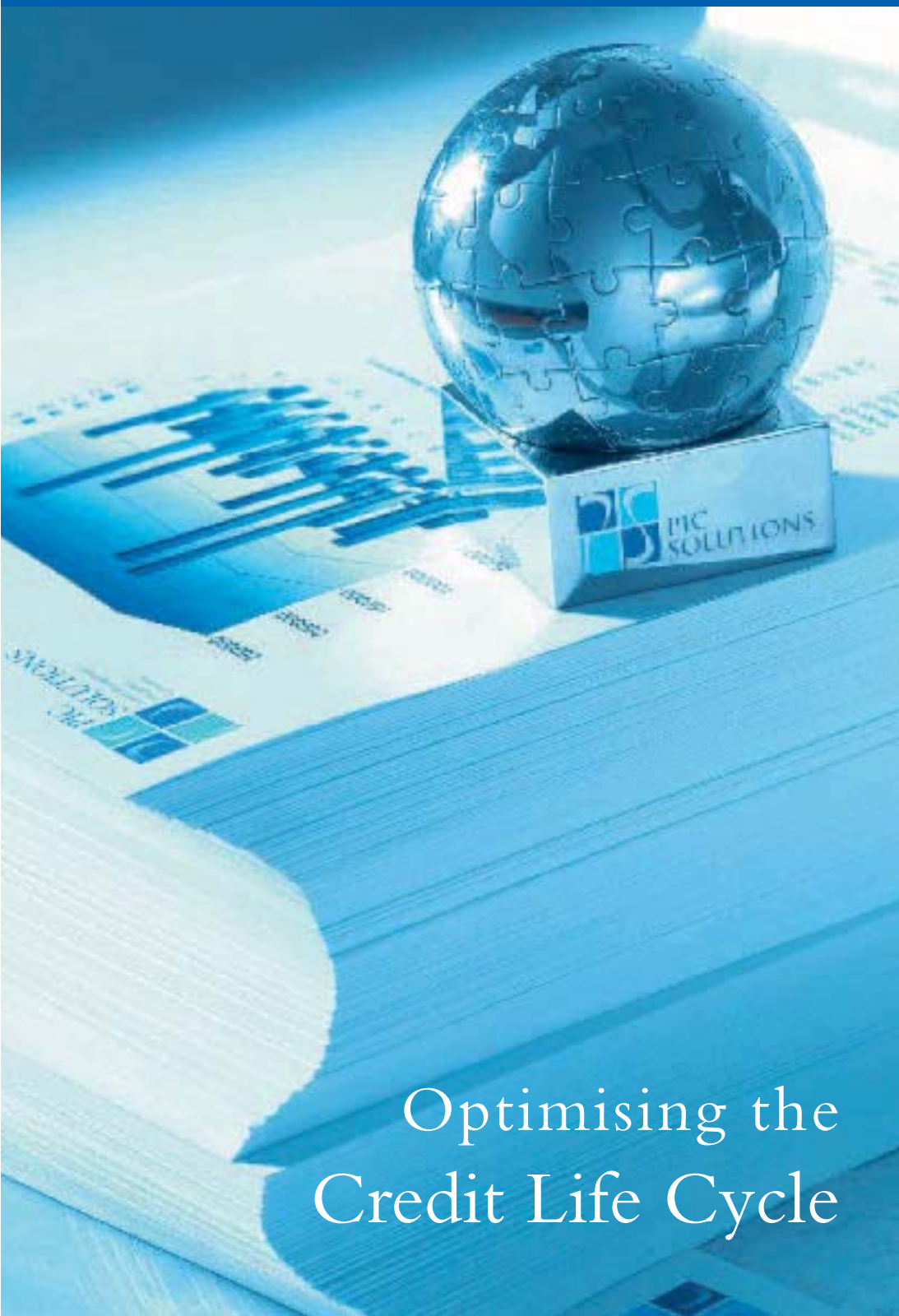# Newsletter

Operations Research Society of South Africa
Operasionele Navorsingsvereniging van Suid-Afrika

October 2003

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FROM THE PRESIDENT'S DESK

By Wim Gevers
ORSSA President
wg@sun.ac.za

Wim Gevers

It is a privilege to write my first president's letter to all of you reading our excellent newsletter – and obviously also an obligation towards the newsletter editor!

It is probably the first time in many years that the president of ORSSA does not come from the practitioners of Operational Research nor from an academic department where OR specialists are being trained. The fact that I am involved with OR at a Business School and the teaching thereof on an MBA programme, will probably result in a slightly more management oriented approach in what I have to say!

In this letter I am not going to focus on a particular approach to decision analysis, nor on the latest hot management topic. I want to briefly focus on our most valuable resource – People.

We live in an era which some call the information era; others call it the knowledge economy. What is very clear is that more and more people are being employed by organisations in the service economy. Not that comments about people are limited to those working in the service economy – in fact whether persons are employed in agriculture or mining or production or the services – if it were not for people, very little would get done.

This brings me to the first point that I wish to make. Do we treasure our staff in organisations sufficiently that we treat them on an equitable basis with all other stakeholders? In the past it was usually the financiers of an organisation that put capital at risk and in exchange received a shareholding. The reward for taking the risk and making a necessary resource (finance) available gave the shareholder dividends as well as growth in share value if the company performed well. But employees also make a necessary resource available – the ability to do a specified job to the required quality standards within an expected time. Reward for the hours spent is via a remuneration package. But the employee today is also at risk. Gone are the days of lifetime employment. Downsizing (an ugly euphemism for retrenchment) is the order of the day, and a livelihood can be cut off. How is the employee rewarded for taking that risk? Many companies have gone the praiseworthy route of substantial performance based bonuses and in some cases even to share incentive schemes (although this is usually reserved for senior management). The question, however, remains whether the employees are treated as equal partners with the financiers and business idea generators when it comes to reward for taking risk. I am convinced that we as operations researchers could make some relevant inputs in this equation.

The second point that I want to make in his brief note is related to the reward expressed above, but it is that intangible reward – the appreciation expressed for a job well done. In fact we can become so performance driven that high quality work becomes the norm. We tend to see deviations from the norm when people are not performing to our expectations, and tend to praise when people are exceeding the norm (although criticism is probably more prevalent than praise!). But do we give sufficient acknowledgement when people are continuously delivering according to the standard, high quality norm? I have learnt that appreciation expressed for a job well done can make a world of difference to those doing the job – even though my analytical brain tends to accept that that is the norm and that it is expected.

That brings me to a word of appreciation and genuine thank you to a number of persons who have really made high quality service the norm and who have rendered exceptional service to the OR community in South Africa.
Firstly to Hans Ittmann – for taking on the strains of becoming president for a second time when a vacuum was left when Rob van den Honert left for Australia;
then to Paul Fatti who has now retired as editor of ORiON after occupying this time consuming and often ungrateful position (when you chase referees) for 8 years;
Then also to some other committee members:
Jan van Vuuren and Isabelle Nieuwoudt for a totally revamped and updated website of ORSSA;
Theo Stylianides who has put the finances and database on the straight and narrow;
Leo Tome for revamping and publishing a worthwhile newsletter like clockwork;
Esbeth van Dyk for an efficient and meticulous secretariat;
The rest of the committee for doing voluntary work well.

With respect to our recent annual conference a big word of thanks to:
Gys Wessels and Thereza Botha for a well run conference;
All the speakers at the conference who took the trouble of making a presentation on the work that you have been doing – without you there would be no conference!
Esbeth van Dyk and Willem Fouche in assisting with the adjudication for the Tom Rozwadowski award; and congratulations to Kobus Wolfaardt and Rene Fossati for winning the Tom Rozwadowski award.

I thank you, the members, for putting your trust in me to be your president for the next two years, and I hope that your committee will serve you well. ♦

Cover:

The cover is a collage of photos taken at the ORSSA Annual Conference 2004 held at the ABSA Conference Centre in Pretoria.

Voorblad:

Die voorblad is 'n collage van foto's wat geneem is by die ONSA Nasionale Konferensie 2004 wat gehou is by die ABSA Konferensie sentrum in Pretoria.

COVER

14 ORSSA ANNUAL CONFERENCE

features

FROM THE EDITOR

Leo Tomé

This issue is packed with a wide variety of articles and firsts.   There are the usual, like the president's letter and the member profile, as well as an interesting article on OR in credit scoring and some chapter and conference feedback.

Kluwer Publishers has also agreed to sponsor books for review.   Inside you will find a list of these books. Have a look at them, and please let me know if you are interested in reviewing one of them.

At the recent conference it once again became apparent that the society needs to adapt, to keep up with the times, and the needs of the members. I would like to hear your thoughts on the challenges facing ORSSA and the needs of you, the members. What do you want ORSSA to be for you? Please send me a letter (or e-mail) and give your views. The best letter will also win a book prize! So start writing.

Sommige lede het hulle kommer uitgespreek aan die engelse aard van die nuusbrief. Indien u een van hulle is, wil ek u uitdaag om dit te verander deur u afrikaanse artikels vir my te stuur.

This is the last issue for 2003, a year of big changes for the newsletter. I would like to thank everybody that made it possible, whether it was through verbal support, contacting advertisers, or submitting an article.

To all of you, the members, I would like to wish the best for the final stretch of the year. I hope that you will all be well rested after the festive season and that 2004 will be an even bigger year than 2003.

Until next time,
Leo Tomé

MEMBER PROFILE: HANS ITTMANN

By Leo Tomé
University of Stellenbosch
ldtome@dip.sun.ac.za

Hans Ittmann

Hans Ittmann is currently Manager of the Centre for Logistics and Decision Support, Division of Information and Communications Technology at the CSIR. Before starting his illustrious career at the CSIR in 1973 he served in the South African Air Force as a pilot. During his years in service he obtained a B.Mil. (B.Sc.) degree, later furthering it with an honours and masters degree in operations research. Hans has been a very active member of the society since he joined in 1973. In this period he has served as secretary and chairman of the Pretoria chapter, treasurer and additional member on the executive, business manager of Orion, and finished his second term as president this year (the first term being in 1986). Hans has also made some substantial contributions to OR in South Africa leading to him winning the Tom Rozwadowski Medal on two occasions. He has represented the society in the international arena well over the years. Currently he is the ORSSA representative on the EURO council and IFORS educational committee and has served in various other capacities for international societies.

Question: You have had a long association with ORSSA during which you served as president on two occasions. When did you become involved and why?

Answer: I attended my first ORSSA conference in 1973; if I remember correctly it was held at UNISA that year. During those years the Pretoria chapter was fairly active and being an active member I was soon pulled into the chapter committee - initially as secretary of the chapter and later as chairman. This was during the late seventies, early eighties. In 1982 I became treasurer of the society and President in 1986. I believe very strongly that one needs to give back to a professional society as much as you get from it. My attitude was thus always to contribute to the running of the society in whatever role I was approached to serve. One cannot sit back and let others do the hard work!

Question: As was mentioned in the first question, you were president of ORSSA on two occasions. In what way has the role of the society changed and where do you see this role going?

Answer: In the last newsletter I tried to reflect on whether there have been changes in the role of the society and whether there were changes between 1986 and now. OR is much more mature today and it is possibly much more widely used today than in those early days. However, what is different is that for many who are using OR models, techniques, etc. this is not under the banner of OR. Most people are not aware that what they are practising is Operations Research. In a sense the widespread use is great

because it shows the value of OR. For us as a society this should be a concern since we should ideally have all these people practising as Operations Researchers and being members of our society. This is possibly idealistic, but I do believe our role as a society should be much stronger outwards to market not only our profession, but also our society and more importantly, make the world aware of the value of OR.

Question: What would you consider to be the highlight of your career in operations research?

Answer: I have been in OR for more than 30 years and there have been many highlights. In the early years when I was still doing some technical work, receiving the Tom Rozwadowski medal jointly with colleagues on two occasions were definite highlights. Within my own environment we had to go out and "market" ourselves, get projects, etc. To be able to do this consistently over more than fifteen years was, and still is, a highlight. Chasing budgetary targets has not always been that easy! Another highlight, and privilege, is the top people, colleagues in OR, that I have been fortunate to work with and be associated with. This interaction with top people was not only very challenging, they kept you on your toes, but at the same time very rewarding in terms of the high quality of outputs that was produced.

Question: Recently you have been part of an international panel that took a look at the state of the OR profession. How do you feel about the state of OR in South Africa as well as the future of OR?

Answer: I am very optimistic about OR in South Africa. As I have indicated elsewhere, I am continuously amazed at where OR is being used in South Africa, it is much more widespread than what we realize. In this sense I am not concerned about its future. The only downside is that most of this work is done under a non-OR banner! How to change this is a tremendous challenge for our discipline here in South Africa. Whether we can change it is a totally different issue. Something else worth mentioning is the fact that there are initiatives all over Africa to get OR groups more active in the different regions. I am very encouraged with what I observe and we could see a proliferation of OR use in this continent.

Question: Do you have a message for young aspiring OR practitioners?

Answer: Operations Research is a wonderful discipline that combines the use of quantitative methods and techniques, with practical real life problem solving. The nature of the discipline makes it applicable in almost all areas of life, i.e. all businesses, industries as well as government. To get exposed to many of these different domains is very stimulating. To young OR practitioners I can confidently say there are many, many complex problems out there in the real world that we as OR people can address. The challenge for you is to go out there, find them, solve them and support proper scientific decision making in the process. In this way we as OR practitioners can make a real impact that is very relevant! ♦

A PERSPECTIVE ON OR DOWN UNDER

By John Hearne (john.hearne@rmit.edu.au)

from the RMIT University

John Hearne

It is only five months since I left South Africa to take up a position in Melbourne. This is not enough time to give a definitive view on the state of OR in Australia but some first impressions of OR in Melbourne might be of interest.

RMIT University, where I work, is in the centre of the city right opposite the Melbourne Central Station. The University of Melbourne (UM) is also walking distance or a short tram ride away. RMIT thus makes an ideal venue for the monthly meeting of the chapter. Due to my first semester lecture schedule I was only able to attend one of these meetings. There seemed to be a fair spread of people from the several universities in the region, the commercial world, and some private consultants. It was good to see Moshe Sniedovich whom many of the older members of ORSSA will remember from his days at CSIR. Moshe is based at UM now and an active office-bearer at all levels of OR organisation. Santosh Kumar, based at Victoria University of Technology, is also active here and well-known to ORSSA. He spent many years in Bulawayo and at one time had about 20 of his students register with ORSSA. In addition to the chapter meetings, postgraduate students at UM organise a weekly meeting (ORSUM). Student projects are presented as well as invited specialists.

With a population between three and four million one expects there to be many opportunities for practising OR. While this is true there is the usual ignorance amongst clients of just what OR could do for them. There is also a feeling that companies don't realise the extent of local expertise and have a culture of referring their problems to offshore consultants. This is especially true in the case of multinational corporations.

Another negative sentiment amongst OR practitioners is that potential clients refer their OR problems to people from other disciplines. Business and engineering graduates thus effectively do a lot of the OR work and possibly not optimally.

As South Africans know only too well, sport is big in Australia and there is a range of OR activity in this area. Gambling is also big and any OR work linking sport and gambling makes headlines in the local newspapers. Readers are eager to know, for example, to what extent homeground advantage should be factored into their bets. An article like this is the most effective way to advertise OR and one's department!

If anyone will be here for the Rugby World Cup please pop in. Just ask for the Department of Maths and Stats right opposite Melbourne Central Station and 15 minutes walk from the Telstra Dome where some matches will be played. I watched England beat Australia there a few weeks ago. There was a terrific atmosphere and loads of 'Pommie Bastards' supporting their side to a convincing win. ♦
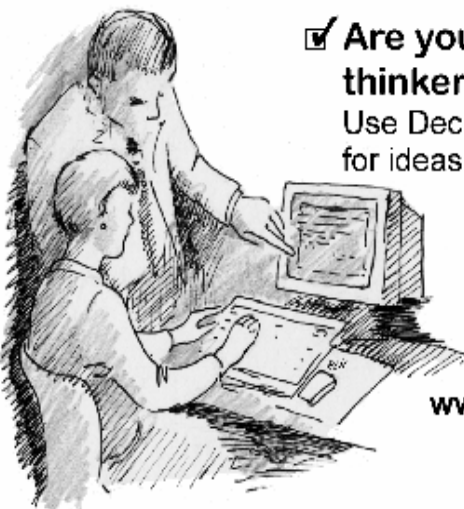
Operations Research in the Credit Scoring arena

Eva Neves has over 9 years of risk management experience in both the development and implementation of scoring models and systems. Currently she is managing the predictive modelling team in PIC Solutions as Senior Consultant. Previously at Deutsche Bank, she worked as a management consultant for various IT implementation projects in Europe, where she was in charge of the business design of the software products. Previously with Fair, Isaac International, she managed the development of scoring systems for the Europe-Middle-East-Africa region, ranging from paper-based application scorecard developments to suites of advanced customer-level models. She has a BSc (honours) degree in Business Studies from the University of Sheffield and an MSc. in Operational Research from the University of Birmingham. She is also a member of the Institute of Credit Management, the Operational Research Society of South Africa and the South African Statistical Association.

Financial institutions face many decisions on every day credit lending. From the point in time when a customer walks through the door requesting a product through to the point in time when a customer or account is written off the books because of bad payment behaviour, companies need to make decisions and take actions both on a reactive and proactive manner.

Traditionally, banks responded on a reactive basis, and only at the customer's request, they would grant credit or additional exposure. Cross selling was also driven by marketing based on, for example, cluster analysis of what the customer looked like or may buy, rather than on the risk that was supposing to the bank. The whole system was found to be inconsistent and very manual, causing customer dissatisfaction and expensive manually-intensive processes. A more effective decision making tool was required.

In 1956, two American operational researchers thought that some of the mathematical techniques available could be applied in order to optimise the process. By looking at the past data, one could predict the probabilities of a customer reaching a certain stage of delinquency based on the information gathered from the application form. They focused first on the application stage of the decision making, where a customer applies for a credit risk product and requires an accept/decline decision.

In the past, underwriters in each branch would review and assess the application information and decide whether the customer was credit risk worthy. Although a final decision was reached, the exact level of risk the bank was taking when opening the account was unknown. Training of new underwriters was a long process and gut feel decisions were being taken daily. There was also a lack of central control of what was happening in the branches. The whole process could take about a week for high amount lending products like mortgages and lots of manual checks had to be in place to minimise risk.

Development Window

Figure 1 below illustrates the development window used in application scorecard developments. A period of applications is selected from the past and its subsequent performance observed.
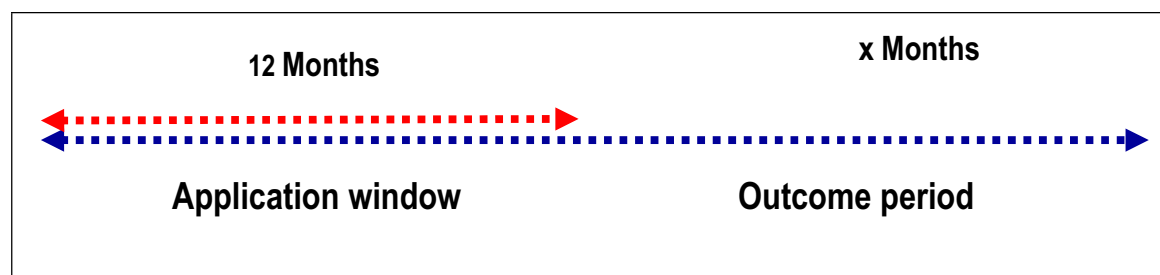
Figure 1

The choice of the development window depends on the time required for accounts to be on the books to mature and show true performance. Furthermore, it is important that this is not too long for the applications to be representative of the future through-the-door population. A final issue that has to be addressed is seasonality; it is best practice to avoid this by selecting applications representing every month during the year. Usually, a 12 month window is selected.

Model Outcome

One of the first steps in the modelling, once data has been extracted and validated, is to define the outcome that we are trying to predict. The first scorecards were built to predict risk and so this article focuses on this definition. It is important to say, though, that nowadays scorecards are developed to predict all types of outcomes; how much a customer is going to repay, when the customer is likely to close the account, whether he has a particular propensity to spend on a certain product, or respond to a particular mailing. Whatever the outcome, most of the principles still apply.

In risk scorecards, customers or accounts are usually classified using what is known as contractual delinquency. This counts the number of consecutive months the customer has ever missed a payment. For instance, a customer has missed 3 consecutive payments or may have missed 3 times 1 payment. Whatever the definition, it is important to keep this as simple as possible.

The business then has to define what a good and a bad customer is using the contractual delinquency scale. A bad customer is usually defined as the customer that, if the bank had known what they know now, they would not have accepted at the point of application. A group of indeterminates is also defined. The main reasons for this group are that it is difficult to decide on where the separation between goods and bads are, and that it makes it easier for the model to have clear risk patterns if we separate them slightly. We are taking a recent sample, so some of the indeterminate accounts will eventually become bad.

Usually, a certain percentage of indeterminates is considered optimal. If this group is too small, the scorecard will struggle to differentiate between the characteristics that make a good different from a bad. If this is taken too far, though, the model will only be able to predict the extremes (super goods and super bads), giving no benefit to the decision making process. The rates in application scorecards should be about 5-15% of the population.

In order to build an effective model, it is recommended that the definition be kept simple. It must be as stable as possible but also has to be easy to understand and to remember. The quality of the overall portfolio is then measured by the term odds: probability of an application reaching the bad definition in the future. This is calculated by simply dividing the percentage of goods by the percentage of bads.

Predictors

All predictive information is taken from the point of application and includes data from the application form (geo-demographics), existing customer files and bureau payment profile (credit bureau external pooled databases). Both continuous and categorical variables are used and the values are usually grouped (classed) in order to remove noise in the data and ensure statistical significance.

Finding the optimum solution

Many techniques are currently applied to the modelling of the problem. Some organisations have chosen linear/logistic regression, as this is currently widely available in many software packages. Others decided to apply neural networks to ensure all interactions in the data were taken into account in the model built. This latter technique is currently used mainly in the Fraud detection arena, but due to the volume of data required and the lack of understanding (black-box approach) of the model output, many organisations still prefer the traditional regression approach. Some current research is also being carried out in applying Bayesian probabilities to develop the scorecards.

The main vendors use Multiple Goal Linear Programming to optimise the solution. This was the approach taken by the first American company to apply OR techniques to the problem. Although a very successful technique in building scorecards, it is not widely available as a package in the market yet.

Goal programming allows for a series of constraints to be applied to the data, making it more palatable to the business and more understandable to the scorecard builder. It also allows the scorecard builder to apply his/her experience in order to get rid of the noise in the data. The multiple objectives vary by organisation, but the main idea behind it is to optimise what is called divergence.

Divergence is a measure of the predictive power of the scoring system. When building a scorecard, it is important to optimise the score separation of the goods and the bads. This is done by maximising the difference of the score means for each group and minimising the variance of the two groups.

$$\text{Divergence} = \frac{(\mu_g - \mu_b)^2}{1/2\,(\sigma_g^2 + \sigma_b^2)}$$

where μ_g equals the mean score for the goods, μ_b equals the mean score for the bads, σ_g^2 equals the variance of the score for the goods and σ_b^2 equals the variance of the score for the bads.

Figure 2 below illustrates this concept for a scorecard. Divergence measures how far apart the two curves are (d).
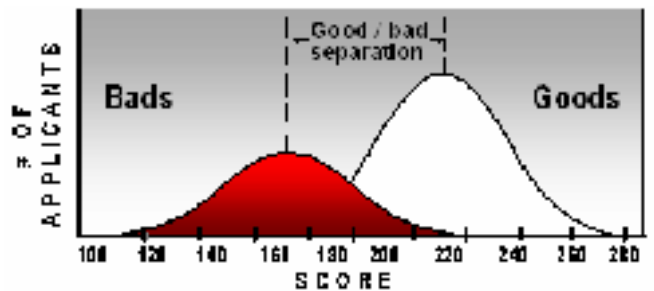

Figure 2

This measure assumes a normal distribution and so, some argue that trying to optimise log likelihood of an application going bad improves the solution.

Whichever the technique, once the algorithm finds a solution, this is translated into weights for each attribute in the predictive characteristics that made it into the model. The score for an applicant will be the sum of all the weights for the characteristics. The higher the score, the better the applicant. An example of the final output is shown below:

AGE	Score
18-27	14
28-33	23
34-45	30
46+	32

RESIDENTIAL STATUS	
Owner	45
Tenant	35
Other	30

Usually, a linear transformation is made to make the relationship between score and odds linear, providing a scale with which the organisation can rank order applicants and choose cut off scores for their different strategies.

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Summary

Scorecards are applied throughout the credit life cycle of an account in most organisations. Wherever the bank has to make a decision, from cross-selling to increasing credit card or overdraft limits, scorecards are now the main information used on the customer or account in order to ascertain their risk level in a lot of organisations.

Regardless of the technique used, they have been found to add benefit both from the operational and the profitability point of view. They have increased productivity and focused the experience of underwriters where they are mostly needed. They have also made the process a lot more consistent and easier to control from the central departments, making it possible for organisations to provide a better customer service whilst maximising profit.

This is a real example of how applying a mathematical technique to the data available has simply revolutionised the industry of credit lending, moving it from a completely manual process to a customer data driven decision system. ♦

The International Conference on Competitive Manufacturing (COMA '04) is taking place for the second time. In the year 2004 the theme of the conference will be "Progress in Innovative Manufacturing". The main objective of the conference is to present recent developments, research results and industrial experience related to the improvement of competitiveness in the field of manufacturing. A further objective of the conference is to be a generator of innovative ideas and fruitful collaboration both locally and abroad.

Progress in Innovative Manufacturing

4-6 February 2004
Stellenbosch, South Africa

Website: http://www.ie.sun.ac.za/coma

BOOKS AVAILABLE FOR REVIEW

Thanks to a generous sponsorship by Kluwer Academic publishers there are four books available for review. These reviews are for the March, June, October and December 2004 issues of the ORSSA newsletter.

Below there are eight books to choose from. Any member who is interested must please contact the editor and specify which book he or she would like to review. A short CV specifying the member's background that will enable him or her to review the book must also be sent. All enquiries must reach the editor three months before print. This is to ensure that all the requests can be screened and the book sent to the reviewer in time. All reviews must be between 1500 and 2000 words.

The contact details of the editor can be found on page 2.

Game Theory and Business Applications (International Series in Operations Research & Management Science, 35)

by **Kalyan Chatterjee**, **William F. Samuelson**, **Kaylan Chatterjee**

In the last twenty-five years, game theory has been applied to a growing number of practical problems: from antitrust analysis to monetary policy; from the design of auction institutions to the structuring of incentives within firms; from patent races to dispute resolution. The purpose of Game Theory and Business Applications is to expand these applications of game theory into a broad and meaningful view of the way business decisions can be modelled and analyzed. The chapter contents embrace a wide variety of business functions -- from accounting to finance, to operations, to strategy, and to organizational design. In addition, specific application areas include numerous kinds of market competition, bargaining, auctions and competitive bidding. All of these applications involve competitive decision settings, specifically situations where a number of economic agents in pursuit of their respective self-interests take actions that together affect all of their fortunes. In the language of game theory, players take actions consistent with the given `rules of the game,' and these joint actions determine final outcomes and payoffs. As this volume demonstrates, game theory provides a compelling guide for business strategy. The first section of this volume discusses game-theoretic applications in four functional areas of business: finance, accounting, operations management and information systems, and organization design. The second section considers competitive strategies in `imperfect' markets. Using cooperative and non-cooperative game-theoretic approaches, these four chapters consider various topics: spatial competition, signalling of product quality, trust and cooperation in ongoing relationships, strategic behaviour in bargaining, and the `balance of power' between the firm and its buyers and suppliers. The last section of the book deals in detail with auctions and competitive bidding institutions. The emphasis is on the contributions of game theory to both auction theory and practice. Topics considered include optimal auctions, bidder collusion, and the design of institutions for selling the radio spectrum and trading electrical power.

Chapters in Game Theory
In honor of Stef Tijs

edited by
Peter Borm & **Hans J.M. Peters**

Chapters in Game Theory has been written on the occasion of the 65th birthday of Stef Tijs, who can be regarded as the godfather of game theory in the Netherlands. The contributors all are indebted to Stef Tijs, as former Ph.D. students or otherwise.

The book contains fourteen chapters on a wide range of subjects. Some of these can be considered surveys while other chapters present new results: most contributions can be positioned somewhere in between these categories. The topics covered include: cooperative stochastic games; non-cooperative stochastic games; sequencing games; games arising form linear (semi-) infinite programming problems; network formation, costs and potential games; potentials and consistency in transferable utility games; the nucleolus and equilibrium prices; population uncertainty and equilibrium selection; cost sharing; centrality in social networks; extreme points of the core; equilibrium sets of bi-matrix games; game theory and the market; and transfer procedures for non-transferable utility games.

Both editors did their Ph.D with Stef Tijs, while he was affiliated with the mathematics department of the University of Nijmegen.

In-Depth Analysis of Linear Programming

by **F.P. Vasilyev & A.Yu. Ivanitskiy**

Along with the traditional material concerning linear programming (the simplex method, the theory of duality, the dual simplex method), *In-Depth Analysis of Linear Programming* contains new results of research carried out by the authors.

For the first time, the criteria of stability (in the geometrical and algebraic forms) of the general linear programming problem are formulated and proved. New regularization methods based on the idea of extension of an admissible set are proposed for solving unstable (ill-posed) linear programming problems. In contrast to the well-known regularization methods, in the methods proposed in this book the initial unstable problem is replaced by a new stable auxiliary problem. This is also a linear programming problem, which can be solved by standard finite methods. In addition, the authors indicate the conditions imposed on the

DIRTY DATA IS IMPACTING THE RETURN ON INVESTMENT OF

Dirty data is having a profound impact on the profitability of compa... according to a recent study commissioned by SAS Institute, leaders in business intelligence.

"The survey highlights the fact that data quality is a major obstacle to achieving ROI from customer relationship management (CRM) initiatives," says Retha Keyser, product manager at SAS Institute in South Africa. "The foundation of successful CRM is the accuracy and timeliness of the underlying data."

"This survey demonstrates how vital accurate data is to the bottom line of businesses, proving that data quality is the single largest obstacle to achieving ROI from campaigns," says Keyser.

The independent survey was commissioned by SAS in April 2003 to ascertain the perceptions of business users in Europe as to the extent data quality impacts the success and profitability of customer interactions. It also looked at changing attitudes regarding the importance of customer data from a business user's perspective.

81 percent of survey respondents agreed that data quality has a direct impact on the profitability of sales and marketing campaigns, with almost two out of three admitting that one or more of their campaigns had not been profitable due to inaccurate data. More than half of respondents (55 percent) admitted experiencing lower than expected return on campaign investment due to inaccurate customer data.

Two-thirds (66 percent) of respondents also said that company profitability was affected by the accuracy and completeness of data, highlighting the critical business implications of 'dirty data'.

The survey also found poor data quality is a widespread phenomenon.

The majority (56 percent) of respondents cited... errors as the most frequent source of inaccura... concern, as third-party data is also the... information, with 61 percent acknowledging th... of customer data.

The survey also found that 66 percent of resp... satisfaction and loyalty would improve if their... was better. This was further supported by the... of respondents had received customer co... marketing material.

Finally, integration was also highlighted as a... with more than half of the respondents sayin... integrate are a major cause of dirty data.

"To begin to address this problem, companie... corruption areas and quantify the issue in b... on marketing campaigns) before they can sta... process," concludes Keyser.

VALUE-ADDED ASSESSMENT OF STUDENT DATA CONTINUES TO GAIN ACCEPTANCE AS SCHOOLS LOOK BEYOND NO CHILD LEFT BEHIND

...ional Value Added Assessment Services (EVAAS) continues to gain wider ...ce as states increase their focus on accountability reporting and federal No Child Left Behind (NCLB) requirements.

records of student academic progress over ...formance and future performance probabilities. ...cial diagnostic information that can be used ...ucators to look at alternative curriculum or students with greater proficiency needs.

...ginally resulted from the research of ...his colleagues at the University of Tennessee. ...ry have looked to Sanders' methodology of ...ic information to objectively measure student ...1992 when state lawmakers in Tennessee ...essment System a centerpiece of their school

...d a tight economy make it more critical than ...ecisions on precise and reliable information," ...challenge also presents an opportunity to use ...cut costs but to increase effectiveness."

Research Association. Sanders stated that a value-added assessment of student data can provide a more comprehensive picture of student achievement over time including probabilities of future grade-level proficiency. This approach can help schools ensure that in their effort to meet mandated year-end percent proficient standards by focusing on near-proficient students, they will not let lower achieving students fall further beyond and not stagnate the performance of higher achieving students.

Since coming to SAS, the world's largest privately held software company, in 2000, Sanders and his team of statistical researchers have web-enabled the reporting of the previously paper-based system and added additional diagnostic results to assist districts in decision making that affects educational opportunities for all students.

SAS recently aligned EVAAS with its IntelliVisor organisation to provide increased internal support and development enhancements to the system. Last year, SAS was presented Software Business Magazine's Software

parameters of the auxiliary problem which guarantee its stability, and this circumstance advantageously distinguishes the regularization methods proposed in this book from the existing methods. In these existing methods, the stability of the auxiliary problem is usually only presupposed but is not explicitly investigated.

In this book, the traditional material contained in the first three chapters is expounded in much simpler terms than in the majority of books on linear programming, which makes it accessible to beginners as well as those more familiar with the area.

Military Operations Research
Quantitative Decision Making

by **N.K. Jaiswal**

The field of Operations Research (OR) grew out of World War II operations to improve the effectiveness of newly introduced weapons and equipment, and to solve logistical problems for the war effort. Since its beginnings, OR has rapidly become a robust set of decision-making methodologies widely used in business, engineering, and governmental sectors. Nevertheless, many of OR's military and defence contributions have remained confined to classified reports.

This book is a systematic, state-of-the-art treatment of military operations research (MOR). It has been written for those interested in learning about the applications of OR techniques to military problems, and within these discussions theoretical concepts needed for analysis of military issues are presented. The book examines issues that relate to both tactical and strategic levels. Several examples have been solved in each chapter to illustrate the application of the techniques of MOR to military systems. The data used in these examples are hypothetical. They do not correspond to any existing weapon or military situations. They are used strictly to illustrate an application of MOR in defence decision-making.

Operations Research in the Airline Industry

by **Gang Yu**

The field of operations research has had a tremendous impact on the management of today's air transportation. Driven by enormous demand from management to gain a competitive advantage in the market, airlines are turning to advanced optimization techniques to develop mission-critical decision support systems for management and control of airline operations.

The purpose of *Operations Research in the Airlines Industry* is to show some recent advances in optimization techniques and decision support systems applications in air transportation. It covers a wide variety of operations research topics in the air transportation industry including: Demand forecasting, Network design, Revenue management, Route planning, Airline schedule planning, Irregular operations aircraft routing, Integrated scheduling, Real-time crew management, Crew pairing optimization, Air traffic flow management, Crew rostering, Airport traffic simulation and control, Coping with the FAA's traffic control program.

Operations Research/Management Science at Work

edited by **Erhan Kozan & Azuma Ohuchi**

There is synergy between the diverse methodologies of Operations Research and Management Science, and the many problems it seeks to solve. *Operation Research/Management Science at Work* is an example of that synergy. The principal aim of this book is to examine selected recent research in and applications of Operational Research/Management Science. The focus is on research that is of industry interest and covers a wide range of topics from major fields of OR/MS in a systematic and coherent fashion. Each application is chosen to demonstrate the elegance of their implementations. The book meets the needs of applied researchers who are interested in applications of OR/MS algorithms. Moreover, real world problems together with their solutions and implementations are the applications that have been selected for the volume.

The Asia Pacific region has embraced business applications of decision support systems in recent years. Many of these applications have the state of the art OR/MS techniques in this region embedded in them. Hence, the increased use of OR/MS techniques in this region provides opportunities for identifying methodological advances that are taking place as a result of the unique nature of the applications. These also provide opportunities for exploring synergies and interfaces that exist between OR/MS, both in terms of applications and theoretical advances.

Operations Research in Transportation Systems
Ideas and Schemes of Optimization Methods for Strategic Planning and Operations Management

by **Alexander S. Belenky**

This is the first book that presents basic ideas of optimization methods that are applicable to strategic planning and operations management, particularly in the field of transportation. The material of the book covers almost all parts of optimization and is a unique reference work in the field of operations research. The author has written an invaluable manual for students who study optimization methods and their applications in strategic planning and operations management. He describes the ideas behind the methods (with which the study of the methods usually starts) and substantially facilitates further study of the methods using original scientific articles

rather than just textbooks. The book is also designed to be a manual for those specialists who work in the field of management and who recognize optimization as the powerful tool for numerical analysis of the potential and of the competitiveness of enterprises. A special chapter contains the basic mathematical notation and concepts useful for understanding the book and covers all the necessary mathematical information.

Operations Research and Environmental Management
The FEEM/KLUWER International Series on Economics, Energy and Environment

edited by **Carlo Carraro & Alain Haurie**

This book presents novel operations research methods for optimal management of the environment. A wide spectrum of applications of these methods clarifies how environmental management can be carried out at the local, regional and international level. Local natural resource problems and international environmental issues are discussed and appropriate policy measures are proposed. ♦

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CHAPTER CALENDER

Vaaldriehoek Chapter

October/November 2003, at Sasol, Sasolburg
Year end function

Western Cape Chapter

Wednesday November 12th, 2003 at 16:00
Student competition combined with the annual chapter AGM and cocktail party.
Speakers: Students at honours level (or equivalent), nominated by a Tertiary Institution
Topic: *Student Competition on OR year projects completed in 2003*
Venue: Room 102, Van der Horst Building, Stellenbosch Business School, Bellville

CHAPTER NEWS

Vaal Triangle

Spreadsheet-based OR: Trojan Horse or Achilles Heel

By Marthi Harmse (marthi.harmse@sasol.com)

At four o'clock on Wednesday afternoon 23 April 2003, the Vaal Triangle chapters of the Operations Research Society of South Africa (ORSSA) and the South African Institute for Industrial Engineering (SAIIE) had their first joint meeting of the year (I believe it was their first joint meeting ever) at the Personnel Auditorium at Sasol I, Sasolburg. ORSSA and SAIIE would like to thank Sasol Technology Information Management for hosting the event.

Professor Paul Stephanus Kruger – a member of both societies – addressed the meeting. He maintains that he was born a long, long time ago in a faraway galaxy known as Johannesburg; according to him on the "wrong" side of the Jukskei River but on the "right" side of the Hex River Mountains. Paul holds that some say he acquired by devious means the degrees BSc Eng (Industrial), MSc Eng (Industrial) and DSc Eng, and along the way an MBA, from the University of Pretoria.

Paul claims that at present he is a slightly mad professor in the Department of Industrial and Systems Engineering at the University of Pretoria, trying very hard to create an image of eccentricity – mainly for the sake of posterity. Some of his most loyal and endearing mistresses are System Simulation, System Optimisation and Computer Applications, within the field of Industrial Engineering, and they have provided him with many a memorable and pleasurable moment over many years.

It is said that Paul spends his spare time reading gruesome horror books and cultivating enormous turnips for no rational purposes. He arrived on his BMW R1100 RT motorcycle that – according to Paul – he cannot control but rides in an effort to keep his physical and mental balance.

Paul briefly summarises his presentation as follows:

The perceived Malady

There seems to be a difficult to comprehend but nonetheless troubling dichotomy bedevilling the tranquillity and prosperity of the Operations Research (OR) community. On the one hand, the practice of OR seems to be alive and well, even booming. Journals are full of success stories and many, many more successful applications are probably never even reported, On the other hand, these same journals have often published papers with titles such as The Future of Operational Research is Past and Requiem for the Management Science Course. At the same time education and training in OR seem to be on the decline and OR groups in industry are under continuous pressure and battling to survive. Worst of all, a persistent and long-standing negative attitude towards the value, or even the raison d'être, of OR/MS seems to prevail. This malaise is probably psychosomatic in nature but may nevertheless require some timely attention.

The suggested Remedy

Spreadsheet software is extremely widely available, inexpensive, well known, extensively used and trusted by a broad spectrum of organisations for a myriad of day-to-day decision-making and other business purposes. Since its inception in 1978, electronic spreadsheets have developed from a tool primarily intended for simple budget calculations to an instrument capable of performing extensive mathematical and graphical analysis. Spreadsheet software may therefore serve as a vehicle for introducing OR-type of analysis to a very broad spectrum of potential users and thus may act as a partial remedy, or at least a temporary crutch for the aforementioned psychosomatic, but nevertheless debilitating illness.

The required Procedure

Relatively recent developments have made it possible to effectively develop and implement some traditional OR/MS analysis and modelling techniques, for example statistical analysis, linear programming and simulation modelling, using general-purpose spreadsheet software, such as Microsoft's Excel, as the development platform. These developments have been enhanced and facilitated by the increasing availability of a wide range of integrated spreadsheet add-ins, for example StatPro, the Excel-solver and the @RISK simulation software.

The necessary Rehabilitation

*Spreadsheet-based OR/MS models are certainly limited in terms of size and complexity and only appropriate in the case of relatively small-scale applications mainly intended for operational decision-making, demonstration and proto-typing. Furthermore, the inherent structure of spreadsheet software results in several disadvantages such as the almost inevitable unstructured "programming" approach and the lack of model scalability and documentation capabilities. However, spreadsheet software is extremely widely available and very flexible, but above all, it has without a doubt become the **"analytical vernacular"** of the primary "client" for OR services – **management**!*

The expected Prognosis

*The use of spreadsheets and spreadsheet add-ins is not a long-term remedy for whatever is ailing OR. However, it may have a significant impact on the long-term "health" of the practice of OR and may contribute greatly to improving the "image" of OR as a practical, real-world problem solving approach. It is already revitalizing OR/MS education, especially in the Business Schools ("the spreadsheet revolution in education") and it may be instrumental in bringing OR-type of analysis to a much broader audience ("end-user modelling"). In this way the use of spreadsheets may serve as a **Trojan Horse** for introducing the "masses", and other assorted "infidels", to the principles and advantages of OR, but it may turn into an **Achilles Heel** if these developments are not heeded and carefully managed. It is recommended that the OR community should embrace spreadsheet-based OR and that it should be exploited and used to its fullest possible extent.*

An electronic invitation was sent out to people mainly in the Free State, Gauteng, Mpumalanga and North West provinces. Mail was also sent out to ORSSA members living in the Free State. Twenty-one people attended of whom Sasol employees comprised 71%; people from Comparex Africa, the CSIR, UTi and the Vaal Triangle Technikon also attended. It seems that people in Secunda are interested in arranging similar events.

The meeting was concluded by networking with one another with something to eat and to drink. The Vaal Triangle chapters of ORSSA and SAIIE would like to thank Paul for the excellent preaching and demagoguery he did! ♦

Besides OR, motorcycling is another passion of Paul Kruger

New Members

We hope that your relationship with the society will be a long and rewarding one.

Johannesburg

Mergenthren Pillay	NV Ndaba
Sfiso Mthembu	Ahmad Maidamisa Aliyu
Ruvimbo Goremusandu	Andries Botha
Ruan Rossouw	Watson Lekalake

Pretoria

Johan Joubert	Mario Marias
Jean-Pierre Luhandjula	Alwyn Moolman
PEN Lutu	Myles Rennie
Peter Schmitz	

Vaal Triangle

DCJ de Jongh	Pieter Kruger
PM du Plessis	Wim Morris
Melanie Fourie	Anette van der Merwe
Frederick van der Westhuizen	

Western Cape

Eva Neves	Jeanette Engelmohr
Faniel Sahle Habtemichael	Alison Joubert
Liezl van Eck	Johann de Kock
Amy Barty	Nthabiseng Ntene

THE ORSSA ANNUAL CONFERENCE 2004

by Leo Tomé

The 2004 annual ORSSA conference was hosted by the Pretoria chapter. Most of the organising was done by Gys Wessels who was assisted by Thereza Botha, from TechnoScene. The conference was held in Pretoria at the ABSA Conference Centre, and between their staff and the ORSSA organisers everything ran like clockwork. Congratulations on a very well and professionally run conference.

One of the things everybody will probably remember from this conference is the food. This is something we were quickly made aware of with the opening function (dinner) being held on the Sunday evening.

Dinner at the opening function

The conference was well attended with a total of 72 delegates. The delegates constituted a nice blend between students, academics and members from the private sector. This was seen in the variety of papers, both in theory relative to practice, as well as topics. There were a total of 54 papers. The talks touched topics like Eskom, farming, the banking industry, the JSE, environmental issues, logistics, manufacturing, and many more, once again illustrating the variety of fields in which operations research is being applied and is making a difference. Marthi Harmse also gave a workshop on soft OR methodologies. The conference definitely had more than enough to keep everybody interested and making it worth while for all who attended.

One of the highlights at any ORSSA annual conference is the presentation of the Tom Rozwadowski medal. The medal was handed over by Hans Ittmann, the president, during the welcoming ceremony. The judges for the competition this year were Wim Gevers, Esbeth van Dyk, and Willem Fouché. They awarded the prize to Cobus Wolvaardt and Rene Fossati for their paper entitled, *The construction of drape surfaces with constrained first derivatives*. The article can be found in ORiON Vol 17 no 1/2.

Another highlight is the SAS/ORSSA student competition. The prizes was handed over at the same ceremony by Mnr AJ

Coetzee representing the SAS institute (Pty) Ltd who sponsored the prize money. We would also like to extend a hearty thank you to the SAS institute (Pty) Ltd who has agreed to sponsor the competition for another three years. The judges for this competition were Anton de Villiers and Paul Fatti. This year the first prize is being shared by Joel Lejaha at WITS and Willem van Schalkwyk at UP. The respective titles of their projects were *Eskom Commercial Availability* and *An algorithm for the Vehicle Routing Problem with various side constraints*. Congratulations to both of these winners!

Tea between sessions

As has been the tradition over the years, there was a conference dinner the last evening of the conference. This year it was a braai in the lapa at the ABSA Conference Centre. The evening was great fun with everybody having a "lekker kuier".

Conference Dinner: Wine, food, …

The conference was concluded with some closing remarks by our new president, Wim Gevers. I think I would like to add my voice to his when I say that once again the annual conference was a great success. Old friends were seen again and new ones made!

I asked one of our new members, Nthabiseng Ntene, to whom the conference in Pretoria was her first ORSSA National Conference to give some of her perspectives on the conference:

The President Wim Gevers closing the conference

Although driving from Stellenbosch to Pretoria is long and exhausting, my experience at the conference made the trip all worthwhile. The conference was brilliantly organised. Accommodation was superb and yes, the food was just great. Sessions management was also excellent. Above all of the brilliant logistics, the conference enlightened me on a broad spectrum of operations research, which I believe many people are not aware of.

The ORSSA conference presents great networking and information sharing opportunities to students and people from a wide range of higher learning institutions and working environments. If you are in luck, you might even meet people doing research in a field similar to yours and as such you can share ideas and gain good advice.

The only downside I experienced was the fact that a great majority of people who attended the conference were highly articulate in Afrikaans or at least understood the language. I found this to be a great hurdle for me as I do not speak, let alone understand, the language and as such I more often than not felt a bit left out. Based on my observation, the language barrier created a gap between English and Afrikaans speaking people. It is my belief that if we want to attract as many people as possible, especially those beyond the boundaries of South Africa, then the medium of communication has to be given attention.

I would like to recommend that in future, the organisers of the conference should warn people who will be using the conference facilities well in advance about where to save their presentations (e.g. CD, floppy disc, USB memory stick) to avoid unnecessary hiccups.

In a nutshell, I really had a great time at the 2003 ORSSA conference and hope to see familiar and new faces at the next conference in Bellville. ♦

A TRIP DOWN MEMORY LANE
From the archives: Minutes from the AGM

by Ilze du Plooy (ORRSA archivist)

ORSSA's conferences are always informative, interesting and enjoyable. Some are more interesting than others…I remember such a conference in the Kruger Park. Jeanne le Roux was responsible for the allocation of the chalets and being very considerate, sent a form to all requesting information on whom they want to sleep with. Paul Fatti successfully snuffed a warthog and Anny Pachyannis, his partner in crime, cried her eyes out about it. For some mysterious reason, Jeanne, who does not touch a drop of alcohol, decided that the society must pay for all the drinks. The AGM was conducted with the aid of bottles of red wine and never ever was there such a chaotic and very vague AGM again. At that time Jeanne and I were the newsletter editors and ended the feedback on the conference with the following (liberally based on Lewis Carroll)

An apology
The time had come in August to talk of many things:
Not of shoes – and ships – and sealing wax
but of conservation – sums – and teas –
and why presidents get lost (and found)
and whether warthogs should be culled or not.

And, strange to tell, among that earthen lot,
Some could articulate, while others not.
And suddenly one more impatient cried
-"Who is professional, pray, and who is not?"
It seems such a shame to play them such a trick
after we've brought them out so far
and made them swallow such a lot.
They had such a pleasant time
renewing friendships, drinking wine.

For some reason or other, Unisa has never been asked again to organise a conference.

The following on some of the other (not so chaotic) conferences:

1969 (University of the Witwatersrand): First National Conference on Operations Research
The formation of SA Operations Research Society was scheduled for 16:00 and was followed by a cocktail party (!) at 18:00.
The papers delivered were:
The trace correlation coefficient and its application to simultaneous economic relationships (Prof CG Troskie)
A model for forecasting – estimating footwear production in South Africa. (Dr GJ Rudolph)
The lead time variability of the use of a gamma distribution in stock control (Dr JA Ryder)
Merchandising and Inventory control. (Mr JD Hampton)
Optimal disaggregation of aggregate production plans. (Mr K Zoller)
An application of linear programming in a control system for factory water resources. (Mr RJ Buttery)
Preventative maintenance with two failure distributions operating. (Prof HS Sichel and NDW Greenfield)
Computer time-sharing priority systems. (Dr RJ van den Heever)
Some queuing models. (Prof JH Venter)

A method for optimising the mining and treatment operations of a group of copper mines. (Mr M Splaine)
And the fees for the two-day conference? " An attendance fee of R3-50 will be charged. This covers tea, lunch, cocktail party and the postage on sets of conference papers."

1971 (Kyalami Ranch): I Miller wrote comments on this conference and suggested that quieter venues be used in future but that the proper use of microphones (hanging from the neck for instance) would also solve the background noise problem. Attendance fees were R5,50 for members; R9,50 for non-members with a late registration fee of R1,00. The cost of staying at the Kyalami Ranch hotel was R6,30.

1975 (Randse Afrikaanse Universiteit) From an OR viewpoint this was a most interesting conference with different sessions. The session on the chemical industry include the following papers:
Application of operations research in the chemical Industry with special reference to AE & CI. (D Bromley, RL Ingles, A Bottega)
Some operations research experiences in the fertiliser industry in South Africa. (BL Joffe)
The Sasol Synthol simulation model. (FW Harris)
Gas reformer simulation model. JWA King)
Linear programming activities at Sasol. (TD Pay)
The session on the mining industry include the following papers:
Non-linear programming for long term mine scheduling. (C Beeforth & J Armstrong)
An industrial design experiment – a case study for a gold plant. (M Splaine)
A medium term planning system for a beach mine deposit. (B Smith)
And under "general": Application of Operations Research in Agriculture. (RI Jones)
A systems study of solid waste management in Johannesburg. (JR Bicheno)
A conceptual form of model for town planning policy decisions. (TJ Stewart)

 1977 (University of Port Elizabeth) From the presidential report by R Eales: "This paper is a plea that Operations Research should not see its objectives as the achievement of solutions to complex problems accompanied by a hope that those solutions will influence policy. OR should instead be aimed specifically at generating greater insight amongst all who may be concerned with policy formation."

1981 (CSIR Conference Centre, Pretoria): Israeli/South African Symposium on Operations Research. This symposium was organised by ORSSA in collaboration with the National Research Institute for Mathematical Sciences of the CSIR and the National Council for Research and Development of Israel.
Some of the Israeli papers read:
Interception strategies for the protection of a target against penetration – pursuers moving along two parallel lines. (Y Yavin (Israel) & G Reuter (SA))
The game of two elliptical cars. (T Miloh)
Management of on-farm agricultural waste for energy and food recovery. (G Oron)
Models for multi-resource allocation of projects. (Y Tur)
Capacity expansion using damage functions under uncertainty in the prices of primary energy resources. (Y Zahavi)

1984 (CSIR Conference Centre, Pretoria): This was the BIG one – an IFORS sponsored event: International conference on Operations Research in Resources and requirements in Southern Africa. Thirty-eight papers were delivered. Overseas visitors included Prof BHP Rivet (University of Sussex, UK), Prof RH Collcutt (Manchester Business School, UK), Prof KB Haley (University of Birmingham, UK), Prof AM Lee (University of Hull, UK), Prof H Müller- Merbach (Universität Kaiserslautern, Germany). Prof JL Steel (Texas Christian University, USA), Prof M Zeleny (Fordham University, USA) and Prof HJ Zimmerman (Aachen Institute of Technology, Germany). ♦

One of the listed benefits of being a student member of ORSSA, is that students may request that abbreviated versions of their CV's be published in the newsletter, if they have graduated and are about to enter the job market. Please contact the newsletter editor at ldtome@dip.sun.ac.za if you are a student who fits this profile and if you wish to have your CV published.

Curriculum Vitae: Mergen Pillay

I am currently seeking an OR related position.

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1995	Vaal Triangle Tech	National Higher Diploma Electrical Engineering (Light Current)
1994	M.L Sultan Tech	National Diploma Electrical Engineering (Light Current)

Computer Skills:

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