formed part of the programme.

**Future Goals**

Our future goals are to intensify the Faculty of Education's efforts to create a footprint on the continent with closer cooperation between universities and scholars in Africa. To this end, in 2019 we intend to host an African scholar from Moi University in Kenya as a visiting academic in the faculty.

**Dr Muki Moeng**  
Executive Dean  
Faculty of Education



**The fruits of the East and South African-German Centre of Excellence for Educational Research Methodologies and Management (CERM-ESA) became evident when the first cohort of eight scholarship students, all from Kenya, graduated in December 2017, 50% of them cum laude.**

## Growing Africa's Master's and PhDs in Education

“Sadly, one the graduates, Gamba Wafula, died of a heart attack before the ceremony,” says Emeritus Professor Paul Webb, who heads the CERM-ESA programme at Nelson Mandela University. “Gamba's supervisor, Professor Logamurthie Athiemoolam from our Faculty of Education, saw to all the final details required by the university to allow Gamba to graduate posthumously. Gamba's degree was received on his behalf by his son, Robert.”

CERM-ESA is a cooperative project between the University of Oldenburg in Germany, Moi University in Kenya and Nelson Mandela University in South Africa. The Centre is based at Moi University and funded by the German Academic

Exchange Service (DAAD) and also includes the University of Dar es Salaam and the Uganda Management Institute in its network.

The aim is to grow the pipeline of African master's and PhD scholars in education. In order to do this, the CERM-ESA team facilitates high-contact and blended learning supervision support programmes for academics who currently supervise postgraduate research students in education in South Africa, Kenya, Uganda and Tanzania. More than 80 academics have participated each year in these supervision support workshops since CER-MESA was launched in late 2014.



"The first cohort of CERM-ESA master's students spent approximately four months in Port Elizabeth in 2016 and six weeks in 2017, working closely with their supervisors and attending research seminars and workshops," Prof Webb explains. The second cohort of 13 master's students are from Kenya, Tanzania and Uganda, while the first cohort of four DAAD doctoral fellows are from Uganda, Tanzania, Kenya and South Africa. A second cohort of CERM-ESA PhD scholarships, two from each of the four countries, were awarded in 2018.

Sarah Jemutai, from the first CERM-ESA cohort, is one of the recipients of the PhD scholarships. She was supervised by Prof Webb, and graduated *cum laude* in 2017. She was also selected as the recipient of the Nelson Mandela University Council's best Master's Degree by Dissertation in the Humanities Award, which she received during the Academic Awards Dinner held at Port Elizabeth's Feather Market Hall in June 2018.

Based on her research in Kenya and South Africa, Jemutai's master's dissertation, *The effect of guided play on pre-school learners' visual perceptual abilities*, showed how young children's visual perception development is accelerated by teachers facilitating guided play. These findings have implications when designing instructional materials to promote the development of reading, writing and numeracy skills in pre-literate children.

Not only does Jemutai's study attest to the ever-evolving development of educational methodologies and innovation, but her outstanding academic achievement, despite her difficult circumstances, sets an inspiring example. She offers some insight into her life:



## The Pedagogy of Mathematics in South Africa

Published in December 2017, *The Pedagogy of Mathematics in South Africa: is there a unifying logic?* is a book on mathematics education that is the outcome of a research project led by Professor Paul Webb and co-edited with Professor Nicky Roberts from the University of Johannesburg.

"The research was commissioned by the Mapungubwe Institute for Strategic Reflection (MISTRA) towards understanding why learners in so many of our schools do so badly in maths," says Prof Webb.

"We took a forward-looking approach as to what could change, and identified three pillars, namely,

developing mathematical identities where teachers believe they can teach maths, and children believe they can do maths; developing school teachers' in-depth understanding of mathematics; and using multilingualism as a resource for maths teaching.

"We interviewed stakeholders in government, NGOs and FirstRand/National Research Foundation Chairs in Mathematics Education across the country. Many of the Chairs wrote chapters, which contributed greatly to our aim of opening dialogue and having a positive effect on the mathematics community in South Africa."



Sarah Jemutai

"I am a teacher by profession, teaching in a primary school. I live in my home village called Kapkeben village in Nandi North Chesumei constituency, Nandi County, Kenya. Kapkeben is an area where there are poor roads and connection is a big problem. From home to Moi University is 70km. I walk for some distance because riding on muddy roads can be dangerous. Then I get a motorbike ride to Mosoriot shopping centre where I board a *matatu* (taxi) to Eldoret town. From Eldoret Town I board another *matatu* to Moi University.

"CERM-ESA has enabled me to complete my master's degree, to grow academically, and to meet, interact and share ideas with other students, supervisors and lecturers from the different universities, which, for me, is a rare opportunity and one for which most students yearn.

"Where I come from, electricity is still a challenge and doing my master's was not all that easy but through hard work and determination together with steadfast guidance from my supervisors it became a dream come true. Having completed my master's I felt it was not enough. I desire to gain more knowledge and skills through a doctorate to be able to give back to the community. Thanks to CERM-ESA and Mandela University this has become possible."



Moi University in Kenya – one of the members of the CERM-ESA cooperative project.





**Dr Bruce Damons**

***“The ways in which poor working class communities and schools come together to create an enabling environment for learning to occur is rapidly emerging as a practice and scholarship,” says the Director of the Centre for the Community School (CCS) in the Faculty of Education, Dr Bruce Damons, who graduated with his PhD in 2017 and was the recipient of the South African Education Research Association (SAERA) national award for the top PhD.***

## Working Class Schools as Communities of Practice

“It challenges the outdated educational paradigm where power is solely vested in the formal educational sector, and demonstrates how the community school requires the participation of the non-formal sector (NGOs and NPOs), and the informal sector – parents, volunteers and community members making a significant difference in the educational space.”

The CCS, in collaboration with participants from the non-formal and informal categories, is working with a growing number of schools in the Nelson Mandela Bay Metro and the wider Eastern Cape to reimagine schooling under challenging conditions, especially in these working class communities.

As part of his PhD, Dr Damons researched how community volunteers were recruited, supported and sustained in a school located in one of these communities. The work of these volunteers contributes significantly to the functionality of the school in a variety of ways – from helping as teaching assistants to security and safety (identified as a priority), maintenance, cleaning classrooms, improving the school grounds and looking after orphaned and vulnerable children.

Dr Damons says: “Part of the engagement with the volunteers led to the affirmation of the principle of duality of outcome, namely that scholarship will inform practice and practice will inform scholarship. Additionally, all participants in the study are recognised in all forms of scholarship that emerge from these engagements, such as the procedure manual

produced by the co-researcher/volunteers in our study. The manual is used to expand the volunteer programme in interested schools, and volunteers who were co-researchers are now co-presenters.”

One of the co-researchers is Neziswa Ntwini, a volunteer in administration at Sapphire Road Primary in Booyesen Park, Nelson Mandela Bay Metro. She is continuing her work there as well as working as a coordinator for reading and maths clubs in a project supported by the Mott Foundation of the United States. Ntwini is also one of the co-facilitators with Dr Damons of the volunteer programme they are currently piloting at 14 schools – all of them in the Manyano Network of Community Schools.

A key feature of the CCS’s engagement is to ensure that the voices of all participants, including community members, volunteers and parents, are valued, recognised and acknowledged. “They have substantive knowledge, which, as part of a decolonised education, needs to be both recognised and harmonised with formal education through critical engagements,” says Dr Damons.

The approach is strongly influenced by participatory action learning and action research (PALAR) methodology. The start-up engagement of CCS is to introduce all participating schools to the concept of the Community School and organise them into a number of multi-stakeholder communities of practice (CoP). Through these CoPs the schools present their challenges and jointly construct appropriate responses to tackle them.

Dr Damons emphasises the extensive goodwill in working class communities, where many people are volunteers in educational and other fields. “In our Mott Foundation projects, for example, we have 14 unemployed volunteers starting and running reading clubs in high schools, supported by one of our faculty members.”

From 2017 to 2020 the CCS is partnering the Learning Trust in an initiative called OASIS (Organising After School and In School Support) – a community of practice consisting of various organisations working in the after school and in school space, to support basic school functionality. OASIS is in the process of developing a school improvement plan in collaboration with two schools in the Nelson Mandela Bay Metro – a high school in Kwazakhele and a primary school in Helenvale.

Also from 2017 to 2020, the CCS is partnering with the iKamvelihle Development Trust in the Sakhingomso programme. Three schools in the rural Eastern Cape region of Cala (one high school and two primary schools) are focusing on school management training, school governing body training and training representative councils of learners. This programme forms part of a memorandum of understanding between the iKamvelihle Development Trust and Nelson Mandela University.

The CCS is continuing with its work with the Helping Hands Trust in six high schools in the Northern Areas of the Metro and provides support to various schools and communities that are not affiliated to any specific network.

**“Part of the engagement with the volunteers led to the affirmation ... that scholarship will inform practice and practice will inform scholarship.”**  
– Dr Bruce Damons

At the same time the CCS is sharing research on the community school, some of which has been published, such as a chapter co-authored by Dr Damons and Professor Lesley Wood from North West University titled, “Fostering a School-Community Partnership for Mutual Learning and Development: A Participatory Action Learning and Action Research Approach” in *The Palgrave International Handbook of Action Research*, published by Palgrave Macmillan US in 2017.

In June 2017 the CCS and Faculty of Education presented on participatory engagement through a community and popular education praxis at the ARNA

Action Research Network of the Americas Conference at the National Pedagogical University of Bogota in Colombia. “What really inspired us was the passion of our colleagues working in the most rural areas of Colombia, which were impacted by wars and the drug trade.

“There is a growing national and international interest in our work, with great willingness to share knowledge in the education space and to be receptive to new concepts of knowledge,” says Dr Damons. “The CCS was invited to form part of a collaboration with the University of Cape Town to focus on school and community engagement in 2018. It is also part of a collaboration with Rhodes, North West, Free State and Stellenbosch universities to explore scholarship around community engagement. Faculty of Education and cross-faculty collaboration is also increasing, especially with our social development professions, and we have done work with colleagues in the human movement sciences and community psychology.”





**Professor Nokhanyo Mayaba**

***In grappling with the decolonisation of teacher education, Professor Nokhanyo Nomakhwezi Mayaba's concern is whether or not curriculum developers invest issues of language – which she believes to be at the heart of the curriculum – with thought and ingenuity.***

## The Case for isiXhosa

She says, "What I think we continue to get wrong is to imagine that we can talk about a curriculum without paying attention to issues of language and their political and economic dimensions." She believes that colonial constructs are still at the heart of teacher education curricula because they are institutionalised at universities. In relation to language, for instance, English is the language of learning and teaching (LOLT) at most universities in South Africa. As such, a student whose African language is marginalised in primary education enters a university system that perpetuates the same process.

Quoting a paper in the *South African Journal of Childhood Education* titled "Mama doesn't speak that (language) to me: indigenous languages, educational opportunity and black African pre-schoolers", by Professor Vuyisile Msila, of the

University of South Africa, Prof Mayaba says: "Black parents have expressed a desire for their children to learn English, as it is viewed as a language of opportunity, yet they are not aware of the cultural, cognitive and pedagogical implications of learning in an additional language." She continues, "if decolonial imperatives are efforts to address the 'parity of esteem' of languages and to identify discourses and structures that undergird social injustices, then the historical legacies associated with university language policies need to be addressed. These factors have implications for teacher education and how we educate student teachers."

In preparing student teachers, she asks the following questions:

- How do faculties of education capacitate student teachers to engage with the language realities of classroom contexts in which they are going to teach?
- How can teacher education empower student teachers to question and disrupt the constructions of language ideologies and assumptions which perpetuate social injustice and marginalisation of African languages in particular?

Her interest in this field of study emerged as a result of teaching an isiXhosa conversational module to non-mother tongue speakers of the language, and from observing these student teachers in multilingual Foundation Phase classrooms.

In South African schools, learners in the Foundation Phase are taught in their home languages. In private and former white schools, the LOLT is English: a language many young learners have not yet acquired. "During teaching practice I observed that learners in the Foundation Phase often respond to teachers' questions in their home language, either Afrikaans or isiXhosa". This poses challenges to English- and Afrikaans- speaking student teachers who are not competent in African languages – in this case, isiXhosa.

Prof Mayaba continues, "Currently English- and Afrikaans- speaking students register for an isiXhosa conversational module to assist them to engage with isiXhosa-speaking learners during teaching practice. However, I noticed that my students are not able to 'border cross' between their own language repertoires and learners' home languages, especially isiXhosa, despite taking a course which is supposed to enable them to use isiXhosa whenever the need arises."

The student teachers have expressed their concern about their unpreparedness in using isiXhosa whilst teaching in multilingual contexts. This needs to be addressed, as research on classroom discourse indicates that the quality of communication between teachers and learners is essential in knowledge construction.

"There is a reasonable argument for English being the preferred LOLT in most South African schools, but, as the University of Cape Town's Dr Carolyn McKinney, in her 2017 book *Language and Power in Postcolonial Schooling: ideologies in practice*, says, 'the real language problem in schooling is that monolingual ideologies teach children to devalue the non-English languages they bring with them to schools and continue to use on daily basis'."

At the 4th International Conference on Language and Literacy Education at Wits University in 2017, Prof Mayaba presented a paper on the redesign of the isiXhosa teaching module for non-

isiXhosa speakers, in which she reflected, "My research strongly indicates that the teaching approach needs to be far more practically conversational, and that the current one-year isiXhosa course in the four-year Foundation Phase student degree is completely insufficient. Far more time is needed for non-mother tongue isiXhosa speakers to become more comfortable with speaking and understanding the language."

As a result of these findings, Prof Mayaba and the Faculty of Education took action. From 2019, the redesigned isiXhosa module will be taught over the full four years of the Foundation Phase teaching degree.

"This will significantly benefit both the learners and the teachers," she says. "Not to do so, would be to deny Foundation Phase learners in multilingual classrooms the opportunity of getting learning support through their mother tongue. If education in general is to embrace a decolonised, humanising pedagogy, we are compelled to foreground African languages in the Foundation Phase teacher preparation curriculum, in order to develop a new generation of teachers who use African languages in the classroom." She adds, "This is all the more critical given the growing number of English- and/or Afrikaans-speaking student teachers who will eventually teach in multilingual classrooms".

**"What I think we continue to get wrong is to imagine that we can talk about a curriculum without paying attention to issues of language and their political and economic dimensions."**

**– Professor Nokhanyo Mayaba**



**Professor Lungile Pepeta**

## Executive Dean's Report

# Faculty of Health Sciences: Highlights

As the faculty journeys towards the establishment of the country's 10th medical school, using an innovative teaching model, it has not lost sight of its research commitments and is determined to improve its present output and strategic research choices.

The Faculty of Health Sciences desires to radically improve its research output over the next five years. As such, the faculty has taken a drastic decision to phase out directors of Schools and introduce directors of functions that cut across the faculty. One of the core functions of a university is research.

The faculty hopes soon to have a Director of Research portfolio. This directorate for research will be chaired by the director, who will be supported by an administrator, a

researcher and a bio-statistician. The directorate will organise write-up workshops and faculty research conferences, manage treatises, dissertations, theses and all research matters emanating from the faculty.

The new directorate will also assist research units, entities and institutes that exist or are planned for the future as part of the faculty's bid to invest more time, capacity and resources on research. As part of this new drive, the faculty intends to allocate dedicated time for research to its staff members. To do so, it is reviewing its workload spread or allocation. This is intended to allow fair allocation of modules to staff, with particular focus on allowing young researchers the time to perform their research projects and complete their master's and doctoral studies.

The faculty includes the following engagement entities: the Drug Utilization Research Unit (DURU), the University Psychology Clinic (UCLIN) and the Biokinetics and Sports Science Unit (BSSU).

- DURU promotes, educates and informs all interested parties about the rational and cost-effective use of healthcare resources, with specific emphasis on the management of medicines. This entity is led by Prof Ilse Truter.
- The UCLIN comprises two psychology clinics, one on the University's South Campus (run by Prof Greg Howcroft) and the other on the Missionvale Campus (run by Dr Jennifer Jansen). The entity is chaired by Prof Louise Stroud. Both clinics are dedicated to community service and the education and professional training of postgraduate psychology students in the faculty.
- The BSSU offers professional biokinetics services to the community and offers student training, internship and research in the Department of Human Movement Science. This entity is led by the head of department, Prof Cheryl Walter.

### Research Projects

The KaziBantu Project (Healthy Schools for Healthy Communities), also under the leadership of Prof Walter, is another successful engagement and research project. The project relates to the wellness of school children and teachers. It focuses on non-communicable disease prevention and the general well-being of communities. It is a collaborative project between our Human Movement Science Department and the Department of Sport, Exercise and Health at Basel University in Switzerland. Prof Walter's counterpart from Basel University is Prof Uwe Pühse.

Water Sanitation and Hygiene (WASH) is another successful project, run by Prof Paula Melariri from Department of Environmental Health. Several postgraduate students are conducting research on clean water and sanitation within the communities of the Nelson Mandela Bay Metro.

Projects led by the Dean's Office include:

- The Adolescents receiving Continuous Care for Childhood-onset Chronic Conditions (ADOLE7C) project, an international collaborative project investigating care of adult patients with congenital heart disease. The member institutions in this study include the University of Cape Town (UCT), University of Leuven in Belgium, Walter Sisulu University and ourselves.
- The Investigation of Rheumatic Atrial Fibrillation Antagonist Rivaroxaban or Aspirin Studies (INVICTUS) randomised clinical trial, an international project involving 21 countries. It is led by the Division of Cardiology within the Faculty of Health Sciences

at UCT and the Population Health Research Institute, Hamilton Health Sciences and McMaster University, in Canada.

- The African Cardiomyopathy and Myocarditis Registry Programme (IMHOTEP) study into cardiomyopathy aetiology (causes), with particular interest in genetic causes. This research is being undertaken in collaboration with universities in eight African countries and Oxford University.

There has been a sustained growth of output in the faculty, which we are committed to maintaining. In 2017, we attained 35,4 units from published articles in accredited journals – the highest number earned by the faculty to date. Of particular note is that Esmarie van

Tonder won a presentation award for her conference paper titled "Prevalence of malnutrition and feasibility of MUAC as a screening tool in detecting malnutrition amongst adult hospitalised patients".

Following our Research Strategic Planning workshop early this year, the faculty expects each academic produce at least one full unit (as per Department of Higher Education and Training guidelines) each year. With a complement of over 100 academics, this bodes well for the faculty's future.

**Professor Lungile Pepeta**  
**Executive Dean**  
*Faculty of Health Sciences*

"... the faculty has taken a drastic decision to phase out directors of Schools and introduce directors of functions that cut across the faculty."

– Professor Lungile Pepeta





**Professor Ilse Truter**

**South Africa is one of the countries with the highest consumption of codeine worldwide, officially prescribed for pain but also widely abused both for pain relief and for its numbing effect, which reduces anxiety. Its use and abuse is a focus area for Professor Ilse Truter from the Department of Pharmacy and leader of the Drug Utilization Research Unit (DURU).**

## South Africa's Rocketing Codeine Consumption

"Pain is the most common medical symptom worldwide," Prof Truter says. "It intrigues me because it is so common and there is a story behind every pain condition – from physical pain, such as a broken leg or migraine – to emotional pain. There is also a strong addictive component to painkillers such as codeine – a mild, over-the-counter opioid available in South Africa."

Prof Truter's specific interest is the central nervous system and associated pain medication. She has done extensive research on combination analgesics, where one painkilling tablet or capsule contains more than one active ingredient, such as a combination of codeine, paracetamol, caffeine and antihistamine.

"Research shows that the widespread addiction to painkillers can start with legitimate treatment for a condition," Prof Truter explains. "If you have cancer, for example, you might be prescribed a high dose of painkillers for a period which is correct, but this is very different to routinely taking high doses of painkillers like codeine for no clear diagnosis."

She says an alarming percentage of South African men and women are addicted to painkillers, and are taking anything from five to 20 or more painkillers a day. What they are not always aware of until it is too late, are the severe consequences, such as kidney and liver damage and extreme constipation.

"It's essential to educate people better about this," says Prof Truter, who presented on rational prescribing and best practice use and abuse of combination analgesics at the Pain South Africa Conference in 2017 in Cape Town and at the Pain South Africa regional seminar in Port Elizabeth in November 2017.

She explains that the mass overuse and abuse of painkillers is not just a South African problem, it is a continental problem, exacerbated by a wide range of highly effective adverts promising the end to pain. DURU master's student, Lauren Campbell, started her research in 2017, which takes the form of a survey in Africa to look at the prescription and usage patterns of opioids such as codeine.

She and Prof Truter emphasise that many of the combination analgesics are good products; the caveat is that it has to be the right dose for the right condition, prescribed for the right patient. "Currently, it is too easy to go with a shopping list of over-the-counter painkillers without understanding what they are doing to you," says Campbell.

Pain research, including the many different aspects of pain treatment, pain management and public health, is one of the areas for which the DURU team is renowned.

"Our fourth year pharmacy students are looking at complementary and alternative methods for pain management, such as aromatherapy and homeopathy, as certain aromatic oils and homeopathic products are used for pain management," Prof Truter explains.

Bernadette Louwrens, who graduated with her pharmacy master's in 2017, is researching migraines. She surveyed 173 people in the Port Elizabeth, Uitenhage and Despatch districts who went to a pharmacy with a migraine prescription or who went into a pharmacy and said they had a migraine. The trigger factors ranged from red wine and mature cheese to stress, lack of sleep, preservatives, and sitting in front of a computer screen for too long. Louwrens, Prof Truter and statistician Theunis J. van W. Kotze authored a paper, published in 2018 in the journal *Value in Health*, on the seasonal variations in migraine attacks, with evidence of a rise in migraines as summer transitions to winter and vice versa.

For the rapid treatment of migraines, pharmacies sell over-the-counter migraine cocktails. At least one of the tablets in the cocktail contains codeine, which needs to be monitored, Truter explains. Codeine was rescheduled in South Africa in 2015. You can no longer go into a pharmacy and buy 100 combination analgesic tablets at a time; now you can only buy 40 tablets at a time, 10mg codeine per tablet. The over-the-counter availability of codeine in some other countries like Australia has also recently been changed.

"To limit the problem of multiple purchases of codeine at multiple pharmacies, an initiative known as the Codeine Care project has been proposed, aimed at creating links between pharmacies nationally, whereby if you buy codeine or if you have a prescription, you need to produce ID," Prof Truter explains. "Your ID number, together with what you bought, when, and where, would then be recorded on a national database. All the pharmacies, clinics and GP practices would work together on this system, which will hopefully be implemented with National Health Insurance."

## A Research Dream

To be elected as a member of the World Health Organisation's (WHO) International Working Group for Drug Statistics Methodology is to be recognised as a world leader in the field. Prof Truter received this honour in 2017.

"We are establishing the standard doses of medications worldwide for the WHO's Collaborating Centre for Drug Statistics Methodology in Norway, which is responsible for developing and maintaining the ATC Codes and DDD for pharmaceutical products globally," says Prof Truter.

Each and every pharmaceutical product has to be linked to the appropriate Anatomical Therapeutic Chemical (ATC) code and defined daily dose (DDD). For monitoring and comparing drug use internationally it is important to ensure that the data

retrieved is comparable. "Having a global standard helps us to set and compare usages and dosages between countries and to adjust doses where necessary," Prof Truter explains.

An example of this is the research on the antiretroviral medication, efavirenz, by DURU research associate Dr Razia Gaida, who graduated with her pharmacy PhD in 2017. In its prescribed dose efavirenz can have neuropsychiatric side effects in certain patients, such as hallucinations and dizziness. Dr Gaida found that although there are instances of these side effects, the drug's value currently outweighs these in most patients. In those patients experiencing side effects, these can be managed with adjustments in the dosage. Dr Gaida is now extending this research to TB patients through her postdoctoral work at the Human Sciences Research Council.





**The prevalence of malnutrition (both under- and over-nutrition) in hospitalised adults in the Nelson Mandela Bay Metro has been estimated at approximately 60% among acute care patients. This was the finding of three studies conducted between 2016 and 2018 led by Esmarie van Tonder of the Department of Dietetics, together with the Department of Nursing Sciences and the Department of Health.**

## Malnutrition in Hospitalised Adults

These cross-sectional, multi-centre studies were conducted with a total of 603 consenting patients in three public hospitals in the Eastern Cape, South Africa.

“Malnutrition is as much of a factor in overweight or obese people as it is in underweight people,” van Tonder explains. “Malnutrition prevalence was high in this study population, with the incidence amongst the overweight and obese being almost double that of those who were underweight. Patients falling into either of the first two categories were unidentified and untreated, with only approximately a fifth being referred to dietetic services.”

Malnutrition is a major issue in many hospitals as it lowers the patient’s immune system, increases chances of infections,

delays recovery, prolongs the hospital stay and costs, and increases morbidity and mortality.

Clinical practice groups worldwide recommend that nutritional screening be conducted on all acute care patients on admission, and that a patient’s nutritional status should be optimised and the negative clinical outcomes associated with malnutrition prevented during their hospital stay.

“This should also be extended to the outpatient setting, prior to planned hospital admissions. With planned elective surgical patients, for example, it is extremely important that malnutrition is identified before the surgery take place, so that the patient can be referred to the hospital or community dietitian for nutritional optimisation ahead of time. When

such patients come to see the surgeon in the pre-operative clinic, usually around six weeks before the operation, this is an ideal opportunity to screen the patient for malnutrition, which allows for a window of opportunity to improve their nutritional status.”

The dietitian will conduct a nutritional assessment on which the nutrition intervention will be based. For instance, if malnutrition is due to the patient not being able to meet their nutritional requirements (which may be increased due to the disease process), the patient will be counselled on optimising their energy and protein intake, making use of appropriate and economical choices of foods, based on their individual tolerance. Nutritional oral supplements or artificial nutrition support may also be prescribed, depending on the individual case.

“Limited South African data exists concerning malnutrition prevalence in adult hospitalised patients and the associated consequences and costs, but a 2009 study in the UK showed that the hospital costs for the care of patients at nutritional risk have been up to four times higher than those not at risk,” says van Tonder, who worked in a large academic hospital in the UK before joining Mandela University.



**Esmarie van Tonder**

“In the UK we screened patients for malnutrition and we were involved in the monitoring of patient progress and training nurses in how to use the Malnutrition Universal Screening Tool (MUST), which included recording the patient’s weight, height and MUST score on a weekly basis. When I returned to South Africa in 2012, I worked in the public hospital system for 18 months and it stood out for me that practices to identify and treat malnourished patients were not ideal, and many patients remain malnourished throughout their hospital stay.”

When van Tonder joined the Department of Dietetics at Mandela University in 2013, she set out to determine the extent of malnutrition in local hospitals, as well as improving practices to identify malnourished patients for nutritional intervention. She leads the third- and fourth-year dietetic student research projects pertaining to adult hospital malnutrition, some of which also

formed part of the Inter Professional Health Research Network (IPHRN), a faculty-driven academic collaboration that focuses on interdisciplinary research and mentoring.

“We linked these projects to IPHRN and used MUST as a screening tool to identify malnutrition risk in three provincial hospitals, and also to assess whether the nurses are weighing and taking the heights of adult patients on admission. Almost all the hospitals have access to height and weight measuring equipment and currently it is obligatory to measure these indices in children but not adults, which we believe it should be.

“We found that only 19% of nurses in these hospitals routinely weigh patients on admission, and 44% occasionally; 88,9% never take a patient’s height on admission. We also found that only 19% of underweight patients were referred to a dietician at a public hospital. The main reason cited by the nurses is understaffing. Both doctors and nurses also reported inadequate knowledge on performing screening, calculating percentage weight loss and BMI.”

The validated MUST is not a feasible nutrition screening option for nurses or doctors to use in South African public hospitals, as patients need to be mobile for measurements. The system is also time-consuming and requires several calculations, such as BMI and percentage weight loss. “We are therefore recommending the use of the simple to use, mid-upper arm circumference (MUAC) measurement, as a mandatory nutritional screening tool and a key nutrition indicator in South African public hospitals.” MUAC research by van Tonder and her team has shown that it achieves similar results to the Body Mass Index (BMI) and Malnutrition Universal Screening Tool (MUST).

“The problem is there are so few dietitians in the public hospital system and we are not reaching nearly enough patients,” says van Tonder. If all malnourished patients were successfully identified and referred for dietetic intervention, this could lead to multiple benefits for both the patient and institution, but would also need a larger nutrition workforce to cope with an increased patient load.

“I presented our findings at the Faculty Research Symposium in 2017 and at the interprofessional conference of the Critical Care Society of South Africa (CCSSA), which is attended by everyone who works in Intensive Care Units – including intensivists, nurses, physiotherapists and dietitians. The response was very positive and we were awarded the best research poster presentation at the CCSSA conference.

“We definitely want to escalate malnutrition screening, prevention and treatment, and I would like to see it enforced from a high level down as a mandatory practice. As a university we need to play our part in ensuring we offer this training as part of interprofessional health sciences education. Malnutrition screening and management in all our hospitals is a very important intervention that needs to be included as part of National Health Insurance in order to be preventative, save a lot of money and improve quality of life.”





Paediatrician, Dr Isaura Nunes, uses techniques from the Griffiths III to assess a 7-month-old baby

**A donkey and chicken appear on the screen of the tablet. They need help to locate a missing pair of shoes on-screen. So a young human friend comes to their assistance and drags and drops the pair of shoes into the correct position so that the donkey and chicken can be on their way again. When the young friend gets it right, lights flash and bells are sounded to congratulate him or her.**

## 70 Years of Child Development

This is one of the digital items included in the latest revision of the Griffiths Scales of Child Development – Third Edition (known as the Griffiths III). Griffiths was developed in the UK by Ruth Griffiths and introduced in 1953 as a comprehensive assessment of young children’s development from birth to six years, including their motor, social, and cognitive abilities.

For almost 70 years, the Griffiths, now published by Hogrefe, has gone through successive revisions and is used worldwide, including in South Africa. It was introduced here by Professor Dolores Luiz, a child development specialist and head of the Department of Psychology at the then University of Port Elizabeth (now Mandela University) who worked

collaboratively with the Association for Research in Infant and Child Development (ARICD) in the UK from the outset.

Child development specialists Professor Louise Stroud, Director of the Mandela University’s School of Behavioural Sciences and School of Lifestyle Sciences, who took over from Prof Luiz, was chosen as the lead researcher of the third revision – Griffiths III – launched worldwide in May 2016.

“Psychological development tests, or psychometrics, need adapting to the times, because our world is developing so fast that children are developing faster than ever before,” Prof Stroud explains. “The tests also need to be developed

for different and diverse contexts, such as rural and urban contexts in different countries, in order to gather information on children in diverse environments in a fair and applicable way. Africa being a diverse, multifaceted continent, I am pleased to say that it is leading the way in ensuring diversity in Griffiths III, which the Global North and South equally require.”

From its conception to its piloting and associated training, Griffiths III was developed at Mandela University by Prof Stroud and a team of experts from the university, including the Dean of Teaching and Learning, Professor Cheryl Foxcroft, assessment consultant Kim Hurter from the Centre for Access Assessment and Research, Johan Cronje from the Department of Psychology, and Rivca Marais from the University of Fort Hare’s Psychology Department. Mandela University postgraduate psychology students also conducted much of the testing with children from across the cultural and socio-economic spectrum in the Nelson Mandela Metro.

“... we can identify any children at risk of developmental delays from an early age, or children with an issue such as autism, and focus on them to help them progress.”

– Professor Louise Stroud

“This informed the administration of the new version of the test in the UK and Ireland, where a group of my students who had been trained on Griffiths III went to England, Ireland, Scotland and Wales and tested it,” Prof Stroud continues. Their visit was paid for by a UK charity, the Association for Research in Infant and Child Development (ARICD). Prof Stroud worked closely with ARICD’s president, paediatrician Dr Elizabeth Green, who was the project lead on Griffiths III.

“For this revision we included an innovative ‘Quiet Book’, which presents the items in a three-dimensional context, because that is what children today respond to from a very young age,” Prof Stroud explains. “What we would now like to move towards is a combination of digital games, such as the example of the donkey and the chicken and the lost pair of shoes, and a range of physical games (including play blocks and skipping ropes) and books, which fit into a carrying case with about 40 different pieces that the child development assessor can use.”

“The test items are adapted to the child’s age, and they assess how a child is progressing in terms of the foundations of learning, including how they start to think and reason, how they use their memory, how they communicate, how they receive language, their hand eye coordination, and their emotional world – do they make eye contact, are they socially reciprocal, how they separate from their parent or caretaker, how they crawl, sit up, walk, what they do with their hands – today we can observe a baby’s development from the moment s/he is born.”

To make sure that Griffiths III works well for diverse cultures, certain items were left out, such as replicas of knives and forks, as some children eat with chopsticks or spoons or their hands. The white doll was replaced with Griff the bear to whom all children respond well, and he features as a proper toy bear in the kit as well as in the Quiet Book and pictures. In one item in the Quiet Book, Griff

goes to the shops and has to choose the middle cupcake from a row of cupcakes – this game starts to develop numeracy.

“With the system we can identify any children at risk of developmental delays from an early age, or children with an issue such as autism, and focus on them to help them progress,” Prof Stroud explains. “We can also identify and work with gifted children. It’s such a useful assessment tool, and we are extremely pleased with the statistical results from both South Africa and England for Griffiths III.”

Following Griffiths III’s launch, Prof Stroud and her team have been training people worldwide to use it. “To date, Griffiths has mostly been used by paediatricians and psychologists,” says Prof Stroud, “but we have now opened it up to allied professions such as nursing sisters, occupational therapists, speech therapists and other child development professionals who can prove they are part of a child developmental assessment team.”



**Professor Avinash Govindjee**

## Executive Dean's Report

### Faculty of Law: Highlights

The Faculty of Law continues to promote research at undergraduate and postgraduate levels that is responsive to societal needs, and encourages its staff to produce legal research that addresses local, national, regional and global challenges. Engagement activities that respond to the situation of vulnerable people in communities is particularly promoted, for example through the work of the Law Clinic, Refugee Rights Centre, Centre for Law in Action, Labour and Social Security Law Unit, Street Law Programme and through collaboration with the Institute for Coastal and Marine Research.

The successes and achievements of the faculty for the period under review were many, but the following is a list of highlights:

- The Centre for Law in Action focuses on transdisciplinary work and has positioned itself as a national leader in the implementation and enforcement of government legislation, with an emphasis on municipal health, fisheries, forestry and communication;
- The FishFORCE Academy has been successfully established by the Centre for Law in Action and has resulted in an extensive range of international partnerships. The FishFORCE Academy has also worked hard to ensure that a large number of people have received training in order to respond to fisheries crime;
- The faculty's Refugee Rights Centre has provided an array of services, including information dissemination, awareness raising and advocacy, which are designed to benefit refugees, asylum seekers and other categories of migrants;
- The Labour and Social Security Law Unit offered a range

of training programmes to employers and trade unions in 2017, including the expansion of these programmes to school principals. The Unit enjoys great standing in the labour law community in South Africa. The provision of labour law advice services and funding of meritorious labour law cases, through a partnership with the Legal Aid Clinic, should benefit vulnerable employees in future;

- The Law Clinic continued to assist hundreds of vulnerable clients and enjoyed a high settlement and success rate;
- The faculty's incumbent of the NRF Chair in the Law of the Sea and Development in Africa, Prof Patrick Vrancken, co-edited a landmark publication, *The Law of the Sea: The African Union and its Member States*, published by Juta;
- The director of the Centre for Law in Action, Prof Hennie van As, received an Engagement Excellence Project Award for the FishFORCE project;
- Dr Joanna Botha received the prestigious Faculty Researcher of the Year Award for her outstanding research work in the area of hate speech, freedom of expression, law and development. Dr Botha's work included a publication titled "Towards a South African Free-Speech Model", published in the prestigious *South African Law Journal*. This contribution emphasised the social dimension of freedom of expression and its impact on the rights of others, recommending a communitarian model of free speech reflective of the transformative constitutional mandate;
- Dr Lynn Biggs was recognised as the Faculty Emerging Researcher of the Year for her work on franchises and the scholarship of teaching and learning, including approaches to blended learning. Dr Biggs, most notably, published an article in the *South African Mercantile Law Journal*, "Franchise disclosure documents through the lens of the Consumer Protection Act and the Regulations";
- The faculty, through the Department of Private Law, again hosted

the annual *Private Law and Social Justice Conference*, which was well attended by academics from across the country.

Staff remain, in general, actively involved in the promotion of research, through publication, conference attendance and presentation and through undergraduate and postgraduate research supervision. Five candidates graduated with a Doctor of Laws

(LLD) qualification (including two faculty staff members), with over 30 candidates achieving master's (LLM) qualifications. Faculty colleagues published in areas such as military law and social security law and presented papers in various parts of the world, from Oxford to Bangalore.

A number of colleagues continue to involve themselves actively in engagement activities which contribute to broader society, from participation in the faculty's Ubuntu Project to raising awareness of human rights principles through the Street Law programme.

Given that a significant number of staff members have completed postgraduate qualifications during the past three years (or are about to do so), it is anticipated that the faculty will be in a position to increase its research output in the years to come. A proposed research collaboration with the University of Johannesburg in the areas of Public Law and the Law of the Sea should also yield fresh possibilities for research collaboration. The proposed

revisions to the Bachelor of Law (LLB) programme will also be designed to result in greater emphasis on student writing and increased focus on research.

**Professor Avinash Govindjee**  
**Executive Dean**  
**Faculty of Law**

"The Centre for Law in Action focuses on transdisciplinary work and has positioned itself as a national leader in the implementation and enforcement of government legislation, with an emphasis on municipal health, fisheries, forestry and communication."  
  
– Professor Avinash Govindjee





Faculty of Law staff members and 2017 Postgraduate Associates (PgAs)

**As part of the Faculty of Law's transformation strategy, linked to research, the faculty appointed nine Postgraduate Associates (PgAs) during 2017, and 15 PGAs in 2018.**

## Postgraduate LLBs on The Rise

In addition to enhancing the students' qualifications and marketability, the increase in the number of students obtaining postgraduate qualifications assists the faculty in filling academic vacancies predominantly with outstanding black and women South Africans.

"The PgAs are all Master of Laws students who participate in a tailor-made programme run by the faculty with various forms of research support," says Dr Lynn Biggs, who heads the PgA Leadership Programme.

"As PgAs they receive a salary and assist with lectures on our diploma courses, run tutorials and assist with marking. At the same time, they are given a solid amount of time to focus on their LLMs."

Several of the 2017 PgAs have secured articles at reputable

law firms or have joined the Bar, while still registered for their master's. Out of the 15 PgAs three are international (two are from Zimbabwe and one from Zambia) and the others are from throughout South Africa.

### The Leadership Programme

Dr Biggs and Executive Dean Professor Avinash Govindjee developed the Leadership Programme and started it in 2017 for the PgAs, the candidate attorneys at Mandela University's Law Clinic, and any interested staff member.

Dr Biggs explains: "Once a month, on a Friday, we invite professionals and specialists to provide insights to a wide range of issues, including the impact of politics on the law and South Africa (such as how land expropriation without compensation impacts the economy and the country); what it is like to practise as an attorney or advocate; how to budget

and plan financially (many of the PgAs and candidate attorneys are receiving a salary for the first time); and how to market themselves and see themselves and the faculty as a brand, and what impacts positively and negatively on this, including the do's and don'ts of social media."

### Research Hub

"Embarking on postgraduate research for the first time can be a scary space without support, but it can also be an inspiring, exciting space if postgraduates are given the support they need," says Dr Biggs.

The faculty's Professor Patrick Vrancken leads monthly 90-minute lunchtime research hub sessions on the same Friday as the Leadership Programme and everyone pursuing postgraduate research is welcome to attend. Postgraduates ask questions about any research areas with which they are grappling, and share in a collegial research journey.

### Re-curriculation and TAU

The strong base for success provided by the Faculty's LLB offering was confirmed in 2017 when it received full accreditation from the Council on Higher Education (CHE). It was one of the first three out of 17 LLB programmes countrywide to receive full accreditation.

The LLB accreditation process started in 2012/13 when the CHE, the South African Law Deans Association (SALDA) and the legal professions (General Bar Council and the Law Society of South Africa) deliberated extensively and decided that a national review of the LLB programme should be undertaken in 2015/16 by the CHE to strengthen the quality of legal education provision across all South African universities that offer the LLB.

Dr Biggs was part of the CHE working group, together with colleagues from throughout South Africa, and she was part of Mandela University's improvement, re-curriculation, transformation and Africanisation plan.

For their considerable contribution to learning and teaching, in 2017 Dr Biggs and Dr Jacqueline Lück, the Head of the Department of Applied Language Studies at Mandela University, were nominated by both the Deputy Vice-Chancellor of Teaching and Learning, and the Dean of Teaching and Learning to represent Mandela University in a two-year, multidisciplinary national fellowship in Teaching Advancement at Universities (TAU).

A high level of writing and communication skills is a prerequisite for every law graduate, and the CHE accreditation process had highlighted that the writing skills of LLB students nationally are not at the required level. "We are required to carry out an individual research project for the fellowship, and mine is the process of the re-curriculation for the LLB programme with an emphasis on the writing skills of LLB students," says Dr Biggs.

## Postgraduate Associate (PgA) Ntemesha Maseka

Ntemesha Maseka's research interest lies in international humanitarian law, which forms part of public international law. She is one of the three postgraduate students who represented the University at the 2017 edition of the annual Jean Pictet Competition, an international competition in this field, held in Macedonia.

"I am currently researching the accountability of UN peacekeepers for sexual violence. My work considers this topic from an international law perspective – particularly humanitarian law, human rights law and criminal law," she explains.

"How do you hold an offender in a peacekeeping force accountable, given that the person who has been sexually violated has the legal right to remedy? At present, what happens all too often is that the peacekeeping force simply recalls that soldier without any accountability beyond this."

Maseka is looking at this from the South African perspective, "as this is one of the countries pushing for a more coherent framework of accountability. Ideally, the peacekeeper who has committed the crime should come back and face prosecution; the complexity is that it straddles international law and military law."

She says the Research Hub and Leadership Programme have considerably assisted her: "You engage both with your peers and experienced researchers, and you share research hurdles. It has helped me to build a network, manage my life and help me decide on my future direction."





**Ntemesha Maseka**



**Mmusho Mokgwetsi**

## Postgraduate Associate (PgA) Mmusho Mokgwetsi

Mmusho Mokgwetsi is a member of the 2018 PgA group who is doing his master's on the Law of the Sea with Professor Patrick Vrancken, specifically the FAO Port State Measures Agreement, which came into effect in 2009 and which Africa became a party to in 2016.

"It needs to be incorporated in our legislation and I am looking at how this can be achieved," Mokgwetsi explains. "The agreement seeks to enhance transnational cooperation in fisheries regulation to suppress illegal fishing. According to the agreement, any vessel that brings fish into any country has to produce their official quota documentation from that country.

"The crisis in our fish resources and oceans only came to the fore in the 1990s and we need to identify and address the gaps as a matter of urgency. One of the gaps I have identified is the sharing of information between states, because at present there isn't a platform or legal structure for two coastal states to share information."

Mokgwetsi says Prof Vrancken's research hub has helped him to choose his research question, learn how best to do reviews and hone his research skills. He adds that the Leadership Programme seminars have helped him to sharpen his insights and life skills.



**"Our postgraduate strategy in the Law Faculty is for the vast majority of academic staff members to get their master's and PhD degrees, achieving a doctorate rate of at least one a year, and five in the next five years," says Professor Mark Tait, the head of the Department of Mercantile Law and chair of the Faculty Research and Engagement Committee.**

## Research Growth and the Competitive Edge

"This will substantially boost our 30 academic staff members' research and supervision capacity; in 2017, 36% had doctorates."

Staff members are pursuing a range of research areas in their theses, from Moslem Marriage Law, to the Law of the Sea, to International Trade. To free up more time for faculty members to pursue research, they have been assigned postgraduate tutorial and marking assistants to help them with their teaching load.

At the same time, Tait is encouraging LLB students and graduates to pursue their master's degrees. The faculty offers the LLM degree by research or by way of coursework, including the coursework master's programmes in labour law and in criminal justice. "One of the factors contributing to the growth of these programmes is that it's tough out there. Doing postgraduate studies gives graduates a competitive edge in securing good articles and entering the profession," he explains.



## Faculty Member Doctorates in 2017

Two academics in the Faculty graduated with their doctorates in 2017



**Dr Razaana Denson**  
Advocate, lecturer in the Department of Private Law

**LLD thesis:**  
*A Comparative Exposition of Islamic Law relating to the Law of Husband and Wife*  
Islamic marriages are not recognised as legal marriages in South Africa and England. The study compares five sets of legal principles relating to the relationship between a husband and a wife, with specific reference to engagements, marriages and divorce. It compares the two sets of national laws with Islamic law. It highlights the dilemma for Muslim women living in a Western society to enforce their Islamic relationship rights. In an attempt to accommodate these problems, changes were made to the national laws. However, as these legal developments are not in line with Islamic principles, Muslim women are still legally left out in the cold.



**Dr Lynn Biggs**  
Lecturer in the Department of Mercantile Law

**LLD thesis:**  
*An Evaluation of the Impact of the Consumer Protection Act 68 of 2008 on the Relationship between Franchisors and Franchisees*  
Dr Biggs says the Consumer Protection Act is a well-intended first attempt in South Africa aimed at regulating and balancing the franchisee–franchisor relationship. However, her research highlights a number of shortcomings in the Act. For example, it does not provide for the education and development of prospective franchisees. Small, new and inexperienced or unsophisticated franchisees in particular require protection, and mechanisms need to be introduced not only to protect but also to educate and develop such franchisees, in order to enhance the growth and sustainability of their franchises.

The faculty has introduced a Postgraduate Associate (PgA) programme. The programme provides a number of recent graduates with the opportunity to be employed in the faculty and assist with lecturing and other academic activities. It is a condition that these PgAs commence with postgraduate studies.

“As part of their involvement in the faculty, they participate in a leadership development programme,” says Tait. “It is hoped that in the near future the PgA programme will contribute significantly to producing our next generation of legal academics. The success of the programme is further confirmed by the positive feedback

the faculty is getting from the profession. Former PgAs perform exceptionally well in practice.

“As a result of our postgraduate growth, we are streamlining our processes in terms of applications, admissions, registrations and the management of postgraduates. We will be establishing a centralised research management office that deals with all research-related issues. We currently have a range of different research committees dealing with postgraduate and research-related matters but this would be refined, with three dedicated people working on it.”

## Engagement Highlights

### The Law Clinic

The Council on Higher Education’s review of the Faculty of Law referred to the faculty’s Law Clinic in Missionvale and its Refugee Rights Centre in Bird Street, Central, as examples of best practice.

Through the Refugee Rights Centre, refugees and asylum seekers receive free assistance. The Law Clinic is known for providing outstanding legal services to indigent members of the community.

The Law Clinic’s new director, Matilda Smith, started in 2017 and is working on the planning and associated resources required to expand their outreach beyond the Nelson Mandela Bay Metro, to include nearby areas such as Kirkwood.

“The Law Clinic would like to do so much more but we are resource strained,” Tait explains. “Our candidate attorneys who work there are paid by the Law Society, while the University pays for the salary of the director and administrator. A number of articled clerks also work at the Law Clinic, plus our final years who do two-week stints there.”

### The Centre for Law in Action

The Centre for Law in Action (CLA) has increased its footprint from a provincial (Eastern Cape) impact to covering seven provinces and establishing an international presence – mainly in the fields of law enforcement and access to justice.

In 2015 the CLA shifted its focus to include sea fisheries and related crimes and in 2016 it was instrumental in the conclusion of a five-year funding agreement with the Norwegian Department of Foreign Affairs to address

international organised crime in the fisheries environment. This work has been strengthened during 2017. The initial focus is South Africa, but the project will extend to a number of countries in the Indian Ocean rim.

Professor Hennie van As from the Department of Public Law is the director of the Centre for Law in Action and the FishFORCE Academy.

The FishFORCE Academy was established at Nelson Mandela University and its work has been escalated to inter-ministerial level and incorporated into Operation Phakisa’s Compliance and Enforcement Working Group (Initiative 5). Kenya and Indonesia have also been included in the FishFORCE project. In the field of criminal justice the CLA is collaborating with international organisations such as INTERPOL and the United Nations Office on Drug Control (UNODC).

The CLA is considered to be a national leader in the implementation and enforcement of legislation in all spheres of government, with an emphasis on laws relating to health, fisheries, forestry, and municipalities – for which it developed the first and only course in the investigation of municipal health offences. The CLA also addresses communications law through the Independent Communications Authority of SA (ICASA).

### The Labour and Social Security Law Unit

The Labour and Social Security Law Unit (LSSLU) of the Faculty of Law expanded its high quality training and output in the form of its Practical Labour Law Programme. The LSSLU’s training courses in the field of labour law continue to attract participants from across South Africa, generating income for the university and the faculty in the process.

## Research Collaboration with UJ

In 2017 the deans of the Faculties of Law from Nelson Mandela University and the University of Johannesburg (UJ) committed their respective faculties to collaborate on a joint research project. The concept is to produce a book on each of two different themes, namely:

- Marine and Maritime Law or the Law of the Sea, with Professor Patrick Vrancken from Mandela University working with Professor Charl Hugo from UJ as editors; and

- Public Law, focusing on responsible governance and development, with Dr Joanna Botha from Mandela University working with Professor Hennie Strydom from UJ as editors.

The focus is on creating an opportunity for the development of younger scholars to work with senior academics in authoring the papers, thereby encouraging the younger scholars to publish.



**For the oceans to play their part in the birth of an international order in which Africa has its rightful place, and for them to contribute to redressing the injustices of the past rather than increasing further the gap between the rich and the poor, more than sporadic policy statements are required. The existence and contribution of coastal and island communities need to be acknowledged and valued.**

## The Oceans and Africa's Maritime Domain

The vast, diverse and rich expanses of the African maritime domain need to become as much part of the African world-view as the continent's savannahs, mountains and cities. Africans must not only explore and exploit, but also protect their marine resources and their environment themselves. African ocean governance has to be based on cooperation, transformative justice, transparency, accountability and the rule of law.

This is an excerpt from the preface of a seminal 800-page book published in 2017 titled *The Law of the Sea – The African Union and its Member States*. The prologue is written by Professor Patrick Vrancken, the incumbent of the South African Research Chair in the Law of the Sea and

Development in Africa at Nelson Mandela University, and the co-editor of the book, The other co-editor is Emeritus Professor Martin Tsamenyi, who is a former director of the Australian National Centre for Ocean Resources and Security (ANCORS) and an adviser to Ghana on maritime boundaries issues and fisheries governance.

It is the first work to attempt to systematically collate the legal aspects of ocean governance in African countries. The book is therefore an indispensable reference for all the role players in the African maritime domain, including governments, business, civil society, lawyers, scientists and students. "Before this book, you had to rely to a much greater extent on what was written outside of Africa, which

was often unreliable, biased and incomplete," Prof Vrancken explains. This book, by contrast, is produced on the continent, focusing exclusively on the continent and written by people who are based in Africa or are part of the diaspora."

Prof Vrancken spent most of 2015 to 2017 producing this opus, including encouraging several young African scholars to produce chapters for the book, which he co-authored when necessary.

He explains that "Africans are making renewed efforts to explore, exploit and protect the maritime zones that surround the continent and to play their rightful role in the global ocean economy, something which is essential for them to be able to contribute to the realisation of a just and equitable international economic order."

African maritime affairs are now starting to receive the level of attention they deserve. Perhaps the most significant evidence of this paradigm shift is the adoption of the 2050 Africa's Integrated Maritime Strategy (AIMS) by the Assembly of Heads of State and Government of the African Union on January 31st 2014. The overarching vision of the strategy is "to foster increased wealth creation from Africa's oceans and seas by developing a sustainable thriving blue economy in a secure and environmentally sustainable manner".

Prof Vrancken is a member of the International Law Association's Committee on International Law and Sea Level Rise. He was the Deputy Leader of the Marine Protection Services and Ocean Governance Lab held in Durban from 7 July to 14 August 2014 as part of Operation Phakisa. He was the Chairperson of the Department of Higher Education and Training (DHET) Operation Phakisa Skills Initiative Working Group for Marine Protection and Governance. He is also a member of the steering committee of the South African International Maritime Institute (SAIMI).

### The SARChI Chair

The SARChI Chair in the Law of the Sea and Development in Africa was established in 2013 and has been renewed for a second five-year cycle until 2023. The Chair focuses on the following three areas:

1. South Africa and the law of the sea, including the legal regime governing the South African continental shelf and the exploitation of its resources;
2. Development in Africa and the law of the sea, including relevant indigenous law – research at international and comparative level on:
  - i. the East coast of Africa and the Indian Ocean;
  - ii. the West coast of Africa and the Atlantic Ocean;
  - iii. the Southern Ocean and Antarctica;
3. The legal aspects of marine tourism.

A number of master's and doctoral candidates are working with the Chair on research relating to the Law of the Sea. The Chair's profile in this area is rapidly growing and research-related activities (including overseas presentations and invitations) are flowing in as a result of Prof Vrancken's leadership and pan-African focus.





## Three of the 2017 PhD graduates supervised by Professor Vrancken

**Dr Denning Metunge from Cameroon, thesis title: The Safety of Navigation and the Role of Port State Jurisdiction: A South African Perspective**  
**Citation**

The uniform incorporation of international standards is vital to international shipping. The thesis discusses critically the incorporation of international safety standards into South African law, focusing mainly on the incorporation into South African law of the 1974 International Convention for the Safety of Life at Sea (SOLAS). It identifies inconsistencies and regulatory gaps between the Convention and the Merchant Shipping Act, 1951, and its subordinate legislation. It also recommends a number of amendments aimed at protecting the competitiveness of the South African ports and ensuring that this country complies fully with its international obligations in this critical regulatory area.



**Dr Emmanuel Nkomadu from Nigeria, thesis title: Maritime Piracy Legislation for Nigeria**  
**Citation**

Nigeria does not have at the moment any piece of legislation criminalising piratical acts and providing sanctions for those acts. This thesis makes a significant contribution to knowledge and to the fight against the scourge in the Gulf of Guinea by proposing maritime piracy legislation for Nigeria. Those draft legislative provisions are based on a detailed examination of the existing Bill on piracy and other criminal offences at sea undertaken in the light of the relevant rules of international law, comparable pieces of legislation in a number of other African States and the wider legislative context in Nigerian law.



**Dr Tajudeen Sanni from Nigeria, thesis title: The Legal Framework of Concession Agreements in Nigerian Ports**  
**Citation**

The thesis makes a rare and significant contribution to knowledge of the legal frameworks for concession agreements in African ports by focusing on the position in Nigeria. It does so by assessing the consistency of the agreements presently in force with the existing legal regime, examining the relevant provisions of the Nigeria Port and Harbour Authority Bill and the National Transport Commission Bill as well as making a number of concrete proposals for their improvement.



Professor Azwinndini Muronga

## Executive Dean's Report

### Faculty of Science: Highlights

The faculty is strategically moving towards joining major scientific research enterprises, such as Earth Stewardship and iThemba LABS; global research laboratories such as CERN, the European organisation for nuclear research; and similar future-focused facilities. As a faculty, we will be participating and playing a driving role in planned future activities on the continent such as the Africa Light Source and the Square Kilometre Array (SKA).

One of the largest scientific projects in South Africa and the continent today is the SKA, which will open up new ways of studying the universe in places where other scientific instruments have not been able to venture. Universities that are not participating in the SKA, will, by default, be left out

of future scientific discoveries. This is where South Africa and the Department of Science and Technology have committed to invest. This focus will still be relevant at the end of the 21st century.

Another area in which the government is significantly investing is Operation Phakisa for the Blue Economy where ocean sciences play an important role. Our faculty is substantially supporting the Ocean Sciences Campus and its programmes, and the majority of our university's ocean sciences researchers are within our faculty. We are not only interested in the research side; we are also interested in capacity building through the creation of an ocean sciences stream within our diverse faculty programme offerings.



**Strategies and developments:**

- The faculty is already strategically moving in the direction of Biosciences niche areas (including Biomathematics, Biostatistics and Biophysics).
- The establishment of an Advanced Scientific Computing Centre, which will serve as a pivotal big data centre for basic sciences and scientific computing; and the establishment of a Basic and Advanced Scientific Computing Institute;
- Nurturing the Basic Sciences: these are the scientific disciplines where fundamental knowledge is built and maintained. They include the Biological Sciences, Chemistry, Physics, Mathematics, Statistics, Computer Science, and Geological Sciences (or clustered broadly as Mathematical, Physical, and Life Sciences).
- Research experience for undergraduate students: undergraduate science students in the faculty will participate in research to experience what it is about, inspire them about its possibilities and hopefully attract them into postgraduate research and academic careers.
- Trans/cross/multi/ interdisciplinary research: science itself has already been through one revolution in diversity; traditional academic silos that held subjects as distinct disciplines, have given way to new ways of doing research. Transdisciplinary and trans-department/faculty/ university research now sets the agenda in many fields, especially those with a direct impact on society, such as climate change research.

**“Our flagship Science Education, Communication and Outreach Programme (SECOP) is focusing on science education from Grade R learners to undergraduate university students ... ”**

**– Professor Azwinndini Muronga**

social media for social reasons, they do not enjoy using social media platforms for work. In 2017, Prof Calitz was also bestowed as a Fellow of the Institute for IT Professionals South Africa (IITPSA).

One of our newer staff members, Dr Gaathier Mahed, a lecturer from the Department of Geosciences, was nominated for two National Science and Technology Forum (NSTF) awards, namely the Emerging Researcher, and Water Research Commission awards. The NSTF Awards were established in 1998 as a collaborative effort to recognise outstanding contributions to science, engineering and technology (SET) and innovation by SET-related professionals and organisations in South Africa.

**Engagement**

Our flagship Science Education, Communication and Outreach Programme (SECOP) is focusing on science education from Grade R learners to undergraduate university students, with outreach programmes for learners, teachers and communities across the province. We are visiting and hosting maths and science exhibitions throughout the province and cultivating the ethos of “it takes a village to raise a child” by encouraging parents and communities to take an active interest in their children’s education and to be part of growing a culture of learning.

Together with the Executive Dean of Education at Nelson Mandela University, Dr Muki

Moeng, we will be partnering the iKamvelihle Trust in rural Cala in the Eastern Cape. The Trust is made up of a group of professionals who believe in ploughing back their skills and expertise into poorly resourced, financially impoverished communities, with an emphasis on improving the quality of education in these communities.

Significant successes in maths and science in the Eastern Cape can be achieved, boosted by key partnerships such as the one between our faculty and the Institute of Physics (UK), the South African Institute of Physics, the American Physical Society and the African Physical Society. Once this is formalised, we will invite other institutions in the Eastern Cape to form a consortium.

**Professor Azwinndini Muronga**  
**Executive Dean**  
**Faculty of Science**



**In June 2017, one of the worst wildfires on record in the Knysna region of the Western Cape burned 15 000 hectares – from Knysna to Sedgefield in the west, and to Plettenberg Bay in the east – destroying more than 800 buildings, 5000 hectares of forest plantations, and claiming the lives of seven people.**

## What Caused the Knysna Wildfire?

One-third of the area that burned was in natural vegetation (mainly fynbos shrublands), and more than half was in plantations of invasive alien (non-native) pine trees, or in natural vegetation invaded by alien trees.

“This called for research on the factors that contributed to the fire, a fire of such severity that it could happen again if preventive measures are not taken to limit the fuel loads,” says Dr Tineke Kraaij from the School of Natural Resource Management, whose field of interest is fire ecology in South African vegetation types, particularly fynbos. “It’s like living in an earthquake prone area; it is not a question of whether it will happen again, it is a question of when, as the average natural frequency of fires would be 20 to 30 years in fynbos

vegetation, many species of which need fire to stimulate germination,” she explains.

In a paper accepted by the journal *Fire Ecology*, to be published in August 2018, titled “An assessment of climate, weather and fuel factors influencing a large, destructive wildfire in the Knysna region, South Africa”, Dr Kraaij and her co-authors researched the factors that contributed to the severity of these fires. Her co-authors are Johan A. Baard from the South African National Parks, Garden Route Scientific Services, Jacob Arndt from the Department of Geography, Environment and Society, University of Minnesota Twin Cities, Lufuno Vhengani from the Meraka Institute, Council for Scientific and Industrial Research, and Prof Brian W. van



Wilgen from the Centre for Invasion Biology, Department of Botany and Zoology, Stellenbosch University.

“Natural fires had been largely suppressed for over 50 years in the Knysna area because of the commercial timber plantations and development in and around Knysna,” says Dr Kraaij. “Much of the fynbos in the Knysna coastal area had therefore become moribund and partially encroached by thicket and forest species or invaded by alien trees and shrubs. Historically, mega-herbivores, such as elephants, rhinos and hippos, no longer present in the area, would also have helped to reduce fuel build-up between the natural fire occurrences.” Adding to the fuel loads was the presence of alien invasive plants, including commercial pine plantations close to the town and also invasions of pine, wattles and eucalyptus trees in the coastal vegetation and mountain catchments. Fire intensity is not only affected by the amount of fuel, but also by the moisture and chemical content of fuels.

To measure the severity of weather conditions in relation to fire risk, researchers and fire managers use a system called the Fire Danger Index, where blue and green is safe, yellow or orange is moderate and red is very high danger. The index is based on weather parameters that include temperature, relative humidity, wind speed and rainfall – which includes factors such as whether it rained the day(s) before.

Weather conditions equivalent to (or worse than) those experienced on the day that the Knysna fires started occurred on approximately 0.1%–0.2% of days since the 1940s.

“On average, you thus get one day every three years in the Knysna area where the weather conditions are as extreme as those experienced during the fire,” Dr Kraaij explains. The fire danger conditions during these fires were therefore very high, but not unprecedented in recorded history. “However, what we found was that the drought conditions over the 18 months preceding the fire were the worst in the recorded history for the southern Cape (Knysna, George) and Port Elizabeth regions.”

The rainfall was also the lowest in recorded history during that 18-month period, and the drought indices – including factors such as the extent to which the soil has dried out and what amount of rain it would take to moisten the soil – were also the worst in recorded history. The vegetation was therefore extremely dry and much had died off as a result of the drought, providing large amounts of dry fuel.

“This time around when the fires started – with two distinct fires at the outset – they could not be controlled, such was their severity,

with extreme berg wind conditions fuelling the rapid spread of the fires, so they even jumped the Knysna estuary.”

The fires wreaked havoc in the commercial timber plantations, mostly pine, which are only flammable under very dry hot weather conditions. When this happens, they burn with high severity, exacerbated by the large amounts of biomass.

“The amount of biomass consumed during the fire – which may be interpreted as a proxy for fire intensity or severity – was significantly higher in plantations of invasive alien trees, and in fynbos invaded by alien trees, than in uninvaded fynbos, providing support for the contention that invasion by alien trees increases the impact and difficulty of control of wildfires,” says Dr Kraaij, who presented these results at a meeting of the Southern Cape Landowners Initiative.

“Our results show that commercial plantations and alien invasions comprised 50% of the total burnt area, and these results support calls to control invasive alien plants, reduce commercial planting of invasive alien trees, ensure that there are proper, well-maintained firebreaks in key areas and strictly regulate development in areas of high fire risk, as well as maintaining awareness of the need for fire-wise practices.

“We need to think critically about the timber industry, as the commercial plantations around Knysna are situated in former fynbos areas, which means they are located in the fire-exposed and fire-prone parts of the landscape, situated in the fire paths. The fire risk is really high and plantation companies need to think of fires as something that will happen, and not as unexpected disasters when they do happen.

“The region’s municipalities need to closely consider fire in their town planning and look closely at the location of developments in relation to berg wind-driven fire paths. The recent fires burnt many areas with very poor residential planning, including informal settlements, as well as low-density estate developments situated on hilltops with plenty of alien-invaded fynbos around them.

“Overall, it calls for the need to look at the control of alien invasives, reduction of plantations in fire-prone areas, particularly those neighbouring urban areas, the reintroduction of prescribed burning programmes, particularly in the urban–wildland interface, and the strict regulation of town development in areas of high fire risk. Far better town planning is required and it needs to include the insurance companies, which should not insure properties that

“Our results show that commercial plantations and alien invasions comprised 50% of the total burnt area ...”  
– Dr Tineke Kraaij

are situated in very fire-exposed parts of the landscape, in the same way they shouldn’t ensure properties built below the flood line.” Many of the houses across the socio-economic spectrum are being rebuilt in exactly the same places where they burnt down. Owners also need to focus on managing the vegetation around their properties to keep down the fuel loads immediately surrounding their assets.

As the authors concluded in the *Fire Ecology* paper: “Growth in the human population has been accompanied by development in rural areas and an increase in the urban–wildland interface, increasing the risk of exposure to wildfires. These factors, combined with very high fire danger weather conditions, preceded by an unprecedented drought, and vast amounts of alien invasive plants, led to the destructive wildfires of 2017. Events like these are infrequent and people can quickly lose interest in implementing fire-wise practices and become increasingly willing to place developments in high-risk areas in the long inter-fire periods.”

“People cannot afford to become complacent in this area,” says Dr Kraaij. “As I said at the outset, it is not a question of whether it will happen again, it is a question of when.”







**Uganda has two million organic farmers, 200 000 of whom are certified as organic producers, which qualifies them to sell and export their products as organic, and gain higher revenue. There is no reason why South Africa cannot achieve the same, according to Professor Raymond Auerbach, whose research over the past 45 years on organic farming and sustainable food systems, has established him as an international authority. He has doctoral students working in Uganda, Tanzania, Zambia and South Africa.**

## Organic & Natural Food Systems – Imperative for Climate Change

“My twin passions are: how can we address rural poverty in Africa, and how can we produce healthy food without degrading farmland and natural resources? The answer lies in agroecology, soil biology and organic or sustainable farming,” says Prof Auerbach from the Agricultural Management Programme, School of Natural Resource Management at Nelson Mandela University’s George Campus. Auerbach is also a member of the trans-university Centre of Excellence for Food Security (CoE-FS), based at the universities of the Western Cape, and Pretoria.

Prof Auerbach, who was an organic dairy farmer for 20 years in the Kokstad region of KwaZulu-Natal says that

South Africa needs to accelerate its adoption of organic and natural, sustainable farming methods for a number of reasons, including the development of new farmers and adapting to climate change, with the associated widespread reduction in rainfall.

“Climate change is not going away and we need to be far more proactive about improved soil health and more effective rain and water absorption in farming,” he says. “If you consider that you need ±500mm per season to grow rain-fed crops and if you consider that over the past 20 years, 18 municipalities in the Eastern Cape that previously had an average seasonal rainfall of ±550mm, have dropped to an average of ±450mm,

then you may understand the crisis. Add to this a two-degree rise in average temperatures by 2050 and you have even less plant-available water, with high evaporation and transpiration.”

For the past six years Prof Auerbach has been doing long-term comparative organic farming systems trials with his agroecology master’s research group at the university’s George Campus, and the NRF-funded African Organic Farming Systems Research project with doctoral students in several African countries. The research and findings are attracting local and international interest and will be published in a major work by Prof Auerbach titled *Organic Food Systems: Meeting the needs of Southern Africa*, which will be published as a book in 2019 by the Centre for Agriculture and Bioscience International (CABI).

“The research trials in George span 1500 square metres, divided into 40 plots of 6m x 5m per plot. The soils are changing under organic management, and we have been able to close the gap between organic and conventional yields, so that the organic yields are as high as the conventional yields in dry years, and water use efficiency is better. Given the escalation of climate change and the rising cost of fertilisers and poisons, this is essential,” he explains.

A true research pioneer, Prof Auerbach, now 65, recognised the need for sustainable, integrated food production and ecosystem services decades ago when he studied organic agriculture in Australia in the ’70s, and then pursued his doctorate in Agricultural and Environmental Sciences at Wageningen Agricultural University

in the Netherlands. He focused on integrated catchment management, rainwater harvesting, sustainable farming and experiential learning.

He is a major driver in the development of the South African Organic Standards and Participatory Guarantee Systems, and is a member of the international Organic Food Systems project, which in turn is one of the eight core initiatives of the UN Sustainable Food Systems Programme.

“Third party organic standards can be too onerous for many small-scale farmers and we have therefore developed a South African Participatory Guarantee System (PGS) – a simple, sustainable approach to organic quality management that facilitates access to high-end markets for small-scale farmers.”

Through a new project, funded by the German government, Mandela University is working with local food gardeners, South African organic farmers and the South African PGS Association to assist emerging farmers in implementing these methods and accessing high-end markets, such as the popular Bryanston Organic and Natural Market in Johannesburg.

“Consumer groups locally and internationally are expressing increasing concern about food quality, including the amount of chemicals, growth hormones and genetically engineered organisms used in mass food production systems, and their high carbon, methane and water footprints,” he explains.







Cows, for example, are ruminants and they need to graze on grasslands, but to speed up their weight gain they are given growth hormones and fed grain and high concentrate feed in mass feedlots, which produces high methane emissions. Cows that graze on natural grasslands carry a far lower methane footprint and do not compete with humans for grains and proteins. Since 86% of South Africa is grassland, which is ideal for livestock and healthy meat production, we should focus on grass-fed meat production, not feedlots.

“Our soils are so depleted of natural elements from long-term monocropping and herbicides that they can only produce when artificial fertilisers are added. Organically farmed soils do not need artificial fertilisers because the soil is naturally enriched through crop rotation, compost and mulch. Our research has shown that a long-term rotation of cabbage, sweet potato and cowpea improves soil health, whereas in the long-term, monocropping with cabbage takes a lot out of the soil.”

Cowpea, a protein-rich legume crop, is indigenous to Africa. It is also known as *dinawe* (Ndebele), *dinaba* (Shangaan), *imbumba* (Zulu), *monawa* or *nawa* (Pedi) and *dinawa* (Tswana). Cowpea leaves

nitrogen in the soil and therefore has a beneficial effect on the follow-up crop. Prof Auerbach’s postgraduate students are researching its value in crop rotations, the effects on soil microbiology and access of traditional producers to organic markets.

Prof Auerbach is increasingly sought after to address international symposiums on food security and organic or natural farming systems. In June 2018 he addressed the Organic Plus Project in Padua, northern Italy, (he serves on its Scientific Advisory Board) and the 24th International Sustainable Development Research Society Conference in Messina, Sicily. In September he will teach at a summer school in Oldenburg, Germany, which eight Mandela University postgraduates will attend, as well as German and Tanzanian students from partner universities.

He says that over the past decade, food systems research has developed dramatically, and organic farming systems have become mainstream. He looks

forward to working with the AEON Earth Stewardship Research Institute at Mandela University on sustainable food systems over the next ten years.

“Our research has shown that a long-term rotation of cabbage, sweet potato and cowpea improves soil health ... ”  
 – Professor Raymond Auerbach



**Have South Africa’s leatherback and loggerhead sea turtles been displaced from their optimal habitats by human activities or by changing climatic conditions?**

## SA’s Sea Turtles Might Be Refugees

This is the question that Professor Ronel Nel from the Department of Zoology is investigating for her Pew Fellowship, awarded for unique research that informs better management and conservation of the world’s marine life and oceans. Prof Nel is one of eight scientists and conservationists selected from seven countries for 2018.

“To inform conservation planning, my research is testing the applicability of the ‘refugee species’ concept with regards to two sea turtle species in South Africa – the South Western Indian Ocean leatherback (*Dermochelys coriacea*) and the loggerhead (*Caretta caretta*) nesting along the iSimangaliso coast of northern KwaZulu-Natal,” Prof Nel explains.

“We know from displaced migratory populations on land, also known as ‘refugee species’, that they may not be able to recover their population sizes when displaced to inappropriate or low-quality habitat, even in the presence of adequate protection.”

The refugee species concept is relatively new, starting in about 2012 with the European bison when it was found that their current distribution is in areas such as forests, where they were forced to retreat as a result of extensive hunting. These are in fact suboptimal foraging areas for these grassland animals. The same concept appears to apply to the Cape mountain zebra, which zoology professor Graham Kerley is researching.

Prof Nel has been researching sea turtles since 2002 as part of the iSimangaliso Turtle Monitoring Programme, which dates back 55 years. She is comparing the two turtle species’ habitat use and population dynamics along the protected iSimangaliso coastline in northern KwaZulu-Natal (an area of about 180km) to test whether this concept can be applied to marine environments.

“A large proportion of the work I have done, together with Ezemvelo KZN Wildlife, is to try to understand why the turtle populations in the iSimangaliso area are not recovering,”



Prof Nel explains. There are currently about 70 female leatherbacks nesting per year in iSimangaliso and about 1000 loggerheads – both are modest populations. Leatherback turtles have remained critically endangered in the region, despite being protected for 55 years. South Africa only has the occasional illegal harvesting of eggs, unlike in neighbouring Mozambique or Madagascar where poaching of eggs and turtles is more rampant.

“The leatherback is far larger than the loggerhead; the shell length of the loggerhead is 80–90cm, while the leatherback is double the length at approximately 160cm. The literature says that both species can live to ±150 years, and I have worked with a number of turtles that are ±60 years old. Leatherbacks are very different from other sea turtles and the only one left in the family. It is a more ancient species, and has been around for at least 100 million years, dating back to the Cretaceous era of the dinosaurs.

“The low numbers for leatherbacks don’t make sense; leatherbacks produce almost twice as many eggs in a season as loggerheads. Both nest in our summer between mid-October and mid-February and leatherbacks come ashore up to eight times in a season to lay 80–100 eggs at a time, while loggerheads come ashore only four times in a season. It may be that the survival of the hatchlings which emerge from early January into April, is different between the two species.

“Our long-term monitoring suggests the incubation environment is favourable so that hatching and success is very good, but what we don’t know is the health and body condition of the females when they come ashore. So we are going to draw blood from a sample group to see if there is an increased amount of stress hormones in leatherbacks, which could suggest the condition in their foraging grounds is not ideal. To test this further, we will compare these blood metrics to other populations where we know the species are doing well.”

Prof Nel goes on to explain that the leatherbacks’ lack of recovery can partly be attributed to their evolutionarily programmed nesting habits, where they very rarely turn back once they have exited the sea to nest, irrespective of whether there is too much light or human presence: “The hormone cascade kicks in and there is no turning back, almost like a woman in labour. The loggerheads, by comparison are skittish, scope out the high shore from the low shore and may come out later or on a different part of the beach.”

Turtles are not only threatened on the coast, however; the biggest threat offshore to leatherbacks and loggerheads is fisheries. Both species are attracted to bait or light sticks used in commercial longlining and so get hooked when they go for the bait, or they get entangled in artisanal or commercial fishing gear including coastal gill nets. The greatest “new” threat is plastic pollution. As airbreathing marine reptiles, sea turtles are very vulnerable, because they spend most of their time in the top 20m of ocean.

Plastic floats on the surface and when the turtles come up to breathe they see plastic, often blue, white or transparent in colour and accidentally swallow it, because the bits of plastic are the same colour as bluebottles and jellyfish – a main part of the sea turtle diet for the first ten years of their life, and the exclusive diet of leatherbacks.

“These threats are certainly contributing factors, but the lack of recovery needs additional research. The largest population of loggerheads in the world is off the coast of Oman, where they have 20 000 nesting females annually, and the largest population of leatherbacks in the world is off the coast of Gabon where they have 30 000 nesting female leatherbacks annually. Both populations face

the same threats as the iSimangaliso population but their numbers are staggering by comparison.”

Most turtles are highly migratory, so they leave their national waters after hatching and again after nesting to go and forage in areas off other countries. This trait makes conservation of these species far more difficult as it requires international agreements and cooperation for the protection of migratory species.

Prof Nel is now trying to determine whether the iSimangaliso leatherbacks and loggerheads are unique founder populations or part of populations that were bigger in the past. “It could also be that they have become environmental refugees, forced to lay their eggs along a part of the coast that is not ideal, or it could be that the habitat into which we forced them is not nutritious enough for optimal growth and reproduction. We may need to apply for additional protected areas with better foraging habitat. These areas may be outside of South Africa’s exclusive economic zone and will require international cooperation. If our sea turtles are not refugee species, it means the pressure is entirely human induced – fishing pressure, plastic and other pollution, or habitat destruction.”

“A large proportion of the work I have done, together with Ezemvelo KZN Wildlife, is to try to understand why the turtle populations in the iSimangaliso area are not recovering.”

– Professor Ronel Nel

## Researcher of the Year Award and Engagement Excellence Team Award, 2017

### Professor Janine Adams

#### Faculty of Science

Department of Botany and the Institute for Coastal and Marine Research (ICMR)



My passion for research lies in exploring our diverse estuary ecosystems while working with others in multidisciplinary teams and growing our next generation of scientists. During the year I published 20 articles in rated journals with researchers from 11 different national and international institutes, which indicates the multidisciplinary collaborative nature of my research.

The purpose of this research is to investigate the health of South Africa’s estuaries and to help develop appropriate conservation and management responses. My current focus areas are blue carbon ecosystems and response to climate change, mangrove and salt marsh ecology, and water quality management of estuaries.

Estuaries are complex, dynamic and productive ecosystems, as they form the interface between marine and freshwater environments. They are threatened by development, changes in freshwater inflow, deterioration in water quality and resource utilisation. Research on the role of microalgae and macrophytes as indicators of change

has been used to assess the ecological health and importance of estuaries and is globally recognised. In 2016/2017 my research provided a detailed understanding of estuary structure and function: important information to support conservation and management efforts.

My research is driven by my desire to bridge the science–policy–practice divide. I like to tackle problems and find solutions working collaboratively with local management authorities and a wide group of stakeholders. I also enjoy working with students and seeing their growth and development into excellent research scientists. For the future, I would like to focus on restoration of estuaries and rebuilding our green infrastructure. Healthy estuaries and other coastal habitats are essential in order to ensure that they deliver the ecosystem services that we are dependent on. This research would be exciting, as it would have a socio-ecological systems approach that would involve many collaborators.



## Research Excellence Award and Faculty Researcher of the Year Award, 2017

### Professor Graham Kerley

#### Faculty of Science

Centre for African Conservation Ecology



I am a Distinguished Professor of Zoology and Director of the Centre for African Conservation Ecology, in the Faculty of Science. The awards reflect my work in the field of African ecology, and specifically the papers that my team and I produced in 2016. These 13 peer-reviewed papers cover topics as diverse as predator-prey interactions and historical ecology; they reflect both highly applied (largely in the field of conservation biology, but also human-wildlife conflict) and strongly theoretical (in evolutionary ecology) perspectives.

The study on cheetah prey preference, for example, demonstrates for the first time that horns in prey species reduce predator preference – and this is a major contribution to our understanding of the evolution of horns, as the explanations to date have focused on male combat. The study on jackal, provides the first evidence that the killing of jackals by livestock farmers does not solve the livestock predation problem, as jackal respond by breeding younger

and faster. The paper on the historical distribution of mammals has been recognised as one of the twenty most influential environment studies published in the Transactions of the Royal Society of South Africa since 1877.

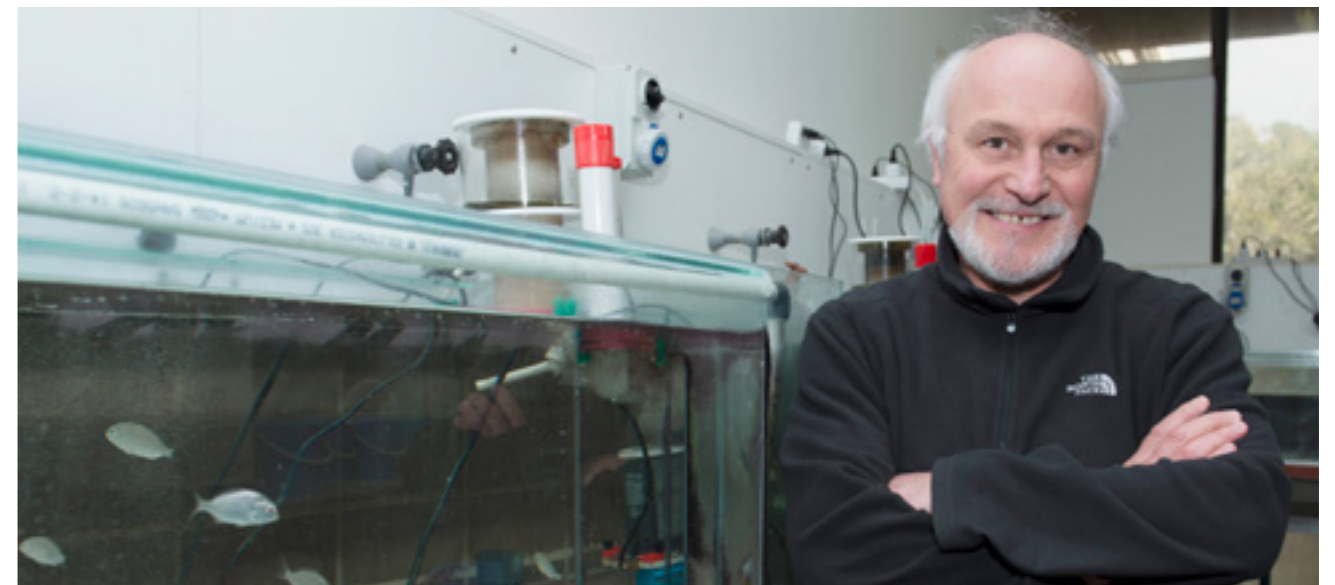
The deeper value of my research is that these studies and papers feed directly into my teaching, and so in addition to the sheer thrill of developing new ideas, it is hugely stimulating to be able to use this work to inform and hopefully inspire the next generation. Furthermore, this approach allows us to directly contribute to the process of bringing science, ever more prominently, into an African context. We need to encourage and empower bright young people to help society in overcoming future challenges and pressing problems. How we manage our environment and benefit from biodiversity is clearly one of the greatest issues facing humanity. I hope I can help develop just some of the capacity to address this.

## Research Excellence Award 2017

### Professor Renzo Perissinotto

#### Faculty of Science

SARChI Chair in Shallow Water Ecosystems



The key areas of research undertaken during the period of the award can be summarised as follows:

- biodiversity, ecological functioning and rehabilitation of Lake St Lucia, iSimangaliso Wetland Park (KwaZulu-Natal);
- biogeochemistry of living stromatolites along the Eastern Cape coastline;
- characterisation of micro-estuary systems along the eastern and southern Cape coast; and
- a baseline study of the biodiversity and ecology of wetlands in the Karoo region earmarked for shale gas exploration.

Among these, the most novel advancements were achieved in the research we undertook on the extant stromatolites recently discovered along the Eastern Cape coast. These are essentially living fossils that date back at least 2.7–3.5 billion years in the Earth's history. In the Archean eon, the cyanobacteria involved in the formation of hard deposits and reefs that formed stromatolites comprised the first photosynthetic algal organisms responsible for transitioning the Earth's atmosphere into its current, productive oxygen-rich state. Modern stromatolites are scarce globally for two primary reasons: firstly, ocean chemistry has shifted from conditions which were once rich in calcium carbonate; and secondly, animals

and higher-level algae have now evolved that can outcompete or graze upon and disrupt the stromatolite matrix. More than 500 living marine stromatolites systems have been discovered along a 200 km stretch of South African coastline, between Cape Morgan in the east and the Storms River mouth in the west, which has allowed us to understand the reasons for their continual survival and the threats posed by anthropogenic activities and climatic change along this coastline. We were also able to make a very significant contribution to our understanding of the pressures and dynamics that these partial analogues of ancient stromatolites may have been exposed to in the distant past, especially with regards to how these may have shaped evolutionary processes in modern metazoans.

Our research team's plan for the future is to undertake a comparison of the trace element composition and rare earth element fractionation patterns of ancient and extant South African stromatolites. This could clarify the validity of the interpretations of the biogenic origin of ancient stromatolites and the suggestion that modern stromatolites are counterparts to the Archean structures. These investigations will, therefore, prove important to addressing problems regarding the origin of life, paleo-environmental conditions, and the search for extra-terrestrial life.



## Lifetime Research Excellence Award and Faculty Researcher of the Year Award, 2017

### Prof Rossouw Von Solms

#### Faculty of Engineering, the Built Environment and Information Technology

School of Information and Communication Technology

Department of Information Technology

Centre for Research in Information and Cyber Security (CRICS)



Emeritus Professor Rossouw Von Solms retired at the end of 2017 after nearly 36 years in academia, and received a Lifetime Research Excellence Award in 2017.

Prof Von Solms' research career started in 1989 when he completed his master's degree on the topic of computer security management. Throughout his career he has continued his research on this topic even as it has evolved into the contemporary field of cyber security. Prof Von Solms focused his research specifically on the human and management aspects of information and cyber security. In later years he also conducted some research in the field of IT governance; however, the security aspect has always been in the forefront.

Over these years Prof Von Solms authored or co-authored more than 80 peer reviewed journal papers, more than 130 peer reviewed papers in conference proceedings, numerous papers or articles in popular journals and magazines, presented many keynote addresses and published a book titled *Information Security Governance*.

Apart from his achievements as an independent researcher, Prof Von Solms has always believed that research excellence stems from working in a team. "The NRF taught me that no research can excel on an 'island' and that teamwork is critical". For Prof Von Solms therefore, it was not only critical to do well as an individual researcher, but also to lead others in a team to research excellence. He claims he was blessed to have worked throughout his career with a group of similarly focused researchers. Most of them he was lucky to have supervised to their PhD degrees, some received NRF ratings and it was wonderful to see how they excelled as individual researchers, but within a real research family, the Centre for Research in Information and Cyber Security (CRICS).

Prof Von Solms is still actively supervising several master's and PhD students. He also writes a weekly article on cyber security in a local newspaper, ploughing back some of his knowledge to assist in educating readers on current cyber security matters.

## Faculty Researcher of the Year 2017

### Professor Pierre le Roux

#### Faculty of Business and Economic Sciences

Department of Economics



The love of economics drives my research, and specifically the field of market processes and business cycles, in which we can examine fluctuations in the economy and the processes that unfold from them. For instance, I am involved in research into the effect of the recession on sales in a major food ingredient supply company, and I am also assisting a major European commercial bank to analyse risk factors affecting private firms.

Another favoured topic of my research is the impact of institutions on economic growth, and I have been invited to present a paper on this at an international conference in Dubai at the end of 2018. I have also published a number of articles on the Austrian school of economics in general, and business cycles in particular.

Much of my research shows a positive correlation between economic growth and economic freedom, so, in the interests of achieving social and economic transformation, I am involved in the Free Market Foundation and the Individualist Movement. I am also interested in monetary policy, and energy economics, and have doctoral and postdoctoral students researching these fields, as well as contributing articles myself.

Although I am now retired, I feel I still have much to offer not only to the students at Nelson Mandela University, but also at institutions overseas, and my plans for the future include teaching abroad as a visiting professor, while still focusing on my writing and contributing to the discipline of economics.



## Faculty Researcher of the Year 2017

### Professor Ilse Truter

#### Faculty of Health Sciences

Department of Pharmacy and the Drug Utilization and Research Unit (DURU)



I was actively involved in two main research initiatives in 2016 and 2017, apart from the research conducted by my postgraduate students under the auspices of DURU. I led the Interprofessional Health Research Network (IPHRN) in the Faculty of Health Sciences, which aims to stimulate collaborative research between different professions and different departments in health sciences.

So far, 17 projects have received seed funding and at least 10 peer-reviewed publications have resulted from this initiative. Secondly, we established the Medicines Utilisation Research in Africa (MURIA) research group in January 2015, and we are actively collaborating with several African countries in various research projects, leading to peer-reviewed publications. I was also the convenor for the South African Association of Health Educationalists (SAAHE) Conference, *Transformative Health Education in Motion*, held at the Boardwalk Hotel and Convention Centre in June 2016.

My research involves the analysis and interpretation of prescribing and usage patterns of medicine – a dynamic field, with so many new medicines coming on to the market – as well as economic factors related to medicine and health care. My doctoral qualifications in both Business Management and Pharmacy make this a perfect match. Although my research focuses on a variety of conditions, my passion lies with those affecting the central nervous system, especially the management of pain, dementia, anxiety, attention-deficit hyperactivity disorder (ADHD) and depression.

I would like to be remembered for the pioneering research we started here when we introduced drug utilisation research and formalised these activities into a research unit in 1994. My dream is to grow DURU into a self-sustainable research centre here at Nelson Mandela University that can become the research hub in Africa for this field and which comprises a team of researchers with a passion for better health care – for a country very much in need of it.

## Faculty Researcher of the Year 2017

### Associate Professor Deon Erasmus

#### Faculty of Law

Department of Criminal and Procedural Law



My research is mainly into criminal and procedural law, within two broad themes: the protection of vulnerable groups within the criminal justice system (women, children and victims of sexual offences) and anti-corruption measures and ethics management within government and the private sector. I am the programme coordinator of the LLM coursework programme in criminal justice and teach 70% of the four modules as well as supervising most of the coursework dissertations. At present I am supervising two doctoral students.

For the period 2016/2017 I published three articles in accredited journals; one was a co-publication and for the other two I was the sole author. I delivered a paper titled "Piercing the rape shield: (In)justice for Khwezi." at the international *Elimination of violence against women conference*, held at Aberystwyth University, Mauritius, in November 2016. The paper is to be published in a forthcoming special issue of the *Cambrian Law Review*. I also supervised a doctoral candidate, Dr Chris Ndzengu, who graduated in April 2017. His thesis is titled, "A critical comparison of some aspects of criminal and civil forfeitures: South Africa, Canada and New Zealand as asset forfeiture regimes."

My interest in anti-corruption measures and ethics management ties in with the protection of the vulnerable, as state resources and social aid suffer under the scourge of corruption present in our country. Despite our formal constitutional guarantees for equality and equal treatment, certain groups in society are not treated equitably. By taking anti-corruption measures seriously, government will be able to bring about substantive equality for vulnerable groups.

According to American legal scholar, Professor Martha Fineman, vulnerability is inherent in the human condition, and governments have a responsibility to respond to vulnerable groups to ensure that everyone has access to societal institutions, such as the courts and the criminal justice system. Vulnerable victims of crime need to be protected against institutional biases. My research in this area is ongoing and I am endeavouring to find practical means to protect and advance the rights of vulnerable groups.



## Faculty Emerging Researcher of the Year 2017

### Dr David Morton

#### Faculty of Health Sciences

Department of Nursing Science  
School of Clinical Care Sciences



In 2016 I was awarded a National Research Foundation Thuthuka grant for my research proposal, which focused on the concepts, subjective well-being, job satisfaction and social capital. This grant enabled me to conduct research on nurses' well-being in public hospitals in the Eastern Cape.

I have always had an interest in research concerning people who have some kind of disadvantage or who are a vulnerable group. My final year undergraduate research project focused on elderly people. My honours treatise concerned people with physical disabilities, as did my master's dissertation. My PhD also had a focus on a vulnerable group, namely, people living with HIV/AIDS or more specifically, their carers. In 2013 I joined a large collaborative mental health study between the University of Gothenburg and Nelson Mandela University. I was tasked with compiling an article with well-being as the main focus, which led to my growing interest in the topic.

Because of its origins in positive psychology, well-being has a more holistic approach to mental health, which is why I would like to explore it in different research areas. For instance, well-being is also linked to life satisfaction and happiness. And, as we spend a large portion of our lives at work, it stands to reason that well-being is largely influenced by the satisfaction we derive from our work. Job satisfaction is, therefore, an area of research that I wish to pursue. The social networks in which we find ourselves also play a large part in influencing our well-being, so the concept of social capital and what this entails is another area I wish to explore further.

I would like to become more involved in larger research projects and engage at both national and international levels. In doing so I will be able to develop my own research knowledge and skills and in the process I will be able to assist and capacitate novice researchers in their research careers.

## Faculty Emerging Researcher of the Year 2017

### Advocate Lindi Coetzee

#### Faculty of Law

Department of Mercantile Law



My main areas of research are corporate law, human rights and street law.

I received the award for articles published in the field of company law and for international papers delivered in the area of street law. My research considers aspects related to the partial codification of directors' duties in the Companies Act 71 of 2008, and contains a critical examination of this codification

and its effect on the interpretation of the provisions relating to directors' standard of conduct. The conference papers for which I received the award were focused on implementing community projects within the law curriculum at universities and considered the design of interdisciplinary training programmes to improve access to justice for marginalised people. These papers were delivered at conferences in South Sudan, Mauritius and London.



## Faculty Emerging Researcher of the Year 2017

### Dr Alastair John Potts

#### Faculty of Science

Botany Department and African Centre for Coastal Palaeoscience



My research has both applied and curiosity driven aspects. In 2016 and 2017 I published 10 papers in international ISI rated journals. These were on a wide range of topics – from methods to reconstruct palaeoclimates, as well as evolutionary relationships, exploring the role of edible bulbs in early human diet, to understanding estuarine salt-marshes and why populations of *Aloe ferox* may be at risk of extinction in game reserves.

My overarching research aim is to gain exposure to many different fields and model study systems. The motivation for this approach is based on the American philosopher Elijah Millgram's identification

of the current "Great Endarkenment" – in which widespread focus on hyperspecialisation within disciplines has meant that experts cannot understand each other, which has led to questions that require interdisciplinary knowledge being answered poorly.

The ultimate aim of my expansion and immersion in a wide range of fields (mostly within the ambit of plant ecology) is to become an "integrator" – to become a researcher who understands how many different fields operate, to evaluate their theories and to determine how they might be drawn together.

## Innovation Excellence Award and Engagement Excellence STEM Award 2017

### Professor Darelle van Greunen

#### Faculty of Engineering, the Built Environment and Information Technology

Centre for Community Technologies (CCT)



My engagement activities are wide-ranging and are aimed at using innovation, co-creation, applied research and appropriate technologies to solve common problems affecting how communities live, work and play.

I have been working with members of the Northern Areas in Port Elizabeth, a low income and vulnerable community, including youth, adults and elders, with the aim of offering ways that ordinary people can change their immediate communities. The various initiatives include: a focus on youth development, through the Youth Leadership Academy which was started in 2012 and has graduated over 120 young leaders from this very vulnerable community; skills development, offering e-skills training to community healthcare workers, with approximately 1200 of them having successfully completed the short learning programme, opening them up to alternative employment opportunities; and interventions at the homes for the aged in the Northern Areas. In this engagement, community healthcare workers use technology to monitor and manage the aged people in their care, allowing the care workers to attend to their needs timeously.

The introduction of free community Wi-Fi hotspots and digital libraries in the Northern Areas enabled these interventions to extend further and to be replicated in other vulnerable communities. My engagement activities contribute not only to the advancement of the discipline of information technology but also that of interdisciplinary interaction. As well as affording me insights into social challenges, these activities allow me to engage with community stakeholders and also, importantly, with a variety of professionals and government decision-makers and, ultimately, to influence policy.

"I believe that these programmes, combined with applied research, enhance the university's Vision 2020 Engagement Strategic Priority, positioning Nelson Mandela University as a university that contributes to a sustainable future through relevant and critical scholarship, as well as being an institution that takes the Academy to the people. Engagement activities are all undertaken in the actual communities where the needs are. Our interventions both respond to the needs of the communities, and allow for co-creation with those communities, which, in turn, promotes inclusive innovation, through partnerships with communities, and regional, national and international role players."



## Engagement Excellence Social & Economic Sciences Award 2017

### Professor Elmarie Venter

#### Faculty of Business and Economic Sciences

Nelson Mandela University Family Business Unit (FBU)  
School of Management Sciences



The Family Business Unit (FBU) focuses on the research and teaching of family business theory, and is the first and only institute of its kind in Africa. It has grown in stature nationally and internationally by working closely with leading scholars and family businesses to provide excellence in this discipline. As a founder and director of the FBU, I am driving the engagement activities of the unit.

Through its FBU, Nelson Mandela University is also the first university from Africa to be an affiliate of the global Successful Transgenerational Entrepreneurship Practices (STEP) project. As a STEP affiliate, we have access to academics all over the world, as well as business families, in order to explore the entrepreneurial process among family businesses. The STEP project has enabled us to expand our interdisciplinary and research collaboration with international family business researchers. The empirical findings of these research projects have made a vital contribution to the body of knowledge in this field; at the same time, our international partnerships generate solutions that have immediate application for family businesses in South Africa. And successful family businesses

contribute to economic development, wealth creation and poverty alleviation in South Africa and Africa.

Because of the expertise the FBU has built up, we are attracting doctoral students from all over Africa. Current postgraduates include five doctoral students who assist with various aspects of the STEP project, for example, developing a framework for enhancing the transgenerational potential and success of African and indigenous family businesses; examining the role of values and corporate social responsibility and other social outcomes in South African family businesses; and researching philanthropy in South African family businesses. Several masters and honours treatises are also focusing on particular aspects of the STEP project. Other non-STEP related doctoral studies include the influence of South African parental role models on the next generations' intentions to take over the family business; the role of accountants in the service delivery process to family businesses; and developing an intellectual capital framework for value creation in the financial planning industry (including many family-owned businesses) in South Africa.

## Engagement Excellence Project Award 2017

### Dr Marilyn Gibbs

#### Faculty of Education

School for Education Research and Engagement (SERE)



My main interest is in the field of innovation in the sciences, alongside developing research skills in schools, so the Eskom Expo for Young Scientists aligns with many of my personal visions and dreams.

Expo's vision is to inspire young scientists and researchers, and to develop those who can identify a problem, analyse data, find solutions and communicate findings effectively. For me, working in this space and seeing these innovative minds with positive energy and unique creative ideas inspires me to continue, connecting me to the learners by the love of science and research and giving back to the community. Skill shortages in this area are critical and by creating interest and awareness, the Eskom Expo encourages learners to follow careers in science, engineering and technology.

For the future, I would like to see more support from Nelson Mandela University, perhaps by sponsoring a bursary. Expansion into new development schools needs to be structured into support hubs whereby we can offer support and training to schools as a

cluster. Fourth year educators or honours students could become motivator mentors for starting Expo projects in the new schools. Mentor programmes such as those sponsored by the Department of Science and Technology were very successful last year, with some of the B.Ed and PGCE students being mentors. We have set goals of increasing new development schools by a minimum of 10% every year and we have achieved this over the last five years. Challenges remain in our finances as we have only a small operating budget. We also have limited human resources as we all work as volunteers, and, with expansion into new schools increasing training and support required in the community new volunteers are hard to find.

We are very proud of our region, as we have consistently achieved a high standard of research. In the last five years at the Expo International Science Fair, learners from Nelson Mandela Bay have won the top research prize, three times. This has been a great honour and demonstrates the level of research excellence achieved by this region's young scientists.



## Engagement Excellence Project Award

### Professor Hennie van As

#### Faculty of Law

Department of Public Law

FishFORCE Academy and the Centre for Law in Action (CLA)



I received the engagement excellence reward for the FishFORCE project, which is aimed at addressing organised crime in the fisheries environment and establishing fisheries law enforcement as a new and emerging fisheries compliance model. The criminal activities we address include illegal fishing or poaching of marine living resources and the crimes that are often associated with it. We do this by developing and implementing training for the various agencies involved in the battle against fisheries crimes. Training is underpinned by research on a number of related topics, such as crime rates and trends, cases investigated and the outcomes thereof, the reasons certain prosecutions fail, and how legislation can be improved. FishFORCE also provides a post-training helpdesk, where law enforcement officers and prosecutors have 24-hour access to advice.

The FishFORCE Academy endeavours to achieve knowledge-based and intelligence-led investigations and to increase successful prosecutions of the perpetrators of fisheries crime. Whilst building capacity, the project also enables law enforcement officers involved with fisheries crime to obtain formal qualifications in their chosen field of expertise.

The challenges posed by criminal networks engaged in fisheries crime demand a high level of investigative skill, information sharing and prosecutorial competence in developing countries. Although new tools and services to combat fisheries crime are being made available internationally via organisations such as INTERPOL and the United Nations Office on Drugs and Crime, fisheries law enforcement officers lag behind in their ability to make effective use of these and to harness the full range of domestic and international legal frameworks. FishFORCE is a response to the urgent need to build fisheries law enforcement capacity and establish resilient law enforcement responses in developing countries. New FishFORCE academies have already been set up in Indonesia and Kenya, with Tanzania next in line.

The FishFORCE Academy is funded by the Norwegian Government. Ultimately, however, our aim is to make FishFORCE a self-sustaining entity that is not reliant on international funding.

## Engagement Excellence Project Award 2017

### Professor Cheryl Walter

#### Faculty of Health Sciences

Department of Human Movement Science



I am the head of the Department of Human Movement Science (HMS) at Nelson Mandela University, where I have been a faculty member since 2003. I obtained academic qualifications and work experience from five South African universities and obtained my DPhil in 2008. My research focuses on understanding and promoting physical activity especially among school children. I am passionate about the teaching of physical education in schools and the health and well-being of children and youth from marginalised communities. My research, teaching initiatives, national and international collaborations and community engagement revolve around these themes. My strengths are in the area of community engagement, working with teachers and schools, fostering close links between Nelson Mandela University and the schools in the area, for the improvement of the health and well-being of children.

Since 2014 I have been the coordinator of a joint project – The Disease, Activity and Schoolchildren's Health (DASH) project – with the University of Basel in Switzerland to assess the incidence of communicable diseases and non-communicable chronic conditions

among primary school children in selected underprivileged schools near Port Elizabeth, and to assess the effect of these on children's physical fitness, cognitive performance and psychosocial health.

The outcomes of the DASH research have, in turn, led us to develop the *KaziBantu* (active people) project, a specially tailored school-based intervention programme aimed at consolidating the practice of physical education and ensuring the physical literacy and healthy active living of school children and teachers.

*KaziBantu* is divided into two programmes, *KaziKidz* and *KaziHealth*. *KaziKids* provides a toolkit for primary school teachers, which uses health education, games and physical activities – sometimes with musical accompaniment – to promote a healthy lifestyle throughout childhood and into adolescence. Meanwhile, *KaziHealth* is a teacher's health promotion programme consisting of a behaviour change model that targets health behaviours, as well as perceived levels of stress and mental health outcomes.

# Engagement Excellence Team Award 2017

## Professor Daniël Hattingh

Faculty of Engineering, the Built Environment and Information Technology  
eNtsa



eNtsa is an engagement institute within the Faculty of Engineering, the Built Environment and Information Technology at Nelson Mandela University. The eNtsa team's slogan – and modus operandi – is “innovation through research”; as an internationally recognised innovation hub, its focus is on engineering design, component and material testing, prototyping and industrial research and development. Through the institute, Nelson Mandela University has strong strategic relations with the Technology Innovation Agency (TIA) and the Department of Science and Technology (DST).

The eNtsa group has been advancing research boundaries in the field of friction processing, and has developed expertise in the fields of friction stir welding, friction hydro pillar processing, friction taper hydro pillar welding and friction welding (including boss welding, friction stud welding and hexagonal bar welding). Small sample testing is closely aligned with the WeldCore® technology developed by eNtsa, in which samples retrieved by the WeldCore® procedure can be further analysed for creep and

toughness properties. This field requires development; however it is gaining increasing acceptance by the petrochemical and power generation industries, where high temperature component condition monitoring is becoming increasingly critical for safe and economical plant operation. eNtsa has 11 small punch creep testing platforms, which are currently occupied with ongoing and scheduled testing. Testing procedures and data evaluation are continuously developing and require standardisation, so the team is collaborating with international leaders in this field to ensure our knowledge and service is at the forefront of development.

eNtsa believes that growing the manufacturing economy in South Africa, through engineering innovation holds the key to sustainable job creation and improved quality of life for all in SA. And in future we hope to become an innovation-based engineering “spin-off” company from Nelson Mandela University, placing the university at the forefront of demonstrating how innovative engineering solutions can make the world a better place for all.

# Facts and figures: 2017

## RESEARCH

Nelson Mandela University ranks among the top 10 South African universities, in terms of the number of researchers who have research rating from the National Research Foundation. In 2017, the university had 88 NRF-rated researchers.

Research Chairs	<b>15</b>
Research Themes	<b>6</b>
NRF-rated Researchers	<b>88</b>
Research Entities	<b>27</b>
Centres	<b>15</b>
Units	<b>8</b>
Institutes	<b>4</b>
Technology Stations	<b>2</b>



**TOTAL UNIVERSITY STUDENTS** **27 000+**

## GRADUATION



**STUDENTS GRADUATED IN 2017** **6 940**

**MASTERS** **442**

**PHDS** **92**

**STAFF WHO OBTAINED DOCTORAL DEGREES** **281**



# TOP NRF-RATED RESEARCHERS

<b>Prof Richard Cowling</b>	A1 rating	Faculty of Science
<b>Prof Curtis Marean</b>	A2 rating	Faculty of Science
<b>Prof Mark Watson</b>	B1 rating	Faculty of Health Science
<b>Prof Paul Watts</b>	B1 rating	Faculty of Science
<b>Prof Rossouw von Solms</b>	B2 rating	Faculty of Engineering, the Built Environment & IT
<b>Prof Bill Branch</b>	B2 rating	Faculty of Science
<b>Prof Renzo Perissinotto</b>	B2 rating	Faculty of Science
<b>Prof Stefan Veldsman</b>	B2 rating	Faculty of Science
<b>Prof Anthony (AJ) Christopher</b>	B3 rating	Faculty of Science



**1 624** INTERNATIONAL STUDENTS

**70** COUNTRIES

**Produced by Communication & Stakeholder Liaison**

Many thanks to all the staff at Nelson Mandela University who contributed images to this publication.

Content: Heather Dugmore  
Copy-editor and proofreader: Jill Wolvaardt

**Change the World**

**100**

**YEARS OF MANDELA**

PO Box 77000,  
Nelson Mandela University  
Port Elizabeth, 6031

[info@mandela.ac.za](mailto:info@mandela.ac.za)



[mandela.ac.za](http://mandela.ac.za)