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ORSSA Newsletter October 2014

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From The Editor

By Mark Einhorn (einhorn@sun.ac.za)
ORSSA Newsletter Editor

Mark Einhorn

Hello esteemed members of ORSSA and welcome to the October edition of the Newsletter. For those of you who were at the 43rd Annual Conference of ORSSA, I hope you, like I, found it to be an enjoyable experience, and for those of you who couldn't make it, we hope to see you there next year. I would like to congratulate Lieschen Venter and her team for organising what was an excellent conference.

Before I continue, I would like to offer my humble apologies to Hans Ittmann. The book review in the June edition of the Newsletter was not written by Graham K. Rand as indicated, it was written by our very own Hans Ittmann and was included in a collection of book reviews compiled by Graham K. Rand. My sincere apologies Hans, though I fear we may be even after you referred to me as "Mark Eindhoven" in one of your talks at the conference.

As is customary, this edition of the Newsletter will serve to recap the happenings and ongoings of the recently passed conference. Once again I have been able to call upon my friend, Jacques du Toit to write about some of his highlights of the conference as only he can, and I can tell you that his recollections are as hilarious as ever. This is followed by a testimony to all the recent award winners. A heart-felt congratulations to them all!

Our third installment of the OR-related activities at South African universities focuses on the University of Cape Town and is very interesting and enlightening. Finally, the issue closes with a member interview (remember those?) with Alewyn Burger about his recently developed puzzle app, *WrapSlide,* so be sure to look out for that.

Until December, enjoy the read good people, and cheers for now!

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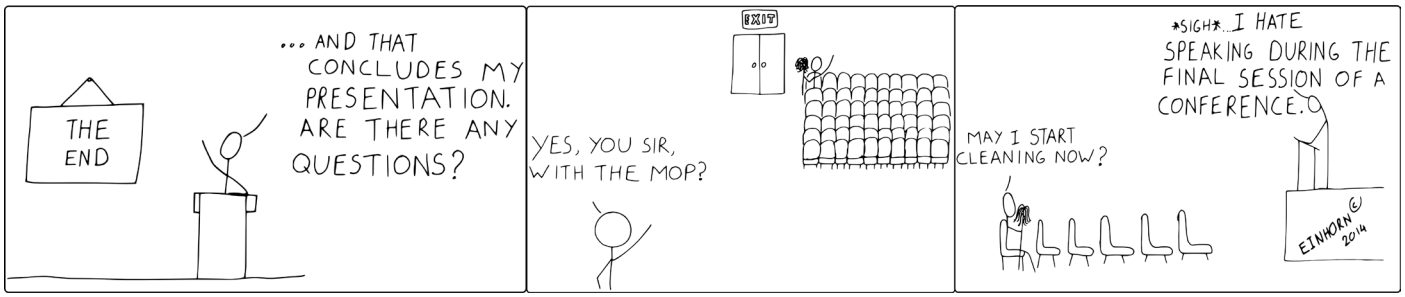
QUERIES & CONTRIBUTIONS

Any queries or contributions to the Newsletter are most welcome, especially article submissions. For any queries or contributions, please contact the Newsletter editor at *einhorn@sun.ac.za.*



From The President's Desk

By Hennie Kruger
(Hennie.Kruger@nwu.ac.za)
ORSSA President

Hennie Kruger

A large part of the October Newsletter is usually devoted to the ORSSA conference. This year is no exception and if you were unable to join us at the 43rd Annual ORSSA Conference, you missed out on a memorable and outstanding event.

This year's conference was held at Stonehenge in Africa just outside of Parys in the Vredefort Dome which is the largest and oldest meteor impact site in the world. The conference started on Sunday 14 September 2014 with a tutorial on the COIN-OR optimisation suite which was presented by one of the keynote speakers, Prof Ted Ralphs from Lehigh University in Pennsylvania. There were also two other keynote speakers, Prof Andreas Bley from the University of Kassel in Germany and Prof Frans Waanders from the North-West University's Potchefstroom campus. The plenary lecture by Prof Frans Waanders was quite different to the normal OR presentations and the audience were treated to an interesting and entertaining account of the history of the Vredefort Dome. As part of the program the 2014 AGM was held on the Tuesday afternoon, followed by the conference gala dinner on the Tuesday night. The conference closed on Wednesday 17 September 2014 at lunch time after a total of 59 contributed papers were delivered. More information on the program and the nature of the conference can be found in an entertaining article written by Jacques du Toit found on page 5.

The annual conference is the event where the Society can recognise and celebrate the individual achievements of our members. This year's conference followed the tradition and a number of medals and recognition awards were awarded to our members.

The 2014 Tom Rozwadowski medal was awarded to Jason Matthews and Stephan Visagie for their paper entitled *Order sequencing on a unidirectional cyclical picking line* which appeared in the European Journal of Operational Research. The Tom Rozwadowski medal is the premier ORSSA award and I would like to congratulate Jason and Stephan on this achievement.

Three recognition awards were also presented at the gala dinner. John Dean (Johannesburg Chapter) received a Category I award which is awarded to a retired member for outstanding contributions over a long period of time. A Category II award was presented to Riaan de Jongh (Vaal Triangle Chapter.). This award is made to a current member for a single outstanding achievement. Lieschen Venter (Vaal Triangle Chapter) received a Category IV award as an upcoming member of age 35 or below for excellence in OR practice. Congratulations to John, Riaan and Lieschen!

The 2014 Gerhard Geldenhuys medal (for best 4th year/honours project) went to Sumarie Meintjes (University of Pretoria) while the winner of the Theodor Stewart medal (for best masters thesis) was Francois Fagan (Stellenbosch University). Congratulations to these two awardees on their high quality projects.

In addition to the National Student competition, prizes are also awarded for the best oral presentation at the conference in different categories. This year Stellenbosch University walked away with all the prizes and the winners were as follows:

- Honours/4th Year Category – Dirk Human,
- Masters Category – Thloni Masipa,
- Doctoral Category – Mark Einhorn.

Congratulations to Dirk, Thloni and Mark. More details on all the awards and prizes can be found in this issue of the Newsletter.

The 43rd ORSSA Annual Conference was a huge success. Following the tradition of past conferences we had a well-attended and stimulating conference supplemented by enjoyable social events. A large and diverse number of high-quality papers were once again presented and delegates included a large number of young and student members as well as a significant number of attendees from industry.

I want to conclude by thanking every delegate who attended the conference, presented a paper or helped in an organising capacity. In particular, I would like to thank the Local Organising Committee for a superb job done. The committee members were Lieschen Venter (chair), Esmi Conradie (treasurer), Diki Langley, Michele Fisher, Fanie Terblanche and Preston Ferreira.

We are looking forward to the 44th Annual ORSSA Conference which will be hosted by the Johannesburg and Pretoria Chapters in Gauteng during the period 13–16 September 2015. Brahm Bothma will chair the Local Organising Committee. Please join us then for another successful, productive and enjoyable conference. Details of the conference will soon be posted on the official ORSSA website.

With best wishes / Alles van die beste
Hennie Kruger

Operations Research at South African Universities Part III: University of Cape Town

by Ian Durbach (indurbach@gmail.com), University of Cape Town

The current academic home of operations research at the University of Cape Town (UCT) is the Department of Statistical Sciences, and there has from the outset been a intimate link between OR and statistics at UCT. The first professor appointed to the newly established Department of Mathematical Statistics in 1966 was Cas Troskie, who had previously been at the CSIR and had attended the short course on OR presented by Gerhard Geldenhuys there just a few years previously. Although in these years the focus was very much on the administration of the mathematical statistics major for the BSc degree, a strong OR component was soon introduced into the statistics courses for the BCom degree, in collaboration with the Department of Applied Mathematics. An OR option was also introduced into the honours program of the department.

By 1983, a second chair in the Department of Mathematical Statistics was established with specific responsibility for OR, and Theo Stewart was appointed to this post from July 1984. In 1991 the Department of Mathematical Statistics was renamed the Department of Statistical Sciences, formally acknowledging the role of OR in the department (the initially-proposed name, the Department of Statistical and Decision Sciences, was more accurate but rejected for being too long!). Today the department is established in the Faculty of Science but is also formally associated with the Faculty of Commerce.

The embedding of OR into statistics degree programs is one of the key achievements in the development of OR at UCT, and – to the best of my knowledge – is currently unique in a South African context. Although one encounters occasional resistance (from statisticians of course), there is general consensus that the two areas develop highly complementary skill sets, and that the "problem solving" orientation emphasised and encouraged by OR is valuable beyond the prescribed OR curriculum. The recent explosion of interest in "analytics" has been a valuable endorsement of this positioning.

Students are first introduced to OR at UCT in a semester-long third-year course "Operational Research Techniques" which forms part of the Applied Statistics stream offered by the Department. The course is primarily taken by BCom and BBusSc students as part of their core programs in Applied Statistics and Analytics respectively, but may also be taken by BSc (and other) students as electives. The course covers OR topics such as linear programming, queuing theory, simulation, decision analysis, forecasting and game theory. The honours program in Statistical Sciences includes two compulsory core OR modules, extending topics such as those mentioned above as well as introducing new ones. A number of semester-long elective courses contain at least some OR – decision modelling, portfolio theory, and analytics, for example. Students are given thorough introductions to programming and scientific computing through a core course in statistical computing. Traditionally, students wishing to pursue OR topics beyond the honours year would have enrolled for dissertation-only postgraduate study, either at MSc or PhD level. These options remain in place but, as of 2013, the

The University of Cape Town with Table Mountain in the background.

department also offers a dedicated taught masters program, the MSc in Decision Sciences and Advanced Analytics. The emphasis of this program is on harnessing the combined power of statistics, OR, and computer science to transform large amounts of data into information to solve real-world problems and enhance decision-making. Students take core courses in Simulation and Optimisation, Longitudinal Data Analysis, Advanced Topics in Regression Analysis, and Multivariate Analysis. Electives include Statistical Inference and Design, Bayesian Decision Analysis, Problem Structuring and Project Management, Financial Modelling, and Biological Modelling. The program consciously aims to use the current interest in analytics and big data to emphasise the central roles of statistics and OR in evidence-driven problem solving, and the positive interaction between these two disciplines. Upon completion of the coursework component of the program, students spend 3-6 months working on a half-dissertation, which may of course involve further study of an OR topic.

Of the 22 staff members currently making up the department's core staff contingent, 8 have a primary research interest in OR. Research areas vary widely but include multi-objective optimization, problem structuring, decision analysis and support, combinatorial optimization, scheduling, system dynamics, simulation, project management, financial, economic and environmental modelling, and risk analysis. Application areas are similarly broad, but include management consulting to support electricity supply management, evaluation of health economics models, public sector management, natural resource management, monitoring and evaluation with the NGO sector and epidemiological modelling. Most staff members are active both in research and in consulting to various organizations. The resulting activity yields a steady supply of topics for postgraduate dissertations.

A discussion of OR at UCT would be incomplete without a mention of the Masters program in Operational Research in Development (ORD), launched in 2005. This program was specifically focused on applying OR to the problems of the developing world in general and Africa in particular. Core courses included Case Studies in OR in Development, OR Methods, Project Management, Problem Structuring methods, and System Dynamics. Following the coursework component, students took the lead in a real-world development problem, including applications in, for example, health (antimalarial drug resistance), poverty alleviation (food banking), governance (NGO management structures and monitoring of local government performance) and sustainable livelihoods (spaza shop operations). The course was discontinued in 2011 because of persistent problems in meeting minimum enrolment targets imposed by the faculty, but graduates of this program tended to show remarkable maturity – and today two are lecturers in the department!

See http://www.stats.uct.ac.za/ for further details of the Department of Statistical Sciences and degree programs in the department.

EURO Summer Institute XXXI on Operational Research Applied to Health in a Modern World

by Sheetal Silal (sheetal.silal@uct.ac.za), University of Cape Town

The EURO Summer Institute (ESI) XXXI on Operational Research applied to Health in a modern world took place at the breathtakingly beautiful Forti di Bard in Valle d'Aosta, Italy from 11 to 20 June 2014. This meeting brought together 21 early stage operational researchers working in health care to present and discuss their research with peers and senior experts in the field. I was fortunate enough to be selected as one of two IFORS representatives to attend this meeting.

The daily programme comprised a series of presentations, discussions and tutorials. Each participant had the opportunity to present an unpublished application of Operational Research to a health care problem. A diverse group of participants such as the one at ESI XXXI is bound to result in a variety of topics being presented including appointment scheduling, workforce scheduling, resource allocation and national and regional strategic planning. I presented a paper entitled "Sensitivity to model structure: a comparison of compartment models in epidemiology"; a study that seeks to compare differential equation models of infectious diseases to assess the sensitivity of model predictions to changes in model structure. Each participant had a discussion session dedicated to their paper where other participants and senior experts provided feedback on the presentation and how to improve the paper for publication. The senior experts also presented tutorials on a range of methods commonly used in OR applications in health care including queueing theory, decision trees and system dynamics. The practical tutorials were very useful as the participants were exposed to new software.

The social programme at ESI XXXI was equally beneficial as the scientific programme as the participants were able to get to know each other better while appreciating the beauty of Valle d'Aosta. The social programme included a tour of

After the treasure hunt: Melanie Reuter (middle) and Sheetal Silal (seated) explaining our winning solution to the other participants.

Forti di Bard, Fenis Castle, Gran Paradiso National Park and a visit to the Adriano Olivetti Foundation in Ivrea. We were also fortunate enough to have an evening of local wine and food tasting at our hotel. The highlight of the social programme for me was the Operational Research for Health Care Treasure Hunt, an "Amazing Race" of problems to be solved using OR techniques! Participants, randomly partitioned into groups of four, were given photographs of a mural to be located, where an OR problem was waiting to be solved. There were five such problems to be solved sequentially requiring knowledge of network theory, queueing theory, scheduling and linear and quadratic programming. The treasure hunt was allocated only three hours in our programme, but the intensity of the hunt was such that after four hours, all five groups were still "stuck" on the last optimisation problem. Even dinner was delayed by 20 minutes to accommodate the hunt. It was only in the last 25 seconds of the hunt that my group comprising Melanie Reuter from Germany, Mário Lopes from Portugal, Paulo Tubertini from Italy and myself from South Africa, solved the last problem using a "rough and ready" quadratic program to win the treasure hunt! We were richly rewarded with t-shirts from Forti di Bard.

My sincerest thanks must go to Prof Roberto Aringhieri and the organising committee for the flawless organization of ESI XXXI. The scientific and social programmes, the location, accommodation and food were all fantastic. I am also very grateful to IFORS for sponsoring my travel to ESI XXXI. I walk away from ESI XXXI with a rejuvenated approach to OR in health care and a network of friends and colleagues that will last for many years to come.

The 43rd Annual Conference of ORSSA

By Jacques du Toit (jacques@dip.sun.ac.za)
Student at Large, Stellenbosch University

The views expressed in this article are the personal views held, only at the time of writing, by Jacques du Toit.

Having not yet solved all the problems that remain to be solved, ORSSA members gathered at Stonehenge, not in Wiltshire, England, but in Parys, South Africa. This strange blend of UNESCO World Heritage Sites, one in name and the other in location, resulted in "natural, strategically placed granite plinths" arrayed within a two billion year old impact crater. This conflation of places extends to Parys itself, which was presumably coined by a German gentleman for whom the Vaal River brought back memories of the Seine (in Paris, France, this time). Just as the ORSSA executive is customarily nominated without opposition each year, these conference reports tend to begin with what has become a customary introduction by way of discussing the conference venue and the surrounding area. This introduction is rather easily compiled on account of a cataclysmic event and the fascinating closing plenary by Frans Waanders. He revealed that ORSSA delegates, of insignificant ages in geological time, found themselves within the largest known impact crater on Earth (approximately 380km in diameter). This scarring of the earth's crust was caused by a rather chunky 'impactor' of approximately 10km in diameter that slammed into the Earth at a speed of 72,000km/h, or 20km/s (this speed qualifies it as a *hyper-velocity* object considering that its speed exceeded the measly 11,000km/h required for such a classification). This plenary included talk of politicians, of mining magnates and of the fact that the principle researchers (geologist crew) had a somewhat bad boy reputation (aka "war boys" or "the three musketeers"). We learned that Everest is as high as it will get, that granite contains 1g of gold per ton (which is not profitable to mine), how the Witwatersrand was formed and that Hans Ittmann grew up in Viljoenskroon, but never heard of the Vredefort Dome (in fact, it sounds like most people had not). Frans also mentioned that one of his colleagues took 40 years to obtain his PhD. This is a feat that I have tried and (hopefully) have failed to emulate.

The delegates who arrived on Sunday afternoon were presented with two pre-conference events. The first of these was a COIN-OR optimization suite tutorial, which finished an hour before the second, a welcoming reception on a glorious deck overlooking the Vaal river. Although it was possible to enjoy the tutorial and the deck,

it seemed that some thirsty folks chose not to risk this level of enjoyment after their travels. The deck, the warm air, the gin and tonics, and the river view brought back memories of the conference in Victoria Falls. Incidently, Stonehenge also offered river rafting when the river is flowing a little more forcefully (upon further inquiry I was dissuaded from considering such an activity after being informed that Parys was upstream from Stonehenge).

Michele Fisher sought to "lock down" the gaffe of the conference as she introduced fellow local organising committee member Lieschen Venter by saying she would kick-off the conference of the "OR society of America in Stonehenge". Her early attempt at attaining this apparently sought after mantle (the stiff competition has led me to believe that it is sought after) was scuppered by a few top-class Joe Biden moments that were still to come. The president of ORSSA, Hennie Kruger, delivered a rousing presidential address about "operations research and the road to professionalism". He rightly noted that he need not fear the repercussions of his address as questions were not allowed. However, his deft reference to a certain Erica Ferreira's presidential address in 1995 (if any of you are wondering who she may be, well, soon there will be a book for you to consult) made it clear that these repercussions may be laying in wait in the distant future. Hennie stated that professionalism benefits practitioners by providing recognition, marketability and allows for the "maintenance of professional standards". Amongst the many personalities along this road was the infamous Russell Lincoln Ackoff who proves to be a rather popular fellow amongst the delegates.

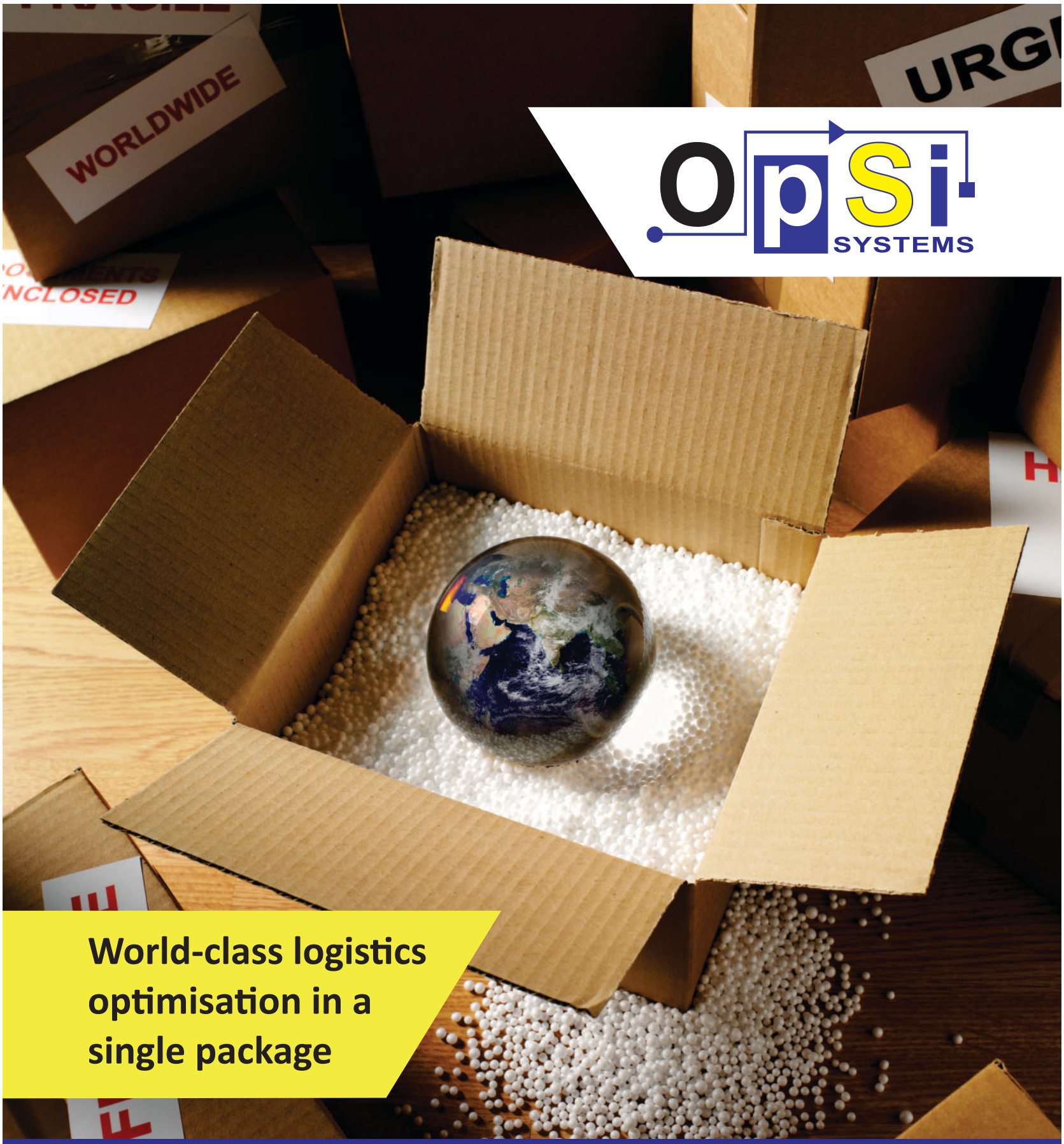
Now that ORSSA (and IFORS) have adopted analytics, the 43rd annual ORSSA conference was concerned with accessible analytics (the bed has been made and now we are starting to snuggle in it). As Ted Ralphs said during the opening plenary, "analytics is a big step forward" since "people understand, or think they understand what analytics is" (OR practitioners were presumably unsure of what OR was exactly). If the steady increase of serving stations at meal times over the last three years is anything to go by, then things are certainly looking up since the society has joined IFORS in "taking ownership of the advanced analytics space". Ted discussed open source software and managed to mention BSD, Unix, GNU, the Free Software Foundation and Linus Torvalds within the space of a few minutes. How I envied him. With computers, software packages and libraries playing a large supporting role in much of the work presented at these conferences, it was nice to see some of the loftier ideals of the open source community make its way to an ORSSA conference. He went on to discuss the open source COIN-OR project that is specifically geared towards operations research. He said that the "lack of availability of implementations hinders accessibility" and that "good science requires that we be open and that we replicate and test ideas of those who have come before us." He also revealed that COIN-OR is a backronym that arose from unavailability of their first-choice domain name.

The first parallel sessions got under way after tea and I found myself in the Maritime Applications session, not least because I was presenting. The final speaker of this session was Winnie Pelser who quoted Draper and Box in saying that "essentially, all models are wrong, but some are useful." In addition to the interesting surnames, which give the *Dog and the Fig Brewery* a run for their money in a race for quirky English pub-like names, George E.P Box has a rather fetching portrait picture on Wikipedia. Winnie discussed Achoff's division of complex problems into messes, problems and puzzles. She had two kindred spirits in Dave Evans and Raimo Hamalainen in Session XVII on assorted topics. Besides Achoff quotes, they shared a view of OR that extended beyond the usual specificity to the more general, holistic and sometimes philosophical. They were thoroughly enjoyable talks. Dave Evans also tackled complexity in decision making and presented the audience with a *magic roundabout* (a traffic circle in Swindon, England) that "consists of five mini-roundabouts arranged around a sixth central, anti-clockwise roundabout". Raimo discussed the need to consider behavioural aspects in problem solving as a part-and-parcel of OR modelling. He pointed out that in many cases the human is integrated into the decision making process in human-in-the-loop models and that "we become problem elements ourselves" when proposing models. This thinking reminded me a great deal of the *observer effect* in which it is often not possible to measure a property without the measuring process affecting it. I was glad that Raimo's research did not yet extend to the creation of efficiency-seeking robots for world-optimization when he remarked that "it would be so easy to run anything if there were no people in it."

Monday's lunch was served in the main lodge to the accompaniment of R Kelly's "Echo". I suspect that the search for more inappropriate music was abandoned once his crooning about copulation at various times of the day was discovered. In addition to adding another serving station, the conference organisers saw it fit to add an additional fifteen minutes to the lunch break. These adjustments were most welcome and the lunches were, as a consequence, very relaxing and unhurried.

Apparently, the word "pep" is derived from "pepper" and is used in a figurative sense to describe vigor or energy. A use of the phrase "pep talk" was recorded as far back as 1926. It was also heard in the forecasting session immediately following lunch, and in the conference closing in reference to Antoinette Erasmus' presentation which tackled a prob-

The COIN-OR Optimization Suite:
Ted Ralphs
COIN
LEHIGH
COR@L
open-source
South African Operation Research Society Annual Meeting
Pretoria, South Africa, 15 September 2014



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lem in one of South Africa's large retailers. Antoinette's presentation was followed by that of Dirk Snyman who presented an approach to malicious URL detection. The last speaker of the session was Hans Itmann who discussed a forecast model that got him on television and that would have performed even better were it not for the fact that the "EFF is not only disrupting parliament, they are also disrupting our model". Forecasters appeared to be in low attendance at this conference and the scheduled "no talk scheduled" forced a session swap to the energy and sustainability session in which Marc Hatton discussed an optimiser for an energy flow simulator. The audience was in a jovial mood and fired a number of questions Marc's way.

After a little pepping up at a caffeine break, I ventured a few metres into the adjacent venue and into the agriculture, forestry and land use session. Catherine Price described an agent-based simulation she used in the modelling of the complex sugar cane supply chain in Kwa-Zulu Natal. Brian van Vuuren (no relation to Jan van Vuuren) described characteristics of a rather destructive moth, referred to as "the pest", that he will be using in an agent-based simulation. R. Kelly's lunchtime rhythms likely had an influence on the unsophisticated conclusion I drew from his statement that "males [moths] typically get laid beneath the stalks". The final presentation of the session, and of the day, was that of Hausitoe Nare who used a multivariate adaptive regression splines technique for predicting cotton output in the Gowke Area, the "main cotton growing area in Zimbabwe".

The Craft brewery craze that is sweeping the country thankfully has a foothold in Parys in the Dog and Fig Brewery, that provided generous helpings of their wares to thirsty conference goers on the Monday night. Many at our table favoured the 'heavier' beers amongst them and there was much discussion around the conference, beer, the water quality of the Vaal river and whether or not Hans Ittmann has attended every ORSSA conference since the dawn of the society (we discovered that he has missed only the first four between 1969 and 1972, but other than that he has attended every conference since 1973).

I began Tuesday in the military applications session, not least because I was the session chair. The first two talks were concerned with a threat evaluation and weapon assignment system. Louw Truter discussed a system elevator and Danie Lotter discussed the various challenges associated with the implementation of such a system. These two talks were measured in their use of what may be construed as war-like language. In fact, it is probably a little known fact at ORSSA conferences that the military sessions also discuss OR, and not slaughtering (of ducks) or eradication (of pests). However, when the military session competes with the ecology and environmental session and the transport and transportation session, it is not surprising that I struggled to find attendees to evaluate the speakers participating in the student competition. In any case, the measured tone was lost in the military session when Pieter de Wet started using words like 'conquer' and 'world domination' when discussing strategies in the game of Risk.

In the combinatorial optimization session following tea, Colin Phillips was unsure as to whether or not he should "touch this customer on this channel". He also gave a wonderful response to a question regarding his methodology when he said "one of the great things about the ORSSA Conference is that I learned about column generation yesterday." Not to be left behind, I quickly googled it. Robert Benetto followed with an interesting presentation about lazy constraints in mixed integer programming and he reminded the audience that the units of digital information have not changed recently when he said that his memory usage was "...eighty gigabytes on modern computers, on old computers too."

The masters category of the ORSSA national student competition saw student take on supervisor in a battle for the Theodore Stewart medal. This unprecedented event arose due to the fact that one of the competitors found himself approximately 12,800km away at a foreign institution. Hans Ittmann stated that the judges did not consider the presentations when choosing their victor (see page 13 of this publication for a list of the eventual winners).

A long AGM followed a short coffee break. There was talk of terminating members, of shows of hands, of the viability of the newsletter, of the soon-to-lapse moratorium on discussions on the viability of the newsletter, of secondments and of motions to vote. As we neared the end of the agenda, Hennie Kruger announced that "if it wasn't for the dress-up theme, then we'd be finished now." Mark Einhorn or Mark Eindhoven, as he became known thanks to Hans Ittmann, proposed that arriving to the AGM in costume may contribute further to an already enjoyable AGM and that it may entice the notably absent youngsters to be in attendance. The earnest nature in which he presented his case, and the equally serious nature with which those gathered considered it, was rather enjoyable in itself. Ultimately, despite Jan van Vuuren's calls for a vote, it was decided that "we minute it that we need to do something to get more people to the AGM."

Hans Ittmann welcomed many, and some more, to the conference banquet on Tuesday night by stating, as master of ceremonies, that "fortunately, or unfortunately, you are stuck with me again". Hans also implied that Theo may have had a hand in managing to have his birthday coincide with the conference each year. Some wonderful wines

were served and between the delicious courses, a few select delegates were honoured with awards. These included the LOC chair, Lieschen Venter (go Lieschen!), the esteemed John Dean, who was ever so gracious in his acceptance speech, and the very successful and funny Riaan de Jongh. For the rest of you there is always next year and the *we-didn't-win-conference-prizes-but-we-said-something-memorable* awards for 2014. There were a few contenders for the *slip of the tongue* award. In addition to Michelle Fischer's initial attempt at claiming the prize, Robert Benetto asked Theo Stewart, the chair of his session, "How are we doing for time there, Stewart?". Fortunately, or unfortunately, they don't hold a candle to our eventual winner.

Redundant Redundancy: "I'll conclude with conclusions." — Bernard Schülnz.
Fan-favourite Abbreviation: R.B.F.N.N. (Radial Basis Function Neural Networks) — Dirk Snyman (we suspect that the delegates were so enamoured with this abbreviation because of its length; however, it may simply be because they just love ANNs).
Slip of the tongue: "Significant career sh*t" —Brahm Bothma.
Best Joke: "The Old Age Home and the Hypnotist"— Hans Itmann (a perfectly timed delivery).
Funniest post-conference quote: "I would also like to point out that no ORiON journals were harmed in making the table decorations for the gala dinner" — Michele Fisher.
The most frequently asked question (or variants thereof): "Can everyone hear me?" — Dave Evans, Colin Phillips, Hennie Kruger, Andreas Bley.

Wednesday's closing plenary by Andreas Bley was fascinating and filled with a few new concepts for this listener — I've since remedied that using what Hans Ittmann referred to on Tuesday night: "there is something called Google that is simply amazing." He concentrated on "static network design", which he said was "more than enough for one hour". He also dealt with the most frequently asked question in a delightful way when he said, "Can you hear me at the back?". "Obviously not, I'll go on like this anyway". After providing a tour through some of the fundamentals of his approach, he went on to present computational solutions. He informed the audience that it has never been easier to solve these difficult problems, provided that they know the mathematical techniques and the software tools ("Hey CPLEX, I have a nice Knapsack for you, do the rest").

Another successful conference drew to a close at lunch-time on Wednesday. The presentations were great, the venue was great, the people were great. The LOC had done a wonderful job. We'll see you all at next year's conference hopefully. I hear that it might be Theo Stewart's birthday, and who knows, perhaps this time there will be dancing and a few costumes.

ORSSA: Category I Recognition Award Presented to John Francis Dean

Citation by Brahm Bothma

John Francis Dean was born in Liverpool, in the United Kingdom on January 25th, 1946. He obtained a bachelor's degree in physics from the University of Cape Town in 1966 and followed this up with an honours degree in physics from Rhodes University in 1968. John started his working career as Radio Astronomer at Jodrell Bank Observatory in Cheshire, England in September 1969, after leaving Rhodes University. He studied there under Sir Bernard Lovell, completing his master's thesis in March 1973 on a topic involving neutral hydrogen emission from a group of twenty nearby large spiral galaxies. Thereafter, he enrolled for a PhD in radio astronomy at the University of Manchester, in the United Kingdom, obtaining his doctorate in 1973.

In April 1973 John started working at the South African Astronomical Observatory under Sir Richard Wooley, the ex-Astronomer Royal who had just retired from the Greenwich Observatory in England. The Council for Scientific and Industrial Research had recently taken over the Royal Observatory in Cape Town and renamed it the South African Astronomical Observatory. This remained John's professional home until the early 1980s.

ORSSA President Hennie Kruger with Category I Award recipient, John Dean.

John made a significant career shift in 1981 when he started working as Systems Analyst at Eskom's head office, a position he held until 1986. Thereafter, he joined the Systems Operations Division of Eskom's Production Planning Department at Simmerpan where he was employed as Production Cost Modelling Specialist, taking responsibility for power station production plans and fuel delivery schedules using the Powersym and Promod software suites.

He also decided to further his studies during this period, obtaining a second honours degree — this time in operations research — from the University of South Africa in 1986, and successfully completing the Management Development Programme of the University of South Africa's Graduate School of Business in 1987.

In 1996 John joined Eskom's System Operations Department where he assisted in developing the Eskom Power Pool, a bidding system by which power stations can sell power to the Transmission Department. A reserve market was set up, initially with generating units offering governing and automatic response services and subsequently also incorporating demand market participants in the form of large industrial customers who are prepared to reduce their electricity demand loads for an agreed payment. He also assisted Eskom's Hydro Engineering Division in the design of the Ingula Pumped Storage Projects by simulating the effects of inclusion of the projects on national energy generation costs. As a result the number of sites at Ingula was increased from three to four.

John is a regular contributor at ORSSA conferences, often also making his expertise available to ORiON, and has served on the Executive Committee of the Johannesburg Chapter of ORSSA. For his high-quality operational research and analytical work within the energy sector over a period of more than thirty years, John Francis Dean was, on the 16th day of September 2014, duly awarded a Category I ORSSA Recognition Award.

ORSSA: Category II Recognition Award Presented to Pieter Juriaan de Jongh

Citation by Hennie Kruger

Pieter Juriaan de Jongh was born in Malmesbury on February 20th, 1956. After matriculating with an A-aggregate from Goudini High School in Rawsonville in 1973, he enrolled for further studies at Stellenbosch University. There he obtained a BCom degree in 1976 and a BCom Hons degree in statistics in 1977. He followed this up with an MSc degree in statistics cum laude from the University of South Africa in 1982 and a PhD in mathematical statistics from the University of Cape Town in 1985. In 1987 he also completed post-doctoral studies at the University of North Carolina at Chapel Hill, USA.

Riaan started his working career in 1980 when he was employed as Chief Scientist at the Institute for Maritime Technology (IMT). In 1996 he took up a position as Senior Consultant at Deloitte and Touche Consulting Group, where he was promoted to Manager the following year. Since 1998 he has held the position of full Professor in Business Mathematics and Informatics at the erstwhile Potchefstroom University for Christian Higher Education. In 2003 he was also appointed Director of the Centre for Business Mathematics and Informatics at the current North-West University (Potchefstroom Campus).

He has authored and co-authored a large number of peer-reviewed journal articles and conference papers. For one of these articles, entitled "Risk estimation using the normal inverse Gaussian distribution", he was awarded the Herbert Sichel Medal by the South African

Category II Award recipient, Pieter du Jongh with ORSSA President Hennie Kruger.

Statistical Association in 2005. He was also awarded the Tom Rozwadowski Medal by ORSSA in 1994 and was part of the Deloittes team that won the internationally acclaimed Franz Edelman Award in 1996, awarded by INFORMS. In addition to his duties as Director of the Centre for Business Mathematics and Informatics at North-West University, he has also supervised twenty six MSc students and two PhD students to completion.

Riaan has been a member of ORSSA since the early 1980s. He is also a Fellow of the South African Statistical Asso-

ciation as well as a member of the American Statistical Association. In addition, he is also a member of a number of other national and international societies and has served on various international committees, such as being the South African Regional Director of the Global Association of Risk Professionals during the period 2002–2008 and a council member of the International Society of Business and Industrial Statistics during the period 2008–2013. As Director of the Centre for Business Mathematics and Informatics at the Potchefstroom Campus of the North-West University, Riaan played a key role in establishing the unit as a Centre of Excellence within the field of Risk and Business Analytics. Notably for ORSSA, he also established a Business Analytics Programme during 2012 which is strongly focused on operations research. The Centre and the Business Analytics Programme play a prominent and significant role in delivering a large number of scarce-skills graduates entering the job market. For this single, outstanding service to the profession of operations research, Pieter Juriaan de Jongh was, on the 16th day of September 2014, duly awarded a Category II ORSSA Recognition Award.

ORSSA: Category IV Recognition Award Presented to Lieschen Venter

Citation by Michele Fisher

Lieschen Venter was born in Johannesburg on January 9th, 1985. She fell in love with the Western Cape after moving there when she was ten years old and completed all of her studies at Stellenbosch University.

She followed up a bachelor's degree in the mathematical sciences in 2006 by a bachelor of commerce honours degree in operations research in 2007. Her studies and achievements that year sparked a passion for operations research and the role of ORSSA in its advancement. Her honours year project, entitled "Optimal allocation of workers to tasks on a production line" was a finalist in ORSSA's national student competition in 2008. Lieschen was awarded a Sasol postgraduate bursary to pursue a master's degree in commerce with specialisation in operations research. She achieved this qualification based on a thesis on meta-heuristics for petrochemical blending problems in 2009.

Upon graduation she joined Sasol's Decision Support Team in Secunda, Mpumalanga. While working at Sasol, she further developed her expertise in optimisation and applied new techniques such as stochastic operations modelling. Her use of system dynamics to support executive decisions in the company broke new ground and has been presented at ORSSA and INFORMS conferences. She also applied these skills in support of the wider community by building Sim School, a model used by Sasol's Inzalo Foundation to develop leadership skills in South African schools. Recent work on project metrics, including statistical methods for calculating contingency and escalation for cost estimation, was requested and used by senior managers in the company to monitor and improve project management.

Lieschen is passionate about teaching and using her analytical skills to make a difference. In the four years that she has worked at Sasol, she has provided insights on

ORSSA President Hennie Kruger with Category IV Award recipient, Lieschen Venter

a range of problems from petrochemical to corporate social investment. She is a technological wizard who is up to date on the latest developments and is able to find creative solutions to information management challenges. She has also demonstrated the soft skills required to properly define problems, maintain client engagement and communicate meaningful results. Lieschen has been very proactive in developing her skills and in sharing her talents as a mentor and team member. She was selected to be a One Young World Ambassador at the Leadership Summit held in Johannesburg in 2013. Her leadership skills have also been evident within ORSSA. Lieschen has served on the Society's Executive Committee since 2012 as the Vaal Triangle Chapter Chair and she also chaired the organising committee for the Society's annual conference this year.

Because of her wide range of high-impact operations research work that has been used to support important decisions at Sasol since 2009, as well as the leading roles she has played in developing operations research within the company and in the community at large, Lieschen Venter was, on the 16th day of September 2014, duly awarded a Category IV ORSSA Recognition Award.

ORSSA Student Competition Awards 2014

By Machteld Strydom, Department of Decision Sciences, UNISA (Strydmc@unisa.ac.za)

2014 ORSSA Student Award Co-ordinator

This year was the first time that I was asked to coordinate the annual student competition. Everybody has time constraints and it is not always easy to find the time to do this kind of work. I want to thank the adjudicators who gave of their time to evaluate the projects.

Judging the masters' projects to find the ones to invite to the conference were Tilla Fick, Mardi Jankowitz (also of the Department of Decision Sciences at UNISA) and Hans Ittmann. For the fourth year projects it was me (Machteld Strydom), Winnie Pelser and Hans Ittmann.

There were 6 fourth year entries and 5 masters level entries. Theses covered a large spectrum of different problem areas. We realise that these submissions were the best from the respective universities, but it was still encouraging to observe the quality of the work. All the submissions were well written, well structured and clear while the general appearances of the theses were excellent.
The nature and variety of the topics of the theses made it very difficult to compare and evaluate them. Some of the theses were more practical and applied in nature while others were more research-oriented and this makes comparisons so difficult. All of them can be considered winners.
The two masters' projects considered to be best were:

- Berndt Lindner (Stellenbosch University)– Determining optimal primary sawing and ripping machine settings in the wood manufacturing chain.
- Francois Fagan (Stellenbosch University)– A qualitative model of evolutionary algorithms.

The two fourth year projects selected were:

- Sumarie Meintjes (University of Pretoria)– Multi-objective optimisation of a commercial vehicle complex network
- Rhynard Prins (Stellenbosch University)– Simulation and Order Planning of a Spice Processing Plant

At the special competition session of the conference there were six referees: Hans Ittmann, Jeanne le Roux, Marthi Harmse, Tilla Fick, Mardi Jankowitz and myself. All the presentations were very interesting and well structured. It was again very difficult to decide, but in a competition there has to be a winner.In the end , the winners were Sumarie Meintjes in the Fourth Year/Honours category and Francois Fagan in the Masters category. Congratulations to them both!

In addition to the awards for the best student projects, there were also awards for the best presentation at the conference by an honours/4th year student, masters student and

Dirk Human (right) of Stellenbosch University receives his award for the best presentation by a 4th year/honours student from ORSSA President, Hennie Kruger

Sumarie Meintjes receives (right) the Gerhard Geldenhuys Medal from ORSSA president, Hennie Kruger.

Jan van Vuuren (right) receives the Theodore Stewart medal from its namesake on behalf of Francois Fagan.

doctoral student. The recipients of these awards were Dirk Human, Thloni Masipa and Mark Einhorn, respectively. For the second year in a row now Stellenbosch University has made a clean sweep of all three student presentation awards. Well done to all three of them!

Mark Einhorn (right) of Stellenbosch University receives his award for the best presentation by a doctoral student from ORSSA President, Hennie Kruger

Thloni Masipa (right) of Stellenbosch University receiving her award for the best presentation by a masters student from ORSSA, president Hennie Kruger

The Tom Rozwadowski Award 2014

By Dave Evans (davevans@gmail.com)

ORSSA Marketing Manager and 2014 Rowadowski Award Co-ordinator

The Tom Rozwadowski medal is the Society's premier award and has been awarded on a virtually annual basis since 1971. The medal is awarded for the best written contribution to Operations Research made by one or more members of the Society during the previous year, in memory of Tom Rozwadowski, a founder member of the Society who died tragically with his family in an accident.

Contributions of an OR nature published in journals of international standing during the previous year, are eligible for consideration. Eighteen papers which were published in 2013 were submitted, covering a wide range of theoretical and case study topics. This may be the largest number of nominations received in one year.

These were screened by a nomination committee, nominally consisting of the vice-president [convenor], and the chapter chairpersons, and adjudicated by a selection committee consisting of the president, the immediate past-president and two members of the executive committee. In practice, many of those participants in the process are often conflicted, as they have papers under consideration, so they withdraw from the evaluation. This happened again this year, and I was asked to lead the process, as I have done for several years. Additional members were identified who were prepared to be appointed to the selection committee. As

Stephan Visagie receives the Tom Rozwadowski medal from ORSSA President, Hennie Kruger.

usual, the papers ranged from good upwards, and the final adjudication was close between several excellent papers.

The winning paper was: *Order sequencing on a unidirectional cyclical picking line*, by Jason Matthews and Stephan Visagie, published last year in the European Journal of Operational Research.

The abstract of the paper reads: A real life order-picking configuration that requires multiple pickers to cyclically move

Jason Matthews (left) and Stephan Visagie (right) show off their Tom Rozwadowski medals.

around fixed locations in a single direction is considered. This configuration is not the same, but shows similarities to, unidirectional carousel systems described in literature. The problem of minimising the pickers' travel distance to pick all orders on this system is a variant of the clustered travelling salesman problem. An integer programming (IP) formulation of this problem cannot be solved in a realistic time frame for real life instances of the problem. A relaxation of this IP formulation is proposed that can be used to determine a lower bound on an optimal solution. It is shown that the solution obtained from this relaxation can always be transformed to a feasible solution for the IP formulation that is, at most, within one pick cycle of the lower bound. The computational results and performance of the proposed methods, as well as adapted order sequencing approaches for bidirectional carousel systems from literature, are compared to one another by means of real life historical data instances obtained from a retail distribution centre.

Congratulations to the winners! My thanks go to all the nomination committee members for their efforts; reviewing eighteen papers is a lot of work.

ORSSA Member Interview: Alewyn Burger

by Mark Einhorn

Alewyn Burger was born in Worcester in 1968. He studied towards a BSc degree at Stellenbosch University from 1985 to 1988 and followed this up with a BSc Hons degree the following year in 1989, also at Stellenbosch University. He started his Masters degree in Applied Mathematics at UNISA in 1992 and obtained it the next year, in 1993. Between 1995 and 1998 he completed his PhD in Applied Mathematics on *The Queens Domination Problem*, again at UNISA. Between 2000 and 2008 Alewyn was involved in post-doctoral studies at UNISA, the University of Victoria in Canada and Stellenbosch University. As of 2009, Alewyn was appointed as a Senior Analyst at Stellenbosch University, a position he still holds today.

How did you first come to be involved with Operations Research and how long have you been a member of ORSSA?

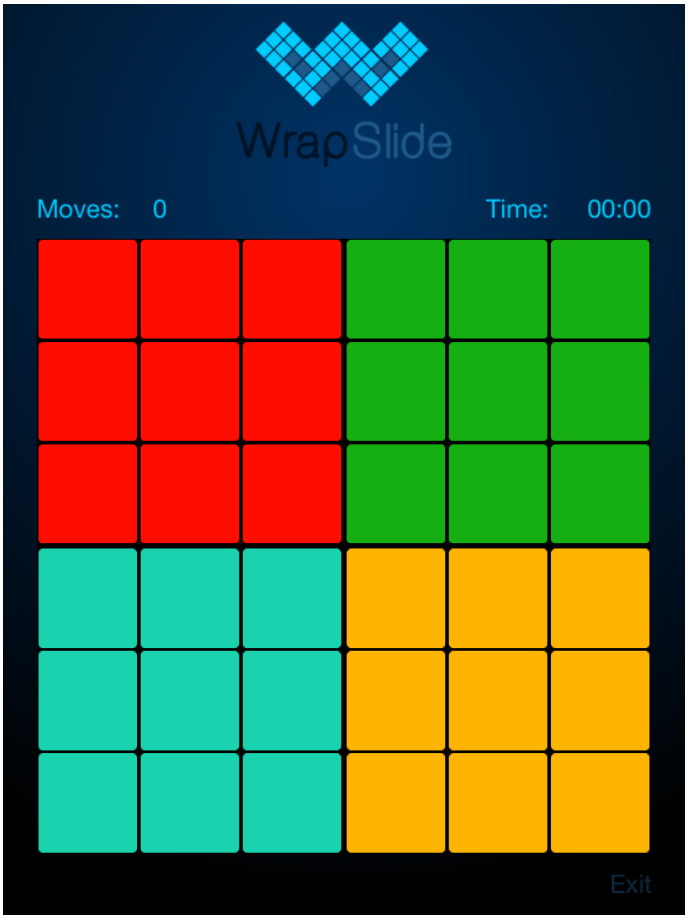
I joined ORRSA in 2005 when I started a post-doc at Stellenbosch University under Prof Jan van Vuuren. **As I understand it, you are a researcher within the Department of Logistics at Stellenbosch University, am I correct? Can you elaborate on some of your past and current research projects?**

Yes, that is correct. My interest tends more to the pure side of mathematics, namely, graph theory and combinatorial optimisation. I also like programming. A problem that was pure OR and combinatorial in nature that I quite enjoyed working on, was a colour print scheduling problem where one has to schedule a number of print jobs for a printer such that the total number of colour changes between jobs is a minimum.

Another problem which I enjoyed working on was the lottery problem, where one has to find the minimum number of lottery tickets you need to buy in order to be sure you win a prize. I also did some research on Latin Squares, particularly designing algorithms for finding Mutually Orthogonal Latin Squares. Thinking about algorithms for traffic-lights that self-organise traffic is also quite interesting.

I am also aware that you have recently had a mobile game that you developed, called WrapSlide (of which I am a very big fan!) accepted by Apple's App Store. Can you tell us a little more about the game in terms of what it is about as well as its inspiration and development?

WrapSlide is a rather difficult slide puzzle that reminds a bit of a Rubik's Cube: it is easy to mix but very difficult to restore again to its unmixed state. The unmixed puzzle is a grid of tiles, where tiles in each quadrant have the same colour. A move consists of sliding either the bottom, top, left or right half of the tiles together (tiles wrap around when moved). The puzzle comes in three sizes, and you can try



A screen-shot of an unscrambled WrapSlide puzzle.

it with either 2, 3 of 4 colours. I would say the medium puzzle (6 by 6 tiles) with 4 colours compares in difficulty with a Rubik's Cube. So far, I don't know of anybody being able to solve it. When trying to solve the puzzle, I would recommend starting with fewer colours or the small size.

I deliberately set out to design a slide-puzzle, since I thought today's touch-screen technology is ideal for sliding things around on a screen. The challenge was to find a puzzle that is both elegant and hard to solve. It took quite a while for me to come up with WrapSlide.

What was the process of dealing with Apple like?

I had a developer doing most of the work, but Apple is quite strict with the quality control of their apps. You have to fill in a lot of forms and tick a lot of boxes compared to submitting an app to Google's store. Also, you have to wait 5 days or so for the app to be approved.

What has the uptake of the app been like?

There are downloads every month, but not many. I received a nice review on nontrivialgames.blogspot.com (look under the reviews for May), which helped to increase downloads a bit. It is a very competitive world, so marketing is important. There is also some mathematical interest in the puzzle, which is nice. If you use the minimum number of turns, the Rubik's cube can always be solved in 20 moves or fewer. WrapSlide seems to need slightly more moves to solve. So far I found one configuration for WrapSlide that can't be solved in 20 moves. I am not sure if there are configurations that require more moves than 21.

In spite of being a free download, is WrapSlide able to generate any form of revenue? If so, how?

Yes, an add might pop up just before you try to solve the puzzle. If you click on it, I will get a few cents.

Are you looking into developing an Android version of the app?

An Android version is now also available in Google's Store.

How could our readers go about downloading WrapSlide?

They can search for "WrapSlide" in Apple's iStore or in Google Play.

Lastly, what are some of your fonder memories as a member of ORSSA?

I don't consider myself a very active member of ORSSA, probably because my tendency is more towards pure mathematics. But I must say, the one or two ORSSA conferences I attended, were quite nice and memorable experiences.

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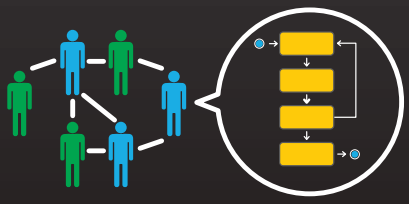

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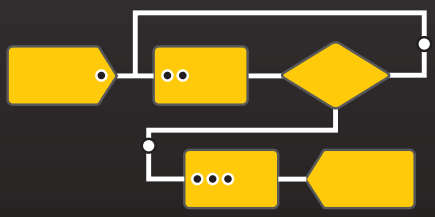

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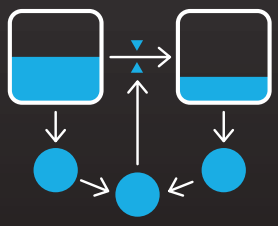

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