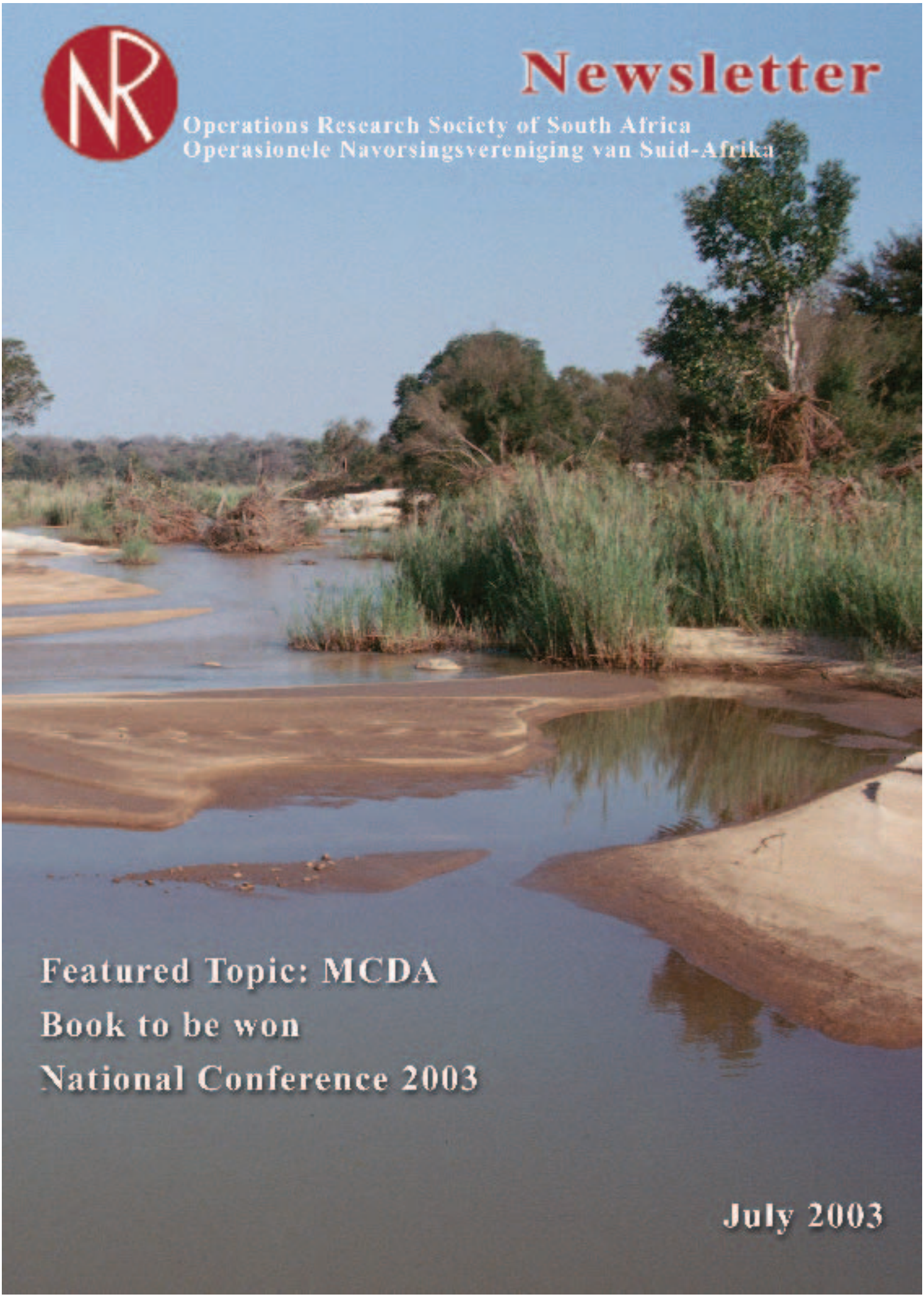

Newsletter

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

Featured Topic: MCDA

Book to be won

National Conference 2003

July 2003

FROM THE PRESIDENT'S DESK

By Hans Ittmann
ORSSA President
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Hans Ittmann

My term of office as President of ORSSA is fast approaching the end of the two-year stint. This was the second term of office I have had and I'm not sure that things were that different the second time round! Maybe there are many changes that took place but because we experienced these as they happened, it was not that noticeable while it happened. Reflecting back over the last almost twenty years one realises, yes, there have been changes. Obviously, time has progressed and there have been many developments not only within the discipline itself but also, at least for us in South Africa, on the political front. Today things are much more open and we are able to interact freely in the international context, which is great. One of the negative effects has, however, been the fact that we have lost many prominent colleagues and friends: all the members of the society who have moved elsewhere in the world. I believe we are feeling the effects of this today and it will remain with us in future. The challenge is to promote our discipline amongst the wider South African population much more aggressively and recruit new blood into the society. Locally, we as a profession is still confronted with many complex problems as in the past, the nature of which may have possibly changed. The problems this country and the region face are all well known to us. Again the challenge is, can we make a difference and make an impact? I believe that our profession has much more to offer than ever before. The toolkit that we have allows us to take on and address these difficult, complex and unstructured problem situations. Again, how do we take on this challenge? Do we carry on as in the past or do we as a profession confront these in a much more concerted way? Here I believe we can do much more by collaborating and working together than trying to do things individually. I sense the times are ripe for this.

Recently I was part of an international panel that looked at the "State of the (OR) Profession" (See the article "As the wORld turns" in OR/MS Today, April 2003). Panel members from different countries were asked to respond to four questions as part of the survey. All the questions were aimed at determining the state of the profession in these different countries as well as a consolidated view of the state of the profession internationally. There are concerns internationally, on the academic side, about the significant decrease in OR courses especially within business schools. On the other hand, OR practice is seemingly thriving – OR approaches and techniques have been used very successfully in many areas. Many of these are possibly not happening under the banner of OR. There is also a vested concern within all countries about the future of the profession itself. The outcome of the survey can be summarized as follows: "*the global survey reflects universal concerns countered by an optimizer's optimism for the future*"! I share this optimism mainly because of the widespread use of OR that I experience almost everyday in many organizations and companies in South Africa.

In the June 2003 edition of the newsletter of the UK OR society there is a column by the Vice-President of that society. In the article he relates a story of how he asked someone to give him a definition of OR. The person responded with one word, "Thinking". This made a huge impression on me because if you think of the OR approach we all use to address problems, ultimately "thinking" is what it is all about. Whatever we as operations researchers develop the final output, is to aid better decision making – a thought-based process! The tools we develop, the solutions we provide and the systems we end up with are all basically an aid to decision making. The implication is very clearly: all successful OR improves the quality of thought, and thereby the decisions made! This, no doubt, is the essences of what we do and I believe this is what makes our profession so exciting!

In previous newsletters we mentioned our bid for the IFORS 2008 conference. Over the last months we have interacted on a regular basis with IFORS clarifying mainly financial issues. Although no final decision has been made, we are, nevertheless, still very confident on receiving a positive response. We hope to hear the outcome soon. It could be a huge boost for our society.

During the last few months our colleagues at the University of Stellenbosch have spent a lot of time redesigning and redeveloping the society's entire website. The executive have been given access to the website to look, test, make suggestions for improvements and give feedback to the development team. What I have seen is, in one word, tremendous. The new website is something we as a society can truly be very proud of. It is a very professionally looking website with a huge amount of information. More stills needs to be added but what is already there is great. Personally and on behalf of the entire society, I would like to congratulate the team and to express our sincere appreciation to Jan van Vuuren and Isabelle Nieuwoudt who took on this huge task. They were very ably assisted by a student, Morné Pistorius – our thanks to you as well, Morné! I would suggest you visit this website at http://dip.sun.ac.za/ONSA/ if you have not done so by now! Nogmaals baie dankie, Jan, Isabelle en Morné, vir al die harde werk; ons is werklik trots op julle vir 'n taak welgedaan!

The time for our annual conference is fast approaching. The conference will be held in Pretoria at the ABSA conference facility. The date is the same as that announced in the March newsletter. It will take place from Sunday, 7 September 2003 to Wednesday, 10 September 2003. I look forward to seeing you there. During the following week the first OR conference to be held in East Africa takes place. As part of our out reach into Africa, I would urge you to try to attend this conference as well. The conference information is available on the website http://www.tanzaniaports.com/orda1 or you can contact the Secretary General of that society, Joe Kakeneno, at joekakeneno@tanzaniaports.com. The dates for this conference 17 to 19 September 2003 in Nairobi, Kenya. I have been to the conference facilities and I am quite happy to recommend these to

anyone who is contemplating attending this conference.

As a final word from my side I would like to thank everyone on the executive for the support they have provided me over the last two years and for those that have actively contributed to the activities of the society. We are there to serve the members of this society and I trust that you experienced some of this service. At the same time, it is only through the active involvement of our members that this society will be able to grow and thrive in the future. Having just read the latest biography of John F. Kennedy let me end off with his now very famous inaugural words (slightly adapted): "And so, my fellow operations researchers: ask not what your society can do for you - ask what you can do for your society!" ♦

FROM THE EDITOR

Leo Tomé

The feature topic for the July issue is MCDA *(Multiple Criteria Decision Analysis.)* With it we bring you the opportunity to win the book; "MCDA: An Integrated Approach". I believe this to be a first for the newsletter and we hope to make this a more regular feature.

Whilst compiling this issue I once again realised what an important role we as Operations Researchers can play in South Africa through our problem solving and thinking skills. Although it is said that ignorance is bliss, I believe that ignorance concerning the possibilities of OR will be to the detriment of all in our beautiful country. A new group of leaders are emerging in Africa. Adding my voice to the findings of the ORSSA marketing group, in the article "A Trip down Memory Lane" precisely a decade ago, it is the responsibility of each of us to market OR. The society provides us with an excellent vehicle to do this.

The annual conference of our society is just around the corner; information concerning the conference early in September can be found in this issue. I hope to see many of you there.

Until next time,

Leo Tomé

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Contributions, advertisements and other forms of communication with the editor can now also be conducted from the website:

http://dip.sun.ac.za/ONSA/

MEMBER PROFILE: GERHARD GELDENHUYS

Deur Jan van Vuuren (vuuren@sun.ac.za) & Leo Tomé (ldtome@dip.sun.ac.za) van die Universiteit van Stellenbosch

Gerhard Geldenhuys

Gerhard Geldenhuys was vanaf 1960 tot met sy aftrede in 1998 'n dosent in Toegepaste Wiskunde by die Universiteit van Stellenbosch, sedert 1974 as professor. Hy het reeds in 1961 lesings in ON begin aanbied en was dwarsdeur sy loopbaan ten nouste betrokke by die onderrig van ON, waar sy vernaamste belangstellings die toepassings van wiskundige programmering, speleteorie en grafiekteorie was. Hy was in 1969 'n stigterslid van ONSA en was altyd 'n aktiewe lid van die vereniging. Hy het in 1971 'n doktorsgraad in Wiskunde by die RAU verwerf. Die Suid-Afrikaanse Wiskundevereniging het in 1998 hulle Merietetoekenning vir die Bevordering van Wiskunde aan hom gemaak, onder andere vir die bydraes wat hy as wiskundige tot die ontwikkeling van ON in Suid-Afrika gemaak het. ONSA het in 1999 ere-lidmaatskap aan hom toegeken.

Vraag: U was een van die stigterslede van ONSA. Hoe het dit destyds gekom dat u by ON betrokke geraak het en uiteindelik besluit het om deel te neem aan die stigting van die vereniging?

Antwoord: In my studentedae op Stellenbosch vanaf die middel van die 1950's het ON as 'n dissipline nog nie by Suid-Afrikaanse universiteite bestaan nie. In my Honneursjaar in suiwer wiskunde was Gerhard Joubert (later professor in Rekenaarwetenskap by Clausthal in Duitsland) een van my medestudente. Hy het voorheen 'n jaar in die praktyk gestaan. Ons twee het saam die bekende boek van Churchman, Arnoff en Ackoff (van 1957) oor ON ontdek en met groot entoesiasme gelees van die uiters interessante gevallestudies wat daarin bespreek word. Ná my M.Sc. in Toegepaste Wiskunde het ek twee jaar studieverlof geneem. Die eerste jaar het ek verder studeer by Harvard, waar ek vir die eerste keer kursusse in ON geneem het, naamlik wiskundige programmering en speleteorie. Daarná het ek by die Nasionale Navorsingsinstituut vir Wiskundige Wetenskappe van die WNNR aangesluit, waar ek op versoek van die Direkteur, dr. A.P. Burger, 'n opname gemaak en 'n verslag geskryf het oor toepassings wat ON moontlik in Suid-Afrika sou kon vind. Behalwe vir mynbou (waar dr. H.S. Sichel belangrike bydraes gemaak het) en vervoer was ON destyds grootliks nog onbekend in Suid-Afrika. Die opname het talle gebiede van landbou tot medisyne tot brandweer tot die chemiese bedryf gedek. Dit is verblydend dat letterlik al die gebiede wat in hierdie opname in vooruitsig gestel is, met verloop van tyd wel toepassings in Suid-Afrika gevind het. Tydens my tyd by die WNNR het ek ook kursusse in verskillende ON-tegnieke vir die personeel aangebied. Mense soos Gerhard Rudolph, Cas Troskie, Jos Grobbelaar, Louw Kotzé en Gideon de Kock wat later belangrike rolle ONSA sou speel, was destyds deel van die span by die WNNR.

By my terugkeer in 1963 by die Departement Toegepaste Wiskunde op Stellenbosch het ek dadelik weer kursusse in ON begin aanbied en ook as toesighouer opgetree vir verskeie M.Sc.-studente wat in onderwerpe oor ON gewerk het. Die WNNR het in die 1960's ook 'n baie sterk span operasionele navorsers opgebou, waarvan verskeie oorsee verdere opleiding ondergaan het. Belangstelling in ON het ook by minstens sommige Suid-Afrikaanse universiteite ontstaan. Daar was ook besoeke deur akademici van oorsee wat ON bevorder het. Daar was goeie persoonlike bande tussen operasionele navorsers in die land. Die werk waarmee ons besig was, het nie goed ingepas by die destydse vakverenigings vir wiskunde of statistiek nie. Dit alles het daartoe gelei dat ONSA in 1969 onder leiding van dr. H.S. Sichel gestig is en die vereniging geword het waarbinne operasionele navorsers die ruimte kon vind om hulleself te organiseer. Die goeie verhouding tussen die praktyk en die akademie was 'n uitstaande kenmerk van die vereniging.

Vraag: U stap al 'n lang pad saam met ON in Suid-Afrika en trouens Afrika. Hoeveel sou u sê het die metodologie en toepassings van ON gevorder van daardie dae af tot nou toe, in die Suid-Afrikaanse konteks gesien.

Antwoord: In my studentedae het rekensentrums of persoonlike rekenaars natuurlik glad nie by Suid-Afrikaanse universiteite bestaan nie en was die internet nog hoegenaamd nie in die visier nie. Dit spreek dus vanself dat die enorme ontwikkelinge in informasietegnologie sedert daardie dae ook 'n groot impak gehad het op die soort probleme wat opgelos kan word en die kommunikasie wat mense in ON met mekaar kan handhaaf. Die probleme in die praktyk het self ook meer kompleks geword. In die gebiede waarin ek gewerk het, was daar 'n merkbare skuif na heuristiese metodes om goeie oplossings vir sulke uiters komplekse probleme binne redelike tyd te bepaal. Vergeleke met die 1960's sou ek sê dat probleme van maatskaplike ontwikkeling in die samelewing vandag ook meer aandag in ON kry, wat natuurlik ook van belang in die res van Afrika is. Die begrip van "sagte ON" het ook nie in vroeër jare bestaan nie.

Vraag: Uit u lang en spesiale verbintenis met ON, wat sou u as u beste herinneringe beskou?

Antwoord: Die ooglopende entoesiasme wat operasionele navorsers in Suid-Afrika het vir die projekte waaraan hulle werk, was altyd vir my 'n riem onder die hart. Dat hierdie projekte byna altyd te doen gehad het met aktuele probleme uit die praktyk, het getoon dat ON 'n belangrike bydrae in Suid-Afrika maak. Binne ONSA het ek 'n warme toegeneentheid en hulpvaardigheid by lede ervaar wat baie kosbaar was. Die mense wat ON bedryf, die interessante projekte waarby hulle betrokke is, en die toepaslikheid daarvan het vir my talle mooi herinneringe besorg.

Vraag: Wat sou u as die hoogtepunte in u loopbaan as operasionele navorser beskou?

Antwoord: In 1980 het ek saam met Jeanne le Roux (destyds 'n student en tans van Unisa) aan 'n baie interessante projek oor optimale plasing van bloedbanke in die Oos-Kaap gewerk. Hierdie ervaring het 'n wesenlike invloed op my loopbaan gehad. In die 1990's was ek saam met studente en kollegas betrokke by die optimale toedeling van beperkte biblioteekfondse aan die verskillende akademiese departemente van 'n universiteit. Die projek is deur al sy fases gevoer en suksesvol geïmplementeer. Dit het gelei tot publikasies in ON, biblioteekkunde, grafiekteorie en suiwer wiskunde. Die interdissiplinêre samewerking waarvan daar soveel melding in die vroeë dae van ON gemaak is, het hier baie goed tot sy reg gekom. Dit was vir my 'n mooi hoogtepunt toe ere-lidmaatskap van ONSA in 1999 aan my toegeken is.

Vraag: Hoe sien u die toekoms van ON in Suid-Afrika?

Antwoord: 'n Jonger geslag operasionele navorsers het na vore gekom wat nuwe stukrag aan ON in Suid-Afrika verleen. Dit is duidelik dat daar in ons land talle gebiede is waar ON 'n belangrike bydrae kan lewer. Daar sal dus geen tekort aan probleme wees waaraan operasionele navorsers kan werk nie. Wat ONSA as vereniging betref, voel ek dat dit belangrik sal wees om 'n goeie proporsie lede te hê wat in die praktyk werksaam is.

Vraag: Het u enige boodskap vir jong en/of voornemende operasionele navorsers?

Antwoord: Dit is aan die een kant belangrik om die deursettingsvermoë aan die dag gelê het om die tegnieke van ON en veral die aannames daaragter deeglik te bemeester, sodat numeriese resultate korrek geïnterpreteer kan word of aanpassings gemaak kan word wat deur die praktiese probleem gedikteer word. Aan die ander kant moet jy die visie hê om steeds nuwe situasies raak te sien waarin ON 'n bydrae kan maak. As jy hierdie twee eienskappe kan kombineer, sal daar 'n wye spektrum geleenthede wees waarin jy 'n verskil kan maak aan die omgewing waarin jy werk. ♦

IFORS Hall of Fame

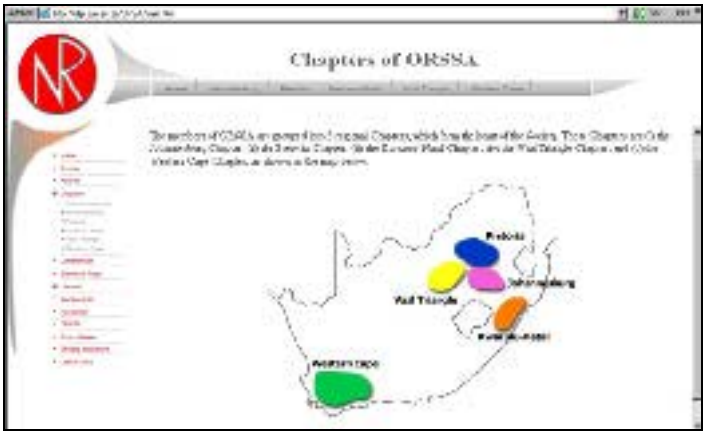
George B. Dantzig was the first to be inducted in the OR Hall of Fame in the March 2003 issue of ITOR (*International Transactions in Operational Research*).

In 1947, he stated the general form of the linear-programming problem and invented the simplex method to solve it. Thus becoming the 'father' of linear programming.

George B. Dantzig

A New Website for ORSSA

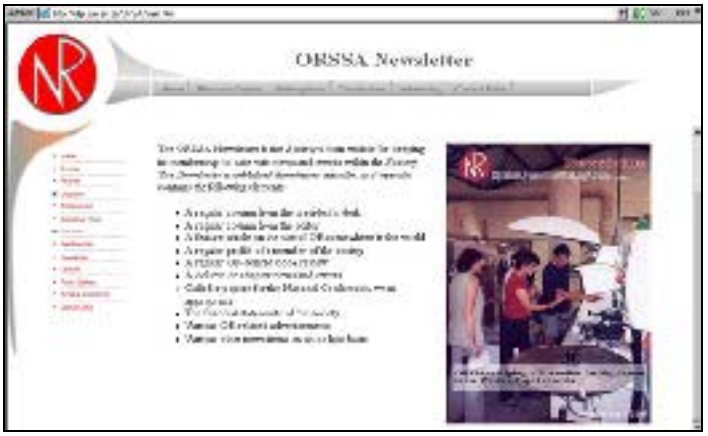
*By **Leo Tomé** (ldtome@dip.sun.ac.za)*
from the University of Stellenbosch



The Chapters sub page

As was reported in the March issue of the newsletter the society has now launched its new website. All but two of the features mentioned, have been completed, viz.: The Executive Office sub page and the Membership Database page.

Members can, however, already join or resign from ORSSA via the web site even though the online payment facility is not yet available. An expert will be contracted at the start of 2004 to design the online database with the different levels of access for members, the exec, the treasurer, etc. as mentioned in the article in the previous issue.



The Newsletter sub page

Isabelle Nieuwoudt and Jan van Vuuren are responsible for the web site. From all of us congratulations on a job well done!

The old website will temporarily still be available at www.orssa.org.za while the new website can be visited at:

http://dip.sun.ac.za/ONSA/

When is a decision problem not a nail?

By Alison Joubert (ajoubert@stats.uct.ac.za) from the University of Cape Town

At the outset I need to emphasise that my interest in MCDA (*Multiple Criteria Decision Analysis*) is primarily in its application to natural resource management decision-making. Within that realm of application, I suspect that, in my initial enthusiasm several years ago, I was guilty of falling into the trap of "When all you have is a hammer, everything looks like a nail". Over time, it has become clearer to me that on the one hand, the field of MCDA provides a multitude of tools which can indeed address a wide array of problems, but, on the other, there are questions that need to be answered using other tools.

There have been a wide range of natural resource management questions that we have addressed with MCDA, and there are a multitude of tools in the MCDA toolkit. However, firstly, either goal programming or a simple "value measurement" approach seem to answer most needs and, secondly, the bulk of the applications followed the same clear stages. These were:

1. Problem structuring to define the questions to be addressed, to identify the alternatives and the criteria with which to evaluate the alternatives (which are often organised into a hierarchical 'value tree'),
2. Evaluation of the alternatives according to each criterion separately and weighting of the criteria (using so-called "swing weights"),
3. Aggregation of the separate evaluations,
4. Sensitivity and other analyses of results, and
5. Feedback to participants.

Particularly in the value measurement approach, all stages (except for stage 4) occurred in workshops with specialists and other stakeholders, with the MCDA analyst acting as sole or co-workshop facilitator. The dual role was sometimes difficult to perform, and it became clear that workshops of larger than say 10 participants required both a facilitator and an analyst. This is because, in these types of applications, the participatory process (e.g. ensuring that everyone participates or that no-one dominates) is as important as the substantive process of ensuring that questions are asked so as to elicit valid responses for scores and weights. The way the questions are asked needs to be tailored to the particular group of participants. Some might quickly grasp the various concepts, while, with the right kinds of questions, swing weights and non-linear value functions can be elicited from less technically- or mathematically-minded (including non-numerate) participants.

Therefore, another common thread in all applications was to ensure that the overall model was easily understandable to all participants and the final decision-maker. The decision workshop format is therefore a popular and useful approach, particularly in a participatory democracy setting.

The third common thread in natural resource management problems is that there are often three main points of view, namely, "ecology", "social" and "economic" or alternately, "sustainability", "efficiency" and "equity". The actual criteria

A section of the Sand River (Mpumalanga). Exploration of the consequences of land-use changes helped to identify ways in which both conservation and social gains could be achieved (Photo: Dr J. Turpie).

for evaluation of the alternatives will depend on the particulars of each project, but usually fall under these three main headings.
Although the overall process was similar for most of the studies, the particulars of each study meant that they fell into roughly four groups of types of application. The groups are described below and illustrated with some details from case studies.

Description, sorting, ranking, choice
The first group of applications required extensive "problem structuring" in order for the group to gain a common understanding of what the main questions were, and which of these could usefully be addressed in an MCDA format. As the questions to be addressed were not immediately apparent at the start of the work, alternatives and criteria had not yet been defined. These would therefore be explored during the course of the project. The approach followed was that of value measurement MCDA.

Once problem structuring was over and alternatives defined, the alternatives needed to be either sorted into categories such as "suitable for more detailed research" or "not suitable at all", and/or ranked from most desirable to least, and/or a "best" alternative could be identified for implementation. Thus, these were problems that implied that the tasks to be undertaken included description, sorting, ranking and choice.

Applications which fell into this group included a study, the impetus for which came from the rapid expansion of forestry in the Maclear district of the Eastern Cape Province. This expansion had both conservation implications (for the under-protected afromontane grasslands) and social implications (due to the disruption to the farming community caused by the sale of farms to the forestry company). Eventually, scenarios were defined which encompassed a range of potential future forestry expansions (extent and location) and potential processing (sawmills or a pulpmill). This made it clear that, with some constraints on where planting occurred, more expansion could take place without seriously affecting conservation goals, although social effects would be similar wherever planting occurred. Another study arose because of the need to rehabilitate the Sand River (Mpumalanga) in order to maintain ecosystem functioning which was being compromised due to both forestry and irrigation practices. In addition, there was an urgent need for social upliftment and economic development in order to curtail the cycle of poverty and resource over-exploitation. Here, the scenarios developed encompassed a range of changes to the main current land-uses in the catchment (e.g. forestry, irrigation, conservation, dryland agriculture). In this case, fairly large gains in conservation could be obtained by reducing forestry to 50% of its current extent. This amount of reduction was not unrealistic as it was estimated that at least 25% would have to be removed to conform with current forestry practice (e.g. plantations which were too close to rivers, or on steep slopes). Also, relatively large social gains could be obtained by changing access to areas for the harvesting of natural and secondary resources.

Aspects of the Sand catchment scenario that was preferred overall after evaluation based on 19 criteria (fitting into the three main points of view) are currently being implemented. In the case of the Maclear study, studies were undertaken to further examine certain land-types which were critical from a conservation point of view. The studies not only gave guidance to decision-makers as to the "preferred direction" of development, but also provided a wealth of information in terms of the trade-offs implied by scores and weights, between for example ecological and economic criteria.

Sorting, ranking, choice
In the case of the second group of problems, the question to be addressed was already defined as substantial problem structuring had already occurred. This problem structuring occurred, generally, as part of a broader study, and was not necessarily guided by "MCDA think", and so additional sessions were still necessary to refine certain aspects. Usually, the alternatives were also already defined as part of this broader process (meaning that a good range of alternatives was not always included: e.g. including a "worst" and "best" from each of the main points of view).

Sometimes, various criteria and scoring systems (or indices) had also already been defined within the broader process. Therefore, the problem structuring stage was often limited to identifying additional criteria and the refinement of existing scoring systems and procedures to ensure that subsequent aggregations were valid. This was undertaken in decision-workshop format as for the previous group of applications and the value-measurement MCDA approach was also used.

Perhaps a further difference between these first two groups of applications is in how early the decision analyst became involved in the problem structuring. In the first group, the MCDA analyst was involved from the early problem structuring stages, and could more easily ensure that the set of alternatives and criteria were appropriate for the value-measurement approach. In the second group, the analyst had to more-or-less "fit in" with decisions and approaches decided on as part of a broader process. However, the flexibility of

MCDA (and hopefully of the MCDA analyst) meant that integration between previous efforts and the requirements of MCDA was usually quite painlessly and seamlessly achieved.

Sorting, ranking

In the third group of applications, the aim was to classify and / or prioritise a set of resources. Usually this sort of problem arises due to limited funding; for example, for research and management. The alternatives are the complete set of the entity in question, for example all 250 South African estuaries, or all 176 South African linefish species. The alternatives are therefore given, and so problem structuring is limited to defining and structuring the criteria and developing scoring systems or indices. In the case of the prioritisation of linefish species, the criteria included conservation criteria (e.g. endemicity, abundance, vulnerable life-history stages) and criteria reflecting the importance of the species to the fishing community (e.g. economic value, number of people involved). The linefish species could then be grouped into those that were of high management importance from a conservation point of view, those that were of high importance to fishers, and those that were ranked highly according to both groups of criteria. Different strategies of research and management would be appropriate for these three different groups of fish. In the case of estuaries, the emphasis was on classifying them from the point of view of their conservation importance, so that protection and management efforts could concentrate on those of highest conservation priority.

Design

In the last type of application, the intention is to *design* an "optimal" alternative. Here, a goal programming approach is appropriate. For example, in terms of the National Water Act of 1998, an ecological and basic human needs "Reserve" needs to be defined for each river. The Reserve is designed so as to allow for the particular degree of protection and use, defined by the management class selected for the river in question. In this case, a value-measurement based scoring system had already been developed to evaluate reductions or augmentations in flow in terms of ecological impacts. The goal program that we developed selected a reduction or augmentation level for each of ten parts of the flow regime (dry season flows, wet season flows and different classes of floods), in order to minimise the ecological impacts (as represented by the scores) for a particular total flow. In this way, the amount of water required for the ecology could be minimised while ensuring that a particular management class was maintained. Thus, more water could be made available for other users.

Conclusions

It can therefore be said with confidence that MCDA provided an array of flexible, appropriate, useful and user-friendly approaches (hammers, screw-drivers, planes) to a wide variety of types of application (nails, screws, planks), and that the MCDA "intervention" was generally well-received. However, two caveats could be noted. Firstly, there remain decisions that require a different approach. For example, where damages to natural resources require compensation to be paid to the people affected, the valuation techniques of environmental economics may be appropriate. Secondly, there are still those who, before involvement in an MCDA application, are rather wary or suspicious, particularly, when weights are mentioned. However, during each application, the participants obtained sufficient understanding of the approach to appreciate and accept the validity of "swing weights", and to undertake the tasks required of them with relative ease and even enjoyment. ♦

BI TO CURB RISING CREDIT CARD FRAUD

While fraud has always been a risk to business, it is becoming infinitely easier to perpetrate fraud, as money is no longer pieces of paper but bytes of data.

This is particularly prevalent in the credit card arena where the incidence of fraud in South Africa and around the world is rising exponentially – making it vital that banks and card industry to move to a pro-active rather than reactive customer-centric detection system.

“One way to address credit card fraud is to use business intelligence, for example by integrating computer-modelling techniques into billing systems,” says Kerry Evans, sales manager: financial services at SAS Institute, leaders in business intelligence.

Credit card fraud can occur in a number of ways. A popular counterfeit method is ‘skimming’. When a customer hands over his card for payment – perhaps in a restaurant where the card is taken away for processing – the details on its magnetic strip are copied by being swiped through a small hand held computer. The data is then used to make dummy cards for email, telephone and virtual transactions. Card number details can also be found on discarded receipts and these can also provide enough detail to create false cards.

Card manufacturers are working hard to protect customers (using chips to store data that are harder to copy, enhancing card delivery systems and rewarding shop staff who prevent illegal card use) but fraud continues to cost institutions and individuals millions.

“If serious headway is to be made into tackling this issue, it is incumbent on the banks and card industry to deliver success,” says Evans.
A major problem facing the industry is the current ‘reactionary’ approach to credit card fraud. The majority of fraud is detected only when customers receive their monthly statements. The time lag between the perpetration of the fraud and receipt of the statement means that errant transactions can go unnoticed for several weeks, increasing the likelihood that further illegal purchases may be made.

Once detected, banks have to invest significant resources in manually checking both computer records and sales dockets for proof of signature and discussing the transactions with the customer.

One way to address both the ‘passive’ nature of credit card fraud detection and the resource that finance companies must invest to tackle the issue, is to integrate computer-modelling techniques into the billing systems.

“Based on business intelligence - in particular data mining technology, advanced analytics and CRM systems - a normal-usage profile can be created for each customer account,” says Evans. “Account transactions can be checked, in real-time, for any anomalies against the profile.”

In-depth analysis of customer data develops a good understanding of card usage patterns relating to:

- **Geographic footprint:** where does the customer use the card?
- **Type of purchase:** what type of sales is the card used for?
- **What is the average transaction value?**
- **Type of goods:** particularly online, fraudsters will target goods that they know can be sold on easily – certain product segments can therefore be carefully watched.

Should an anomaly be discovered, a note can then automatically be sent to the fraud team who can contact the customer and verify the transaction.

Global fraud software provider SAS Institute, which manages major fraud detection systems for 40 institutions around the world, is a leader in the drive for the widespread adoption of pro-active rather than reactive customer-centric detection systems throughout the industry.

SAS® is all you need to know.

AMAZON.COM CALLS ON SAS FOR FRAUD DETECTION

In operation since July 1995, Amazon.com today offers "Earth's Biggest Selection" of nearly everything. Amazon.com has 35 million customers and lists millions of unique items in categories such as electronics, kitchen and housewares, books, music, DVDs, videos, photography equipment, toys, software, computer and video games, tools and hardware, outdoor living and wireless products.

Amazon.com operates four international Web sites: www.amazon.fr, www.amazon.co.uk, www.amazon.de and www.amazon.co.jp. It also operates the Internet Movie Database (www.imdb.com), the Web's comprehensive and authoritative source of information on more than 250,000 movies and entertainment titles and 1 million cast and crew members dating from the birth of film in 1891 to the present.

An early commitment to minimising the risk of fraud led Amazon.com to choose SAS as the foundation of its fraud detection system. According to Jaya Kolhatkar, Amazon.com's director of fraud detection, "Our implementation of SAS has greatly reduced the cases of fraud on our site - and in the first six months of SAS implementation our fraud rates were cut by 50 percent."

Kolhatkar explains why Amazon.com chose SAS for fraud detection. "SAS has the best toolkit for the kind of analysis we wanted to do as part of our fraud detection process. No other vendor offers as comprehensive a range of tools - decision trees, neural networks and so on. It saves resources to have all of the functionality you need in one tool rather than having to prepare the data differently for different niche tools. SAS can also access all of the data that we need to analyse. Finally, SAS has been very proactive in responding to our requests."
For Amazon.com, as for all retailers that sell goods remotely by Internet, phone or mail order, credit card fraud is the most prevalent type of fraudulent activity. Detecting and preventing this activity becomes a priority because retailers - rather than the cardholder's bank - bear the financial responsibility for this type of fraud. Perpetrators targeting online retailers use the same techniques that they might apply to traditional retailers. However, argues Kolhatkar, the fact that they leave a data audit trail with every click makes it somewhat easier to catch them.

Some of the typical "cons" include:

- **Dumpster-diving:** Perpetrators look through trash cans to find credit card receipts and use the information from them.
- **Double-swipes:** In a store, the card is swiped twice. Data from the second swipe is used for fraudulent purchases.
- **Creation of new credit card numbers:** Perpetrators determine which banks, usually smaller ones, don't match credit card numbers immediately, meaning that the retailer will not be able to authorise the purchase with the bank before shipping the goods. The fraud perpetrator creates credit card numbers that are similar to the bank's credit card numbers, knowing that when they use the card to purchase goods fraudulently, the purchase is unlikely to be authorised immediately by the bank.

"Fraudsters generally follow similar patterns of behaviour," says Kolhatkar. "That makes it easier to detect fraud because you can look for corresponding patterns in transaction and customer data. For example, fraudsters tend to purchase goods that they can dispose of easily on the grey market, such as electronic goods. Obviously, they do not have the goods shipped to the same address that is used for billing purposes so an order not shipped to the billing address might be an indication. They'll also tend to use the fastest possible shipping method. Clearly, any one or even combination of these features does not mean that fraud has definitely taken place but, combined with other indicators, these would be the kinds of pointers that we would follow up on."

Amazon.com uses SAS to analyse the behavioural patterns of fraudsters and build predictive scores that indicate the likelihood of fraudulent behaviour having occurred. "We run these scores against the customer database," says Kolhatkar. "We then use SAS to prioritise the results. Obviously, we have to investigate a case of potential fraud very thoroughly before beginning legal action, so we prioritise the results of running the fraud scores and begin with the highest priority cases. We also do all of our reporting on fraud - which cases we are pursuing and their status - in SAS."

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MULTIPLE CRITERIA DECISION ANALYSIS: AN INTEGRATED APPROACH

by **Belton, Valerie and Theodor J. Stewart, 2001.**

Kluwer Academic Publishers, Dordrecht, The Netherlands.
400pp. $90.00.

By Hans Ittmann, ORSSA President, hittmann@csir.co.za

It does not happen often; in fact I don't think it has ever happened, that a book reviewed in the ORSSA newsletter is authored, or co-authored (as in this case) by a member of the society! It is therefore with a feeling of apprehension that this review is presented not only because the authors are well-known to the reviewer but also since the reviewer can by no means consider himself as an expert in the area of multiple criteria decision analysis (MCDA)! As suggested by the authors "the book can be of value to various reader groups….. (one group being)….Operational Researchers who wish to extend their knowledge into the tools of MCDA… (and in addition)…may wish to omit or gloss over the more technical algorithmic descriptions" in some parts of the book. Based on this, the objective was to get a view on the state-of-the-art of the rapidly developing field of multiple criteria decision analysis without necessarily going into all the "technical algorithmic descriptions".

Both Belton and Stewart have impeccable backgrounds in the field of MCDA and are very well qualified to write on this subject area. In addition, their understanding, knowledge and experience in the broader field of Operations Research/Management Science serve them very well in identifying synergies with MCDA. The subtitle of the book is ***An Integrated Approach*** and from the outset, it is very clear that this is the essence of what is presented. The authors strive throughout the book to present a balanced view on the various schools of thought in multiple criteria decision making and integrating this within MCDA. However, they also endeavour to position MCDA within the broader context of management theory, science and practice.

In the introductory chapter the authors set the scene by defining the term, outlining what can be expected from MCDA and presenting the process of MCDA. A multiple criteria decision making problem arises when multiple factors or criteria exist - sometimes explicitly, sometimes without conscious thought - which need to be balanced but which, at the same time, can be in conflict. The following definition is provided by the authors, "*we use the expression MCDA as an umbrella term to describe a collection of formal approaches which seek to take explicit account of multiple criteria in helping individuals or groups explore decisions that matter*". Various myths exist about MCDA but the authors make it very clear that in the end MCDA is an aid to decision making which seeks to integrate objective measurement with value judgement and to make subjectivity explicit. As with many problems faced by OR/MS practitioners, the MCDA process involves iterative identification of the problem issues and problem structuring; followed by model building and use of the model to inform and challenge thinking; and finally develop action plans.

The Multiple Criteria Problem is discussed in Chapter 2. Various examples of such problems are given. Most of these problems are not only introduced here but are referred to in subsequent chapters to illustrate different methods and techniques. This is obviously very useful and some continuity is maintained in the process. Different categories of problems presented for which MCDA may be useful (the first four are from Roy (1996) while the other two were added by the authors), are:

- The choice problematique – to make a simple choice from a set of alternatives;
- The sorting problematique – to sort actions into classes or categories;
- The ranking problematique – to place actions in some form of preference ordering, which might not necessarily be complete;
- The description problematique – to describe actions and their consequences in a formalised and systematic manner;
- The design problematique – to search for, identify or create new decision alternatives to meet the goals and aspirations; and
- The portfolio problematique – to choose a subset of alternatives from a larger set of possibilities.

Chapter 3 covers the first phase of the process of MCDA namely problem structuring. There is a discussion on the importance of problem structuring in MCDA, followed by a presentation of a whole range of different methods. These range from idea generation and capture, including the low-tech "Post-its" ("Participlan" for some people), to the hi-tech Group Systems software. The authors then outline how one gets from problem structuring to model building. In problem structuring the key elements of the model framework are: the alternatives, criteria, the stakeholders and key uncertainties, and this need to be developed.

The next five chapters are devoted to the model building phase of the MCDA process. In Chapter 4 an overview is presented of a number of different models which have been developed to represent preferences in the context of multi criteria problems. Three different classes of preference models are reviewed briefly in this chapter: value measurement, satisficing and aspiration-based methods, as well as outranking. This provides a basic and working understanding of the key ideas. Fuzzy and rough sets are also introduced and discussed. These are the means of capturing imprecision in the value judgement required. Lastly, the importance of weighing judgements and attaching weights to represent the relative importance of conflicting criteria are introduced. Various pitfalls in using the methods are identified.

The next chapter focuses on the use of value function methods and specifically on the concepts of value measurement theory and how to use it in practice. Different techniques are presented with clear and precise summaries. A whole section is devoted to the Analytic Hierarchy Process (AHP). The fact that the AHP has been criticised

before by the authors made me read this section with real interest. The authors need to be commended for the way in which they present the debate around the AHP in a very fair, balanced and objective manner.

"Value function methods" is the topic of Chapter 6. Different methods are discussed and these in general concern the quantification of additive value functions when only partial and imprecise information is available on preferences. In the latter case, these could lead to "interactive methods" which are also covered in this chapter. Parts of this chapter are more technical or mathematical in nature. Most of this more mathematical material is placed in "boxes", which does help the non-technical reader.

In chapter 7 goal and reference point methods are reviewed. Goal programming and some of its variants represent early attempts to provide quantitative decision aids for complex multiple criteria decision problems. It is clear that these had their origins in mathematical programming.

Outranking methods are discussed in Chapter 8. These differ from the value function approaches in that there is no underlying aggregative value function. The two most well known outranking approaches, the ELECTRE methods and PROMETHEE method, are handled in detail. The ELECTRE variations as well as the evolution of this method is traced, tracked and explained very well.

The last three chapters of the book aim to draw all the material presented in the book together in an integrated fashion. The real value of the book comes from these chapters which present practical issues and insights in how the various methods should be used. In chapter 9 practical issues around the implementation of MCDA are discussed. What is very useful is that these are relevant whatever methodology is applied. Some of the issues that are addressed include establishing a contract, the nature of modelling and interactions with and between participants, organizing and facilitating a decision workshop and software support. All of these are very valuable guidelines for those that will be using MCDA. The links to other OR/MS techniques are explored in the penultimate chapter. These links can lead to mutual enhancement. A whole range of methods are mentioned, including game theory, Data Envelopment Analysis (DEA), Multivariate Statistical Analysis, discrete event simulation and system dynamics, scenario planning, value engineering and balance scorecard.

The final chapter is devoted to the overarching theme of the book – An Integrated Approach to Multiple Criteria Decision Analysis. It is the authors' view that integration is essential to the growth and success of MCDA and they offer very convincing views, arguments and explanations to make this point. There are four threads to integration that is highlighted in the chapter.

This book provides not only a detailed overview of all the various MCDA methodologies and methods; it also shows how these work in practice. In addition, the authors go to extreme lengths to show how this powerful tool can be integrated into a broader context and provide the ultimate decision maker with a great tool. Ultimately, the aim of MCDA is to facilitate decision makers' learning about and understanding of the problem they face. It does not provide the "right answers"; it is an aid to decision making, assisting to explore and to guide the decision maker to a preferred course of action.

Multiple Criteria Decision Analysis: An Integrated Approach is a significant and comprehensive contribution to the field of MCDA, but also to the broader area of OR/MS. It is a piece of work of which the authors can be proud. For anyone interested in Multiple Criteria Decision Analysis, this book is essential!

Reference:

Roy, B. (1996). *Multicriteria Methodology for Decision Aiding*. Kluwer Academic Publishers, Dordrecht. ♦

Win this book!

Thanks to Theo Stewart and Kluwer Academic Publishers, this one copy of this excellent book can be won.

To win this book you must write an essay on the possibilities for MCDA in South Africa. Touching on possible problems that can be tackled and why MCDA will be the preferred choice.

The winning essay will be published in the October issue of the newsletter.

The rules:

1. You must be a fully paid member of ORRSA.
2. The essay may not exceed 1000 words.
3. Closing date: **12 September 2003**
4. The judges' decision is final and no correspondence will be entered into.

Entries can be e-mailed to:

ldtome@dip.sun.ac.za

or mailed to:

MCDA Book Competition
Department of Applied Mathematics
University of Stellenbosch
Private Bag X1, MATIELAND 7602

To see other products and services offered by Kluwer Academic Publishers visit there web site: www.wkap.nl

CHAPTER NEWS

Johannesburg/Pretoria Chapter

Annual Johannesburg and Pretoria chapters joint dinner

By Dave Evans (Dave@VALUEANALYTICS.CO.ZA)
and Patricia M Gouws (gouwspm@unisa.ac.za)

This year's joint social function of the Gauteng Chapters was arranged by the Pretoria Committee, who chose dinner at the Die Werf restaurant on the eastern edge of Pretoria; practically in the country, in fact. About 20 people attended, including half a dozen or more who had come through from Johannesburg, or "Jozi", as it seems to be known these days.

Hans Ittmann gave us an overview of the Society's recent and current activities, including coverage of our increasing international, and particularly African role; he recommended "ORDA-1" - the first International Conference in the Eastern Africa Region on OR and Development for Africa, in Nairobi in September, to us. He also commented on not having seen several of the Joburg people for some time, as witnessed by his surprise at Dave Evans's "new" (6 month old) hairstyle and not seeing Elsbeth Dixon for almost a year.

The main speaker was Dewald Roode, who spoke eloquently and entertainingly about his life in and around OR, from the founding of ORSSA to the present day. He particularly highlighted the difference between having elegant mathematical models and answers, and being able to give people with real problems the practical help they need to improve the real, on the ground situation: a perspective which I think we could all identify with.

One minor disruptive factor was that each time one of the speakers started, or was introduced, the staff overhead, on a very loud wooden floor/ceiling, started moving furniture!

The talks were distributed between the courses of the dinner, which had an appropriately South African flavour, as they often do at Die Werf, and were as excellent as always. A good time was had by all, and old acquaintances very pleasantly renewed – always one of the strong points of ORSSA functions.

To those Gauteng members who chose not to attend, I have to say that you are undoubtedly missing out on one of the highlights of our social year – we look forward to seeing even more of our old friends next year. I'm sure I can extend the thanks of all who attended to the Pretoria Chapter Committee for a very well organised and most enjoyable evening. ♦

Western Cape Chapter

A Cut and search Procedure for Solving Binary and Pure Integer Programming Problems

by Leo Tomé (ldtome@dip.sun.ac.za)

UCT hosted the first lecture in the seminar series of the Western Cape chapter for 2003. The talk, entitled *A Cut and search Procedure for Solving Binary and Pure Integer Programming Problems*, was presented by Juwa Nyirenda, a lecturer at the Department of Statistical Sciences at UCT. In his talk he discussed a new procedure for solving linear integer-programming problems that he is working on.

Based on the cutting plane techniques this procedure appends only one general constraint. This is in contrast to the typical cutting plane approach where, very often it is necessary to add a number of cuts or constraints to the iterative problem in an effort to force the continuous extreme point to become integer valued. This new procedure aims to arrive at an integer solution by using the one constraint in a systematic fashion. This results in the new method having reduced computation time. Because of the flexible and general nature of the method it can easily be used to solve 0-1 problems without any need to add any special requirements.

As was the case when Juwa presented a similar talk at the 2002 conference, he really made the audience talk, with reactions ranging from excitement to scepticism. The procedure is however still in a research phase and we look forward to see where it is heading. ♦

A genetic algorithm approach to multi-objective land use planning

by Stephen Berjak (sberjak@dip.sun.ac.za)

The second lecture in the ORSSA Western Cape chapter seminar series was given by Theo Stewart of the Department of Statistical Sciences at UCT. The talk, titled "*A genetic algorithm approach to multi-objective land use planning*", covered research that Theo conducted during his 3 month sabbatical at the Free University of Amsterdam in the Netherlands. The spatial planning problem involved allocating land use classes (i.e. agriculture, residence, industry, water etc.) across a geographical region, subject to a variety of constraints (i.e. financial, environmental, social etc.) and conflicting management objectives. The physical landscape is represented by a lattice consisting of a number of square grid cells of size one hectare, and the multi-criteria problem involves allocating a specific land use class to each cell. The problem was formulated using a goal programming/reference point approach, which utilised a scalarising function to unify the (non-spatial) additive constraints and spatial constraints. Solutions to the nonlinear combinatorial optimisation problem were obtained by implementing a special purpose genetic algorithm that was developed for this problem. After extensive numerical testing, the computer implementation of mathematical model was used to re-allocate land use practises, under different land use scenarios, in the Jisperveld region of the Netherlands. The ultimate goal is to integrate the model into a complete land use planning decision support system.

All in all, the lecture was both interesting and well attended, with Theo achieving a 'full-house' of around 30 attendants! ♦

Credit Scoring within PIC Solution

by Frank Ortmann (ortmann@dip.sun.ac.za)

On Wednesday 28 May 2003, scoring consultant Darin Kent entertained some ORSSA members with a presentation entitled *Credit Scoring within PIC Solutions*. PIC (Project management, Integration services and Consulting) Solutions is a South African company providing (amongst other things) a credit scoring system to large South African and international businesses. It is the largest customer management solutions company in the Southern Hemisphere.

The presentation gave the listeners an overview into how the scoring system is used by PIC Solutions to give their customers a fairly accurate means of predicting the risk involved with their client's acceptance of new account holders to their business. By being able to predict 'bad' or 'good' clients with the scorecard system, companies reduce the risk of having to write off unpaid accounts held by their clients, and they can turn away potential 'bad' clients with more than a 'gut feel'. They make use of methods such as goal programming, neural networks, and linear regression (amongst others) to solve the models. Each company requires at least one model to be developed specifically for them and these become redundant after some years. This is because some of the seemingly 'good' clients change their habits and become 'bad', so these must also be predicted before they join and become account holders.

Much of the data PIC Solutions uses are from their clients, but they also make use of the South African Credit Bureau to check the credit history of new applicants. So, if you are interested in opening new accounts, make sure that your credit history is excellent! ♦

CHAPTER CALENDER

Vaaldriehoek Chapter

July/August 2003, at Sasol, Sasolburg
OR approach/OR thinking by *Dries de Wet*

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

Western Cape Chapter

Wednesday October 1st, 2003 at 16:00
Speakers: Esbeth van Dyk (CSIR) & Frank Ortmann (Stellenbosch University)
Topic: *Modelling infrastructure capacity for the SA fruit industry**
Venue: Room A409, Main Engineering Building

Wednesday November 12th, 2003 at 16:00
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

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

by Ilze du Plooy (ORRSA archivist)

ORSSA's documents have a resting place in the Department of Quantitative Management at Unisa. Except for one odd file named "items to be sorted and filed " everything is in place and under control. And so one afternoon, not wanting to do any work, I picked up the file "Minutes: AGM " and spent a pleasurable time browsing through it. Here are some snippets from the past (verbatim):

1970 (Iscor): On a recommendation from the Executive Committee the meeting approved the granting of the Tom Rozwadowski annual award in memory of Mr Tom Rozwadowski, one of the founders of the society.

1971 (Kyalami Ranch): under general: Miss Virginia Marting suggested that the possibility of applying for membership of the International Federation of Operational Research Societies be investigated. She mentioned that the CSIR could be approached to provide financial support for this.
(*Old members: Can you recall this brilliant lady?)*

1974 (University of Cape Town) : Changes to the constitution: that the following be added to clause 4g: The membership fee for student members shall be R1,00.
(Interesting to notice that AH Money was one of the full members present.)

1976 (University of Pretoria): Financial report: The audited financial statements are presented by the treasurer, Prof AH Money.

1983 (Johannesburg Chamber of Mines): Reports of the Chapters: Johannesburg: Seven seminars had been held during the year. These had all been held during the afternoon and had been attended by between 7 and 70 people.
Pretoria: Dr T Stewart had taken over as chairman from Dr Weistroffer. There had been a number of talks during the year.
Vaal Triangle: The chapter had been founded on 2 August 1983 at a meeting attended by about 50 people. Prof G Woolsey had addressed the meeting. There were 22 members of the chapter and more were expected to join.
Western Cape: There was no report from the Western Cape.

1986 (University of Cape Town): President's Report: There was an upsurge in chapter activities and the Natal Chapter was founded.

1989 (University of the Witwatersrand): Amendment to membership fees: It is hereby proposed that the membership fees be increased from R20 per annum to R30 per annum and all other fees be adjusted accordingly. The proposal was carried in spite of a few reservations. The increase will be explained to members and the EC will look into chapters' activities so as to offer members more for their money.

1992 (University of Stellenbosch): Changes to the constitution: The marketing working group proposed the following name for the society:
Operations Research and Management Science Society of South Africa.
An alternative proposal of no change of name was submitted. The alternative proposal was accepted unanimously.

1993 (University of Natal, Pietermaritzburg): Working groups: The marketing of OR: E Dixon reported that little progress had been made. G Geldenhuys submitted articles to Archimedes and Pythagoras. It was proposed that chapters must be tasked to deal with some of the objectives of the marketing group.

1994 (Volkswagen Conference Centre): Newsletter: Internet and a newsflash are also used to send out information.

1996 (The Tavern Hotel, Mbabane, Swaziland): General: A homepage for ORSSA will be put on WWW after EC has put management structure in place.

1997 (The Karridene Hotel, Illovo Beach): Chapter reports: It was proposed that chapters meet regularly on informal basis for lunch and a talk.

2002 (Goudini Spa): Chapter reports: Johannesburg: From the report read at the AGM:
The "Gauteng" annual dinner was arranged this year by the Johannesburg Chapter and held at Hugo's Place, near Kyalami, with an excellent turnout from both Chapters, undoubtedly as a result of sterling work by the committee members, who undertook to personally phone about a dozen chapter members each to elicit some interest. Dr John Anderson gave a fascinating talk on the "Sixth Extinction" (which mankind is currently imposing on the globe) and a great time was had by all. ♦

The Euro Doctoral Dissertation Award

EURO (The Association of European Operational Research Societies) are presenting the EURO Doctoral Dissertation Award (EDDA), a prize awarded to young OR scientists that have recently completed their doctoral dissertation. To be eligible for the award, the applicant must:

1. have defended their dissertation at a European University,
2. not have given the dissertation defence more than a year before the submission date, and
3. be a personal member of an EURO member society.

Multiple submissions of the same doctoral dissertation to another dissertation award activities of other societies are excluded.

To be considered, a dissertation must be nominated by the applicant's thesis supervisor, who must submit:

1. Three copies of the dissertation
2. Five copies of an extended abstract (3 to 5 pages) in English.
3. If the thesis was not written in English, the nomination must include a paper in English (10 to a maximum of 30 pages) describing the core ideas of the thesis that has been submitted for publication in an international journal or a prestigious conference. The nominee must be the first author of this paper.
4. Nomination letters (or reports) from two referees selected by the dissertation supervisor, supporting the submission and stating their assessment of why the thesis should win the award.

All of these items must be sent to the chairman of the jury before the end of January (6 months before the next EURO K conference). A nomination without any of these items will not be considered.

The jury consists of 5 scientists representing different countries and areas of OR. Members stay in office for 2 consecutive presentations. The jury chair, which is appointed by the EC, selects the remaining 4 members of the jury to be approved by the EC. One member should be a member of the previous jury. The jury identifies 3 finalists who are invited to present their work during the EURO conference and the winner is announced after the presentations.

The first prize is € 1 000 with a certificate from EURO. The three finalists will be compensated their registration fees for that conference and EURO will contribute to their travel and journey expenses.

Jury chairman:	Professor J.P. Brans (jpbrans@vub.ac.be) Vrije Universiteit Brussel B-1050 Brussels – BELGIUM
Jury Members:	P. Hansen (Canada), J. Figueira (Portugal), M. Shutler (UK), J. Spronk (Netherlands)
Application deadline:	31 January 2004

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

What do you get from being a member of the Operations Research Society of South Africa?

FREE	The ORSSA Newsletter – this newsletter appears three times a year with lots of exciting information about OR and ORSSA activities, personalities, international news, book reviews, etc.
FREE	ORiON – the official journal of ORSSA, which has appeared annually for the past, almost, twenty years. It is dedicated to our members and you can use it to publish your work, see what fellow ORSSA members do, etc.
NETWORKING	ORSSA Chapters – there should be an ORSSA chapter in your region. During the chapter meetings and functions you can meet fellow OR practitioners and get to hear interesting talks.
NETWORKING	The annual national conference – this is an annual highlight of our society. The 2003 conference will be held in Pretoria.
MEMBERSHIP	Membership of various OR societies.
JOBS	Access to job opportunities – the society will assist anyone looking for a position in the OR field, by publishing an abbreviated CV.

For more information,

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or
visit dip.sun.ac.za/ONSA/

To join, complete the registration form supplied, or visit our web site.

Operations Research Society of South Africa
NATIONAL CONFERENCE 2003

7- 10 September 2003

ABSA CONFERENCE CENTRE, PRETORIA

FIRST NOTIFICATION AND CALL FOR PAPERS

The annual conference of the Operations Research Society of South Africa will take place from 7 - 10 September 2003 at the ABSA Conference Centre in Montana Park, Pretoria. Participation over the full spectrum of Operations Research will be welcomed at the annual conference. All papers will be welcomed, whether they are of a more fundamental nature, about the application of OR in business or industry, about topical issues in OR or about education issues. Selected full papers of quality will be considered for publication in *ORiON*, the journal of ORSSA. This is an invitation to attend the conference and to submit a paper.

Abstracts

Those interested in participating in the conference should submit an abstract of not more than 300 words by e-mail or by ordinary mail to the conference secretary (see contact details at end of document). The abstract should include the title of the paper, the name(s) of the authors, their affiliation, and contact details (including e-mail address, telephone number and fax number) and the 300 word summary of the paper in plain text, with no mathematical expressions. Notification of acceptance will be given by e-mail by 31 July 2003.

Conference registration

A registration form, payment details, maps, etc will be available on the internet website of ORSSA (http://www.orssa.org.za). To register, download the registration form from the website or use the paper copy in the newsletter and post or fax it to the address below. A registration form is also included with the newsletter.

Conference venue

The conference will be held at ABSA Conference Centre, Besembiesie Rd, Montana Park, Pretoria.

Accommodation is available at the venue. Please indicate on the registration form which nights you would like to have accommodation for.

Programme Outline

7 September	17:00	Registration
	18:30	Welcoming function
8 September	08:00	Registration
	09:00	Sessions
	17:00	Annual General Meeting
9 September	09:00	Sessions
	19:00	Conference dinner
10 September	09:00	Sessions
	13:00	Conference closes, followed by lunch (included)

Conference fees

Delegates:

Registration only:	R 1140.00
Registration and 3 nights, sharing:	R 1995.00
Registration and 3 nights, single:	R 2430.00
Supplement for non-members	R 80.00
ORSSA membership	R 80.00

Students:

Registration only:	R 695.00
Registration and 3 nights, sharing:	R 1550.00
Registration and 3 nights, single:	R 1985.00

Build your own package:

Registration:	R 1140.00
One night sharing:	R 385.00
Two nights sharing:	R 670.00
Three nights sharing:	R 855.00
Single supplement:	R 145.00 per night
Student discount:	R 445.00
ORSSA membership	R 80.00
Annual General Meeting only	no charge (members only)

Notes:

1. The student discount only applies to *bona fide* full-time students.
2. Any delegate not a member of ORSSA or another IFORS affiliated OR society will have to join ORSSA for the 2003/04 membership year, or pay a supplement equal to the applicable membership fee.
3. Please indicate with whom you would like to share, and ask that person to indicate your name on his/her registration form.

The conference fees include conference material, lunches, the evening functions on 7 and 9 September and refreshments during tea breaks. The accommodation fees include breakfast and dinner.

Payment instructions

Your registration will be confirmed by the secretariat, who will also send you an invoice. Payment instructions will appear on the invoice.

Transport from Johannesburg International Airport

The services of a shuttle service to and from the JIA to the ABSA Conference Centre are available if booked in advance. Please book this service with the conference secretariat and make sure that you communicate your flight detail and arrival time at the airport as soon as possible to the secretariat. The cost is per vehicle and the more delegates per vehicle, the better the rate will be:

1 to 3 people	R 350-00 per trip
4 to 9 people	R 450-00 per trip

Important dates

25 July 2003:	Deadline for submission of abstracts
31 July 2003:	Notification of acceptance of papers
31 July 2003:	Deadline for early-bird registration
29 August 2003:	Deadline for conference registration

Cancellation policy

Before 15 August 2003	50% of fees paid
After 15 August 2003	100% of fees paid

Conference secretariat

ORSSA Conference 2003
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