July 2016 Faculty of Engineering & the Built Environment University of Cape Town Vol. 12 Issue 2

Faculty Newsletter

Message from the Dean

Welcome back to everyone who has been away. I trust you have had a good break and are already at full steam in the second semester.

The graduation ceremony in June was a great success and it was heartening to see so many of the 2015 graduates attending the ceremony. Thank you to everyone who put in lots of hard work to make sure our graduation ceremonies went smoothly. The graduates were really excited to be back on campus and to catch up with old friends.

Applications for 2017 have been streaming in, and so far the undergraduate admin staff in the Faculty Office have captured over 6 800 applications and have made over 1 000 offers (some of these are duplicate offers for 1st and 2nd choice).

We are still making final tweaks to the faculty plan for the savings we need to make by 2019. The Finance Department gave two talks to EBE staff and students on the state of the financial situation of the South African Higher Education Sector, as well as the situation and the projected outlook for UCT. The message was clear— the austerity measures are not going away. We need to think creatively in the longer term about how we can do things differently.

The closing date for the academic Ad Hom promotions was 30 June and the working groups are busy looking at all the applications before the committee meets in August. The closing date for the scientific and technical officers' Ad Hom promotions is 19 August.

The annual two-day teaching retreat took place in June with 14 EBE academics attending. This year the focus was on the topic of getting feedback on the quality of teaching. The workshop format allowed participants to spend time reflecting on their teaching practice. The retreat is an opportunity to get away from the busyness on campus and to take good quality time to reflect on one of core activities: teaching.

The faculty had 22 study-abroad students registering for the second semester, who came from Norway, Denmark, Sweden, France and the USA. We should be encouraging more to register as the SSA students add enormously to our environment. They bring cultural diversity to our classes, spread good news about UCT when they go home and, not least, add a good income stream.

I look forward to engaging with staff and students during the semester.

Winner of a 2015/2016 NSTF-South32 Award

Congratulations to Professor Sue Harrison from the Department of Chemical Engineering, who was the winner of a 2015/2016 NSTF-South32 Award in the category for engineering capacity development over the last five to ten years. The winners were announced at a gala dinner on 30 June 2016.

The Research and Engineering Capacity Development award is given to individuals who, over the last five to ten years, demonstrated outstanding leadership in increasing the participation of young researchers or engineers in their chosen SET fields.

Sue is the Director of the Centre for Bioprocess Engineering Research, and holds the SARChI Chair in Bioprocess Engineering. At the moment Sue is also the director for the Future Water Institute, which is hosted by the faculty and integrates the research of academics across some ten departments and across five faculties.

Sue was unable to attend the gala evening as she was abroad at the time taking up a Distinguished Visiting Fellowship of the Royal Academy of Engineering at the Camborne School of Mines as well as presenting multiple papers with her group at both Biohydrometallurgy 2016 and Sustainable Minerals '16.

First Professional Master's graduate for Geotechnical

Iain Paton recently made history as the first person to graduate from the newly introduced Professional Master's Degree in Geotechnical Engineering programme. Iain's degree was awarded with distinction and his dissertation was entitled *An investigation into the geotechnical nature of aeolian coversands in the Knysna area of the Southern Cape*.

His supervisor, Dr Denis Kalumba, is the Head of the Geotechnical Engineering Group in the Department of Civil Engineering. Iain is the Managing Director of Outeniqua Geotechnical Services, based in Knysna, and has been working in the construction industry for over 15 years.

The new programme is a coursework and project oriented master's degree that is designed to aid the development of graduate civil engineers and technical professionals in related fields in their careers as geotechnical engineers by offering specialised knowledge and skills for the expertise required to provide solutions in the rapidly changing business, government and industry environments.

Iain Paton with Dr Denis Kalumba

Meritorious Book Award for Professor Jenni Case

Congratulations to Professor Jenni Case, who received UCT's Meritorious Book Award for 2015 for her book *Researching Student Learning in Higher Education: A social realist approach.*

"Higher education must change the person and it must change their capacity to act in the world, what they can do and how they do it," says Case, who is a member of the Centre for Research in Engineering and Science Education.

Read more

Visiting scholar at Centre for Mineral Research

The UCT Centre for Mineral Research welcomed University of Queensland's (UQ) Dr Grant Ballantyne as a visiting scholar from 4 to 8 April 2016. Ballantyne's visit was very timely as the Centre finalised its submission to the World Economic Forum's Mapping Mining to the Sustainable Development Goals: A preliminary Atlas". Ballantyne made a substantial contribution to this work, in particular to Sustainable Development Goal 11 (Energy). Ballantyne based his input on his research at UQ and work with CEEC International, the not-for-profit industry body addressing best practice in energy-efficient mineral processing.

Ballantyne was also in Cape Town to deliver the first South African workshop on the CEEC energy curves. This unique programme allows companies to confidentially establish their current energy-efficiency baseline for comminution, and identify areas for immediate improvement. Critical to the extension of this transformational programme is the establishment of technical champions around the globe who can provide education on this programme.

Dr Grant Ballantyne with Edson Chairilkinya

Ballantyne worked closely with UCT's Edson Charikinya, the new technical champion for CEEC in South Africa. Charikinya was well placed to assist Ballantyne in the CEEC workshop held on 10 April, prior to the opening of the 2016 Comminution conference.

Going forward the collaboration will involve working with Profs Aubrey Mainza and Dee Bradshaw. For some time Mainza and Ballantyne have been scoping out a research project for an MPhil student to understand the implications of circuit design on ancillary and embodied energy requirements. Plans are now in place to identify a student to commence this research in January 2017.

MtM and Helmholtz-Zentrum Dresden-Rossendorf (HZDR)

The MOU signed between UCT and HZDR at UCT on 4 May 2016 acknowledges the alignment of the two institutions and provides the framework for collaboration between the Minerals to Metals Signature theme (MtM) and the Helmholtz Institute Freiberg for Resource Technology (HIF). HZDR is a member of the Helmholtz Association, a union of 18 research centres in Germany. The official mission of the Association is "solving the grand challenges of science, society and industry". At HIF research is focused on new technologies for the exploration, mining, and use of strategically important metals and minerals. This fits well with UCT being committed to ensuring that research informs all its activities including teaching, learning and service to the community, advancing and disseminating knowledge that addresses the key challenges facing society.

Professor Dee Bradshaw, the Dean, Professor Alison Lewis with Mr Roger Wallace, Senior Contracts Manager, and Professor Marcus Reuter , co-Director, HIF.

MtM is a well-established Signature Theme within UCT and includes the SARChI Chair in Minerals Beneficiation, currently held by Prof Dee Bradshaw, who is also Director of MtM. The mission of MtM is to integrate, enhance and expand existing capacity within minerals and related research groupings at UCT, with a view to facilitating sustainable development and utilisation of natural resources within the minerals industry. This is achieved through a combination of integrative, systemic projects (for example, looking at economic-energy optimisation of the entire copper mineral-to-metal value chain) and fundamental research looking at physico-chemical processes in the context of mineral technology (for example characterising the effects of mineralogy and comminution method on the efficiency of heap leaching).

Professor Marcus Reuter, in his joining of HIF as co-Director in 2015, formulated a vision for research in System Integrated Materials Production, at the heart of which lie the concepts of a circular materials economy. This concept, which recognises that, in order to optimise material cycles, a comprehensive understanding and model of all process flows (from primary resource extraction to beneficiation, to manufacture, to recycling to final disposal) is needed, associated with models of the relevant process technologies. Prof Reuter named MtM as one of the few groupings worldwide with the skills and facilities to contribute meaningfully in this regard. His interest is especially in MtM's focus on the mineral-to-metal value chain and its optimisation within the societal-environmental-economic context.

The collaboration that has been established between HZDR and UCT will extend interdisciplinary research and promote regional and continental engagement in order to develop and generate new process knowledge and skills in the circular economy. More specifically, this collaboration aims to promote development of quantitative flow sheeting tools for metallurgical processes to integrate into broader economic/life-cycle models, strategic metal recovery from post-consumer waste, and the use of geo-metallurgical techniques to characterise primary and secondary metal resources for determining optimal process routes from a sustainability perspective.

Prof Bradshaw said, "We anticipate vigorous exchange on developing these joint projects and the associated expertise and skills, facilitated through regular visits, workshops and conferences. It is also expected that there will be joint publications in relevant high-impact journals."

In his visit to UCT, Professor Reuter presented a public seminar on Circular Economy Engineering and gave two workshops on the use of HSC chemistry as a modelling framework platform to evaluate both the technical and environmental implications of beneficiation systems.

The first PhD student exchange is under way, with Bruno Michaux, a PhD student from Markus Reuter at HIF, spending one month in Cape Town at UCT working with staff and students from MtM as well as from the Centre for Minerals Research. His work focuses on modelling the impact of water quality in the mineral processes, a topic in line with Professor Reuter's vision of System Integrated Materials Production and with the expertise of the CMR. UCT Post doctoral fellow Dr Edson Charikinya is planning to spend one month in Freiberg later this year.

Carbon limit of below two degrees might be reached by 2030

A paper titled *Paris Agreement climate proposals need a boost to keep warming well below 2 °C* appeared in *Nature* on 30 June.

The paper is a meta-analysis by an international team of authors of 10 independent studies. Professor Harald Winkler from the Energy Research Centre, was part of the team. Below is his summary and an abstract from the paper.

Carbon budgets for 2 and 1.5 °C compared to what would happen under INDCs, that is, contributions submitted by countries for the Paris Agreement on climate change. The entire carbon budget for limiting warming to below 2 °C might have been emitted by 2030, according to the study. The study provides a systematic overview and identification of the most promising options to reduce emissions in the short term to reduce the challenge after 2030: implementing national measures to overachieve INDCS, and increasing international cooperation, taking action by companies, cities and sub-national governments into account. While this journal article focused on mitigation, analysis of the "adaptation gap" required further work – as well as consideration of distributional impacts and their (in)equity.

Abstract: "The Paris climate agreement aims at holding global warming to well below 2 degrees Celsius and to "pursue efforts" to limit it to 1.5 degrees Celsius. To accomplish this, countries have submitted Intended Nationally Determined Contributions (INDCs) outlining their post-2020 climate action. Here we assess the effect of current INDCs on reducing aggregate greenhouse gas emissions, its implications for achieving the temperature objective of the Paris climate agreement, and potential options for overachievement. The INDCs collectively lower greenhouse gas emissions compared to where current policies stand, but still imply a median warming of 2.6–3.1 degrees Celsius by 2100. More can be achieved, because the agreement stipulates that targets for reducing greenhouse gas emissions are strengthened over time, both in ambition and scope. Substantial enhancement or over-delivery on current INDCs by additional national, sub-national and non-state actions is required to maintain a reasonable chance of meeting the target of keeping warming well below 2 degrees Celsius."

You can find the paper here.

NRF grant writing workshop

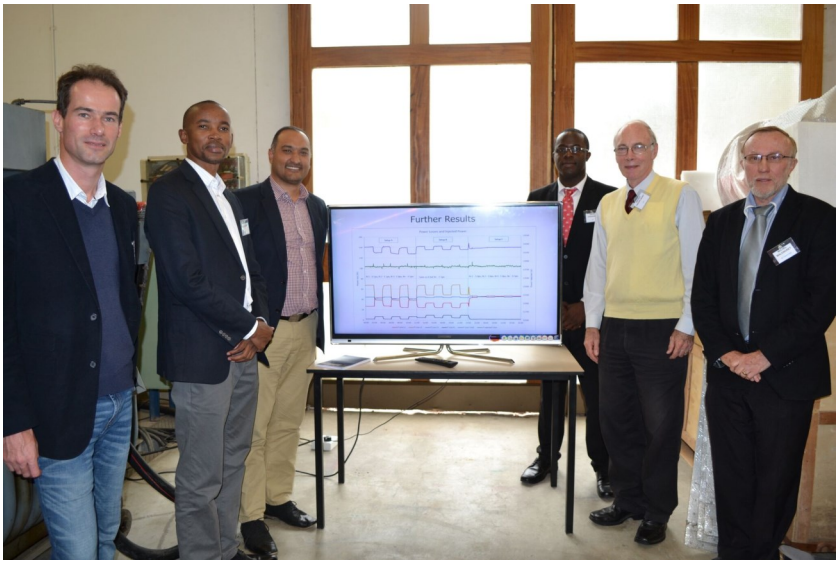
The teaching lab in the NEB was abuzz on Monday 18 July with over 50 EBE postgrad students attending an interactive NRF grant writing workshop.

The workshop was organised by A/Professor Tanja Winkler and Ms Takunda Chitaka (President of the EBE Postgraduate Student Council) as part of an EBE transformation goal – to empower students by teaching students how to apply for funding grants, so that they may complete their postgraduate studies without the additional stress of funding insecurity. The students broke up into their department groups and interacted with academics around applying for NRF (and other) research grants. Dr Kate Le Roux (Language Development, CHED) facilitated the workshop with assistance from Ms Bongiwe Ndamane and Ms Olivia Barron (from UCT's Postgraduate Funding Office), as well as with the assistance from academics from across all departments in the faculty, including Professor Genevieve Langdon, Dr Sarah George and Associate Professors Abimbola Windapo, Azeem Khan and Hans Beushausen.

Power Injection Technology

Electrical engineers have come up with an algorithm that could help the country better manage its power supply by significantly reducing energy losses due to load imbalances on the grid. A patent for the technology, called Power Injection Technology, was granted on 27 January this year. The technology is being developed further with R500 000 from the Technology Innovation Agency (TIA) Seed Fund programme.

The idea is the brainchild of Associate Professor Michel Malengret and Professor Trevor Gaunt in the Department of Electrical Engineering and is being further expanded by lead investigator Dr David Oyedokun. Power Injection Technology is based on software installed in an inverter that allows power to be injected into, or withdrawn from, the network at optimal levels. It can be applied to a single phase or multi-wire power network so that power reaches the destination where it is consumed with minimal losses.



Dr. Bernard Bekker – MLT Inverters (Pty) Ltd, Mr Cebo Silinga – Technology Innovation Agency (TIA) Portfolio Manager: Energy, Mr Saberi Marais – TIA Seed Fund Manager, Dr David Oyedokun, Emeritus Professor Trevor Gaunt and Professor Michel Malengret

Among the potential benefits are greater energy efficiency, increased capacity and increased network stability. Network stability is important as more "green" technologies, such as wind and solar, are connected to the grid. The potential market for the technology includes distributed generators (like rooftop PV), those who control power networks (such as Eskom and municipalities), industries with high electrical consumption or large reticulation systems, such as petrochemical plants and mines, and those that need clean power.

On 27 May, a "proof of concept", real-time demonstration of the technology took place in the Machines Laboratory in front of representatives from TIA, local government, Eskom, industry and other universities. Using three 24 kVA MLT Inverters, the tests achieved a 17% reduction in transmission loss. According to Dr Oyedokun, this is one of the first TIA Seed Fund projects at UCT to reach the level of a full-scale demonstration to external stakeholders.

"Projects like this reaffirm UCT's place in the global space of innovation and excellence," said Dr Oyedokun.

Francois Oosthuizen from UCT Innovation added: "This TIA Seed Fund project is conclusive proof that, with proper support from all players in the national innovation ecosystem, high-impact and relevant innovations proudly developed by South Africans can be delivered successfully to the South African economy."

The ultimate objective of the project is to develop a commercial grade inverter system that can be used locally and internationally.

Building games to tackle problems in schools

In an article published in the Sunday Times, writer Aaron Hyman said the US has Xbox, Asia has Nintendo… and Africa has Regina Kgatle.

Regina is a final-year electrical and computer engineering student who builds arcades and designs her own games. Her games attempt to tackle problems such as gangsterism and the education crisis. She has impressed Patricia de Lille, the Cape Town mayor who is exploring ways to help her. Regina has formed a company called 67 Games which was launched at Kannemeyer Primary School in Grassy Park. She aims to roll out arcades to 67 underprivileged schools, but for now rents them to schools and events, including children's parties.

Engineering student Regina Kgatle shows how to play her arcade game, 'The Pull of the Gangster', at Friends of Design - Academy of Digital Arts, in Cape Town. Sunday Times. Image: Esa Alexander

Launch of book on Real Estate Valuation Theory

On 11 May, staff and guests celebrated the launch of Dr Manya Mooya's book *Real Estate Valuation Theory: A critical appraisal.* The book is only the second book to be published in the Department of Construction Economics and Management. It was published by Springer, an esteemed publisher in the scientific world.

Dr Mooya is part of the Next Generation Professoriate programme, which is a new initiative aimed at addressing the lack of senior black academics. "The publication of his book announces Dr Mooya's arrival in this part of the world and globally," said Professor Morrell, who is responsible for the Next Generation Professoriate programme.

The Valuer-General, Mr Christopher Gavor, was the guest speaker at the launch and said, "Building on his many years of teaching the theory of valuation and his research, Dr Mooya has written a seminal book on the theory of property valuation. He tackles theory heads on, and proposes an alternative in its place."

In the book Mooya deals with key problems that are relevant to the practice of valuation, such as valuation accuracy, client influence, and valuation under uncertain market conditions. "Mooya's alternative perspective on these problems will, or should, provoke intense debate," said Gavor.

Over the years, Mooya has made immense contributions to the valuation profession in South Africa. He wrote the policy document on which the Property Valuation Act is based, and which led to the establishment of the Officer of the Valuer General. His technical expertise is behind the translation of Section 25 (3) of the Constitution into an operational framework. He was also responsible for developing the regulations that will provide the legal basis for this framework. Mooya has been running CPD courses for the valuation profession for a number of years. "These courses are highly regarded in the valuation profession in South Africa," said Gavor. "Through these courses, practising valuers have access to training of a quality that is comparable to the best in the world."

Rob McGaffin, a colleague in the Department of Construction Economics and Management, critiqued the book. He said that when he had first started reading the book, he thought Mooya had made a mistake. McGaffin thought this was a great land economics book, but where was the valuation, and then he realised that was the point Mooya wanted to make. "That we go back and question the underlying economic and philosophical basis upon which we define value today," said McGaffin. "Mooya has shown an intellectual ability and bravery by giving us a succinct, logical and very well written framework to question the current status quo. The challenge is on us to do so."

The book is available at Amazon.

Dr Manya Mooya and Mr Christopher Gavor, Valuer General.

Keynote speaker

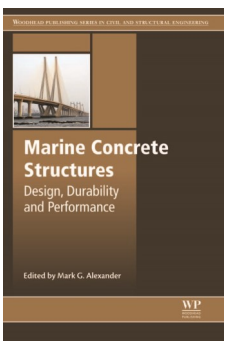
Professor Kobus van Zyl has been invited to give a keynote presentation at the 18th Water Distribution System Analysis conference happening in Cartagena, Colombia, at the end of July.

Kobus is on sabbatical until the end of the year.

New Book for Professor Mark Alexander

Marine Concrete Structures—Design, Durability and Performance, a new book edited by Professor Mark Alexander, has recently been published.

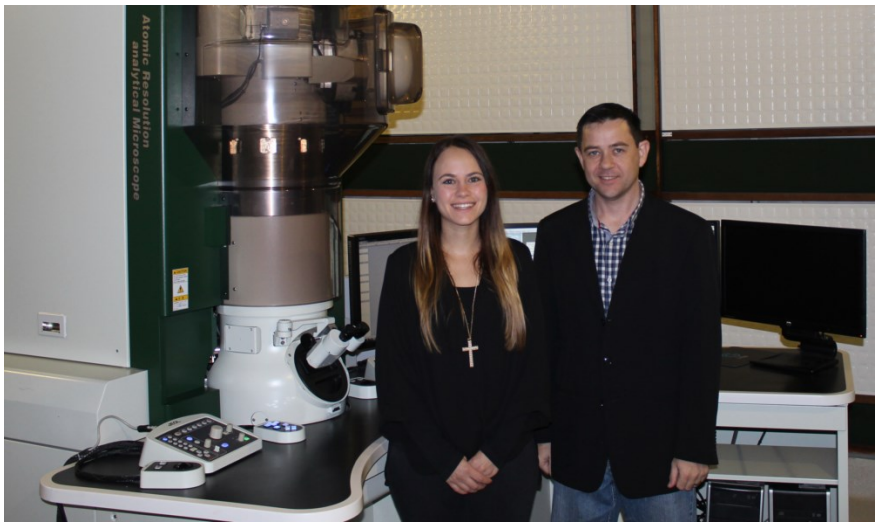
This comprehensive review on improving the durability of concrete structures located in, or in close proximity to, the sea provides information on the design, specification, construction, and operation of marine concrete structures and their performance and durability in the marine environment.



UCT Materials and Mechanics turns NMMU physicists into seasoned physical metallurgists

Predicting the performance and lifetime of components subjected to demanding service conditions such as those experienced in Eskom coal-fired power plants requires detailed knowledge of the make-up of the material. Understanding microstructure-property relationships forms the foundation for tailoring materials to meet the mechanical and thermal service conditions. In addition, the imposed service conditions cause the microstructure to constantly evolve which implies that the properties will change accordingly and might reach a stage when the material is no longer fit for purpose. Being able to monitor and understand the microstructural changes is important for good component lifecycle management practice.

Consequently, investigating and characterising complex microstructures for the range of steels used in power-plant components and systems is a primary activity within the EPPEI Materials and Mechanics specialisation. There is a broad range of tools available for microstructure characterisation, but by far the most practical and effective approach is the use of advanced electron microscopy techniques. It is for this reason that the UCT Materials and Mechanics specialisation, under the leadership of Professor Rob Knutsen, decided early on in the EPPEI programme to partner with the Centre for High Resolution Transmission Electron Microscopy (CHRTEM) at the Nelson Mandela Metropolitan University (NMMU). The CHRTEM is well known for its state-of-the-art microscopes and infrastructure as well as availability of expert microscope operators and analysts.



Genevéve Marx and Dr Johan Westraadt

Notwithstanding the impressive capabilities of the CHRTEM, it was recognised that a challenge lay in transforming a traditional physics-based operation into an activity more closely aligned with physical metallurgy, and more particularly the characterisation of multiphase steel microstructures.

Dr Johan Westraadt was appointed at the CHRTEM through the EPPEI support and the transformation journey began. By working closely with Professor Knutsen and the UCT EPPEI students, Dr Westraadt very quickly got to grips with the different elements of the steel's constitution and he was able to apply his sound electron microscopy knowledge to interpreting the microstructures. But this was only the beginning.

A physics graduate, Genevéve Marx, was recruited as an MSc candidate at the CHRTEM to explore specimen preparation and microscopy techniques that would best fit the requirements to identify the microstructural features that influence creep behaviour in steels. The result of this work is a comprehensive description of procedures for preparing specimens and for extracting relevant microstructure information from damaged steels. The quantitative techniques demonstrated in this study opens up the possibility to perform accurate life assessment on weldments with inhomogeneous microstructures by following an analytical microstructural-based approach. Her dissertation, entitled "Quantitative Microstructural Evaluation of 12 Cr Creep Aged Steels After Welding", recently received rave reviews from the external examiners and she successfully graduated *cum laude*.

EBE phonathon

EBE students volunteered to be part of the EBE phonathon which took place during the vac. The students attended a two-day training session organised by the Department of Development and Alumni. They rang EBE alumni to chat to them about their time at UCT and where life has taken them since they graduated, and discussed fundraising for bursaries and the Student in Distress Fund. Mashudu Muridili, a final-year chemical engineering student, said it was an interesting experience and he learnt a lot about people. He said most of the people were nice and they made up for the few who were rude to them.

They received over 700 pledges which the Development and Alumni Office are now being following-up.

EWB teams up with Vukukhanye Primary School

The Vukukhanye Primary School, located in Gugulethu, asked EWB-UCT to renovate the school's building and give it a facelift with a new coat of paint. The project began in 2015 with the leadership of Fundiswa Douw and aims to conclude in 2016 under 3rd year Civil Engineering student Lulama Mtyeku.

Lulama's goals are to complete all painting of the window frames, walls, roofs and metalwork as well as to replace gutters and install tanks for rainwater harvesting.

"Visits by the new committee in 2016 showed us a great school with motivated staff," said Lulama. After the visit two day projects were run, on 20 February & 19 March, in which the members scraped and painted window frames and metal work. "This project is one of our favourites so far and we hope EWB-UCT can serve efficiently as we grow this relationship with the community and the school," added Lulama. As part of their Mandela day activity, they are going out to the school on Saturday 30 July to complete the work.

EWB members at Vukukhanye Primary School

CEM students third in Global Student Challenge

In July, four students from the Department of Construction Economics and Management travelled to Hong Kong to compete in the finals of the Global Student Challenge. Brendan Ardagh, Alain Alexander, Courtney Meyer and James Myburgh, as team Prestige Worldwide, joined teams from Glasgow Caledonian University, Hong Kong Polytechnic University, Chongqing University, Bond University and Deakin University. Team Prestige Worldwide came third in the challenge. The competition was organised by the Charted Institute of Building.

"Attending the Global Student Challenge finals in Hong Kong will not only be an amazing experience but will provide us with an opportunity to network with influential individuals within the global industry. Mark Massyn was the academic mentor and he has been with us every step of the way, providing encouraging words and advice throughout the game," said Alain Alexander before they left for Hong Kong.

Over 50 teams from universities all over the world competed in the challenge. The teams acted as board of directors for a virtual construction company, in a simulated environment. The challenge utilises software developed by Loughborough University where players take decisions on staffing levels, estimating and bidding, managing cash flow and capital and seeking investment opportunities. It is seen by the industry as an opportunity for university students to learn real skills in contract management, teamwork and leadership. Teams consist of four people who each take on a specific job role such as finance director, construction director or chief executive.

"The CIOB Challenge gave us a great opportunity to experience the corporate and competitive nature of the industry," said James Myburgh. "For me, going to Hong Kong to compete in the GSC Final was an opportunity to open myself up to the world of construction. It was an incredible opportunity to get exposure to the global construction industry by meeting and learning from top industry leaders as well as fellow student competitors," added Courtney Meyer.

Mark Massyn (standing) seen at the awards evening with Team Prestige Worldwide - Brendan Ardagh, Courtney Meyer, James Myburgh and Alain Alexander

Brendan Ardagh said, "We are extremely proud to have made it to the finals while representing UCT. Our academic tutor, Mark Massyn, gave us a great many hours of his time to discuss possible strategies and to review previous rounds decisions. We worked hard as a team to develop a winning strategy and are glad it paid off."

Harvest Water from roads and pavements

A presentation at the Water Institution of South Africa conference by Ben Biggs, an MSc student in the Urban Water Management Research Group, made quite an impression. An article on his presentation 'A water supply from roads' appeared in *The Mercury*.

Below is a copy of the article written by Tony Carnie.

Instead of diverting rain-water into raging torrents in storm drains, South Africa needs to look more closely at harvesting water from the numerous roads and hardened pavements common in big cities.

Presenting a paper entitled 'A water supply from roads' at the Water Institute of South Africa conference in Durban, University of Cape Town engineering student Benjamin Biggs said it was becoming feasible to harvest water by creating more permeable road and pavement structures.

Rather than letting rain gush away into the storm water drains, researchers were hoping to develop more sustainable drainage systems which mimicked the natural water cycle.

This included new permeable roads and pavements which allowed more water to infiltrate the soil to recharge groundwater, or to be harvested into underground tanks for flushing toilets and other uses.

These emerging drainage systems would also help to reduce the velocity of storm-water flows and filter out pollution and impurities so that run-off water could be put to better use. Biggs, studying for his Master's degree in engineering, is researching ways of improving the quality of run-off water by designing new permeable pavements to filter out impurities.

He and fellow students had created four different pavement designs in the UCT laboratories that included a variety of different stone sizes, sand and geotextile layers.

The experimental surfaces were irrigated with watering cans at regular intervals to mimic dry and rain seasons.

While geotextile layers helped to filter out pollutants such as ammonia, nitrates and organophosphates, they were also vulnerable to getting clogged up if the stone mixtures were not pre-washed.

Article ends

Ben graduated with a first class honours for his BSc in Civil Engineering in 2013. His master's supervisor is Professor Neil Armitage and Ben is aiming to graduate in December.

Ben is one of South Africa's top canoeists and has represented South Africa on four occasions. He enjoys competing in various paddling disciplines but his focus is on sprint kayaking and his ultimate goal is the 2020 Olympic Games.

Students work on Intel's new Curie Development Board

A group of electrical engineering students spent some time during their vac experiencing Eduweek and working life at Intel in Johannesburg. EduWeek is the largest and most recognised African education event, bringing together educational professionals across Educational Technology (E-Tech), Vocational & Higher Education, Basic Education, Inclusive Education and NEW for 2016 Early Childhood Development.

Intel , a sponsor of Eduweek, approached Justin Pead, a chief technical officer in the Department of Electrical Engineering, and asked him to get a group of students to work on their new Curie Development board, which is described as a computer the size of a button. The students had six weeks to build a project. Out of the group seven students were selected to travel with Justin to Johannesburg, where they attended Eduweek expo which Intel sponsors. Dominic Schorr said, "It was really amazing to be able to work on a project entirely our own and I'd recommend that more students get involved in future. Justin was always available for technical help and our mentors from Intel (aside from spoiling us with a trip to Jo'burg) encouraged us to think about the practical application of our projects and how we could make them more socially or economically useful."

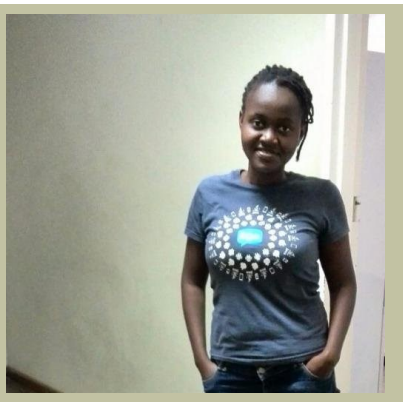
Standing Left: *Dylan Naidu, Oliver Funk, Justin Pead, Yusuf Khan, Dillon Heald*
Seated Left: *Nikhil Mohanlal, Dominic Schorr, Kiuran Naidoo*

ACM-W scholarship

Imaculate Mosha, a final-year electrical and computer engineering student, has been awarded an ACM-W scholarship to attend the International Conference on Functional Programming in September 2016.

ACM-W provides support for women undergraduate and graduate students in Computer Science and related programmes to attend research conferences. This exposure to the CS research world can encourage a student to continue on to the next level (undergraduate to graduate, Masters to PhD, PhD to an industry or academic position).

Imaculate is doing her final-year project under the supervision of Professor Alireza Baghai-Wadji. He is hoping to secure funding for her to do her master's by research next year.



Architecture outreach programme

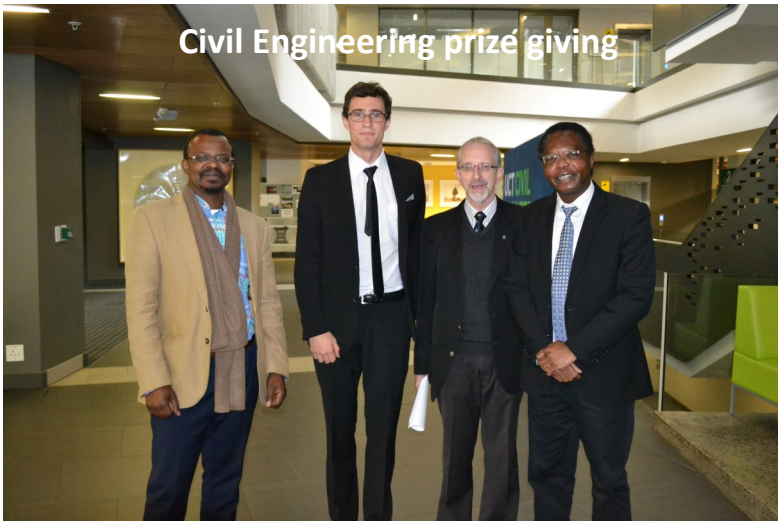
For the last eight years, the School of Architecture has hosted a workshop for Grade 11 and 12 learners. This year, due to lack of funding, instead of 30 students being hosted for a three-day residential programme, it was a two-day workshop, and the learners travelled in from home. Without the expenses of accommodation and food, 86 students from around Cape Town attended the workshop. It was exciting and informative and gave learners an opportunity to have insight into the world of architecture and the built environment. The two days included lectures by staff and professional architects, discussions, films and walks. Learners were also assisted with the application process, specifically with regards to the portfolio, which plays a major part in being accepted into architecture.

Selected for a Science and Technology programme in Japan

Emmanuel Nxumalo, a third-year electrical engineering student, was selected to attend the Meiji University's Science and Technology programme in Japan. Only five international students were selected to attend. The programme introduced them to various aspects of science and technology and also offered introductory lectures on Japanese society, culture and language. Emmanuel said, "This was one of the best experiences in both my academic and social life. The organisers of the programme together with the students we interacted with were kind, fun and approachable. The programme has been insightful, rewarding and added fuel to my passion in engineering. I believe that the knowledge I got from the programme will be of great use in my future career in South Africa."

Emmanuel Nxumalo, second left with other participants from the programme.

Celebrating excellence



Professors Pilate Moyo, Mark Alexander and Alphose Zingoni seen with Aaron Ruffels, the top 2015 civil engineering graduate.

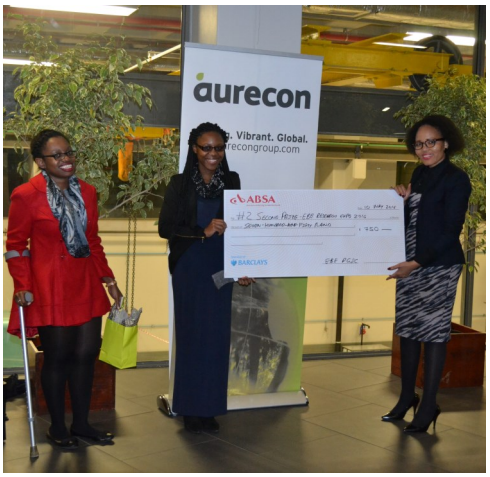
Isaac Chaneta,, Levana Naidoo, Kudzai Zinyengere, Rumbi Mhinga, and Trevor Chakanetsa receiving the Propsim award 1st year for a Property Investment Simulation Project from A/Professor Francois Viruly.

Showcasing EBE research

The EBE Research Expo organised by the EBE postgraduate student council was held in the foyer of the NEB on 10 May. It was the biggest yet – with 35 postgraduate students exhibiting their research posters. Staff, students, industry and family members attended the event.

Dr Thabi Melamu, Acting Chief Director of the Sector and Industry Development at the Gauteng Department of Economic Development, was the guest speaker. She encouraged students to promote interdisciplinary research as this helps to understand and contribute to policies. She said research should address problems, and that, as engineers, we have a responsibility to society. Engineers need to be innovative and to identify societal problems that can be addressed in new and different ways.

The posters and presentations by the students were judged by a number of judges, including Prof Jane English (Professional Communications), Prof Pilate Moyo (Deputy Dean), Prof Peter Meissner (Director Postgraduate Studies), A/Prof Pippa Notten (The Green House sustainability consultants) and Ms Rudi Botha (Aurecon). Aurecon had sponsored the event and Absa sponsored the prizes.



Takunda Chitaka (Chair EBE postgrad council, Sanelisiwe Buthelezi (2nd prize) and Dr Thabi Melamu (guest speaker)

First prize went to Abhijit Kumar Nath and Wei-Yu Louis Feng from Electrical engineering for their presentation on *Continuous bacteria propelled nanosatellite mission for active debris removal (CBP-DR)*

Second prize went to Sanelisiwe Buthelezi from Department of Civil Engineering for her presentation on *Landfills: What happens at the interface?* Sanelisiwe also got a prize for her poster being voted the best by everyone attending the event.

Third prize went to Lucy Little from the Department of Chemical Engineering for her presentation on *Investigating the effects of particle shape on chromite entrainment on a platinum concentrator.*

Visiting delegation from the Indian Power Authority

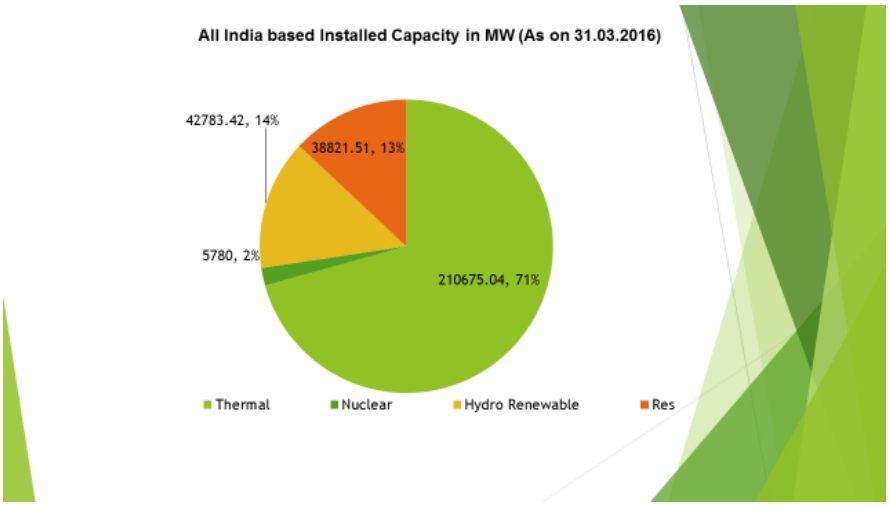
Professor Ed Boje seen with the delegation from the Indian Power Authority

In a joint initiative between SANEA, SANEDI and EPPEI, an information and knowledge sharing event was hosted in the Mechanical Engineering Department with a visiting delegation from the Indian Power Authority. The delegation was constituted by senior officials from India's Ministry of Power, Central Electricity Authority, and three utilities: Maharashtra Generation Corporation, Haryana Power Generation Corporation LTD and the West Bengal Power Development Corporation LTD. Mr Dave Wright, the secretary-general of SANEA, offered a presentation entitled *Introduction & Overview of the South African Energy Sector,* which gave context to the delegation, who had visited a number of sites in the week preceding this event.

Mr Priyesh Gosai presented a talk on the work that EPPEI is doing. The delegation was very impressed by the initiative that Eskom has shown in developing EPPEI and by the model of experienced professionals doing research to directly improve the business. Professor Edward Boje, from the Department of Electrical Engineering, delivered a presentation on *Water circulation control of hot start-up of a Benson Boiler*. The keynote presentation was offered by a member of the visiting delegation, Mr Harpeet Singh Pruthi, who is a director in the Ministry of Power for India. His talk focused on the Indian power sector, the plans for the power sector and the current challenges this industry faces.

The similarity between the Indian and South African power industries was striking, as both countries are heavily reliant on coal-fired power stations as shown in the following figure. India recently invested in a large capacity-expansion drive with 45GW of super-critical coal-fired units currently under construction. The countries also share similar challenges in the areas of rural electrification. The country aims to electrify all homes in the next two years. Emissions control and water utilisation are other common areas of concern between South Africa and India. Indian plants are also required to retrofit with low NOX Burners. To address the water shortages, India has instituted the policy that power plants are required to make use of treated sewage water from nearby municipalities. There is also a major drive towards renewable energy with plans to reach a target of 175GW of renewable energy by 2022.

The event was a great success because there was a good round of discussion after the final presentation and, more importantly, there was plenty of discussion after the meeting closed formally. This event raised the EPPEI profile both locally, amongst SANEA and SANEDI, and internationally through the exposure to the Indian power utilities. EPPEI students were also exposed to gaining a broader perspective of global energy markets.



Welcome to new staff

Mr Yi Zhou joined the Centre for Catalysis Research as a junior research fellow.

Mr Clyde Ohlson joined the School of Architecture, Planning and Geomatics as a departmental assistant.

Ms Helene Hendricks joined the Centre for Catalysis Research as a finance administrative assistant.

Dr Amos Madhlopa became a permanent member of staff in the ERC.

Ms Tracey van Heerden joined the Department of Chemical Engineering as a lecturer.

Mrs Junita Abrahams joined the Division of Geomatics as the senior secretary.

Mrs Clare Bloomer joined the School of Architecture, Planning & Geomatics as the finance administrative officer.

Dr Mohammed Abdul Gaffer joined the Department of Electrical Engineering as a senior lecturer.

Miss Thulile Khoza joined the Centre for Catalysis Research as a technical officer.

Mr Njabulo Thela joined the Department of Civil Engineering as a senior technical officer.

Mrs Mel Scheepers joined the EBE Faculty Office as the Dean's personal assistant.

Resignations

Mrs Janet Baron resigned as personal assistant to the Dean and left in April.

Dr Caryn Fenner left the Centre for Bioprocess Engineering at the end of April.

Professor Gordon Pirie completed his contract as deputy director for ACC and left at the end of June.

A/Professor Henri Comrie from the School of Architecture, Planning & Geomatics left at the end of June.

A/Professor Mark van Ryneveld from the Department of Civil Engineering left in June.

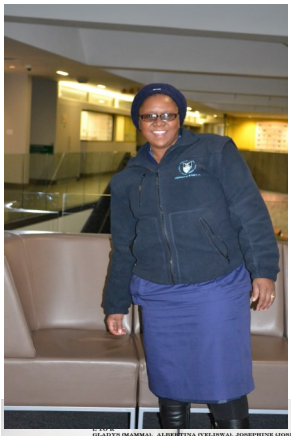
Dr Ramesh Govind, a senior lecturer in the Division of Geomatics ,left at the end of May.

Congratulations

Congratulations to Werner and Chervon van der Ross on the birth of Anna, their second daughter and new sister to Peyton. Anna was born on Tuesday 9 May at 13:08 weighing 3.75 kg and measuring 54 cm.

Welcome

Various events were held across the university to welcome the insourced Supercare staff who joined UCT staff on 1 July.



Bongiwe Mabele from the faculty office in her new uniform. She said she is excited to be a UCT staff member and is looking forward to learning more.

Supercare staff from Electrical Engineering were welcomed to the Department.

Mel Scheepers joined the Faculty Office as the personal assistant to the Dean. Previously Mel had been in the medical industry. She has a four-year old son, Casey. Mel says she is settling in well and has found everyone to be very helpful.

UCT students and IY residents working together to create great spaces

In the June holidays, UCT's second-year architecture students, together with a few key staff members and members of the local community, came together to design and construct the seventh water platform in Imizamo Yethu.

The project forms part of the second-year architecture curriculum. Through the Design and Theory courses the students developed designs for the platform, and in the Technology course they designed and manufactured physical prototypes of components. Students then volunteered to physically construct the platform on site during an intensive six days. Community members were involved during the planning phases and unemployed community members were then nominated by the community to assist during construction.

There was an exchange of knowledge where students taught community members new skills, while the community members in turn taught the students the artisanal skills and demonstrated the realities of living in informal settlements to them. The students and the local residents did all the earthworks, built formwork, installed reinforcing, mixed concrete, built foundations and a retaining wall, paved the platform, made wash-tops, painted, and made a shading structure out of bottle caps.

The use of recycled content was again one of the themes of this year's platform: Concrete test cubes were used for paving and construction of the wash-top walls, while recycled bottle caps were used together with tensile cables for the construction of a much-needed shading structure. The 2800 bottle caps that were required could not be sourced from local recycling depots at short notice, so they were purchased from Operation Smile, thereby making a contribution towards the funding of operations for children with cleft palates.

The platform provides a cheerful, colourful and more dignified place for water collection and washing, social gathering spaces, and cleaner areas for children to play.

Passionate 2015 civil engineering graduate

In the short time that Koketso Rammutla has been out in the work place, he has made a name for himself. He has appeared in numerous publications including the *Leadership Magazine*.

Koketso graduated in 2015 with a BSc (Eng) in civil engineering. During his time at UCT, he was the chair of the undergraduate student council, a civil engineering mentor and the Postgraduate Academic Chair for the 2015 SRC.

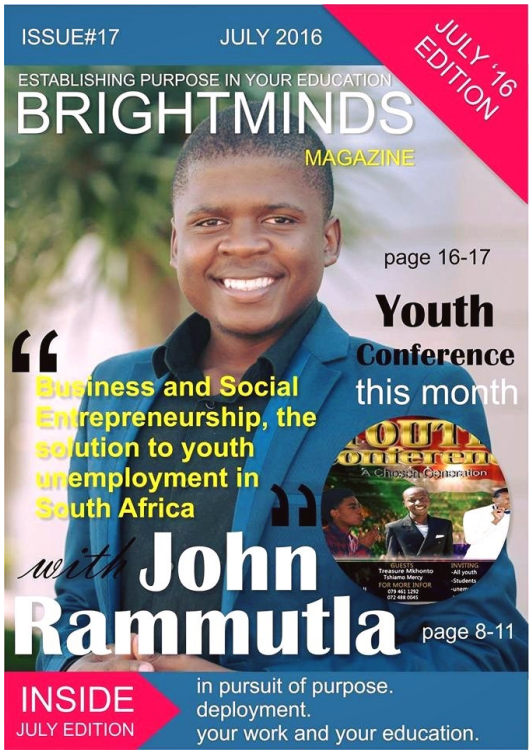
He had a bursary from SANRAL and is working for them in Port Elizabeth as a project manager- in-training. He believes the youth of South Africa can bring about changes this country so desperately needs—and he is starting with himself.

Koketso has just organised the second SANRAL-supported South African Youth Leadership Conference, in partnership with Nelson Mandela Metropolitan University student association, Believers Love World (BLW), to inspire the youth to contribute to socio-economic development in South Africa.

The conference, held at NMMU on 23 May was attended by nearly 500 Grade 12 learners from three township schools in Port Elizabeth and 130 NMMU students and working professionals, including SANRAL employees. The conference was also live-streamed to three other universities in the Eastern Cape – Fort Hare, Walter Sisulu and Rhodes. It followed the highly successful inaugural conference he ran earlier this year in Limpopo for 1300 university students and learners.

"I'm really passionate about South Africa and its development. As a nation, we have so much potential and talent. Someone has to go out there and exploit that talent and inspire people to act. This is my contribution – to inspire others to see themselves as critical instruments in bringing about social and economic development in South Africa."

Koketso believes there are two main issues affecting South Africa's youth. The first is unemployment, and the second is alcohol and drug abuse. And it is these problems that lead to the majority of the country's social problems, including rape, robbery and violent crimes. Instead of looking to



government for solutions, Koketso believes young people should see what they can do, by becoming business or social entrepreneurs. "I encourage the learners to start non-profit organisations (NPOs) to improve the lives of others. I encourage them to start their own businesses, to create jobs, and I give them the support they need to do this. Whether you are 16, 17, 19 or 20, you can start a business."

Regarding the problem of alcohol and drug abuse, Koketso says young people should set up organisations to help their peers. "It's easier for a young person to listen to another young person. It's more impactful than listening to a politician and the chances of success are greater." He said a lack of resources and being overburdened by responsibilities were often used by the youth as excuses for apathy – but he believes they can achieve despite this, just as he did. Koketso himself has been a social entrepreneur since school. With a flair for maths and science, he and some classmates used to tutor learners from other schools, due to the shortage of maths and science teachers in the area. "In Grade 11, we were tutoring Grade 12 learners. That's how passionate we were."

Once they matriculated and went to university – Koketso with a full bursary from SANRAL – the group wanted to continue to make a difference to Limpopo learners. So they started an NPO called "Enlighters Edu-Solutions" and they expanded it to include career exhibitions. It continues to run to date. This year, Koketso started a second NPO, Hi-Africa, for the purpose of empowering the youth through national conferences and summits. His long-term vision is to run these events across Africa.

He is "truly, truly grateful" to work for a company that is deeply committed to developing communities and leaders, and encourages its employees to do the same. "SANRAL is wonderful. Allowing me to run this project and sponsoring the events, shows SANRAL's commitment towards nation building." Koketso said what kept him going was his deep faith, those who support and mentor him and his passion to see the country's youth mobilised to make a difference. "You have to be passionate about what you do, and you have to be committed – then you'll know what to do. You'll get ideas and you'll be inspired to act on them."

Issued on behalf of SANRAL by Meropa Communications.

App wins second place in Discovery's GradHack

In a world where we are inundated with a plethora of food choices, making healthy choices for ourselves and our families can often be very difficult. The desire to "Enable South Africans to make wiser choices" with regard to food and one's eating habits is the primary focus of "Gobble", an intelligent solution to maintaining a healthy lifestyle.

Michael Evans, Wayne Huang and Kuziwa Sachikonye

Gobble is a mobile application developed by UCT final-year Electrical and Computer Engineering students Wayne Huang, Michael Evans and Kuziwa Sachikonye. This application was a runner up in the illustrious annual GradHack hosted by insurance giant Discovery. It managed to snatch up second place ahead of 30 other student development teams chosen from over 200 entries.

Gobble takes the shopping experience to a new level, beginning at the store with the user creating a shopping list and going through the store and monitoring the food items that the user has bought. Over time, the algorithm behind the app suggests better food alternatives and the in-built QR Code Reader scans nutritional information from the pre-existing barcodes on food items and pulls up the user-relevant suggestions, information and alternatives.

As one completes the shopping process, the food that the user has bought moves into the "virtual fridge" component of the application. Here the user is able to get a visual breakdown of their consumption and they are able to customise this data to help them as they build up healthier diets.

If that was all that this little app did that would be great enough, but the app further goes on to make recipe suggestions based on what is in the fridge as well, and the user is able to then populate their next shopping list based on their favourite recipes or new recipes they discover within the app.

This was a fantastic project built over a night of "hacking" against their talented competition, helping to make shopping and healthy living a more bearable if not pleasurable experience.

UCT-Nedbank Urban Real Estate Research Unit launch

In June, the UCT-Nedbank Urban Real Estate Research Unit was launched at the South African Property Owners' Association (SAPOA) convention, which brought together the most influential national and international property professionals. Rob McGaffin presented on Value Capture in South Africa. An article appeared in the Business Report.

Value Capture in South Africa: A way to overcome mounting infrastructure challenges? *By Robert McGaffin, Mida Kirova, Francois Viruly and Kathy Michell*

The South African Government is in the midst of what can often appear to be an insurmountable infrastructure challenge. While our cities grow at a rapid rate, so does the need for infrastructure investment. This investment must address the service delivery backlogs, the legacy of apartheid's spatial planning, the restructuring of our our inefficient and unviable cities and the need for economic infrastucture to drive the economy. However, these competing challenges must be met in the context of a stagant economy and declining revenues at a national level.

Rob McGaffin, Kathy Michell and Francois Viruly

This "perfect storm" clearly indicates the need for investigating other options to solve South Africa's infrastructure challenges, especially in terms of funding and responding to opportunities. One such possibility is Value Capture, which is already used in South Africa and which is used frequently in the USA, Hong Kong and a number of South American countries. Value Capture refers to the sharing of the increased property value that results from public infrastructure investment such as the Gautrain. This could be in the form of the private sector using the additional value to build affordable housing or higher densities (use gains) or it could be through higher taxes or levies (financial gains) that could be used to pay for the infrastructure.

Read More