Operations Research Society of South Africa

AT THE FOREFRONT OF ANALYTICS IN AFRICA

ORSSA Newsletter October 2017

From The Editor

By Brian van Vuuren (brianvv@sun.ac.za)

Brian van Vuuren

Dear ORSSA Members

Yip - you blinked, and now it's October!

This edition of the newsletter comes a little later than usual, owing to its coverage of the annual conference which took place in September at Champagne Sports Resort in the Drakensberg. Congratulations must go to Fanie Terblanche and his team on organising another fantastic conference.

If you weren't fortunate enough to join us in Kwa-Zulu Natal, you can bring yourself up to speed with all the ongoings of the conference in this newsletter. A special thanks goes to the members of the SUnORE Research Group at Stellenbosch University for taking the time to write the articles which appear in the newsletter.
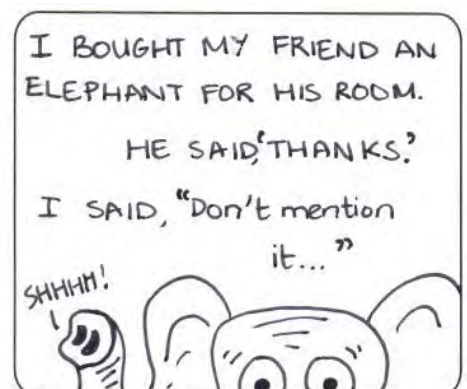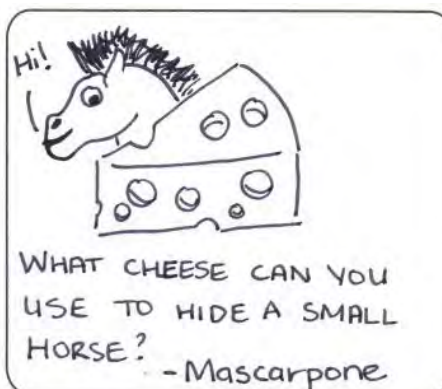
That said, there must be many other stories lurking within the ORSSA community so please feel free to contact me if you have something else to contribute.

I made a suggestion at the annual AGM that each conference attendee should draft a 2 page summary of the research which they presented at the conference to contribute to a repository of interesting short articles which I can publish in the newsletter going forward. This offer still stands and I truly encourage any and everyone to send me insights in to the work you are performing or researching. The function of this newsletter is to keep the ORSSA community informed and interested - any contributions which contribute to that goal would be much appreciated.

Good luck with this busy period going into the festive season! Remember, the holidays are just around the corner!

Until December,
Brian (*Editor*)

Re-living the worst jokes of the banquet...

Features — Page

SOCIAL MEDIA

- **Facebook:** Please visit (and like!) our page at *www.facebook.com/ORSocietySA*
- **Twitter**: @_ORSSA
- **LinkedIn:** Please visit our page at *www.linkedin.com/company/the-operations-research-society-of-south-africa*

WHO'S THE FATTEST KNIGHT OF THE ROUND TABLE?

- Sir Cumference. He has 2 whole pi's in him!

-YUM!

Hi!

WHAT CHEESE CAN YOU USE TO HIDE A SMALL HORSE? - Mascarpone

I BOUGHT MY FRIEND AN ELEPHANT FOR HIS ROOM.

HE SAID 'THANKS.'

I SAID, "Don't mention it..."

SHHHH!

VAN VUUREN '17

From The President's Desk

By Winnie Pelser
(winnie.pelser@gmail.com)
ORSSA President

Winnie Pelser

The October edition of the newsletter reminds us that we are in the last quarter of the year. This edition is devoted to the 46th Annual Operations Research Society of South Africa (ORSSA) Conference held at the Champagne Sports Resort in the beautiful Drakensberg Mountains. The conference was held from 10-13 September 2017 and was, once again, a memorable event and an outstanding success.

The conference commenced with a tutorial on how to create an Optimization Application using IBM's Decision Optimization Centre. After this, onsite registration and a welcome reception in the form of a cocktail function continued in the beautiful setting. It was encouraging to see active ORSSA members, including many student delegates as well as those from industry.

The conference officially started on the Monday morning with an opening plenary lecture entitled *OR is dead! Long live OR!* by the keynote speaker Dr. Susara van den Heever, the Program Manager of Offering Management for IBM Decision Optimization, within IBM Analytics. The programme continued in the form of three parallel streams of contributed talks on the use of Operations Research (OR) to address a large range of applications and developmental issues. The 2017 AGM was held on the Tuesday afternoon and was followed by a very enjoyable banquet. The conference closed on the Wednesday at lunch time after a total of 64 contributed papers and a closing plenary lecture entitled Professional OR training and research programmes in finance, by Professor Riaan de Jongh from the Centre for Business Mathematics & Informatics, North-West University. Jan van Vuuren and Hennie Kruger gave a reflection on the papers delivered at the conference.

A number of medals and recognition awards were awarded presented to members at the gala dinner. The illustrious 2016 Tom Rozwadowski Medal was awarded to Andries Heyes from the University of Pretoria and Jan van Vuuren from the University of Stellenbosch for a paper which appeared in Computers, Environment and Urban Systems. Three recognition awards were presented at the gala dinner:

- **Category III:** To a non-member for outstanding contributions over a long period of time
  - Francois Meyer (*Transnet*).

- **Category IV:** To an upcoming member of age 35 or below for excellence in OR practice
  - Brian van Vuuren (*University of Stellenbosch*).
  - Sheetal Silal (*University of Cape Town*).

Congratulations to all recipients of these prestigious awards.

This year saw the elevation of a member of the Society to ORSSA Fellowship status, the highest honour our Society can bestow, to Stephan Visagie. My congratulations go to him and my thanks for all that he has done for ORSSA and OR over a long period of time and in many capacities.

Our students also excelled and were duly awarded at the conference. There were four high-quality entries on honours level and six excellent entries on masters level for our annual (written) National Student Competition. The 2016 Gerhard Geldenhuys medal (for the best 4th year/honours project) went to Ghiete van Zyl (*Stellenbosch University*). The runner-up was Shane van Heerden (*Stellenbosch University*). The winner of the Theo Stewart medal (for best masters thesis) was Heléne van Schalkwyk (*Stellenbosch University*). The runner-up was Jancke Eygelaar (*Stellenbosch University*). Congratulations to these two awardees on their high-quality projects.

In addition to the National Student competition, prizes were also awarded for the best oral presentation at the conference in different categories. The winners were as follows:

- Honours/4th year Category – Natalie Seager;
- Masters Category – Thorsten Schmidt-Dumont;
- Doctoral Category - Jancke Eygelaar.

Congratulations to these winners. More details on all the awards and prizes can be found elsewhere in this issue of the Newsletter.

Let me conclude by thanking every ORSSA member who attended the conference, presented a paper and/or helped organise the conference, for making our 46th Annual Conference such an outstanding success! In particular, let me thank the Local Organising Committee (LOC) of the conference for their superb and extremely time consuming job of organising the conference so well. The LOC members were: Fanie Terblanche, Philip Venter, WD Schutte, Lieschen Venter, Leonard Santana, Susan Campher, Janette Larney, Johann Myburgh, Marius Smuts and Dave Evans.

Our 47th Annual ORSSA Conference will be held at the CSIR International Convention Centre in Pretoria from 16 – 19 September 2018. Sumarie Koetsier, the Pretoria Chapter Treasurer, will be chair of the LOC. Please diarise the event and join us for another memorable conference. Details of the conference will soon be posted on the official ORSSA website.

QUARTERLY PUZZLE: *THE TEMPLE RIDDLE*

Provided by Shane van heerden (17683068@sun.ac.za)

Adapted from Dennis E Shasha (TED-Ed) - The solution is provided on page 18

Shane v Heerden

You and your team of eight fellow explorers are at the climax of your expedition in the heart of an ancient temple inside The Lost Aztec City. With your fire-lit torch, you bend down to study the inscriptions in the alter room of the temple. In near complete darkness, two of your fellow explorers accidently bump into the temple's alter. Suddenly, two puffs of green smoke burst forth from the alter and the walls begin to shake.

Fleeing for your lives, you come to a familiar room containing five hallways, including the one to the altar you just come from, as shown in the figure. The giant sandglass in the centre of the room begins to flow, with exactly 1 hour before it completely empties (the rumbling walls tell you that you don't want to be around when the time is up). From what you recall of your way here, it would take about 20 minutes to reach the exit at a fast pace. You know this is the last junction before the exit, but you cannot make out any form of trail markings, and no one in your team remembers the way. If the nine of you split up, there should be just enough time for each group to explore one of the four halls ahead, return back to this room and report back, and finally, everyone then making a run down the correct path.

There's just one problem; the inscriptions you read told the story of the altar's curse: the lost spirits of the city will lead intruders to their doom through deception. Remembering the two puffs of green smoke, you realize that two of your fellow explorers have been cursed but, in the near complete darkness, you weren't able to make out who they are. You know for sure that you are not cursed, but you don't know which of your fellow explorers can and cannot be trusted. At any time, one or both of the cursed explorer's might lie, though they might also tell the truth. Consequently, there is no guaranteed way to test them to determine which of them are indeed cursed. Can you figure out a way to ensure that you and your team all escape the temple? The curse only affects a cursed explorer's communication, so the attacking or otherwise harming the others is of no worry.

THE 2017 ORSSA CONFERENCE: ACADEMIC REVIEW

Compiled by Christa de Kock (16506642@sun.ac.za), Nita-Mare Oosthuizen (17521785@sun.ac.za), Samantha Movius (16446305@sun.ac.za) and Thorsten Schmidt-Dumont(17000807@sun.ac.za)

Christa de Kock

The 47th annual ORSSA conference opened with a tutorial on the Sunday that covered a brief introduction on how to create an Optimisation Application using IBM's Decision Optimisation Center. The tutorial attendees were guided through the various steps required to build an application. These steps included a formal definition of Application Data Models, Data Sources, how to deploy an Application, how to manage and utilise such an application, as well as some advanced configuration methods that may be used in order to customise the application.

The conference opening (plenary session A) began on Monday morning with a thought provoking keynote address by Dr Susara van den Heever, bravely drawing on statements made by the renowned mathematician Russel Ackhoff (who declared OR dead), and following this up with a prescription for the revival of OR, showing some in-

teresting examples of cutting edge technology currently being developed by IBM. In her presentation, OR, although it has always been interdisciplinary and thus extremely difficult to define and classify, was restricted to classical mathematical modelling techniques, which have not changed significantly since their conception. This rigidity was cited as one of the reasons why OR could be declared dead. The newer, buzzing field of data science was used as a counter example of how to be more responsive. Should data science not, however, be seen as a new member in the already interdisciplinary field which falls underneath the umbrella term OR? Data science does, after all, draw on the same mathematical and statistical background used in the 'traditional' OR methods. This is all wrapped up in catchy buzz words, as data science uses AI and machine learning as its poster boys.

Nita-Mare Oosthuizen

Samantha Movius

This connection between what may be classified as data science and the more 'traditional' OR methods, was clearly visible at this year's conference as the focus of approximately 17 of the presentations was on what may be defined as the core components of data science, namely machine learning, data analysis and predictive modelling. Taking into account that there were 60 papers presented at the conference (excluding the opening and closing keynote addresses), this amounts to approximately 28% of the content presented at the conference. As may be seen in the figure below, in the majority of the papers presented, 36 according to the author's best knowledge, 'traditional' OR methods were employed, often fine-tuned so as to effectively address relevant real-world problems. This goes to show that data science, the new kid on the block, has not taken over the reins just yet. Finally, in five of the remaining papers, 'soft' OR methodologies or reports and ideas for OR education were discussed. In final two papers, specific software, and some of their strengths and drawbacks were addressed.

- Data Science
- Traditional OR
- Soft OR
- Software
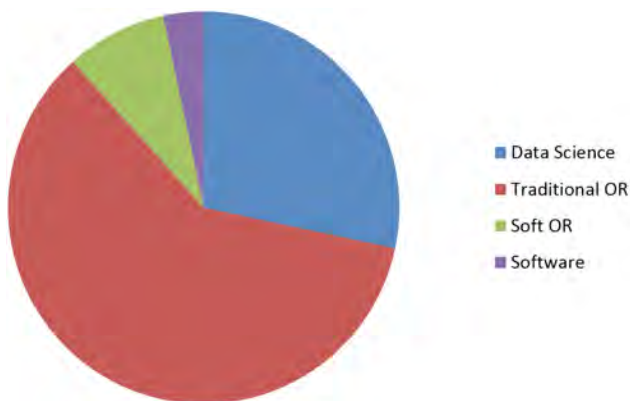
The coposition of of papers presented at the 2017 ORSSA conference, grouped by theme

The four finalists of the national student competition were given the chance to show off their work during plenary session B, where Ghiete van Zyl won the Gerhard Geldenhuys medal for the best fourth year project titled '*In Pursuit of God Numbers for the Puzzle Wrapslide*' while Heléne van Schalkwyk won the Theodor Stewart medal for the best project on master's level which was titled 'T*he development of a spatio-temporal for water hyacinth biological control strategies*'.

A thought-provoking open panel discussion followed in plenary session C, which served in some capacity as a brainstorming session for finding practical methods through which ORSSA can become involved in operations research marketing initiatives, focussing on school pupils and university students, as well as potential employers in industry. The ORSSA annual general meeting was held during plenary session D, where members were provided

Thorsten Schmidt-Dumont

with an overview of the state of the society as well as that of its different chapters and divisions.

As with every year, the AGM was followed by the conference banquet, which was probably the highlight of the conference. During a lovely evening, hosted for the second time by Brian van Vuuren, who managed to find the perfect balance between being classy and telling corny jokes. As always, the winners of the national student competition were announced during the banquet. A number of recognition awards were also granted to deserving candidates, such as Francois Meyer, a non-member of ORSSA who received a category III recognition award for his outstanding contributions towards furthering the profession of Operations Research as a non-member of ORSSA. Two well-deserved category IV recognition awards were awarded to upcoming members of ORSSA. Sheetal Silal was honoured for her continuous, outstanding work in the modelling of malaria transmission with the aim of reaching a state where malaria transmission can be eliminated. The second category IV recognition award was duly awarded to Brian van Vuuren, for his continual effort regarding the society newsletter, as well as his nurturing and development of a new generation of operations researchers. Finally, the societies' most prestigious award, the Tom Rozwadowski medal was awarded during the conference banquet to Andries Heyns and Jan van Vuuren for their exceptional paper titled '*A multi-resolution approach towards point-based multi-objective geospatial facility location*'.

In the conference closing (plenary session E), Prof Riaan de Jongh informed us of the pace at which the world is changing, owing to the fourth industrial revolution, big data, and the changing face of technology. He shared his vision on how to prepare students for managing these challenges in the changing landscape of operations research.

Alongside the five plenary sessions, there were three parallel streams containing a total of 15 sessions and 60 presentations. Issues which are very topical and current in South Africa had sessions dedicated to them, such as Ecology & Water Management, Scheduling & Energy Systems and OR & Education. There were also more traditional topics for sessions which we have become accustomed to, including Data Analysis & Predictive Modelling, Graph & Network Modelling, Software & Decision Support, Combinatorial Optimisation, Finance & Insurance, Routing & Transportation, Simulation and others.

A number of presentations included variations made on classical OR problems such as the vehicle routing problem,

including implementations of the travelling salesmen problem and the capacitated vehicle routing problem. Examples of these include Willemien van Hoepen's talk about the orienteering scoring problem, where a set of scored nodes must be visited in a network within a given time frame so as to maximise the total score. Anthony Smith presented his novel work about the introduction of tiered facilities into the vehicle routing problem while allowing for global cross-docking in the context of pathological specimen collection. Finally, Nina Cooper very interestingly spoke about a vehicle routing implementation for optimally solving Pokémon Go, a game where players aim to collect as many avatars as possible by looking through your mobile phone camera and discovering that the world around you is not what you thought it was.

Some of the conference presentations were presented in a more educational manner, where various software environments and methodologies were explained in detail. These presentations were valuable, and a good introduction to areas which many may not otherwise be exposed to. Examples of these include Berndt Lindner contrasting R and Python, and informing us of the pros and cons of each software. Eckhard Briedenhann also gave a more educational presentation, including a visual demonstration of the constraint propagation, while Robert Bennetto highlighted common mistakes in R while additionally teaching everyone "*How to R like a pirate*" and, in a separate presentation, highlighting various vehicle routing heuristics.

The 'soft' side of OR was explored by presenters such as Theodor Stewart, who spoke about convex and concave value function visitation by means of Monte Carlo support for explanation systems, Raimo Hämäläinen, who talked about path dependence in operations research and warned how the modelling process may influence the results. Ryan Reed spoke about a framework for managing cognitive bias in a decision making process while Leanne Scott presented her work on the use of simulation to keep focus groups focussed.

There were other topics very applicable to the South African context. These included presentations on water management by Janco Barnard and Noe Fouotsa Manfouo, both aiming to provide decision support for irrigation and water allocation in different settings. With respect to energy systems, Patrick Veldhuizen and Jancke Eygelaar spoke about maintenance scheduling for gas turbines and other power generating units. In education, Hans Ittmann gave a thorough overview of the state of education in South Africa with focus on operations research, and Annette van der Merwe shared her work on a modelling approach towards improving learner performance.

Jan van Vuuren highlighted an interesting theme during his reflection on the papers read at the conference. His focus was on the topic of machine learning, which he pointed out had no session dedicated to it, but was instead integrated throughout the programme in multiple other sessions. This is sure to have pleased Susara van den Heever! Examples of machine learning talks included Ghiete van Zyl speaking on the detection of disease causing genes using semi-supervised learning, while Janine Marx applied machine learning techniques to improve student performance with intelligent tutoring using eye tracking. Thorsten Schmidt-Dumont applied reinforcement learning to control traffic flow on highways, while Shane van Heerden utilised it to analyse possible causes for road accidents which take place at certain 'accident hotspots'. Furthermore, Stephan Nel blended machine learning with the well-known concept of 'hyperheuristics' which were employed to discover neural network structures and weights with the aim of maximising the prediction accuracy. Finally, Jessica Rees employed machine learning to analyse people's sentiments about entities from communication data.

The 2017 ORSSA Conference: Social Review

The collated thoughts of Jancke Eygelaar (16516885@sun.ac.za),
Ghiete van Zyl (17734681@sun.ac.za) and Shane van Heerden(17683068@sun.ac.za)

Jancke Eygelaar

Three things come to mind when recalling the 46th annual ORSSA conference. Firstly, a renewed appreciation for the array of applications of Operations Research and the rapid perpetuation of the field. Secondly, a now recurring nightmare involving a corrupted presentation pdf and last, but most certainly not least, socialising (or I suppose we should call it networking?). As always, the first social event of the conference was the welcoming function held at the conference venue.

Shane van Heerden

This year's conference venue was the Champagne Sports Resort in the central Drakensberg region of Kwa-Zulu-Natal. As a first time visitor to the region, I was once again in awe of our country's diverse beauty. The vista of a relatively dry landscape punctuated by blossoming trees was particularly striking to the eye of this lifelong resident of the Western Cape. Another surprise was the troops of Vervet monkeys frolicking on lawns of the resort.

Ghiete van Zyl

Some surprises, however, were less pleasant, such as the large number of (expensive!) toll gates. Tip for future travellers to the region: if you are driving a rental car that goes 'beep' every time you pass through a toll gate, the cash you are dutifully handing the toll gate worker is an unwitting donation to their weekend fund.

> In response to Sarette van der Heever's question as to whether computers could accurately tell dogs and muffins apart:
> "In Asia, it doesn't matter whether it's a puppy or a muffin, because both classify as food."
> Jancke Eygelaar (Cultural Connoisseur)

Fortunately, our toll gate faux pas did not mean anybody would have to go hungry, since we had the welcoming function food to look forward to. At the commencement of the welcoming function, however, our fickle student minds were easily distracted by the announcement of an open bar. But the first sight of a masticating jaw quickly reminded us how much we needed food for thought - in the literal sense. Being about as subtle as Trump's tan, my fellow attendees and I made a beeline for the nearest visible platter and continued to discuss the food for a period spanning a longer period than I would like to admit.

The remainder of the evening consisted of catching up with old friends and meeting potential new ones. Conversation topics drifted from the food to research to politics to presentation jitters and back to the food (*if you have not picked up on this yet, the food was a highlight*). The evening drew to a close as guests started to trickle away. A true testament to the enjoyability of the welcoming function was the 45 minutes it took us to traverse the 100m from the welcoming function to the resort entrance.

The end of the first official day of the conference heralded a new tradition in the form of a social braai, however, we were not to be part of the braai'ing crew, as the chefs at the Champagne Sports resort fulfilled this duty to ensure that the variety of meats were cooked to perfection. Most of the delegates flocked towards the bar area where free drinks were served which included a variety of wine as well as beer and ciders. Whilst in the drinks queue, I met a stressed group of final year logistics student from Stellenbosch University attending there first ORSSA conference and was already scared of the possible ques-

tions they might be asked during their presentations by some of the "older" delegates. One of the students, Nina Cooper, is taking an interesting approach to playing the very popular 'Pokemon Go' mobile game by applying the celebrated Travelling Salesman Problem to catch as much Pokemon possible in a limited amount of time, amongst other objectives. This spurred a group discussion on which Pokemon is the best and why this mobile game became such a sensation not only amongst children, but also adults.

The conference organisers were fairly generous with the bar tab, and after I ordered my third Castle Lite for the night, I joined a group of people discussing Watson (*the IBM AI not Sherlock Holms' assistant/sidekick*). Among the people in this group was John Chaves (a member of IBM Advanced Analytics team and presenter of the conference tutorial) and Sarette van den Heever (program manager at IBM Data Science and Machine Learning and also one of the keynote speakers of the conference). The combination of these two delegates provided in depth inputs on Watson and what it has achieved over the past few years. John mentioned a case where a patient diagnosed with terminal cancer was sent home with only a couple of months left to live, as doctors felt that there wasn't much they could do for the patient. Watson, however, identified this patient as a potential candidate for a new type of therapy, even though doctors thought otherwise. Long story short, the therapy was very successful and the patient was cured of cancer and still is alive today.

I also discovered that John is an avid collector of Japanese motorcycles. He currently owns twenty Japanese motorcycles, all of which are connected to an automated battery charging station that tracks the voltage of each motorcycles battery and keeps it within an optimal voltage range so as to ensure the batteries are not over-charged, but also ensuring the batteries do not fall below a certain voltage which might cause harm.

Later, whilst standing in the food queue with Dave Evans and Bernie Lindner. Dave told myself and Bernie a story of the time he and his friends finished their final exams at Cambridge University. To celebrate the big occasion, one of Dave's friends sponsored a whole case of sherry which made this unforgettable moment a difficult one to remember afterwards.

> To end of his future work: "Oh and part of my future work… I'm 35, single and ready to start a family!"
> Andries Heyns (Available)

> In response to a request for comment or quotes regarding the banquet that took place on the Wednesday evening: *"Nee, gee my nog eers tyd om te dink, ek wil drink!"*
>
> Fanie Terblanche (Responsible Citizen)

straint during the night were rewarded with a lovely malva pudding, custard and ice cream dessert at the end. The banquet's entertaining MC, Brian van Vuuren, did not

> In response to whether or not panel members were exposed to OR in high school: *"I'm so old, I can't even remember!"*
>
> Riaan de Jongh (Not that old...)

The food served at the braai was, as all the other events organised at the conference, amazing and the range was endless. The meat served ranged from steak to pork sausages, with sides such as potato salad, a variety of vegetables and garlic bread. To cap off a memorable night, a large variety of desserts, hot and cold, were also served which had a number of the students overeating and having to go for a jog the next day to get rid of the extra calories.

The conference banquet was held the Tuesday evening where spiffily dressed delegates arrived in numbers and gathered outside to enjoyed the warm evening breeze and a glorious (and slightly strong) sherry. Upon entering the cozy venue, delegates were greeted by attentive staff, a ceiling draped in beautiful fairy lights, and white cloth tables lined with silver underplates and accompanying bottles of wine. The superb selection of background music threw us back to the times where most of the ORSSA fellows still had full heads of hair.

disappoint. We were kept on the edge of our seats wondering if his next joke could be as bad as the previous. But I mean, let's be honest – most of the jokes were quite average. All jokes aside, Brian did a fantastic job at creating a lively, light-hearted atmosphere throughout the night's proceedings.

The formalities quickly changed to not-so-formalities when a few brave delegates opened the dance floor with some line dancing as they slowly danced the night away.

> As a point of clarification in his discussion about constraint satisfaction: *"Constraint satisfaction without constraints is a whole other story..."*
>
> Eckhard Briedenhann (Ladies' Man)

> A guy walks into a sandwich shop and sees a sign that reads "Home of the meanest grilled cheese sandwich in town". So he decides to go in and order the grilled cheese. When his bill arrives, the waitress asks him – "So, how did you like the sandwich?". "Ehhh" – he replies "it was average"
>
> Brian van Vuuren (The meanest MC of all time)

The night kicked off with a warm welcoming speech by Fanie, together with a beautiful aubergine starter that left us salivating for the main course buffet. Upon arriving at the end of the buffet line, many delegates wished they hadn't loaded their plate with too many veggies at the start when they were greeted with three beautiful cuts of beef, lamb and pork. Throughout the night's proceedings, a few selected delegates were honoured with a variety of awards, while being ushered towards the sponsor's banners. The delegates with a sliver of self-con-

HOW WAS YOUR CONFERENCE?

The conference is always best relived through the memories, conversation and occurrences experienced by its members. If you have a story, comment or memory of the 2017 conferecne that you'd like to share, or if you'd like to present your current research in the form of a short newsletter article, please email is to the editor on *brianvv@sun.ac.za.*

The 2017 ORSSA Student Competition

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

The Operations Research Society of South Africa (ORSSA) organises an annual 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 2016, all by fourth-year students from the Department of Industrial Engineering at the University of Stellenbosch. Supervising lecturers also nominated six theses completed during 2016 by one masters student from the Faculty of Economic and Management Sciences and five masters student from the Department of Industrial Engineering, all at the University of Stellenbosch.

This year nominations were submitted directly to the convener of the selection committee. The convener requested the assistance of three ORSSA adjudicators for the honours or fourth-year category, and another three ORSSA adjudicators for the masters category. Three of the adjudicators are from academic institutions and three are from industry, all with at least a masters degree in a relevant field. The adjudicators are from the Johannesburg chapter (2), Pretoria chapter (1), Vaal Triangle chapter (2), and Western Cape chapter (1). Entries were ranked according to the rubric of criteria and quality descriptors as accepted by the ORSSA executive committee in March 2016.
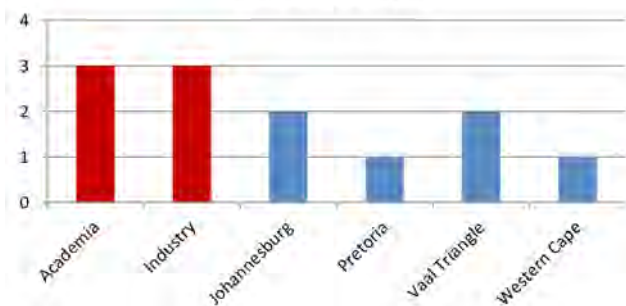
A breakdown of the sectors and provinces from which the judges of the student competition originate.

All entries were of a very high standard which caused the adjudicators to judge them strictly. They are extremely

Honours category winner, Ghiete van Zyl, receiving the Gerhard Geldenhuys medal from ORSSA president, Winnie Pelser.

pleased with the quality of the submissions and feel that the amount of work that was put in is way beyond expectation. It was extremely difficult to distinguish among the entries as they all are of the highest standard judged on all criteria. The students have worked really hard and thoroughly.

The top two entries in each category were designated as finalists. It was requested that these finalists submit abstracts for presenting their work, or representatives appointed by them, at a special finalists' competition session which was held at the 2017 annual ORSSA conference.

The winner in the honours category was Ghiete van Zyl with the project titled *In Pursuit of God Numbers for the Puzzle Wrapslide*, 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 Jan van Vuuren and co-supervision of Alewyn Burger. The runner-up was Shane van Heerden with the project titled *The Placement of Stock Keeping Units in a Retail Distribution Centre*, 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 Jan van Vuuren.

The winner in the masters category was Heléne van Schalkwyk with the thesis titled *The development of a spatio-temporal model for water hyacinth, Eichhornia crassipes (Martius) Solms-Laubach (Pontederiaceae), biological control strategies*, presented in partial fulfilment of the requirements for the degree of Master of Commerce in the Faculty of Economic and Management Sciences at Stellenbosch University under supervision of Linke Potgieter and co-supervision of Cang Hui. The runner-up was Jancke Eygelaar with the thesis titled *Generator maintenance scheduling based on the risk of power generating unit failure*, presented in partial fulfilment of the requirements for the

Helene van Schalkwyk's supervisor, Dr. Linke Potgieter, collecting the Theodor Stewart medal on her behalf as the Master's catogory winner from Professor Stewart himself.

degree of Master of (Industrial) Engineering in the Faculty of Engineering at Stellenbosch University under supervision of Jan van Vuuren and co-supervision of Danie Lötter

A deep appreciation goes to the adjudicators who 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, Winnie Pelser, who has entrusted me with this enlightening opportunity.

2017 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 full-time 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 awards were conferred at the 2017 ORSSA banquet event.

Category IV Award: Awarded to *Brian van Vuuren*
Citation by Jan van Vuuren (vuuren@sun.ac.za)

Brian John van Vuuren was born in East London on January 31st, 1991. After matriculating from Clifton College in Durban as dux student in 2009, he enrolled for a bachelor's degree in megatronic engineering at Stellenbosch University in 2010. At university he excelled in a wide variety of leadership capacities, such as serving as head of house (or primarius) of Simonsberg Men's Residence, co-lecturing a course on Leadership Development for Engineers in conjunction with the Frederick Van Zyl Slabbert Institute, and being elected to form part of a collaborative think tank project together with students from the Catholic University of Leuven in Belgium tasked with envisioning the future city-scape of Stellenbosch. This fruitful undergraduate period culminated in Brian achieving the unprecedented honour of being awarded two Rector's Awards whilst still a student — one for leadership and one for service provision.

After being awarded a BEng (Megatronics) degree by Stellenbosch University in 2013, he went on to enrol for a master's degree in 2014, this time in operations research within the Department of Industrial Engineering at the

Brian van Vuuren receiving his award from ORSSA president, Winnie Pelser.

same institution. His master's thesis work on agent-based simulation modelling in pursuit of sound decision support to the ongoing national effort aimed at combatting *Eldana saccharina* Walker, a serious stalk-borer pest in South African sugarcane, was of such high quality and exhibited such novelty of approach that he was designated a finalist in the masters category of the ORSSA annual student competition for the best master's thesis in South Africa in 2016. During the previous year he had, in fact, also been given the

opportunity of either taking his master's degree *cum laude*, or upgrading to doctoral student status. He chose the latter and enrolled as PhD student with the same research topic in 2016, expanding his original work for a further year. Based on this work, he obtained his doctorate in operations research from Stellenbosch University at the end of 2016.

2016 was indeed an eventful year for Brian; he was also appointed lecturer within the Department of Industrial Engineering at Stellenbosch University during that year, a position he still occupies within the Stellenbosch Unit for Operations Research in Engineering, or SUnORE Group. He plays an important part in the organisation of activities and research outputs of this group. His research area is simulation and agent-based modelling. He has supervised eight fourth-year industrial engineering students in respect of their final-year research projects, or skripsies, and he currently supervises or co-supervises three master's students in respect of their theses in operations research. He teaches the underlying theory and algorithmic implementation methodologies related to information systems, simulation and computer programming on undergraduate level, as well as agent-based modelling on master's level. In these capacities he is making a meaningful contribution to the

training and nurturing of a new generation of industrial engineers in general and operations researchers in particular.

Brian is well known in the local operations research community, having attended all the annual ORSSA conferences since 2014 when he became a student member of ORSSA. Last year he also started bringing his own students to these conferences where they present their work. In addition to his activities as a lecturer, he has served on the Executive Committee of ORSSA since 2015 — first as additional member and now as editor of the ORSSA Newsletter. He currently also serves on the Executive Committee of the Western Cape Chapter of ORSSA. As if this is not enough, he has taken part in the organisation of the 2016 ORSSA conference, where he presented the pre-conference tutorial on agent-based simulation modelling.

In recognition of the excellent service rendered to the local profession of operations research in general in his capacity as lecturer and mentor of a new generation of operations researchers, and his dedicated service in various capacities to our Society in particular, Brian John van Vuuren is, on this 12th day of September 2017, duly awarded a Category IV ORSSA Recognition Award.

Category IV Award: Awarded to *Sheetal Prakash Silal*
Citation by Jan van Vuuren (vuuren@sun.ac.za)

In 2002, Sheetal Prakash Silal enrolled for a bachelor's degree in actuarial science at the University of Cape Town (UCT). After obtaining this degree in 2006, she was appointed as junior research fellow in the School of Public Health and Family Medicines at UCT, and simultaneously enrolled for a master's degree in statistical sciences at the same institution. She obtained this master's degree in 2009 based on a thesis titled A simulation model of antimalarial drug resistance. Thereafter, she joined the Department of Statistical Sciences at UCT as a lecturer in 2010, obtaining her PhD there in 2014 based on a thesis titled A Mathematical modelling approach for the elimination of malaria in Mpumalanga. This year she was promoted to senior lecturer in the Department of Statistical Sciences at UCT where she also heads the Modelling & Simulation Hub, Africa. Dr Silal's research interests centre on disease modelling. Her mathematical models involve an impressive range of phenomena, from the very small (such as disease transmission at the cellular level, for example) to the very large (such as population migration, for example), and encompass physical, economic, and social processes that vary both spatially and temporally. In short, her work is highly complex and of considerable consequence to the many people affected by Malaria. Sheetal has truly excelled as a young academic. She has an h-index of 8 and has published twelve papers in

Sheetal Silil receiving her award from ORSSA president, Winnie Pelser.

peer-reviewed journals since 2014. This includes a paper published in Nature, arguably the world's most prestigious scientific journal (with an impact factor of no less than 42) — she may well be the first ORSSA member to achieve this distinction! She is actively involved in high-level intercontinental collaboration through the Tropical Diseases Modelling Network, the American Society of Tropical Medicine and Hygiene, and a recent Asia-Pacific project on malaria elimination in that region. She has this year, in fact, been appointed as honorary visiting research fellow in tropical disease modelling at the University of Oxford. Her achievements are all the more impressive in view of her substantial teaching and administrative responsibilities. Dr Silal has taught a range of undergraduate

and postgraduate statistics and operations research courses at UCT since 2010. She has supervised 7 honours students to the successful completion of their year projects, and she currently supervises 2 master's students as well as 3 doctoral students. In these capacities she is making a meaningful contribution to the training and nurturing of a new generation of statisticians and operations researchers. She is very active in departmental and faculty administration (managing the website and social media of the Department of Statistical Sciences at UCT and co-ordinating open days for the department). Sheetal is well known in the local operations research community. She is a member of both ORSSA and the Statistical Association of South Africa, and regularly attends the an-

nual ORSSA conferences where she presents her research. In 2016, she won the Tom Rozwadowski Medal for her excellent paper titled Hitting a moving target: A model for Malaria elimination in the presence of population movement. She was also an invited plenary speaker at the 2015 OR Practice in Africa Conference, held in Algeria in 2015. In recognition of her high-calibre research as well as her excellent service rendered to the local profession of operations research in general in her capacity as lecturer and mentor of a new generation of operations researchers, Sheetal Prakash Silal is, on this 12*th* day of September 2017, duly awarded a Category IV ORSSA Recognition Award.

CATEGORY III AWARD: AWARDED TO *FRANCOIS MEYER*
Citation by Hans Ittmann (hittmann@gmail.com)

Francois Meyer was born on 7 September 1964 and matriculated in 1982 from Sasolburg High School. He studied civil engineering at Stellenbosch University, obtaining his bachelor's degree in civil engineering with majors in transportation and geotechnical engineering. In 2001, he obtained a master's degree in engineering management from the University of Pretoria with majors in decision analysis and management of technology.

Francois has had a long and illustrious career within Transnet where he currently holds the position of General Manager: Capital Planning and Advisory Services within Transnet Group Capital. After completing his civil engineering degree, he joined the South African Transport Services which later became Transnet, first as a Technical Assistant and then as a Junior Engineer. In 1989, he started his two-year compulsory military service in the South African Defence Force. Thereafter, he returned to Spoornet and soon became involved in planning. In 1992, he served for just over two years as District Engineer (Operations Research) in Spoornet's Physical Planning group. Here he established, inter alia, a rail simulation and operations research group within Spoornet and also developed the first SIMAN/Arena simulation of the manganese line between Hotazel and Port Elizabeth.

In 1994, he was promoted to manager responsible for establishing a Management of Technology unit in Transnet. Thereafter he joined his wife in 1996 on a diplomatic posting to the United Kingdom for four years, but continued to serve Transnet over this period. After a stint in business development he became the planning director responsible for rail planning in the Transnet Capital Projects group. Here he conceptualised and developed the first Transnet Transportation Model for forecasting freight demand on a route-specific and mode-specific basis. In addition, he co-developed what ultimately became the Long Term Plan-

Francios Meyer receiving his award from ORSSA president, Winnie Pelser.

ning Framework (LTPF). This is an unconstrained framework plan, covering rail, ports and pipelines, for satisfying the 30-year freight demand forecast, and is updated annually.

In 2011, Francois was promoted to Executive Manager: Planning Integration within Transnet Group Planning and Sustainability. His responsibilities included demand planning, simulation and decision support, capital planning and support, the LTPF production and planning alignment as well as planning advisory services. Here he conceived an internal Simulation and Modelling Area of Excellence aimed at providing policy oversight, quality assurance and advisory support in the highly specialised field of simulation and modelling to the various functions within Transnet Group Capital as well as the various Transnet Operating Divisions. Many of these services were previously outsourced, but Transnet is now building these capabilities internally.

In his current position, Francois is also responsible for the Long Term Planning and Advisory Services function at Transnet Group Capital, a function that is the "cradle" in Transnet's "cradle-to-grave" capital delivery process. Transnet's international planning and development is now also part of his responsibility. Finally, he is also a member

of the Advisory Board of the Transnet Centre for Systems Engineering located at the University of the Witwatersrand.

For his support of and contributions to the profession of operations research by the application of simulation modelling within the broader rail environment in South Africa, Francois Meyer is, on this 12th day of September 2017, duly awarded a Category III ORSSA Recognition Award.

FELLOWSHIP AWARD: CONFERRED ON STEPHEN VISAGIE
Citation by Isabelle Nieuwoudt (isabelle@sun.ac.za)

Stephanus Esterhuyse Visagie was born in the small Karoo town of Middelpos on 5 September 1972. He matriculated in Calvinia in 1990 and, after completing his military service, enrolled for a BSc-degree in Agriculture at Stellenbosch University, but later changed to a general BSc-degree in the mathematical sciences. He obtained his bachelor's degree with majors in physics and applied mathematics in 1995. Thereafter, he enrolled for a master's degree in applied mathematics in 1996, obtaining this degree in December 1997. In January 1998, he was appointed as lecturer in the Department of Logistics at Stellenbosch University where he also obtained an MPhil-degree in transport and logistics in 2002. He obtained his PhD in operations research in March 2007.

He is currently professor of operations research and head of operations research and quantitative management within the Department of Logistics at Stellenbosch University. He is an inspirational lecturer who is well-loved by his students — both on undergraduate

and on graduate levels. He was awarded the Rector's Award for Excellent Teaching at Stellenbosch University in 2001. He has also supervised more than seventy students on honours, masters and doctoral levels, where he is always willing to go the extra mile for his students.

Stephan's research interests and expertise include methods for solving non-linear knapsack problems and the application of mathematical programming and metaheuristic techniques to fields as diverse as agriculture, retailing, production, logistics and scheduling. Stephan is a National Research Foundation-rated researcher. Stephan is a prolific author and co-author of scientific papers and has published many papers nationally and internationally. He is also a Tom Rozwadowski Medal and ORSSA Category II Recognition Award recipient. In addition, he has presented numerous papers at national and international conferences.

Stephan is a valued member of ORSSA. He has a long history of involvement in and service to our Society. He has been involved in the management of the journal ORiON for the past fifteen years, the last seven years as editor. This is a significant contribution. He has also served in different roles on the Executive Committee of ORSSA, including as treasurer, before becoming involved in the management of ORiON.

For his services to and ambassadorship of operations research in general, his services to ORSSA in particular, and his nurturing of a new generation of operations researchers at Stellenbosch University over many years, Stephanus Esterhuyse Visagie is duly inducted as Fellow of the Operations Research Society of South Africa on this 12*th* day of September 2017.

ORSSA's newest fellow, Stephen Visagie, pictured with ORSSA president, Winnie Pelser, as well as all ORSSA fellows who were present at the 2017 banquet.

THE 2017 TOM ROZWADOWSKI MEDAL

by Winnie Pelser (winnie.pelser@gmail.com)

The Tom Rozwadowski Award is made each year to the best written contribution to Operations Research published by a member of the Society in a peer reviewed journal during the previous year. The medal is awarded in memory of Tom Rozwadowski, a founder member of the Society who died tragically with his family in an accident.

The Selection Committee consisted of six members. The Nominating Committee invited submissions for consideration for this award. Eleven papers were received that qualified. The criteria used for evaluation are: Originality, The quality of any theory developed, Interaction between theory & practice, New areas of application, New opportunities created for Operations Research, and Clarity of exposition. The quality of the papers was very high and it was particularly difficult to decide on the

The 2017 Tom Rozwadowski Medal recipients, Andries Heyns, and Jan van Vuuren (supervisor), receiving their award from ORSSA president, Winnie Pelser.

winner. The winning paper was: "A multi-resolution approach towards point-based multi-objective geospatial facility location" by Andries M. Heyes and Jan H. van Vuuren. The paper appeared in Computers, Environment and Urban Systems, Volume 57, May 2016, Pages 80-92.

The abstract of the paper reads: *The placement of certain facilities, such as radars and wind turbines, requires careful planning according to very specific geographical and spatial requirements. Such placement*

problems are often solved by metaheuristics which find near-optimal solutions within a fraction of the time required to solve these problems exactly. The use of high-resolution representations of the feasible search space generally ensures a high level of solution quality and accuracy, but involves evaluation of a larger number of candidate solutions than lower resolution representations, and is therefore more time-consuming. A trade-off between solution quality and time requirements must therefore be achieved when choosing an appropriate resolution of data to include in geospatial facility location models. In this paper, we propose a novel explore-and-exploit, multi-resolution solution approach that takes advantage of the reduced computational requirements associated with lower resolution terrain data, while simultaneously benefitting from the quality of solutions returned at higher resolutions. Our multi-resolution approach is capable of outperforming analyses in which only highest resolution data are considered, both in terms of solution quality and solution time requirements.

Congratulations to the winners. My sincere thanks go to the Selection Committee members for their time, expertise and participation.

OTHER NOTEWORTHY ORSSA ACHIEVERS

As mentioned, Shane van Heerden and Jancke Eygelaar were the runners up in the Gerhard Geldenhuys and Theodor Stewart Medal Nationsal Student Competitions, respectively. They are pictured below with the ORSSA president, Winne Pelser.

Jancke was further awarded the conference student presentation prize in the PhD category. Natalie Seager (top right) was the winner in the Honours/4th Year category of the presentation competition, with Thorsten Schmidt-Dumont (bottom right) the winner in the Masters category.

A hearty congratulations to all recipients and finalists of all awards made throughout the duration of the conference.

The person behind the plenary: Getting to know Sarette van der Heever

by Ryan Reed (ryan4reed@gmail.com)

Sarette van der Heever

The 46th Annual ORSSA Conference held in the Drakensberg's picturesque Champagne Peak valley attracted a fine group of attendees. As the first keynote speaker, Sarette van der Heever made it onto our special guest list at this year's conference. Having been tasked with the responsibility of interview Sarette, it became my side-line pet project to pick the perfect moment to make her acquaintance. During morning tea on the last day of the conference, banana muffin in hand, I saw my chance. The following conversation ensued.

Ryan: Sarette, there are several readers who wouldn't have attended this conference, for their sake, would you please just give us a quick overview of what you do, where live ext.
Sarette: Anytime. I am from IBM, as a matter of fact, I lead the product management group for IBM decision optimisation of which the core product is the Cplex solver engine. This entails working with developers, customers, marketing in order to determine what to put in our offering and how we bring that offering to market with the ultimate goal of satisfying customers.

Ryan: Brilliant, and you have done this in the States and in Ireland?

Sarette: Exactly, and I am currently stationed in France. Seeing quite a bit of the world!

Ryan: Alright - now for something a little more about you as a person. What is your favourite 90s jam and associated memory?
Sarette: Ooooh now that's in interesting question. I am actually a 80s fan!

Ryan 80s will do just fine! I just thought it might be safer to keep the question in the 90s!

Sarette: Well I really loved Pink Floyd back in the day, Division bell is definitely a favourite. Had some good jamming session in hostel at TUKS University. Good times studying and listening to Pink Floyd.

Ryan Reed

Ryan: I just going to pretend like I know that song! But they certainly sound like some fantastic memories. Next question - If you could invite three people to dinner (dead or alive) and you knew they would accept your invitation, who would you invite and why?

Sarette: Mmmm, let me think about that… ah, Elon Musk. I think he is exceptionally fascinating, and has a brilliant way of thinking about things. Next I would invite Sheryl Sandberg because she is a very inspiring woman. She leads the 'Lean In' movement and I think there is a lot both men and women can learn from her in the way she operates, carries herself, approaches business and inspires others.

Ryan: Quite the high bar you are setting for your final guest!

Sarette: Haha ok one more, let's make it interesting and say Darwin! Then he can tell me about his trip to Patagonia and how he formulated his theories.

Ryan: Brilliant, that's really cool. One last question i'd like to ask it: What inspires you to do what you do?

Sarette: Well, I know the impact optimisation can have, and I know that it is vastly underutilised around the world. So, I find inspiration in growing an awareness of the potential impact and working toward making a positive difference in the world. Not just to make money, but making a difference in people's lives. You know, everyone always thinks the part they play is so small, but were like a big colony of ants and collectively we can make a huge impact.

Getting to know: David Clark

by Anthony Smith (16678591@sun.ac.za)

Anthony Smith

David Clark is a member of ORSSA - serving on the executive committee as the Johannesburg Chapter Chair and being the driving force behind the very successful 'Lean Coffee Meetups' which have been happening in the Johannesburg area. I sat down with David at the recent ORSSA conference to hear more about his views on operations research and the ORSSA society.

What has been your favourite presentation that you have attended at the conference and why?
I really enjoyed the opening plenary with Surette. I also found Hans Ittman summary of the state of OR very interesting, it wasn't a technical talk but there was a lot of information that I haven't seen before. Oddly enough, I also found the TSP linked to Pokemon Go a really novel problem, having seen a lot of logistics problem it was refreshing to be exposed to a probability based variation. Finally, I also found the

presentation about the Wrapslide particularly interesting.

What has been your favourite ORSSA memory over the years?

Surprisingly, this is only my second ORSSA conference with my first being the one held by the Joburg chapter at Hartbeespoort Dam. I thought that was really nice, although I think I might have enjoyed this one more, the talks and the venue have been great. I have been to numerous other conferences but I really enjoy ORSSA as it shows local support and content.

Recently OPSI has been synonymous with ORSSA conferences, what is/was the strong connection with ORSSA?

We appreciate the difficulty of solving logistics problem, those problems form a core part of Operation Research theory in terms of scheduling and packing and several other techniques, it is sort of the one discipline that we are happy to invest time in as we want people to learn and benefit from these skills.

What do you feel is the biggest benefit of being a member of ORSSA?

Haha - it feels like a bit of a trick question but it's about the community of ORSSA and the ability to engage with its members that are facing similar problems. I think ORSSA is going to face a number of challenges in the upcoming years as there will be a lot of competing fields that are vying for the same people and work, but I feel that the people and community really add value to this organisation.

There are a lot of 'hot topics' being discussed at the conference this year, such as AI, machine learning and big data. What do you think will be the next "hot topic" in Operations Research?

It will definitely be around this idea of reasoning with uncertainty. Reasoning with uncertainty and its application of more causal based knowledge into machine learning systems, will lead to large improvements in this field which will allow us to deploy such systems into spaces that we haven't been able to beforehand.

SITTING DOWN WITH PROF RAIMO HÄMÄLÄINEN

by Mattie Landman (17736064@sun.ac.za)

Mattie Landman

Raimo Hämäläinen is a professor of Applied Mathematics and Operational Research at the Aaolto University School of Science in Finland. He is also the founder and director of the Systems Analysis laboratory at Aaolto University. His research interests cover game and control theory, decision analysis, energy modelling, resource management and systems thinking.

He was nominated as Honorary President of the Finnish Operational Research Society and among other achievements presented the MCDM Edgeworth-Pareto Award by the International Society on Multiple Criteria Decision Making. This award is the highest distinction the society bestows to a researcher who has established a record of creativity to the field of MCDM that would not allow the field to exist in its current form without the researcher's contributions.

What was your career path in becoming a Professor in Applied Mathematics and Operational Research?

I started by getting my Phd in control theory and game theory, but at that time game theory was not considered to be useful. This forced me to drop one of the decision makers in a two-person games I was studying and turn to the field of decision support. I mainly focused on research in multi-criteria decision making. From my background in control theory I mainly did work for the air force - enabling decision support on how the fighter planes and missiles should fly.

Since I am an engineer, I always want things to be applied and the output of my work to be used, so that is why I became concerned that the theories and models are not enough. We need to understand how to apply and use them and this started my interest in behavioural OR. So here I am retired last year, but reemployed as Senior Advisor.

In your conference talk, you discussed various biases in a researchers problem solving and modelling techniques, what bias do you think you are personally most guilty of?

I think it is the hammer and nail, the cognitive bias that involves the over-reliance on what tool you are familiar with, just because I have a hammer I try to treat everything as a nail and push it in somewhere. I often find myself developing a new method and then trying to push it into different kind of problems to try and see its limits, but I forget that the thinking behind the attempt is only one side of the story, other methods and approaches need to be included to probably solve any problem. I am also guilty of not seeing the world in the big picture. I am currently working on something called system's intelligence. This is the next level from emotional intelligence. Emotional intelligence simplified is acknowledging the fact that you have that you can't get rid of but realising you can act intelligently with them. In the same way in systems intelligence you have to acknowledge you are part of a system, for example the ORSSA community or your organisation, and the structures in the system impact how you behave. I need to always acknowledge the system and act intelligently - so you can say, I'm a systems person.

If you could solve any problem in the world, where time and money is not a concern, which problem would you take? I would like to change the perspectives of people so that they would collaborate with others - getting rid of all these wars. I am currently advising the military how to buy fighter planes. I don't see the point, why do we need fighter planes in the first place?

I heard you went fishing this afternoon in the river here at the Champagne Sport Resort, did you have any success? Let me tell you about fishing. Fishing relates to the utmost optimism, it is very unlikely that you will succeed but you still try and must just keep on trying. This is the mentality that you need in leadership and in science as well. You must think to yourself "Maybe one day I will find out something?", so you must try and just keep on trying. Similarly, the one on one situation you find in fishing, you know the fish is there you just have to find out how to catch him. I know there is some new piece of science out there, I just have to fish it out and then later in life you come to realise it's more than just catching the fish. So to answer your question, yes I was having a success-ful day, but maybe not in terms of the typical fisherman. **If you could attend an event in the past, present or future what event would you want to be present at?** I would like to have a little impact on the event - maybe the meeting of the big boys somewhere.

What do you think of the conference and where OR is in South Africa I am really surprised and delighted in the young people here. Last night's banquet was so nice. I like the way you give prizes and celebrate each other's research and success. I admire the way you laugh and enjoy the conference, not taking it so seriously. This is how life in the academia should be, but your work is serious. It's good to know that even if Theo and I go, there is still a future. I was wondering how to transfer some of this mentality to Finnish OR, I am going home to tell everyone it's more fun in Africa. I like the community feeling, and without it the discipline die, it's important that everyone feels like one of the players. I'm positively impressed and can confidently say the future is yours!

RIDDLE SOLUTION

The first thing to realize is that, since you know you aren't cursed, you can explore one of the hallways alone. This leaves eight explorers for the remaining three paths. Sending groups of four down just two of the hallways won't work. If one group has both of the cursed explorers, you will likely have a split vote on one hallway with another left unexplored, in which case you'll have to guess which one to take. Splitting the explorers into one group of two and two groups of three, like that in the figure, would work every time. The cursed explorers might lie, or they might not, but you know for sure there are only two of them, while the other six will always be truthful. When each group returns to the room, all of its members will either give the same report or argue about whether they found the exit. If a trio returns in total agreement, then you know for sure none of them are lying. With the pair, you can't be sure either way, but all you need is reliable evidence about three of the four hallways. The fourth hallway you can work out through a process of elimination. Of course, none of this matters if you're lucky enough to find the exit yourself. If you are, however, not so lucky, three alternative possibilities exist:
1.   If each group gives a consistent answer, either everyone is telling the truth, or the two cursed explorers are paired together. In either case, ignore the duo.
2.   If there's only one group arguing, both others must be telling the truth.
3.   If there are two conflicts, then the cursed explorers are in separate groups and you can safely trust the majority in both trios since at least two people in each will be truthful.

The temple collapses behind you as greenish vapours escape from two of the explorers. You're all safe and free from the temple's curse!
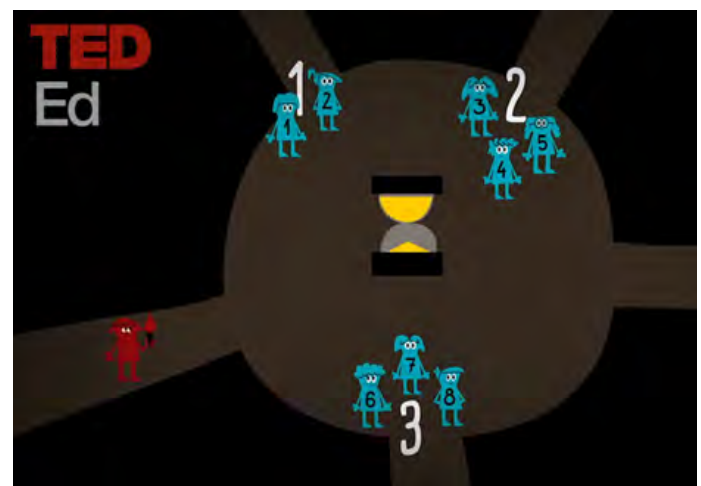
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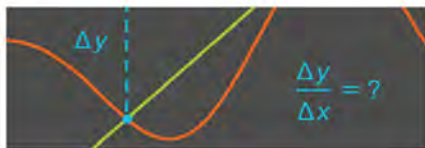
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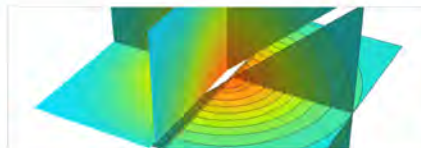**Image and Signal Processing »**

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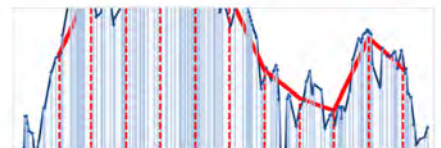**Geo Computation »**

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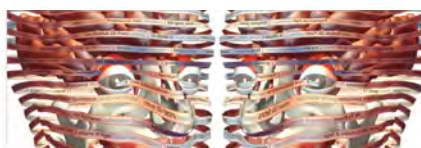**Time Series Processing »**

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