



*AT THE FOREFRONT OF ANALYTICS IN AFRICA*



**ORSSA Newsletter October 2018**

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**FROM THE EDITOR**

By *BRIAN VAN VUUREN*  
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Brian van Vuuren

Dear ORSSA Members,

I trust that everyone who attended the conference has been inspired by the work that they saw, the people they spoke to and the discussions they partook in. On a personal note, it was exciting to be immersed in the field of Operations Research once again, even

for just a few days, as I'm no longer as exposed to it in my current job. I thoroughly enjoyed catching up with members of the ORSSA community and am already looking forward to the 2019 conference in Cape Town.

In this edition we profile the conference and review the formal and informal components of the annual showpiece. We also celebrate our prizewinners who were acknowledged at the gala dinner. Unfortunately, neither of our conference plenary speakers have responded to my request for a post-conference interview as of yet, but I hope to publish their feedback and experiences in future newsletter editions. Furthermore, I sent out a survey to hear from the delegates about their own personal experience of the event. Thanks or the quotes, comments and memories submitted...by those 7 faithful ORSSA friends...

None-the-less, since this edition is jam-packed with conference-related content, I thought I'd use the rest of this column to share a point that I've been progressively learning over the course of 2019:

In a world which focuses more and more on technology, efficiency, minimisation of waste and maximisation of profits and output, it's easy to forget that each of these systems we optimise are still, at least in some way, shape or form, overseen and managed by *people*.

For example, you might present a farmer with an optimal irrigation strategy to maximise his yeild and minimise the possibility of running his reservoir dry, but there's a good chance he'll thank you, turn around and then go back to the same way he's always done his farming: 'by *feel*'.

Similarly, as operations researchers, we might catch ourselves being critical of businesses run by family and friends in light of things like wastage, inefficiency and lack of automation. But if you chat to these business owners, you'll soon learn that they are well aware that things could and should be more efficient if they *automated processes*, or if they as the boss didn't have to sign off every decision which was made. But their business is their baby, and they're not quite ready to let go of the reigns, even if it means making more money in the long run.

I've learnt that, no matter how big or small, reputable or unknown, 'corporate' or 'start-up' a company may be — at the end of the day, it's just a collection of *people*, not unlike you and me. And people have needs, dreams and desires — not least of which is to feel valued and respected (*and not capable of being replaced or overruled by an algorithm...*).

I suppose my point is that a solution, decision-support, methodology or approach, in reality, is only ever as good as the person who implements it allows it to be. And this should be factored into how we develop technological solutions. Not only in ensuring that they are understandable, transparent, elegant and explainable; but also in that we continue to develop our understanding and appreciation of people-driven systems at the same rate and with the same respect that we do the corresponding data-driven systems.

Enjoy the newsletter!

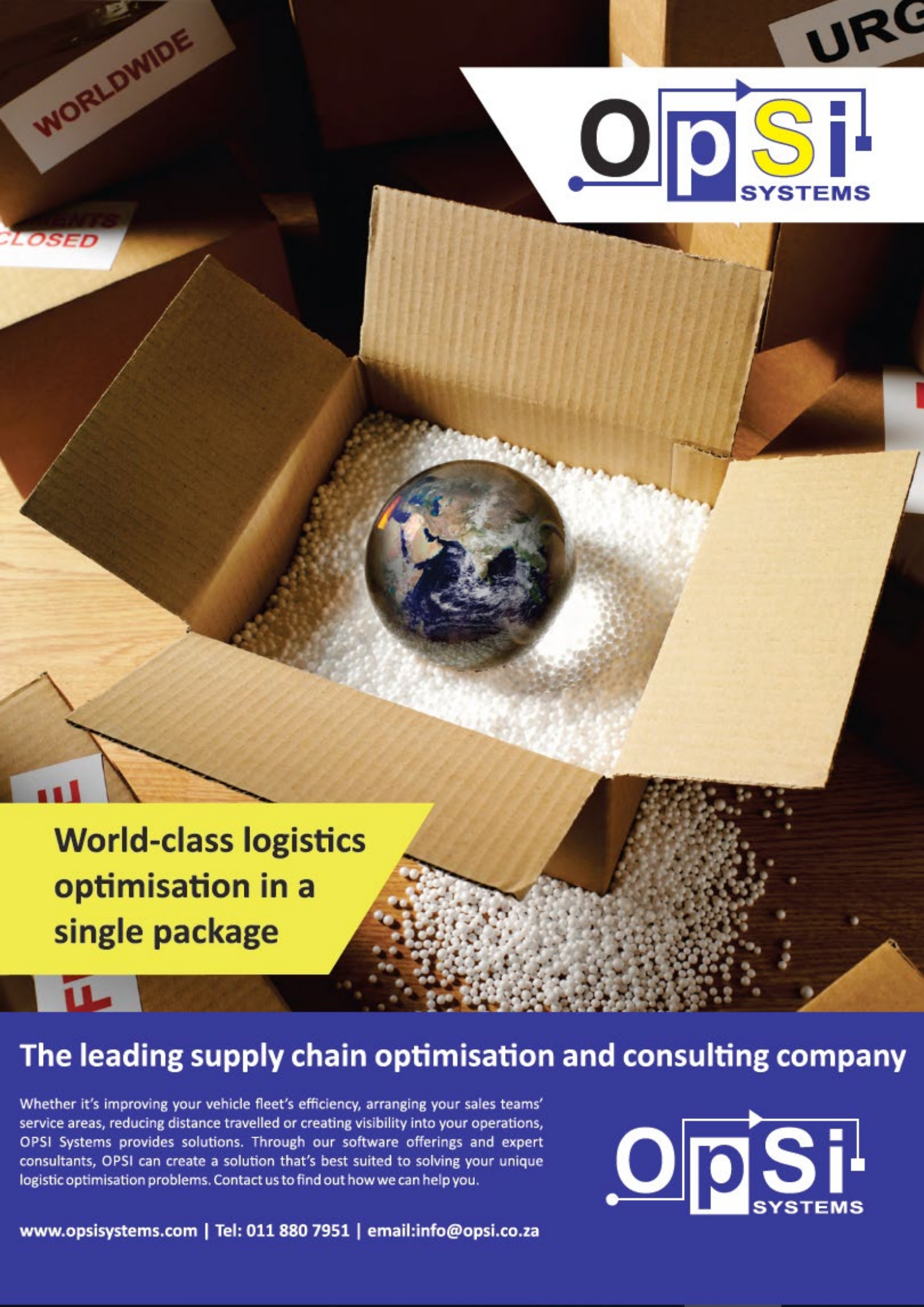
Brian



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## FROM THE PRESIDENT'S DESK

By DANIE LÖTTER

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### ORSSA PRESIDENT



Danie Lötter

Greetings to all ORSSA members. As I am writing this column, the memories of the 47<sup>th</sup> annual ORSSA conference will still be fresh in our memories. This year the conference was held at the prestigious convention center of the Council for Scientific and Industrial Research in Pretoria. This year was, yet

again, a memorable event offering delegates a rich scientific program and lots of social opportunities to network with fellow members and colleagues.

Not only was the conference memorable for all the fascinating talks and events which occurred throughout the conference, but also for the individual achievements which the Society recognised at the Banquet. The 2018 Tom Rozwadowski Medal was awarded to Ian Durbach (University of Cape Town) for a paper, entitled *Expert elicitation of autocorrelated time series with application to e3 (energy-environment-economic) forecasting models*, which appeared in Environmental Modelling and Software. Furthermore, a Category IV recognition award was awarded to Bernie Lindner (Spacial edge) for an upcoming member of age 35 or below for excellence in operations research practice.

Our students also excelled and were duly awarded in the Society's national student competition at the banquet. On honours or fourth year level, the runner up was Jaqueline Kazmaier (*Department of Industrial Engineering at Stellenbosch University*), while the winner of the Gerhard Geldenhuys Medal for the best honours or fourth year project went to Marno du Plessis (*Department of Industrial Engineering at Stellenbosch University*). In the masters category, the runner up was Thorsten Schmidt-Dumont (*Department of Industrial Engineering at Stellenbosch University*), while the winner of the Theodor Stewart Medal for the best masters thesis went to Christa de Kock (*Department of Industrial*

*Engineering at Stellenbosch University*). Congratulations to Jacqueline, Marno, Thorsten and Christa!

In addition, Johann van Niekerk (*Department of Industrial Engineering at Stellenbosch University*) won the prize for the best oral presentation by an honours or fourth year student at the conference, while Monica Rolo (*Department of Industrial Engineering at Stellenbosch University*), won the prize for the best oral presentation by a masters student. Georgina Rakotonirainy (*Department of Industrial Engineering at Stellenbosch University*) won the prize for the best oral presentation by a doctoral student. Congratulations to Johann, Monica and Georgina!

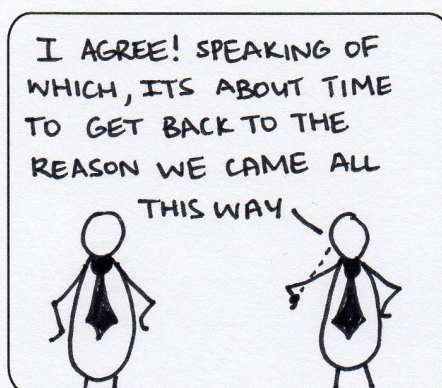
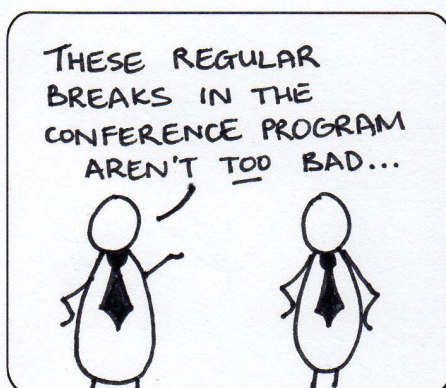
I was once again very impressed by the depth and range of the contributed paper topics at the conference. I was also inspired by the increased number of young students who attended the conference and the interesting presentations they gave at the conference. I am proud to be a member of the Society!

I would like to conclude by thanking every ORSSA member who attended the conference, presented a paper and/or helped organise the conference to make it such a huge success! I would like to thank the Pretoria chapter for organising this year's conference and in particular, the LOC which was spearheaded by Sumarie Koetsier for their superb and extremely time consuming job of organising the conference so well! It is much appreciated.

Next year marks the 50<sup>th</sup> birthday of ORSSA and the conference will be held at the Vineyard hotel in Newlands during the period 8-12 September 2019 chaired by Lieschen Venter. Please diarise the event and join us then for a celebratory, productive and enjoyable meeting on the Eastern slopes of Table Mountain in the beautiful Cape.

### HAVE YOUR SAY

The ORSSA Newsletter is an excellent medium for showcasing one's work or interests to the Operations Research community. Send submissions to [brianjohnvanvuuren@gmail.com](mailto:brianjohnvanvuuren@gmail.com)



## THE 2018 ORSSA CONFERENCE (ACADEMIC REVIEW)

by Jan van Vuuren ([vuuren@sun.ac.za](mailto:vuuren@sun.ac.za)) & Brian van Vuuren ([brianjohnvanvuuren@gmail.com](mailto:brianjohnvanvuuren@gmail.com))



Jan van Vuuren

The 2018 ORSSA conference was, once again, a celebration of the diverse, interesting and excellent operations research work being performed around South Africa and abroad. Covering both academic and industry projects and a wide range of topics and fields, the presentations at the conference were engaging and interesting, and certainly highlighted the growth and expansion of the field.

Just short of 100 delegates attended the conference, a large portion of whom were from Stellenbosch University. The next largest groups were from North-West University and Unisa, with a variety of other institutions composing the remaining delegates.

By sector, the largest institutional representation at the conference was, unsurprisingly, academia – although this percentage has been dropping progressively, unlike a number of years back. Excitingly, a notable number of consulting groups were represented at the conference, such as Chalcid, OPSI Systems and Pivot Sciences, along with a large representation of delegates from Transnet. Other representatives included the likes of research institutions, such as CSIR and IMT, as well as a noteworthy number of delegates from the banking and insurance sectors.

In terms of age, two thirds of conference delegates were, by definition, ‘young people’ – in line with the presidential address which was given on the opening day. Furthermore, although prominent, the senior age group of delegates is certainly shrinking in proportion.

At the conference, the topics by application area were vast and diverse. ‘Healthcare and retail’ formed the largest portion of papers read at the conference, with various other classical OR application areas (traffic flow, vehicle routing and stock picking) also being well represented. This year, various ‘developing country’ applications in the form of healthcare, agriculture, energy, crisis management and education were also prominent, along with a growing focus on social media and sentiment analysis.

Finally, machine learning and data analytics was quite notably the most popular methodology adopted in the papers read at the conference – in line with a growing international trend. Agent-based modelling also continued to gain traction in the Society, with various interesting applications being presented.

There were five plenary sessions which took place during the conference. During the opening plenary, the ORSSA president, Danie Lötter, reflected on the age distribution of members of the society and made some excellent suggestions on how ORSSA can attract and keep millennial members. Following this, Liezl van Dyk then contemplated the respective histories of OR and Industrial Engineering, drawing parallels between the two disciplines in the context of the 4th Industrial revolution. In doing so, she advocated for a closer synergy between the disciplines.



Brian van Vuuren

The second plenary session was the ORSSA AGM during which important initiatives and activities of the executive committee were presented to and discussed with the members, whilst the third plenary was the annual written national student competition. This competition was organised by Marthi Harmse and the session was chaired by Hans Ittmann. Four excellent talks were presented during this session, two across each of the competition categories. Details of the finalists and competition outcome can be found on page 10.

The fourth plenary consisted of a panel discussion concerned with inclusivity and diversity in operations research, chaired by David Clark. The panel members were Liezl van Dyk (one of the conference keynote speakers), Esmarie Schultz (of Chalcid), Dave Evans (of Monash University) and Charles Malack Oloo (the other conference keynote speaker and President of the African Federation of Operations Research). A candid, open discussion covering various views and opinions was had during this session.



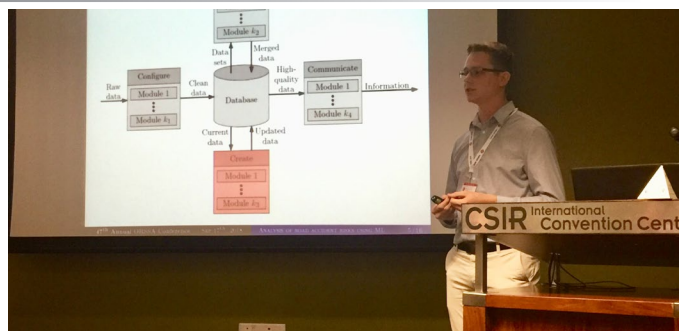
The four student competition finalists ready for the plenary session on Tuesday morning with session chair, Hans Ittmann.

The fifth and final plenary closed the conference. During this session, Charles Malak Oloo addressed the society on reconciling and redeeming Africa through Operations Research. During this talk, he challenged OR in general and ORSSA in particular to contribute to overcoming the many problems faced by African countries, inspiring delegates to 'live' OR, rather than just practice it academically, all the while thinking of Africa in the process.

Other than the plenary sessions, five parallel sessions took place in three different venues. Unfortunately, not all talks could be attended and reported on in this article. A number of highlights from selected talks are included below.

Jacqueline Kazmaier presented a machine learning approach which aims to evaluate unstructured customer feedback for a retail bank by making use of sentiment analysis. During this talk she detailed the complexities involved in sentiment analysis, such as double-negatives and sarcasm, both of which make understanding the content of the sentiment difficult to interpret. She advocated a machine learning approach in favour of a Lexicon- or rule-based approach to better capture customer sentiment based on feedback received.

Shane van Heerden presented a spatial analysis of road accident risks within a machine learning paradigm. This constitutes important work, given that road accidents are the 8th largest killer worldwide. His envisaged analysis tool aims to assist users employ accident data for useful out-



**Shane van Heerden presenting his tool aimed at minimising road accidents in urban areas.**

comes, such as proposing safe routes for travel, informing insurance decisions and achieving better deployment of road safety officials.

Hans Ittmann reflected on the current state of OR in Africa, during which expressed his dream of the establishment of 20 OR societies in Africa in the near future, building on the 5 existing societies at present, while Luis de Sousa discussed how to create scalable and flexible, cloud-based inventory optimization solution in Microsoft Azure.

Rob Benetto gave a very interesting talk entitled “Chess and Starcraft” during which he reflected just how far computers had come in conquering strategy games such as checkers, chess and Go – performing in a far superior manner to humans. He then increased the scope to consider more complex computer games, detailing the unfathomable rate at which computers are capable of playing and learning these games – thereby suggesting their imminent ability to



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outplay humans in almost any game in the not-so-distant future. He likened this ability to understand strategy and provide better-than-human solutions to complex problems in gaming to potential business applications if we could harness the power of computers correctly.

Theo Stewart presented numerical experiments for evaluating reference point designs in many-objective optimization problems, along with how to redefine these designs, whilst Angelo Mendes discussed his work-in-progress model which provides a framework for compressor maintenance and fuel cost minimisation to three natural gas transmission networks located between South Africa and Mozambique, in Portugal and in the Netherlands. Quintin van Heerden provided an overview of technical advances that have enabled the CSIR to implement the first cloud-based urban growth simulation models outside of the USA, while Andreas Bley described a Langragian decomposition and Langragian relaxation approach towards optimising the strategic development of a national energy supply system over many incremental planning stages.



**The Stellenbosch Unit for Operations Research in Engineering from Stellenbosch University ready for a day of insightful and interesting presentations**

Ebert Cawood presented an agent-based simulation model for evaluating the impact of different mill technologies on boiler throughput and availability at Sasol's plant in Secunda in an attempt to increase boiler efficiencies by better understanding their behavior through modelling and analysis.

Dave Evans gave an eloquent overview of the changing role of OR practitioners in the face of cloud-based parallel computing, AI, big data and deep learning. He was followed by Dr Anne-Marie Pothas who returned to the ORSSA conference scene after an absence of a number of years. Dr Pothas reflected on a career in three quite different fields – never being labelled as an operations researcher. She both looked back at the past, as well as forwards to the future.

Ryan Reed presented a framework for understanding and avoiding the reasons that give rise to the phenomenon where systems of stakeholders pursuing a set of conflicting goals enter a state of chaos, after which Johan Kellerman presented a decision support framework for solving sub-

jective preference problems more efficiently. Winnie Pelsler then provided an informative literature review on social behavior research modelling – a passion project she works on in her so-called 'spare time'. During this talk, Winnie emphasised the complexity in modelling such dynamic and unpredictable systems, whilst proposing approaches to address these shortcomings in order to enhance decision making in this field going forward.

Renee Koen reviewed a number of important ethical principles to keep in mind when working with data and when applying modelling and analysis to these data. She made pertinent reference to the well-known Facebook and Cambridge Analytica debacle which has been in the media recently, along with many other esteemed researchers whose misuse of data resulted in abrupt ends to their careers.

Kit Searle presented an interesting project investigating the economic viability of vertical farming – using artificial light in order to grow agricultural crops under synthetic conditions whilst utilising far less space. Janco Barnard, on the other hand, presented a problem concerning more traditional farming methods in which he aimed to propose high-quality solutions to farmers in terms of the management of their irrigation water use with a view to maximise production without exceeding the irrigation capacity of their reservoirs.

George Davie considered the impact of the No Free Lunch Theorem on random fitness landscapes, simplifying a notoriously complex topic in an eloquent and masterful manner which allowed delegates of all experience levels to understand the discussion. Marc Sacks gave a well-attended talk entitled 'Making music with OR' which was an exploration of techniques for creating computer-generated music, focusing on progress in this field, as well as addressing what is still lacking. Thorsten Schmidt-Dumont presented a reinforcement learning model for implementing effective ramp metering by providing detailed slow-driving instructions to autonomous vehicles with a view to improving traffic flow on highways, while Martinus Loots described three metaheuristic solution techniques for the notorious weapon assignment problem in the context of ground-based air defense.

Pierre Cilliers presented an agent-based model which evaluated warehouse picking policies proposed by an industry partner in order to determine the most effective means of collecting orders. His results showed that minimising repeating movements by consolidating orders improved efficiency, even if it meant that picked consolidated orders needed to be re-packed and separated at a later stage. Christa de Kock presented on behalf of one of her 4th year students, discussing an agent-based model for capturing the spread of influenza pandemics in refugee camps. The



model considers the personal profiles of refugees, along with their exposures and proximity to one another, and then uses UN-gathered data to determine their susceptibility of being infected with the virus.

Sumarie Koetsier discussed challenges and opportunities in standardising public transport data in Gauteng so that these data can be read into transport modelling software packages such as MATSim and EMME more effectively. Tiny du Toit presented a methodology for the identification of a terrain by means of a radial basis neural network in the context of a robot moving over different surfaces, such as asphalt, dirt and various forms of tiling or pavements. It was found that a relatively new species of artificial neural networks was able to match a multilayer perceptron in terms of accuracy.

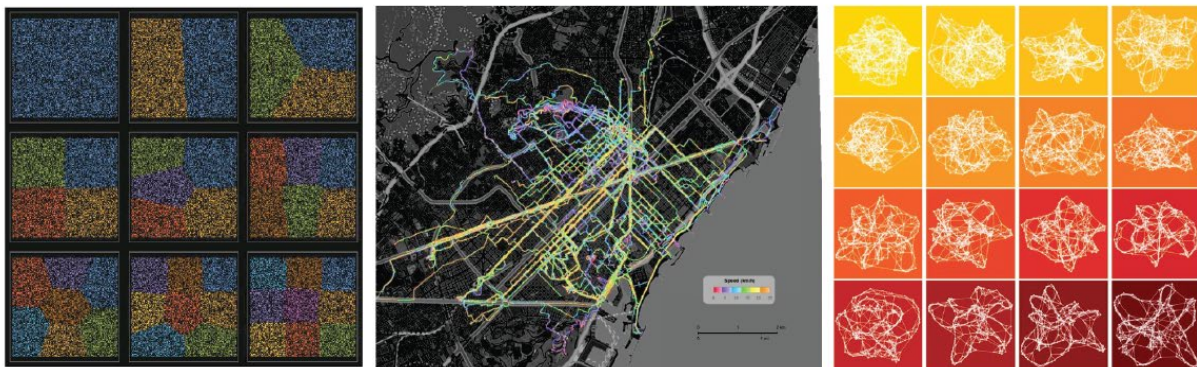
As always, the ORSSA student presentation competition took place during the conference. In the end, Johann van Niekerk was the winner in the honours and fourth year category for his presentation *A multi-objective approach towards optimising the setup of a multi-head weighing machine*. Monica Rolo was the winner of the Masters category for her presentation entitled *Clustering of pick-up points for transportation network companies*. In the PhD category, Georgina Rakotonirainy's presentation, *Metaheuristics for regular strip packing problems*, was elected as the winner. All of these students come from the Department of Industrial Engineering at Stellenbosch University.



Winners of the 2018 ORSSA conference student presentation awards. From left to right: Georgina Rakitorainy (PhD), Johann van Niekerk (4<sup>th</sup> Year/Honours) and Monica Rolo (Masters).

As mentioned, the papers mentioned in this article were only a few of the numerous excellent talks presented at the 2018 ORSSA conference. The work on display was certainly of a very high quality and the balance between applied and theoretical topics of study was inspiring and exciting for the Society going forward. We look forward to the 2019 conference for follow up talks, reporting of results and outcomes from work-in-progress projects and, of course, the next exciting steps in the premier operations research work being conducted in South Africa.

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## THE 2018 ORSSA CONFERENCE (SOCIAL REVIEW)

by Lieschen Venter (lventer@sun.ac.za)



Lieschen Venter

The social program of the annual Conference is always something delegates look forward to and the 2018 offering was no exception. September is no time for a delegate to be working on their summer body and especially not when considering the catering of the CSIR Convention Centre.

After an almost three-hour Executive Committee meeting on the Sunday afternoon I was well ready for a drink and to catch up with friends who I tend to see only once a year at this gathering. We seemed to clear out the pretty generous bar tab far too quickly, but I got around to all of my hellos despite my cheeks being stuffed with tiny wraps. The welcoming function was held on the Convention Centre's outside deck and was the perfect venue for the bold approaching heat wave. The majority of us cleared out early however in anticipation of an early official start the next day.

An AGM held on the Monday instead of the Tuesday afternoon was a slight twist on the usual program and was definitely a smart move. Once all of the official business was taken care of, we were ushered to the main entrance where an actual, I kid you not, inflatable truck was serving soft-serve ice-cream and toppings. The Society's newest partners Chalcid and Ice Pack generously sponsored this cool sugar rush and it was exactly what we needed to carry



An inflatable ice-cream truck served frozen delights to delegates after the annual AGM.

us to the traditional Monday night social.

The spoils from Chalcid turned out to be far from over as they went even further to give us a lavish gin tasting. Three flavours of seemingly bottomless Mirari Gin from the Time Anchor Distillery was available to be mixed and matched with various fruits, spices, and tonics. The blue appeared to be the most popular as its beguiling sweetness and colour-changing properties seduced the tasters. I'm

not sure if the bar tenders grew bored of us or if they had some secret wager as to who would dance naked first, but eventually the single shots became suspiciously double and the doubles seemed to come in half-cup portions. Again, as during all the meals, the food pairing was delicious.



Delegates were given an educa-gin on how to enjoy their G&T's at Monday evening's social event.

As always, the Banquet was the climax of the social program. We quickly dealt with the formalities, congratulated the award winners and handed out the medals while more delicious food was served. The President of SAIIE, Waldo Viljoen joined for the evening and I had a chance to take the esteemed guest for a sokkie-spin once the dance floor was declared open. I tried to make the encounter less awkward for us both by replacing "Jessica!" in the sokkie-hit's chorus with "Waldoman!" for him, but I think I that might just have made the shuffle's awkwardness worse.

The heatwave led me to seek some fresh air outside where I stumbled upon a street party. Turns out someone spotted a car from Secunda and instinctively knew there would be some good liquor in it. They were proven right as I spent an hour having brandy and coke sitting cross-legged on the sidewalk. Upon my return to the Banquet hall I was pleasantly surprised to see the entire NWU delegation still living it up with the students and a special nod to them for hanging out with us well after the DJ left for home.

Overall, I had a great social time and would like to thank the LOC again for organizing great events for us. However, I do want to invite every delegate to hang around for a bit longer than the minimum expected time for showing face. As with every stew, it takes the ingredients a while to get to know each other, but if you are willing to simmer for a bit, something delicious might just happen. As I am currently collecting memories and anecdotes from our Society's rich fifty-year history, I realise more and more that the talks are great, the learning is useful, but the stories of spontaneous adventures are what really light up faces. Bad decisions make good stories, come make some with me in 2019.

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## THE 2017 ORSSA STUDENT COMPETITION

by Marte Harmse (kmharmse@mweb.co.za)

The Operations Research Society of South Africa (ORSSA) organises a student competition in two independent categories on an annual basis, namely an Honours or fourth-year level of study category, and a Masters level of study category. The prestigious Gerhard Geldenhuys Medal is awarded to the winner of the Honours or fourth-year category, while the prestigious Theodor Stewart Medal is awarded to the winner of the Masters category. The objectives of the competition are to propagate the use of Operations Research (OR) in higher education, encourage the inclusion of project work in OR courses, and to market ORSSA among students and staff at South African universities.

This year, supervising lecturers nominated four written projects completed during 2017 by one Honours student from the Department of Decision Sciences at the University of South Africa as well as three fourth-year students from the Department of Industrial Engineering at Stellenbosch University. Supervising lecturers also nominated six theses completed during 2017/2018 by one Masters student from the Faculty of Economic and Management Sciences at Stellenbosch University, four Masters students from the Faculty of Engineering at Stellenbosch University, and one Masters student from the Faculty of Engineering and the Built Environment at the University of the Witwatersrand. The coordinator of the ORSSA student competition is congratulated in attracting nominations from more institutions than the previous year, but once again the following proposals are submitted to the Executive Committee of ORSSA for consideration:

- A department at an academic institution must be limited to one entry per category
- The coordinator of the ORSSA student competition is encouraged to continue taking additional effort to attract more nominations from more academic institutions in collaboration with chapter executive committees.

The convener of the nominations committee received nominations, after which he forwarded them to the convener of the selection committee. The convener of the selection

committee requested the assistance of three ORSSA adjudicators for the Honours or fourth-year category, and another three ORSSA adjudicators for the Masters category. Four of the adjudicators are from academic institutions and two are from industry, all with at least a Masters degree in a relevant field. The adjudicators are from the Johannesburg chapter (1), Pretoria chapter (1), Vaal Triangle chapter (2), and Western Cape chapter (2).

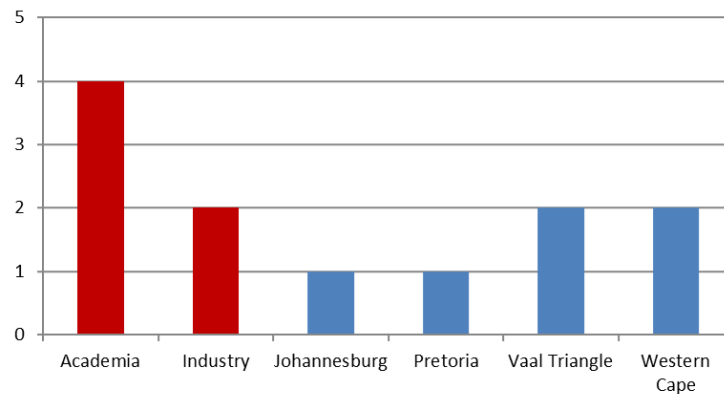
Entries were ranked according to the rubric of criteria and quality descriptors as accepted by the ORSSA executive committee in March 2016. The adjudicators asked the

convener of the selection committee to pass on their congratulations to all the participants. All the projects are impressive, of the highest quality, most interesting and inspiring and show clear understanding of fields of study, great attention to detail and care in their work with crisp conclusions. There is a lot of talent out there. The writing is especially good for example the way literature

studies are approached and explained, and the adjudicators found it a rewarding process to read them. It was difficult to choose among the projects, further complicated by the wide range of problems and methodologies used, but in the end the finalists had a small edge over the others in that they went just a little bit deeper in their investigations and presented the results a bit more clearly and concisely. Some projects could approach problems more holistically, better explain the technical terms utilised, more clearly compare techniques, apply techniques with more thoughtfulness, more clearly define objectives, define all constants and variables with greater care, pay more attention to calculations, and interpret results with more insight. It was noticed that some projects did not include most recent developments in their literature reviews. As mentioned in previous years, some adjudicators were disappointed that some projects did not include applications to industry or specific case studies. In future, contribution and originality could weigh stronger.

The winner in the Honours or fourth-year category is Marno du Plessis with a project titled *The relative effectiveness of destination dispatch in elevator control*, presented in partial

**Adjudicators 2018**



**A breakdown of the sectors and provinces from which the judges of the student competition originate.**



Honours category runner-up, Jacqueline Kazmaier, with ORSSA president, Danie Lötter



Honours category winner, Marno du Plessis, receiving the Gerhard Geldenhuys medal from ORSSA president, Danie Lötter.



Masters category runner-up, Thorsten Schimdt-Dumont, with Professor Stewart.



Master's category winner, Christa de Kock, receiving the Theodor Stewart medal from Professor Stewart himself.

fulfilment of the requirements for the degree of Bachelor of (Industrial) Engineering in the Faculty of Engineering at Stellenbosch University under supervision of Jan van Vuuren.

The runner-up is Jacqueline Kazmaier with a project titled *A machine learning data analysis decision-support system*, also presented in partial fulfilment of the requirements for the degree of Bachelor of (Industrial) Engineering in the Faculty of Engineering at Stellenbosch University under supervision of Brian van Vuuren and co-supervised by Jancke Eygelaar.

The winner in the Masters category is Christa de Kock with a thesis titled *Simulating the movement of forcibly displaced Syrians using agent-based modelling*, presented in partial fulfilment of the requirements for the degree of Master of (Industrial) Engineering in the Faculty of Engineering at Stellenbosch University under supervision of Brian van Vuuren.

The runner-up is Thorsten Schmidt-Dumont with a thesis titled *Reinforcement learning for the control of traffic flow on highways*, presented in partial fulfilment of the requirements for the degree of Master of (Industrial) Engineering in the Faculty of Engineering at Stellenbosch University under supervision of Jan van Vuuren.

Although the selection committee decided on a winner solely based on the written work, the finalists were invited to submit abstracts for presenting their work, or representatives appointed by them, at a special finalists' competition session scheduled at the 2018 annual ORSSA conference. All finalists presented their own work at the conference. The results were only communicated during the awards ceremony at the conference.

A deep appreciation goes to the adjudicators who have invested a lot of time and energy in assessing the submissions. Thank you for the enthusiasm with which you encourage our upcoming OR practitioners. I also thank the ORSSA president, Danie Lötter, who has entrusted me with this enlightening opportunity.

## HOW WAS YOUR CONFERENCE?

Did you attend the 2018 ORSSA conference? We'd love to hear about your experiences, or perhaps a summary of the work which you presented on at the conference. Submissions of any style, length and content are welcome. Please consider contributing to one of the newsletter's future additions.

Email [brianjohnvanvuuren@gmail.com](mailto:brianjohnvanvuuren@gmail.com) with submissions or any further enquiries you might have.

## 2018 ORSSA RECOGNITION AWARDS

Each year, the Society makes recognition awards at its discretion to individuals who have served the profession of Operations Research in an exemplary fashion. These awards are considered a prestigious distinction and are reserved only for outstanding achievements and/or contributions. Awards may be made in four categories:

- **Category I:** To a retired member of ORSSA for outstanding contributions, typically over a long period of time
- **Category II:** To a current member of ORSSA for a single, outstanding achievement with respect to the practicing of OR on a national level
- **Category III:** To a non-member of ORSSA for outstanding contributions, typically over a long period of time

- **Category IV:** To an upcoming member of ORSSA of age 35 or below (who is not a fulltime student) for excellence in OR practice

In addition, the Society may also invite long-standing full members to become Fellows of the Society. Individuals considered for this high distinction have typically served the profession of operations research and the Society in an exemplary manner for a considerable period of time.

The following award was conferred at the 2018 ORSSA banquet event.

### **CATEGORY IV AWARD: AWARDED TO BERNDT LINDNER**

*Citation by Winnie Pelsler (winnie.pelsler@csir.co.za)*

Berndt Gerald Lindner, known to us as Bernie, was born in Pretoria on July 29<sup>th</sup>, 1988. After living for periods in Zimbabwe and in the Western Cape, he matriculated from Piketberg High School in 2006. Thereafter, he enrolled for a bachelor's degree in wood science at Stellenbosch University in 2007. Upon obtaining this degree in 2010 and having in the meantime discovered a passion for quantitative analysis, he enrolled for a post-graduate diploma in industrial engineering at Stellenbosch during the period 2011–2012. Based on this qualification, he was admitted to the master's programme in industrial engineering at the same university in 2013, with a research specialisation in operations research. Based on a thesis titled *Determining optimal primary sawing and ripping machine settings in the wood manufacturing chain*, he obtained a master's degree in industrial engineering cum laude from Stellenbosch University in 2014. His work earned him the prize for the best master's thesis in the Department of Industrial Engineering at Stellenbosch University in 2014. He followed up his master's degree with a doctorate in industrial engineering (again specialising in operations research), conferred on him by Stellenbosch University in 2017 and based on a dissertation titled *Bi-objective generator maintenance scheduling for a national power utility*.

In 2017, Bernie started working as an analytics developer at Pivot sciences, an OPSI Systems company and a leader in prescriptive analytics in South Africa within the realm of vehicle routing and facility location. At Pivot, Bernie worked on a project for a large South African cement producer, analysing and optimising its facility location and sourcing strategies. In another Pivot project, he created a web application for a large local medical insurer. This



**Bernie Lindner receiving his award from ORSSA president, Danie Lötter.**

application was aimed at helping field force customer relationship managers plan daily appointments, taking into account the traffic conditions on the road network, and utilising an interactive travelling salesman model with time windows. In May this year, Bernie was appointed as a data engineer at Spatial Edge, a start-up company that helps its customers integrate and manage their data at scale with a view to facilitate intelligent and objective decision making. There his responsibilities include big data ingestion, secure data flows, data quality assurance and data monitoring.

Bernie is passionate about contributing towards community upliftment in his spare time. During the period 2012–2013, for example, he volunteered to take part in the Peter Project, where he played games, interacted and built relationships with 10–16 year old children at Lindelani Place of Safety, a juvenile centre just outside Stellenbosch. In 2012, he furthermore took part in the Funda Fundisa

Project where he tutored mathematics to matric pupils at Kayamandi High School in Stellenbosch. During the period 2009–2015 he also tutored mathematics in various capacities to first-year engineering students at Stellenbosch University.

Bernie is well known in the local operations research community, having attended all the annual ORSSA conferences since 2012 when he became a student member of ORSSA. At these conferences he is known for presenting his work in a clear and articulate fashion. In fact, he won the prize for the best presentation by a master's student at the 43rd Annual ORSSA Conference held at Stonehenge in Africa, Parys in 2012, and two years later he won the prize for the best presentation by a doctoral student at the 45th Annual ORSSA Conference held at Lanzerac Wine

Estate in Stellenbosch. In addition, he has served on the Executive Committee of ORSSA since 2015 — first as editor of the ORSSA Newsletter during the period 2015–2016, and since 2017 as business manager of the same newsletter. He currently also serves on the Executive Committee of the newly formed African Federation of Operations Research Societies — or AFROS — in the capacity of secretary.

In recognition of the excellent service rendered to the local profession of operations research in general in his capacity as an analyst and data scientist, first at Pivot Sciences and now at Spatial Edge, and his dedicated service in various capacities to our Society and to AFROS in particular, Berndt Gerald Lindner is, on this 18th day of September 2018, duly awarded a Category IV ORSSA Recognition Award.

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## THE 2018 TOM ROZWADOWSKI MEDAL

by Winnie Pelser ([winnie.pelser@csir.co.za](mailto:winnie.pelser@csir.co.za))

The Operations Research Society of South Africa (ORSSA) awards the Tom Rozwadowski medal for the best written contribution to Operations Research made by a member of the Society during the previous year (2017). According to the rules, contributions of an OR nature published in peer reviewed journals of international standing during the previous calendar year are eligible for consideration. Only persons who were members of the Society, or who had already applied to become members of the Society, when the contribution was made, are eligible for the award. For the purposes of this clause, the publication date of the journal with the paper in it will be taken as the date of the contribution.

This year, nine papers were eligible taken the rules into account.

Six adjudicators participated. A deep appreciation goes to the adjudicators who have invested a lot of time and energy in assessing the submissions.

The authors of the winning paper are Ian Durbach, Bruno Merven and Bryce McCall. Of these, only Ian Durbach is an ORSSA member and therefore the only recipient of the 2018 Tom Rozwadowski medal. The paper appeared in *Environmental Modelling & Software* 88 (2017) 93-105. The title of the winning paper is, “*Expert elicitation of auto-correlated time series with application to e3 (energy-environment-economic) forecasting models*”.

### Abstract:

*Explicitly representing uncertainty is recognised as a fundamental requirement of any long-term forecast.*

*We propose and illustrate an expert elicitation protocol for constructing long-term probabilistic projections. Each projection represents a possible realization of a time series with autocorrelation properties, and thus a plausible future evolution of a quantity of interest. We illustrate the approach using two quantities  $e$  GDP growth rates and coal prices  $e$  that were elicited as part of a project producing baseline forecasts of greenhouse gas emissions in South Africa to 2050. The elicited projections can be used as inputs to deterministic structural models of the energy, economic, and environmental sectors ( $e3$  or energy-environment-economic models), to generate similar probabilistic projections for any desired outputs of the  $e3$  model. An R package for the generation and visualization of these probabilistic projections is provided.*



Prof Theo Stewart receiving the Tom Rozwadowski medal from ORSSA president, Danie Lötter, on behalf of Ian Durbach who could not be at the event.





## CONFERENCE COMMENTARY

*by Brian van Vuuren (brianjohnvanvuuren@gmail.com)*

Articles and feedback are great, but the true measure of a conference's success lies in how the delegates actually experienced the event, the activities, the conversations and, of course, the priceless comments.

I put out some feelers to the 2018 ORSSA conference delegates to hear their highlights of this year's event. Some of their responses are documented below, along with a few priceless comments which were passed (and duly recorded) during the event itself.

Thanks to all of those who contributed content (either by intentional submission or unintentional passing of a comment). It's memories and laughs such as these that stick in the minds of delegates and make us all look so forward to next year's event!

*At the crux of his presentation*

Quintin van Heerden: "BUT - and it's a very big but..."

Unidentified vigilante: "That's how we like it!"

"I'm not getting married next week, so if anyone would like to dance at me tomorrow night at the banquet - please feel free!"

- Lieschen Venter *makng her intentions known...*

"The 2017 AFROS conference in Tunisia began with a very dynamic open session:"



*unfortunately timed photograph to accompany AFROS feedback from Bernie Lindner*

Dave Evans: "Simulation is the most fun you can have with your clothes on"

Theo Stewart: "You don't have to have your clothes on..."

"OR and Industrial Engineering have import applications in common, like packing the dishwasher efficiently and being an optimal vehicle routing mom when dropping the kids at school"

- *plenary words of wisdom from Liezl van Dyk*

"Why did the accountant cross the road?"

To bore the people on the other side..."

- *comic relief during the panel discussion from Esmarie Scholtz*

"It's easier to do it the easy way. If you use Simio, everything is going to be just fine in the end"

- *groundbreaking reassurance from Handre Williams*

"How much are Microsoft paying you to drink their coolade?"

- *Rob Bennetto refusing to believe Luis de Sousa was so excited about Azure on his own accord...*

My favourite part of the conference was:

- *Good conversations with many people representing many facets of the OR community*
- *Application of OR in supply chains*
- *Tasting excellent gins!*
- *The session on "OR in Africa and Education"*
- *The networking opportunities*
- *Listening to Theo Stewart, Dave Evans and Louis Dunnhauser reminisce about the 'good old days' when telegrams were used*

I thoroughly enjoyed:

- *The standup comedy at the banquet dinner — it was expertly delivered*
- *The interaction and harmony between young and old delegates*
- *The excellent food*
- *The delicious gin tasting*
- *The high standard across the board - from the presentations to the meals!*

I learned something new about:

- *Behavioural Operations Research*
- *OR in Agriculture*
- *Germans in Namibia*
- *Graph databases and fitness landscapes*
- *Seven-cake dessert tables and capped bar tabs*

Will you be attending the conference next year?

“LOL”

- 2019 ORSSA Conference Local Organising Committee chair, Lieschen Venter

*The distinguished ORSSA locals having a mature engagement about time keeping during sessions:*

Dave Evans: “At the 25 minute, red card mark, I attack you!”

Theo Stewart: “But i’m bigger than you!”

Dave Evans: “But i’m taller than you!”

*Attempting to provide some comic relief as session chair after Ebert Cawood presented a model of the Sasol plant at Secunda:*

Brian van Vuuren: “That looks like a very interesting model. I’m sure if you can show significant improvements in the process, Sasol won’t hesitate for a Secunda to implement your changes...”

Session Attendees: \*Dead Silence\*

“I’m not even hungry - i’m just eating ‘cos it’s so tasty...”

- Everyone at the conference

