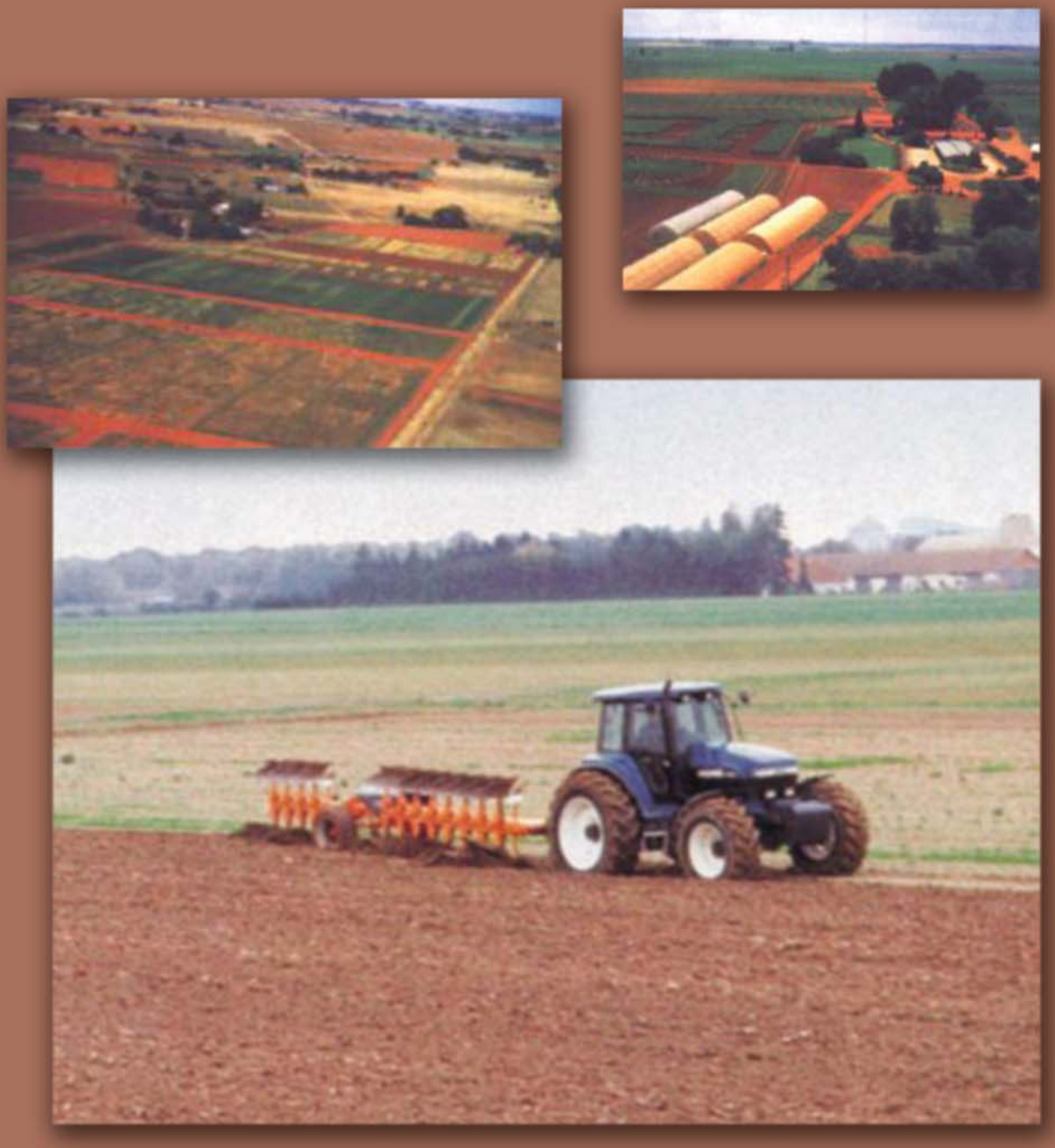
Newsletter

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



Operations Research in Agriculture

June 2004

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FROM THE PRESIDENT'S DESK

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

Wim Gevers

Since the last newsletter we have progressed well into 2004. The general election has come and gone and at the end of last month there were festivities to celebrate ten year of an all-encompassing democracy in our country. Ten years ago we may have wondered what all the changes in our society would entail, and today we can look back, thankful for peace. I have left out "prosperity" since real financial prosperity seems to be enjoyed by a relative few, whilst many of our fellow citizens still feel the pain of poverty.

A vote, however important, does not place food on the table. The economic transformation of South Africa has lagged the political transformation, and at this point in the history of South Africa it is understandable that Black Economic Empowerment (BEE) is high on the current agenda. I do not want to use this column for a political view, thus I am not going to comment on the pro's and con's of various actions. But as the area of BEE starts to unfold, I just realise how many opportunities there seem to be for Operational Researchers to get involved in assisting in finding solutions to the problems with which the decision makers are grappling.

In an attempt to provide a benchmark for BEE, the Financial Mail recently published a list of Top Empowerment Companies. Most of the information in this column has been gleaned from that report. The report looks at seven empowerment factors, namely black ownership, black management, employment equity, skills development, affirmative procurement, enterprise development and corporate social investment. For an overall assessment of companies, a scorecard was developed. Now scorecards are not uncommon for Operational Researchers. To what extent have we as decision aid specialists been involved in assisting in the development of such a scorecard? Are we going to risk criticising the model and suggest improvements? Scorecards often use a one-size-fit-all approach, taking little cognisance of the differences between organisations. Can we not assist in customising the scorecard for specific applications?

The first pillar of BEE is black ownership. In this regard the lack of black capital has been identified as a key challenge. This has lead to a number of innovative transactions involving vendor financing and derivative instruments. Some transactions have conditional structures for conversion. It seems as if modellers have had their inputs in that facet of BEE. Here too a number of concerns have been raised. There is concern about the concentration of economic power in the hands of only a few black captains of industry, while the masses do not seem to benefit. Other concerns are based on the structure of payment models which seem to be dependent on growing stock markets. Perhaps Operational Researchers who are used to work with multiple interest groups can assist in finding solutions that will involve a larger part of the population.

Employment equity is another important pillar of BEE. In order to be successful, skills need to be developed. In this regard we are all contributing through the skills levies that our employers are paying. This has resulted in large amounts of monies being available within the various education and training structures. Here I see an opportunity for operational researchers to contribute to effective utilisation of the available resources so as to enhance the development of skills needed. But also on a more personal level we can assist in the development and training of up-coming generations of Operational Research scientists. It is not going to be good enough to say that the school system is not delivering candidates that have well developed mathematical abilities. What can we do to change the situation?

Only last year the BEE Act was introduced, and that provided more clarity about the government's thinking. The act makes provision for the development of charters in various industry sectors which could become the key drivers of BEE. The development of these charters to me is another area where Operational Researchers could make a tremendous contribution. It deals with complex target setting and accommodating of diverse opinions, leading to some form of measurement of impact.

A secondary contribution of Operational Researchers could also be the development of effective strategies to satisfy minimum criteria as measured by scorecards. This can become a complex trade-off between various options to meet minimum criteria.

In the area of black management development, the charters work on giving target percentages for levels of management to be filled by black people by certain deadlines. In order to maintain our relative economic position, these targets need to be set realistically, taking into account the dire need for development, but at the same time the demand of competitive markets. I am convinced that Operational Researchers have the ability to contribute to setting realistic targets by taking a holistic point of view and accommodating conflicting demands.

I have taken the issue of BEE to illustrate that there are many opportunities for Operational Researchers to become involved in societal problems. There are many more such problems. The question really is: are we going to get involved? Can the society per se play a role in this regard, or is this a matter for individuals in the society to contribute? Since the society is to a large extent what the individuals in the society make of it, this is a challenge for all of us to determine how we can contribute to the debate on these issues and assist in finding solutions. Earlier this year the marketing of operational research featured strongly in our strategy discussions. I am convinced that in BEE we have an opportunity to contribute to society and at the same time promote the discipline that we hold dear. ♦

DISCLAIMER

The views expressed in this newsletter are those of the contributors, and not necessarily those of the Operations Research Society of South Africa. The Society is not responsible for the accuracy of details concerning conferences, advertisements, etc., appearing in this newsletter. Members should verify those aspects themselves if they intend to respond to them.

FROM THE EDITOR

Leo Tomé

The big news of last month must definitely be that South Africa has won the Soccer World Cup 2010 bid. What a great opportunity for us as South Africans to showcase all this country of ours has to offer. To do this, however, South Africa will need to be safe, our airports need to function smoothly, our transport systems need to be upgraded in order to handle the expected strain sufficiently, etc. So what a great opportunity in itself for us as Operations Researchers to showcase what we can offer, and to sell ourselves and our products!

In the president's column Wim Gevers tackles some aspects of Black Economic Empowerment and the possible opportunities we as Operations Researchers can find to contribute. Problems like providing more appropriate scorecards for the various business environments and the development of skills.

In the main article of the June issue Stephan Visagie describes a linear programming model developed to optimize a rotary crop system. In his article he also refers to the relative limited use of operations research that is currently found in agriculture. There are a couple of reasons for this, of which a large number of them are not in the hands of the OR practitioners. The fact, however, remains that there are still a large number of opportunities for OR to be found within the sphere of agriculture. Considering that one of South Africa's main industries through the years has been agriculture I am left with the question of how this is possible.

It seems the health of OR and the future of the discipline has been a topic of discussion for the last thirty years. In this column I have mentioned a couple of fields where opportunities are to be found. I am of the opinion that OR can thrive in SA, but that we must be more than Operations Researchers, we must be entrepreneurs with the possibilities of the discipline... looking for the gaps and making an offering out of it.

Until next time,
Leo Tomé

Address all queries or contributions to the editor:

Mr L.D. Tomé
Department of Applied Mathematics
University of Stellenbosch
Private Bag X1
MATIELAND
7602

E-mail ldtome@dip.sun.ac.za
Tel: (021) 808 4212
Fax: (021) 808 3778

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MEMBER PROFILE: THEO STYLIANIDES

By Leo Tomé (ldtome@dip.sun.ac.za)

Theo Stylianides

Theo Stylianides was born in Famagusta, Cyprus on 29 March 1950. After matriculating he served as a second lieutenant in the Cyprus National Guard until 1969 when he immigrated to South Africa. Having completed a BSc degree in Physics and Applied Mathematics and a BScHons in Applied Mathematics at the University of the Witwatersrand, Johannesburg, he went on to study through the University of South Africa where he was awarded an HonsBSc (Operations Research) and an MSc (*cum laude*) in Operations Research. He also possesses a Diploma in Business Management from the Damelin Management School. He is registered as a Professional Natural Scientist with the South African Council for Natural Scientists, and is a Member of the Operations Research Society of South Africa and an Associate Member of the South African Institute of Management.

After three years service as a Research Officer at the Fuel Research Institute of South Africa he joined Plan Associates, a development planning firm, where he subsequently became a partner in 1987. Here he was involved in numerous land use and transportation studies throughout South Africa. In 1995 he joined the CSIR where is currently employed as a Senior Project Manager, Decision Support Services, Information and Communications Technology. At the CSIR he has managed various projects on logistics modelling, capacity expansion modelling, location studies, accessibility modelling, energy modelling and crime analysis.

He has published a number of papers in both South African and European Journals and was awarded the 1998 Tom Rozwadowski Medal of the Operations Research Society of South Africa for one of his papers. He has also written numerous reports during his career including authoring or co-authoring 15 reports on crime analysis.

Theo's interests include vexillology (the study of flags), geographical linguistics and books. He has been happily married to Eleanor for the past eighteen years and they live in Pretoria.

Question: When and why did you first become involved in OR and ORSSA?

Answer: My first involvement in OR began in 1978. Although already qualified in Applied Mathematics and Physics and being in the employment of the then Fuel Research Institute of South Africa, I had never even heard of Operations Research. A friend of mine, almost quite accidentally, introduced me to OR stating that there were huge opportunities in such a career, not only in academia and the research institutions but also in the private sector. I followed his advice, registered for further post-graduate studies in OR and was offered a position in a planning firm involved in land use and transportation modelling. I haven't looked back since then!

I joined ORSSA in 1979 as an Associate Member and a year later I became a Full Member. For the past three years I served as the society's Treasurer.

Question: You are originally from Cyprus. Why did you come to South Africa and what has kept you here all these years?

Answer: I came to South Africa intending to study Physics and, ultimately, Nuclear Physics. I had many relatives in South Africa and it was, therefore, easier for me to study here than in any other country. Furthermore, certain South African universities were held in high esteem and were quite well known overseas. My first few weeks at Wits were tough: textbook in one hand and dictionary in the other, travelling each day by train from Pretoria to Johannesburg, *etc*. It gradually became easier and I made many friends amongst lecturers and students. However, the nuclear bit didn't work because of security reasons.

South Africa is a fascinating and grossly underrated country. I came to love its people (I married one) and its nature and made roots here. Africa is addictive!

Question: What would you consider to be the highlight of your career in Operations Research?

Answer: It's difficult to isolate one. Probably the award of a prize in the Best Applied Paper Competition at the Euro XV / INFORMS XXXIV Joint International Conference, in Barcelona, Spain (1997) and the related award of ORSSA's Tom Rozwadowski Medal (1998).

However, the most impactful event in my career has been another "chance" discussion, this time with Hans Ittmann, when he invited me to apply for a position at the CSIR in 1995. I have seen a lot of OR since then!

Question: During your career as Operations Researcher you have been involved in a wide variety of projects. Which projects would you consider to be the most interesting?

Answer: Projects vary from extremely quantitative ones to less so. I find the former more interesting. Perhaps, it's because I have seen too many qualitative strategies disappear before they are implemented. Also, there are large, multi-disciplinary projects, and smaller specialised ones. A project can belong to any domain, from justice to energy, from government to industry. Each type is interesting, but acquainting yourself with new domains in short time periods can be stressful. The best projects are always those which, when complete, receive acclaim from the client and make a difference to his/her organisation.

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

Answer: If you have an aptitude for and an interest in quantitative methods and mathematics; if you wish to apply this aptitude in the service of society; and if you have the initiative and perseverance to take complex problems through to successful conclusions, then there should be exciting opportunities and challenges for you in a career in Operations Research. A high degree of job satisfaction will be assured in that you will, to an increasing extent, be involved in important decisions in the public and private sectors.

Love what you do (or at least try to love most of it – sometimes you may feel like a "jack of all trades"), learn from those around you, teach them too, admit your mistakes and learn from them, be consistent, pay attention to detail and above all, work hard. ♦

CHAPTER NEWS

Western Cape Chapter Chairmans's Report: October 2002-September 2003

By Jan van Vuuren (vuuren@sun.ac.za)

The 2002/2003 year was another eventful one for the Western Cape Chapter of ORSSA. In November 2002 the 2001-elected chapter executive was re-elected for a second term of office. The executive elected, consisted of

1. Jan van Vuuren (chairperson),
2. Wim Gevers (vice-chairperson),
3. Theo Stewart (treasurer),
4. Isabelle Nieuwoudt (secretary), and
5. Trevor Wegner (additional member).

The election of the executive coincided with the last chapter meeting of the 2002 calendar year, which was the annual student competition, held at the University of Stellenbosch Business School, in Bellville. This competition is held nearly every year, with the objective of finding the best OR project (roughly on honours or 4th year level) by a student at any tertiary institution in the Western Cape. The winner is usually automatically entered into the annual national student competition of the Society during the following year. The two student teams who took part in the chapter competition during 2002 were:

1. Eltdon de Waal (an honours student from UCT) on a project entitled "Portfolio Optimisation - Examining Resampling Efficiency and Portfolio Confidence Intervals," and
2. Chris Human, Leo Tomé, Amanuel Ghebretsadik & Debessay Kassa (all honours students from Stellenbosch University), on a project entitled "Determining optimal stock reorder levels at ClickaBox Factory."

The adjudicators for the competition were Wim Gevers, Theo Stewart and Esbeth van Dyk. The judges commended both teams for their good written work and interesting oral presentations, and awarded the prize to Eltdon de Waal, who received a year's free student membership to ORSSA and was subsequently nominated as the official chapter entry in the national student competition in 2003. The combined AGM and Chapter Student Competition concluded with a delightful cocktail party, organised by the University of Stellenbosch Business School.

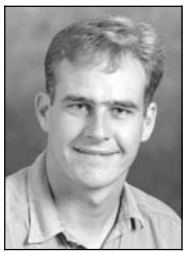
Three seminars were organized by the chapter during the first semester of 2003. The first seminar, on March 12th, was given at UCT by Juwa Nyirenda of the Department of Statistical Sciences at UCT. In this fascinating talk a new "slice and squeeze" algorithm for solving mixed integer programming problems was proposed and illustrated by means of example. A lively discussion about the complexity of the proposed algorithm took place afterwards. The second seminar, entitled "A genetic algorithm approach to multi-objective land use planning," took place on April 16th, 2003 at the Department of Applied Mathematics, at Stellenbosch University. In this interesting talk Theo Stewart of the Department of Statistical Sciences at UCT shared with the audience some of the work done abroad during his sabbatical leave in 2002, in which land utilisation in a Dutch city was optimized according to different criteria, including industrial development potential, recreation value, conservation requirements, and many more. The third seminar was delivered by Darin Kent and Eva Neves, two employees of PIC Solutions, at UCT on May 28th, 2003. In this very well prepared and informative talk the speakers outlined the use of various OR techniques (such as neural networks and goal programming) in use at PIC solutions within their credit scoring system. There were a number of students present at the talk, who were clearly interested in the work done by PIC Solutions, and at least two of these students were offered jobs at PIC Solutions, starting January 1st, 2004, as a direct consequence of the links forged during this seminar.

A fourth seminar was held during the second semester, on October 1st, 2003, during which Esbeth van Dyk of the CSIR and Frank Ortmann of the Department of Applied Mathematics at Stellenbosch University talked about modelling infrastructure capacity for the South African Fruit Industry with a view to identifying bottlenecks and future investment opportunities for cost-effective infrastructure expansion investment. This interesting talk was held at the Department of Applied Mathematics, at Stellenbosch University.

The 2003 Western Cape student competition scheduled for November 12th 2003 was cancelled, due to a lack of suitable nominations. However, supervisors at Western Cape tertiary institutions are invited to nominate OR-related project work by their honours students (or equivalent) for the next competition (due in November 2004), by contacting Isabelle Nieuwoudt (Department of Applied Mathematics, Stellenbosch University) at isabelle@sun.ac.za. As a result of this cancellation, the chapter AGM, which was also planned for November 12th, 2003 was postponed until March 17th, 2004. The March 17th meeting was the first activity on the 2004 calendar of the Western Cape chapter, and consisted of a fascinating talk by Nancy Brown (PIC Solutions) on the impact of seasonal trends in credit provision forecasting (a more detailed discussion of this seminar may be found on page 9 of this newsletter). This very informative talk was followed by a delicious year-start reception, again organized by the Graduate Business School of the University of Stellenbosch, and was preceded by the annual

(Continued on page 9)

Operasionele Navorsing in die Landbou



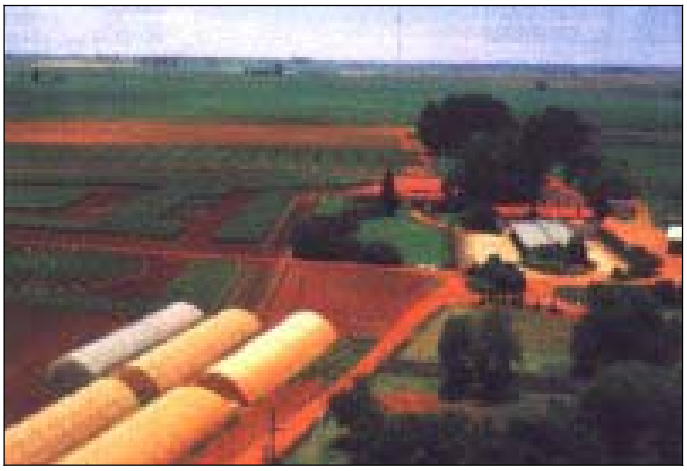
Deur

Stephan Visagie (svisagie@sun.ac.za)

Departement Logistiek
Universiteit van Stellenbosch

Die landbou is, om die metafoor te gebruik, 'n braak land vir operasionele navorsers. Alhoewel die groter landbou-industrie al by ontwikkelings in operasionele navorsing (ON) baat gevind het, het boere nog nie direk veel voordeel daaruit getrek nie. Daar is verskeie redes hoekom spesifiek die boere agterweë gelaat is. Die twee grootste redes is sekerlik die volgende: Die gemiddelde boer besit 'n relatief klein besigheidseenheid en kan dus nie bekostig om 'n span deskundiges in te koop om sy probleme te optimeer nie. Tweedens het boere eers die afgelope paar jaar begin met goeie rekordhouding, wat goeie langtermyn data baie skaars maak vir 'n operasionele navorser om mee te werk. Ten spyte van hierdie probleme kan operasionele navorsing wel met heelwat vrug vir die boer aangewend word. Een so 'n aanwending is die bepaling van 'n optimale wisselboustelsel.

'n Wisselboustelsel is 'n stelsel waarvolgens die boer gewasse op dieselfde grond afwissel in opeenvolgende jare. Hierdie stelsel is relatief onlangs eers in gebruik geneem, maar is vandag onontbeerlik in goeie saaibestuur. Die hoofredes vir die gebruik van wisselbou is eenvoudig. Verskillende gewasse onttrek en voeg verskillende voedingstowwe terug in die grond waarin dit groei. Deur die volgorde van gewasse reg te kies, kan daar dus groot besparings teweeggebring word aan bemesting. Daar is studies in Australië gedoen wat aangedui het dat die grondvrugbaarheid selfs toeneem indien 'n wisselboustelsel oordeelkundig bestuur word. Die bestryding van onkruid word goedkoper met 'n wisselboustelsel deurdat goedkoper gifstowwe gebruik kan word. Sommige onkruide is geneties baie na aan die gewas wat verbou word. Gifstowwe wat sulke onkruide bestry, is besonder duur as gevolg van die duur navorsing om die gifstof se aktiewe bestanddeel so spesifiek te ontwikkel. Indien gewasse wat geneties ver van mekaar af is opeenvolgend verbou word, kan goedkoper gifstowwe wat minder spesifiek is, gebruik word. Plantsiektes kan ook baie meer effektief bestry word in wisselboustelsels. Deurdat die gasheerplant nie elke jaar geplant word nie, word die siklus van die siekte en/of parasiete gebreek. Indien meer as een gewas geplant word, verlaag dit ook die finansiële risiko as gevolg van wisselende marktoestande vir die boer. Verder kan ander bedryfsvertakkings soos melk- en varkboerdery maklik ingeskakel word in 'n wisselboustelsel deur voer vir hierdie diere aan te plant binne die wisselboustelsel.



Saai plaas met gediversifiseerde gewasse

Modellering

Die wisselbouprobleem kan met 'n paar aannames met behulp van lineêre programmering (LP) opgelos word. Die probleem met LP-modelle is dat die modellering van die wisselboustelsel op 'n gegewe tydstip moet begin en eindig. Die probleem is wat hierdie grense van die model moet wees, omdat die koëffisiënte onsekerder raak hoe verder in die toekoms in die model strek. Die ander groot probleem is die bepaling van die randwaardes. Hierdie probleme kan die hoof gebied word deur die LP siklies te maak. Indien 'n siklus van drie jaar byvoorbeeld gebruik word, kan die LP soos volg opgestel word.

Gestel i, j en k is indekse wat die moontlike gewasse in die wisselboustelsel aandui. Laat daar n sodanige gewasse wees. Dit volg dan dat i, j en k die volgende waardes kan aanneem.

$$i = 1,2,3,\ldots,n,$$
$$j = 1,2,3,\ldots,n,$$
$$k = 1,2,3,\ldots,n.$$

Gestel H is die totale oppervlakte waarop gewasse verbou kan word. Gestel x^t_{ijk} is 'n oppervlakte met die volgende eienskappe: Gedurende jaar t groei gewas i op die oppervlakte. Gedurende jaar (t-1) het gewas j op die oppervlakte gegroei en gedurende jaar (t-2) het gewas k op die oppervlakte gegroei.

Gestel c_{ijk} is die bruto marge per oppervlakte indien gewas k (twee jaar gelede) opgevolg word deur gewas j (een jaar gelede) en gewas j weer opgevolg word deur gewas i (vanjaar). Die simbool, c_{ijk}, vorm dus 'n koëffisiënt in die doelfunksie. Let op dat c_{ijk} onafhanklik van tyd is. Aanvaar dat die siklus 'n periode van T jaar het. Dan is die gewasse van jaar T+1 dieselfde as die gewasse van jaar 1. Dus volg dat

$$0 \equiv T$$
$$1 \equiv T+1, \quad \text{ens.}$$

Die doelfunksie is die som van al die oppervlaktes waarop gewasse verbou word vermenigvuldig met die ooreenkomstige winskoëffisiënte per oppervlakte, wat dan die totale wins vir die siklus van T jaar gee. Die probleem kan nou soos volg wiskundig geformuleer word:

$$\text{Maks } z = \sum_{i=1}^{n}\sum_{j=1}^{n}\sum_{k=1}^{n}\sum_{t=1}^{T} c_{ijk}\, x_{ijk}^{t}$$

$$\text{o.a. } \sum_{i=1}^{n} x_{ijk}^{t+1} \le \sum_{i=1}^{n} x_{jki}^{t} \qquad \forall\, j,k,t$$

$$\sum_{i=1}^{n}\sum_{j=1}^{n}\sum_{k=1}^{n} x_{ijk}^{t} \le H \qquad t = 1, 2, 3, \ldots, T$$

$$x_{ijk}^{t} \ge 0 \qquad \forall\, i,j,k,t.$$

Die eerste beperking word gestel om die korrekte volgorde van gewasse, asook die korrekte oppervlaktes te verseker. Daarom word jaar t+1 beperk deur wat in jaar t verbou is. As voorbeeld kan koring, klawer en hawer gebruik word. Alles wat in jaar t+1 op klawer op hawer gesaai kan word, moet kleiner of gelyk aan klawer op hawer op enigiets in jaar t wees – vandaar die vorm van die beperking, wat in der waarheid n^2T beperkings is. Die tweede beperking plaas 'n limiet op die totale oppervlakte waarop gewasse verbou kan word. Dit kan byvoorbeeld die grootte van die plaas wees. Vir die formulering word die grootte H genoem. Die derde en laaste beperking vereis dat al die oppervlaktes nie-negatief is.

Hierdie LP se oplossings is erg ontaard, maar openbaar tog 'n patroon. Indien ons na die duale formulering van hierdie probleem kyk, tesame met die oplossings daarvan, ontstaan daar 'n aantal patrone wat ontgin kan word. Indien hierdie patrone reg aangewend word, kan die LP baie vereenvoudig word. Dié vereenvoudiging bring mee dat daar met strategieë in plaas van met gewasse gewerk kan word. 'n Strategie is doodeenvoudig 'n vooraf bepaalde kombinasie waarin gewasse geplant word. Dit vereenvoudig hierdie groot en lomp LP tot 'n knapsakprobleem wat baie gouer en makliker opgelos kan word. 'n Groter voordeel is egter dat hierdie strategieë as strategieë in 'n speleteorie-probleem gebruik kan word.

Indien die probleem as 'n spel beskou word, kan die boer as een speler en die natuur as 'n ander speler beskou word. Die natuur het strategieë soos reënval, plae, pryse en die wisselkoers. In kort kan al die toestande waaroor die boer nie beheer het nie as strategieë van die natuur beskou word. Die boer se strategieë is die strategieë wat hierbo met behulp van die LP bepaal is. Daar is baie standaardtegnieke waarmee 'n spel teen die natuur aangepak kan word. Enige van hierdie tegnieke kan gebruik word om die spel op te los. Die uitbetalings van hierdie spel kan uit historiese data bereken word. Die spel kan ook as 'n nulsom-spel beskou word, in welke geval dit eintlik die swakste moontlike situasie vir die boer voorstel. Die vraag is met ander woorde wat die boer moet doen indien die natuur optree asof dit die boer se oeste so klein as moontlik wil maak. Die model is al met verskeie verskillende tipes strategieë vir die natuur getoets.

'n Voorbeeld van lande waarop wisselbou toegepas word

Voorbeeld

In die voorbeeld hieronder is die weer as strategie vir die natuur gebruik, maar net sulke goeie, interessante en relevante resultate word verkry indien die wisselkoers as strategie vir die natuur gebruik word. Die bruto marges per hektaar (ha) per jaar vir elke strategie, die gewasse (koring, hawer, medics, canola en lupiene) wat gebruik word om die strategieë vir die boer te bereken en die natuur se strategieë ('n droë, 'n gemiddelde of 'n nat jaar) word saam met die uitbetalings in Tabel 1 gegee.

Tweejaar-strategieë	**Bruto marge/jaar (R)**			**Driejaar-strategieë**	**Bruto marge/jaar (R)**		
Strategie	**Gemid.**	**Nat**	**Droog**	**Strategie**	**Gemid.**	**Nat**	**Droog**
Koring op koring	1900	2310	1117	Koring op koring op koring	2557	3279	1441
Koring op medics	2455	3294	1246	Koring op canola op medics	2184	2859	1057
Koring op canola	1720	2081	908	Koring op hawer op medics	2576	3273	1382
Koring op hawer	2427	2823	1486	Koring op lupiene op medics	1863	2448	902
Koring op droë land (niks)	928	1167	475	Koring op medics op medics	2642	3633	1277
Koring op lupiene	1510	1755	884.5	Koring op canola op niks	1339	1619	705

Tabel 1: Uitbetalings aan die boer vir verskillende tipes jare

Resultate

Indien hierdie spel opgelos word, word gevind dat die boer die hele plaas met die strategie koring op hawer moet beplant, wat ’n gemiddelde bruto marge van R1486 per ha per jaar het. Hierdie antwoord is te wagte indien in ag geneem word dat hierdie strategie die beste van alle strategieë vaar indien die ergste (’n droë jaar) voorkom. Hierdie strategie is ook ’n saalpunt in hierdie spel, wat impliseer dat indien die natuur “rasioneel” sou optree, dit elke jaar ’n droë jaar sal speel. Let daarop dat die strategie koring op koring op medics net ’n kort kop agter hierdie strategie inkom, wat impliseer dat indien die koringprys sou styg, die strategie koring op koring op medics eerder gekies sal word.

Hierdie spel kan maklik uitgebrei word om byvoorbeeld die waarskynlikheid dat ’n nat jaar gaan voorkom te inkorporeer. Indien die model verander word sodat die beperking dat die waarskynlikheid dat ’n nat jaar kan voorkom groter of gelyk aan 0.5 is, bygevoeg word, is die beste uitkoms van die spel dat die boer koring op medics op medics moet saai met ’n gemiddelde bruto marge van R2455 per ha per jaar.

Indien die formulering verander word sodat die waarskynlikheid dat ’n droë jaar voorkom tussen 1 en 0.74 is, is koring op hawer die beste strategie met ’n gemiddelde bruto marge van Rl486 per ha per jaar. Indien die waarskynlikheid van ’n droë jaar verder afneem na tussen 0.34 en 0.74, is die beste uitkoms indien die boer die strategie koring op koring op medics gebruik. Die bruto marge van hierdie strategie varieer na aanleiding van die waarskynlikheid. Indien hierdie waarskynlikheid nog verder na laer as 0.34 verlaag word, is die beste uitkoms vir die boer om die strategie koring op medics op medics te kies. Hierdie oplossings stem baie goed ooreen met wat in die werklikheid op plase gebeur.

Indien ons ’n tipiese plaas beskou as ’n plaas van 1000 ha met 1000 skape en 100 beeste, kan die spel nog verder uitgebrei word. Gestel die boer wil ten minste 0.578 ton ruvoer (weiding) per skaap en 2 ton ruvoer per bees produseer. Koringstrooi kan ook as ruvoer vir die beeste gebruik word. Indien hierdie beperkings by die model bygevoeg word, is die beste strategie wat die boer kan volg om 890 ha met koring op koring op medics te beplant en die orige 110 ha met koring op hawer wat ’n gemiddelde bruto marge van R1 445 755 per jaar sal lewer. Die resultate indien die waarskynlikheid dat ’n droë jaar kan voorkom gevarieer word, word in Tabel 2 gegee.

Waarskynlikheid van ’n droë jaar	Strategieë van boer
$0.74 < p_d < 1$	Koring op hawer (110 ha) Koring op koring op medics (890 ha)
$0.34 < p_d < 0.74$	Koring op koring op medics (1000 ha)
$0 < p_d < 0.34$	Koring op medics op medics (1000 ha)

Tabel 2: Die boer se optimale strategieë vir verskillende tipes jare

Die bruto marge sal in elke geval varieer afhangende van watter waarskynlikheid in elk van die intervalle gekies word. Die bruto marge gaan dus verskil indien die waarskynlikheid byvoorbeeld as 0.8 of 0.9 gekies word, alhoewel die optimale strategieë dieselfde gaan bly.

Die optimale oplossing dui daarop dat ’n groter oppervlakte met klawer (medics) gesaai moet word indien die kanse op ’n droë jaar afneem. Indien die kanse op ’n droë jaar toeneem, moet meer graan (koring en hawer) gesaai word. Hierdie resultaat strook ook met wat in die praktyk deur boere gedoen word.

Saai lande wat voorberei word.

Samevatting

Die probleem om te bepaal in watter volgorde gewasse in ’n wisselboustelsel geplant moet word, is nie eenvoudig nie. Die probleem kan as ’n LP geformuleer word, maar die oplossing is erg ontaard en dit is moeilik om realistiese randwaardes daarvoor te bepaal. Indien die oplossings van hierdie probleem ondersoek word, kan hierdie probleem op grond van strategieë vir die boer geformuleer word. Hierdie strategieë kan op hulle beurt weer gebruik word om die oorspronklike probleem met speleteorie te modelleer. Hierdie model kan waardevolle inligting aan die boer verskaf wanneer hy/sy moet besluit watter strategie(ë) om te volg in die bestuur van ’n wisselboustelsel. Die oplossings van die model met relevante data is in lyn met wat in die praktyk gevind word, naamlik dat die boere ’n oorwig graan in die droogte (of in droër gebiede) moet saai, terwyl die hoeveelheid klawer wat gesaai moet word, toeneem namate die reënval verbeter. ♦

Universität Bremen

Operations Research 2005 (OR 2005)
International Conference on Operations Research

September 7 - 9, 2005
University of Bremen, Bremen, Germany

Contact: Prof. Dr. H.-D. Haasis,
haasis@uni-bremen.de
Prof. Dr. H. Kopfer,
kopfer@uni-bremen.de

ORSSA National Conference 2004

5-8 September 2004

Graduate School of Business, University of Stellenbosch, Bellville, Western Cape

SECOND NOTIFICATION AND CALL FOR PAPERS

The annual conference of the Operations Research Society of South Africa will take place from 5 - 8 September 2004 at the University of Stellenbosch Business School, Bellville near Cape Town. 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.

The international guest of ORSSA and plenary speaker will be Prof Alexander Verbraeck from the Technical University in Delft, Netherlands.

Abstracts

Those interested in participating in the conference should submit an abstract of not more than 300 words via the internet at the Society's website (www.orssa.org.za, click on "Conferences", then on "Upcoming ORSSA Conference", then on "Submission of abstract"), or by e-mail or by ordinary mail to the program chair, Jan van Vuuren at vuuren@sun.ac.za. The abstract should include the title of the paper, the name(s) of the authors, their affiliations, and contact details (including e-mail addresses, telephone numbers and fax numbers) and the 300 word summary of the paper in plain text, with no mathematical expressions. The deadline for submission of abstracts is 23 July 2004. Notification of acceptance will be given by e-mail by 31 July 2004.

Conference registration

A registration form, payment details, maps, etc will be available on the internet website of ORSSA in due course. To register, the easiest would be to fill in the electronic form on the ORSSA web page (www.orssa.org.za, click on "Conferences", then on "Upcoming ORSSA Conference", then on "Conference Registration"). Else you may download the registration form from the website or use the paper copy in this edition of the newsletter and post or fax it to the address below.

Conference venue

The conference will be held at Graduate School of Business, University of Stellenbosch at the Bellville Park Campus in Charl Cronje Drive, Bellville, Western Cape.

Accommodation is available at the Bellvista Lodge on the campus, or at a number of hotels in the vicinity of the Business School. Details are provided below. Participants are responsible for making their own accommodation reservations. A number of rooms at the Bellvista Lodge have been pre-booked for the conference. If you were to make a booking at the Bellvista Lodge please indicate that this is for the ORSSA conference.

Provisional Programme Outline

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

Conference fees

Full registration for the conference, which includes the welcome braai, lunches and dinners as well as abstract of papers, will amount to R950. Cumulative discounts are available for Early bird registration and payment before 31 July 2004 (R100); ORSSA members (R100) and bona fide full-time students (R150) Therefore, a student member of ORSSA who registers and pays on or before 31 July 2004 will only be charged R600. Details of fees payable for the spouses programme and single day attendance is given on the registration form and on the ORSSA web page.

Important dates

23 July 2004: Deadline for submission of abstracts
31 July 2004: Notification of acceptance of papers
31 July 2004: Deadline for early-bird registration
29 August 2004: Deadline for conference registration

Contact details

Conference chair: Wim Gevers
e-mail: wg@sun.ac.za
Phone: (021) 918 4228 **Fax:** (021) 918 4468

Program chair: Jan van Vuuren
e-mail: vuuren@sun.ac.za
Phone: (021) 808 4213 **Fax:** (021) 808 3778

ORSSA web page: www.orssa.org.za

General conference e-mail address:
orssa2004@belpark.sun.ac.za

Postal Address:
ORSSA Conference
PO Box 610
Bellville. 7535

The following hotel accommodation is available

Hotel	Phone no. (021)	Fax no. (021)	E-mail	Single tariff / night	Breakfast
Bellvista Lodge (on Campus)	918 4444/5	918 4443	Bvista@usb.sun.ac.za	R360	R50
City Lodge (10 min walking)	948 7990	948 8895	tlbell.resv@citylodge.co.za	R385	R52
Protea Hotel Tygervalley (2km by road)	913 2000	913 5444	res@phtygervalley.co.za	R455	(included)

(Continued from page 4)

chapter AGM, during which the 2003/2004 chapter executive was elected, consisting of

1. Margarete Louw (chairperson),
2. Wim Gevers (vice-chairperson),
3. Theo Stewart (treasurer),
4. Isabelle Nieuwoudt (secretary), and
5. Trevor Wegner (additional member).

I would like to thank the old executive for their work and dedication during 2002/2003 and I would like to wish the new executive the best of luck for 2003/2004.

Any suggestions as to possible activities for the Western Cape Chapter during 2005 will be appreciated. Please contact the new chapter chair, Margarete Louw (PIC Solutions), at mjlouw@msn.com if you have any suggestions. ♦

ProVision Forecasting: Impact of Seasonal Trends

By Nthabiseng Ntene (ntene@dip.sun.ac.za)

The 2004/2005 annual general meeting (AGM) of the ORSSA Western Cape (WC) chapter was held on 17 March 2004, in Bellville at the University of Stellenbosch Graduate School of Business (USB). Approximately 16 people attended AGM. Jan van Vuuren, the out going chapter chair, opened the meeting. In his opening speech he gave an overview of the minutes of the previous ORSSA WC meeting. Amongst other things he mentioned that the WC chapter would host the 2004 ORSSA annual conference at the University of Stellenbosch Business School. After addressing the chapter, Jan van Vuuren handed over the floor to the newly elected chair Margarete Louw.

The chair gave the objectives and the activities planned for the WC chapter for this year. The objectives are:

- To involve more people from industry in the activities of the WC chapter.
- To start a schools program in the Western Cape Province.

The basis for the first objective is the fact that a large percentage of the WC ORSSA members are inactive. To achieve the first objective, the WC executive committee has to undertake an inquiry into this lack of participation by the ORSSA members from industry. Once the reasons have been established, the committee would come up with a plan to accommodate the ORSSA members. The position of the new chairperson in industry will be of advantage to the executive committee in order to meet their objectives.

The aim in the second objective is to introduce students to Operations Research (OR) at an early stage. It has become evident to ORSSA WC that most students only get to know about OR at a late stage of their undergraduate studies.

Wim Gevers outlined some of the preliminary planning for the ORSSA conference to be held from 5 to 8 September 2004. Wim Gevers is the current ORSSA president, the conference committee chairperson and vice chair-person of ORSSA WC.

After Wim Gevers' talk, Nancy Brown from PIC Solutions gave a brilliant presentation on ***ProVision Forecasting: Impact of Seasonal Trends***. This presentation described a Markov model used to forecast bad debt levels and explores a practical case study, whereby seasonal turnover trends are incorporated to make forecasting of bad debt and provisioning levels more accurate. The talk was very informative.

After the presentation by Nancy Brown, a cocktail party rounded up the meeting. Wim Gevers organized this party.

To conclude this report, I would like to wish this years' WC executive committee, especially the chair, all the best. Hopefully through hard work and dedication, they will accomplish their goals and enlighten the masses about Operations Research. ♦

Introduction to Data Mining

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

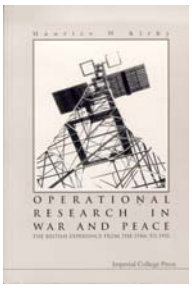
On the 5th of May 2004 at a meeting of the Western Cape chapter of ORSSA, Goran Dragosavac (a senior consultant of the SAS Institute) gave an incredibly fascinating and informative talk labelled "Introduction to Data Mining".

Data Mining has it roots in Artificial Intelligence, which was a popular topic in the 60's and 70's. Commercial applications were discovered in the 80's when government funding dried up for the researchers, while the older techniques were improved and new ones developed in the 90's, which also saw the emergence of commercial data mining software.

(Continued on page 12)

BOOK REVIEW

By Hans Ittmann (hittmann@csir.co.za)



OPERATIONAL RESEARCH IN WAR AND PEACE – the British Experience from the 1930s to 1970 by Maurice W Kirby, 2003. Imperial College Press, London, UK. ISBN 1-86094-297-0, 11 Chapters, pp 444, US$70/52 pounds.

The Operational Research Society of the UK commissioned a project to document the history of Operational Research (OR) in Britain from the period before World War II. The first volume, of the envisaged two volumes, outlining this history has now been published. It is now more than sixty years ago that the term "Operational Research" was first coined in the UK and since the early involvement in the war efforts in Britain, much has happened with OR both within the UK and outside its borders. **Operational Research in War and Peace,** the first volume, focuses entirely on how things developed in the UK up to the early seventies. It is an historical perspective on OR where the author has used a vast array of published and unpublished material. The book provides an original account of the period stretching into the early seventies, outlining how the discipline diffused into certain specific industry sectors, the corporate world as well as different levels of government. It makes for fascinating reading!

What is this thing called "Operational Research" all about? Not surprisingly the introduction to this volume deals with a wide variety of perspectives on how people defined OR in those early years. Some of the ones cited are "quantitative common sense" (Goodeve in 1948) and "a scientific method of providing executive departments with a quantitative basis for decisions regarding the operations under their control "(Kittel in 1947)". Even in those days Operational Researchers seemed, as today, obsessed with this theme of what OR is, whether it is a science, how it adds value, etc. Some have called this existential anxiety! Around the debate whether OR is a science the following comment from Jessop in 1950 is interesting. "OR is still growing and self-conscious. It is therefore very much concerned about what it is, how it came to be what it is, and what its standing is in comparison with other sciences – indeed whether it is a science at all. The latter question has probably been settled, at least, to the satisfaction of most of its adherents. It is agreed that it is a science." Contrary to this, there was then, and based on discussions recently by ORSSA's Executive, there still is no agreement on this! Nevertheless the range of views on OR presented by the pioneers of our discipline are very insightful.

A chapter is devoted to the origins of Operational Research dating back to centuries before the Second World War. The history of warfare is punctuated by attempts to apply some element of quantitative analysis to understanding the causes of victory and defeat. As an example, as far back as the period 1585 – 1625, Maurice of Nassau, Prince of Orange of Holland with training in mathematics, introduced systematic drill enabling soldiers to load and fire their weapons more rapidly and accurately. Early in the twentieth century Lanchester introduced a sequence of equations which quantified the relationship between victory and defeat. A whole range of other examples illustrate the use of quantitative approaches to addressing problems in a war situation.

With Hitler's elevation to power in 1933, Britian's objective of maintaining the balance of power in Europe came under huge threat. To counter the German threat via the air required an almost impossible expansion scheme for the Royal Air Force. This lead to the establishment of a team of scientists that would: "consider how far recent advances in scientific and technical knowledge can be used to strengthen the present methods of defence against hostile aircraft." These activities led to the use of radar for air defence in the UK. The scientist, using mathematics, developed methodologies that could be used for successful interceptions of enemy aircraft. Together with service personnel of the Air Force they ensured that Britain possessed a technically efficient and fully operational early warning system of aircraft interception all along the greater part of the vulnerable UK south and east coast. This first OR success story is worth reading. Many, later well known, OR people were involved in this project and very quickly they were able to proliferate the use of OR into other areas. A few additional examples are discussed where OR made a huge contribution to the war effort. Examples include the U-boat problem, the size of convoys, etc.

The use of OR in Bomber Command during the war years is presented in detail. There were major differences on how to use the power of bombers. Should they be used to attack specific or precise targets, or should they be used for area bombing which could impact on the morale of the German civilian population? A leading figure and pro precise bombing was the South African born Solly Zuckerman. Many different analyses were done to prove different points of view. In addition operations were analysed to determine the effect and to get a better understanding of how and where to improve the effort. The Bomber Command story is possibly the highlight in this volume.

After the war the diffusion of OR in Britain proceeded directly from the wartime experiences. Whereas in the USA non-military OR got off to a slow start the British industrialists immediately recognized OR as a new and valuable instrument. How this happened and who the scientists were that promoted the use of OR enthusiastically is described superbly in the chapter on post war labour government and OR. It makes for fascinating reading looking at what areas for involvement were proposed, i.e. OR as a means of reducing the gap between scientific discovery and practical application, opportunities for OR in Central Government, etc.

The biggest impact of OR after the war, was in two major industries in the UK namely iron and steel and coal mining. Charles Goodeve became the Director of the British Iron and

Steel Research Association and was instrumental in getting OR accepted in this environment. Studies ranged from the importation and transportation of iron ore, production management improvements, simulation, the use of queuing theory, etc. Other well known OR figures involved in the industry included Steve Cook, Stafford Beer and Roger Collcutt. The coal mining industry was another fertile area for OR. Investigations included haulage and transportation, relative costs of driving and maintenance needs; the effects of lighting on output; efficiency of generators; etc. Many ORSSA members will remember Pat Rivett, who played a big role in the establishment of ORSSA; he was the director of the Field Investigation Group (FIG) of the National Coal Board and had a team of close to fifty OR practitioners working for him on a variety of problems. FIG and its successors served the coal mining industry well for more than four decades.

The last three chapters of this volume is devoted to the diffusion of OR into the corporate sector, the public sector and the establishment of OR groups at universities and the formation of professional societies. Brief descriptions are presented on OR in different sectors and industries as well as how it permeated into various government departments. For those interested in the history around the establishment of different OR Journals; OR departments and OR Societies, both within the UK and elsewhere, the last chapter should be studied closely.

Personally I enjoyed reading this volume, it gives one a great insight and understanding of how OR originated and developed in the UK. Sometimes, and one would expect this of history books, there is possibly too much "whaffle" about a specific topic or incident. Nevertheless this volume is a monumental piece of work.

Lastly, something which is mentioned in the introductory chapter addressing the value of OR, I believe should be shared more widely. The vital contribution of Operational Research lay in improving *confidence* in the decision making process and as a notable practitioner of OR observed: "A decision reached by OR methods is not necessarily different from the decision that would be reached by other methods; a right decision is a right decision, irrespective of whether it is obtained by sticking a pin into a list of all the alternatives, or by a piece of OR work. The basic difference is in the degree of confidence that can be placed in the correctness of the result". ♦

To see other products and services offered by Kluwer Academic Publishers visit their web site:

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Book Competition

Thanks to a generous sponsorship of Kluwer Academic Publishers we can run a book competition on any of their books that are reviewed in the newsletter.

Congratulations to Brahm Bothma who has won the book *Military Operations Research – Quantitative Decision Making,* by N.K. Jaiswal, and published by Kluwer Academic Publishers. The book will be mailed to you.

The question and answer were:

Q: What are the uses of war gaming in the military context?

A: "War games can be used for training and planning purposes, while they can also be used to research concepts and doctrines"

Any member who is interested in reviewing a book must please contact the editor and specify which Kluwer book he or she would like to review. Please visit the Kluwer web site to choose a book (www.wkap.nl). 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 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 may be found on page 2.

IFORS HAWAII 2005
July 11-15, 2005
Hilton Hawaii Village
Beach Resort & Spa
Honolulu, Hawaii

The IFORS Triennial 2005 Conference will bring operational researchers from around the globe together in one of the world's most beautiful locations. We invite you to join your colleagues for the pre-eminent international conference in our field, offering an intensive scientific program covering the full spectrum of topics in operational research.

The conference organizing and program committees together represent 17 countries and all five continents, bringing the research, applications and perspectives of their areas of the world to this truly international forum.

Sharing of ideas, knowledge and experience is the primary goal of the conference and of IFORS itself. These exchanges take place not only during the formal scientific program, but also informally in hallways, over cups of coffee and at social events. The IFORS Triennial 2005 technical program and many of the conference social events will be held at the Hilton Hawaiian Village Beach Resort & Spa.

The Institute for Operations Research and the Management Sciences (INFORMS) is proud to host IFORS 2005 in a spectacular location - Honolulu, Hawaii. We invite you to experience all the beauty of Hawaii while you participate in this premier OR meeting.

Visit: www.informs.org/Conf/IFORS2005/

CHAPTER CALENDER

Johannesburg Chapter

By Dave Evans (DaveE@dbsa.org)

Here's the broad calendar for the rest of the year:

July/Aug:	a technically focused meeting for members
November:	a technically focused meeting for members, including the AGM and a cocktail party.

We have another marketing idea up our sleeve, but I won't mention it until it is a bit better defined.

Kwazulu Natal Chapter

By Yvonne Fletcher (Yvonne.Fletcher@sappi.com)

Here's the broad calendar for the rest of the year:

July/August
Speaker: Henk Stander or Andie Immelman
Topic: Using Network analysis to decide on what grade of road to have in tree plantations, and how many of each grade to help facilitate optimal cost of harvesting
Venue: Durban

The talk will be followed by the AGM of the KZN chapter.

Vaaldriehoek Chapter

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

Wednesday August 18th, 2004 from 16:00-18:00
Speaker: Sarie Duvenhage (Vaal University of Technology)
Topic: Optimisation for nutritive value and affordability in a plant-based product using linear programming
Venue: Personnel Auditorium, Block H, Sasol, Sasolburg

Wednesday October 13th, 2004 from 16:00-18:00
Speaker: Robin Hendry, AECI
Topic: Enterprise Risk Management
Venue: Personnel Auditorium, Block H, Sasol, Sasolburg

Refreshments are served at all events to allow for extensive networking

Western Cape Chapter

By Margarete Louw (mjlouw@msn.com)

Wednesday June 2nd, 2004 at 16:00
Speaker: Arabinda Tripathy (Indian Institute of Management)
Topic: Soft Problems, Hard Impats: Can OR Help!
Venue: Seminar Room, Department of Statistical Sciences (Building 28, PD Hahn), University of Cape Town

Wednesday July 28th, 2004 at 16:00
Speaker: Margarete Louw (PIC Solutions)
Topic: Design of an automated DSS for scheduling tasks in a generalised jobshop
Venue: Room A409, Department of Applied Mathematics, Main Engineering Building, University of Stellenbosch

Wednesday August 25th, 2004 at 16:00
Speaker: David Coleman (PIC Solutions)
Topic: Scheduling a general jobshop using computer simulation and neural networks
Venue: Room A409, Department of Applied Mathematics, Main Engineering Building, University of Stellenbosch

Wednesday October 13th, 2004 at 16:00
Speaker: Elmari Roos (Gamma Solutions Bk)
Topic: A Taguchi application in experimental planning
Venue: Room 215 of the Main Building, US Graduate School of Business, Bellville

Wednesday November 17th, 2004 at 16:00
Competition for the Best Student Year Project
Speakers & Topics: To be announced
Venue: Room 215 of the Main Building, US Graduate School of Business, Bellville ♦

(Continued from page 9)

According to Goran, "Data Mining is the process of selecting, exploring and modeling large amounts of data to uncover previously unknown patterns for business advantage." It is based on three other fields of interest: machine learning, statistics and database science. The evolution of data mining began in the 60's with data collection; data access and data navigation emerged in the 80's and 90's respectively, with data mining eventually starting at the turn of the millennium. Data Mining became popular because the technology involved matured, storage for all the necessary data became less expensive, commercial applications of data mining entered the market and there is strong competition between companies to increase their efficiency in order to be more competitive. There are many tasks that commercial Data Mining software can accomplish; such as classification, prediction, clustering, etc. and many algorithms that can be adapted for this purpose (neural networks, regression, decision trees, genetic algorithms and many more).

There are many uses for Data Mining in the business arena. Companies in customer relations management, telecommunications, banking, insurance, retail, finance, medicine, engineering, manufacturing, law enforcement and many others can use Data Mining to render their operations more effective and/or efficient. The value of Data Mining can be realised with an increase in revenue or profit, reduced or avoided costs, increased productivity, strategic benefits and other intangible benefits. Data Mining cannot replace good management, but it can be used as a tool by management to improve the efficiency of a company.

I am certain that everyone from the large audience thoroughly enjoyed the talk. It certainly is wonderful to have business people give ORSSA members a glimpse into the uses of OR in the corporate arena. ♦

THE SAS OPERATIONS RESEARCH STUDENT COMPETITION 2004

Objectives

The objectives of the competition are:

- to propagate the use of Operations Research (OR)
- to encourage the inclusion of project work in courses within the field of OR
- to bring the Operations Research Society of South Africa (ORSSA) to the attention of students and staff at universities and technikons.

Prizes

Best Honours project: R4 000
Best Bachelor, Diploma or Certificate project: R1 000
At the judges' discretion the prizes may be shared.

Participation

Project work that was undertaken for an Honours or Bachelor degree, or a Diploma or Certificate, in Operations Research or a related field of study during the 2003 academic year, may be entered. Only projects undertaken by individuals will be considered.

Closing dates

- The "NOTICE OF INTENT TO SUBMIT A PROJECT" form must reach the organiser of the competition **as soon as possible**.
- The closing date for the submission of projects is **7 July 2004**. Early submissions are welcome.
- The Executive Committee will make the results known by **31 August 2004.**

Organiser and Contact Details

The organiser for the SAS Operations Research Student Competition is Ms TJ Evert to whom any queries should be addressed. Correspondence can also be done through the web page.

Please send all correspondence to:

Ms TJ Evert
SAS OR Student Competition
Department of Quantitative Management
Unisa
P O Box 392
0003

Phone number: (012) 429 4541
Fax: (012) 429 4898
E-mail: everttj@unisa.ac.za
Web: www.orssa.org.za

ORSSA would like to extend thanks and appreciation to SAS for sponsoring this competition

PREDICTIVE ANALYTICS
AND NEW MATH
ESSENTIAL COMPONENTS OF BI

Today's business intelligence solutions have to be forward looking – and this requires a whole new breed of mathematics.

"To remain competitive, companies can no longer rely on a rear view mirror approach to business intelligence," says André Zitzke, Solutions Specialist, of SAS Institute SA, leaders in business intelligence. "They need to predict everything from what customers will want to buy tomorrow (so that they can be sure to stock it) to which customers will move to the competition, so that they can retain them if they are profitable."

Sophisticated predictive analytics, based on advanced mathematics, is therefore an essential component of leading business intelligence solutions.

"The new rash of compliance legislation, for example the operational risk component of Basel II, has opened up a totally new field for mathematicians and statisticians," says Zitzke. "New maths is having to be developed to meet the demand."

According to Zitzke, in the past when new mathematical concepts were developed, leading organisations were quick to examine them, trying to see how they could be utilised to do better business.

"Today, however, businesses have leapt ahead in their requirements, and the maths is having to catch up in order to solve new business problems quantitatively, as well as to cope with the vast volumes of data being generated today. In the past the question was always: Do we have enough data to do the analytics?" he says.
For example, large financial services organisations now have to analyse and predict their operational risk to comply with Basel II.

Basel II (New Basel Capital Accord) is a set of broad policy guidelines that each country's supervisors can use to determine the supervisory policies they apply. The new framework is intended to align capital adequacy assessment more closely with the key elements of banking risks, and to provide incentives for banks to enhance their risk measurement and management capabilities.

Operational risk is not a finite, tangible area that lends itself to traditional analysis. Instead, it involves a disparate mix of everything from business areas and functions to material loss events and physical security.

Enterprises face the challenge of investing in the right business intelligence solution that will enable them to obtain forward-looking analysis that can accurately predict operational risk.

SAS has a large numbers of PhDs – actuaries, statisticians and mathematicians - working in its research and development department. These experts either develop new maths themselves, or are well versed in the latest mathematical developments globally to ensure that SAS utilises these advancements to help businesses solve their current problems.
"The good news is that SAS users themselves need no knowledge of the sophisticated mathematics built into its solutions," says Zitzke, who adds that there are basically two groups of SAS users.

André Zitzke
Solutions Specialist

The vast majority are in business or finance, and use the results of analysis to perform their functions. They can use business intelligence to look at specific scenarios, asking 'what if' questions such as 'if the interest rate changes, what impact will this have on the future financial state of the company, and what are the risks associated with it?' and how can an organisation optimally hedge this risk?

"The other group are the quantitative analysts who understand the maths and stats behind the solutions, and develop statistically sound models that produce the results needed by the end users," he says.

About SAS
SAS is the market leader in providing a new generation of business intelligence software and services that create true enterprise intelligence. SAS solutions are used at more than 40,000 sites - including 96 of the top 100 of the 2003 Fortune Global 500 - to develop more profitable relationships with customers and suppliers; to enable better, more accurate and informed decisions; and to drive organisations forward. SAS is the only vendor that completely integrates leading data warehousing, analytics and traditional BI applications to create intelligence from massive amounts of data. For nearly three decades, SAS has been giving customers around the world The Power to Know®. For more information contact JHB (011) 713 3400 or Cape Town (021) 689 7870 or visit our website www.sas.com/sa

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