

# NEWSLETTER

## SOME REFLECTIONS ON MY VISIT TO SOUTH AFRICA

By Warren Walker

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Warren Walker

South Africa is a country of great beauty and dramatic contrasts. My first impression is that I could easily live there. Many aspects are remarkably similar to California – especially around Cape Town. The climate is similar, the scenery and landscape is similar, the vineyards and wines are similar, even the shops and restaurants are similar. In fact, I found South Africa to be more similar to the United States than the Netherlands is to the United States. Of course, the language helps –

I could speak to everyone, and everyone could speak to me. It is almost my dream of how it might be in the Netherlands – all signs and other information in two languages: English and Dutch! The shopping malls are truly American. The shops and the restaurants remind me of the U.S. The downtown areas of Cape Town could have come from the small town America. The highways look identical to those in the U.S. Of course, the big difference is that cars drive on the wrong side of the road. I think that one reason for these similarities is that South Africa has a lot of space – just like the U.S., and unlike Europe.

Life appears to be comfortable, relaxed, and enjoyable. But, there is a pervasive sense of unease lurking in the background. Barbed wire fences surround gorgeous estates. Most houses have signs posted warning of “armed response”. You are advised not to go out walking in the streets after dark, not to take public transport, and to avoid certain types of taxis. However, I experienced no crime in South Africa (but had a bag of mine stolen on the train on my way to Schiphol Airport) so I can’t honestly say that South Africa is a dangerous country.

One thing that constantly surprised me was how friendly and helpful all South Africans seem to be. No matter how busy they are, they always have time to give you directions or tell you what to see or where to go. They smile a lot, and seem to genuinely like their country and what it has to offer.

My partner (Dorothee) and I spent quite a bit of time hiking in the mountains, bicycling along the back roads of the Cape Peninsula, and walking in the neighborhoods around our hotels. We were stunned by the gorgeous array of colors and varieties of flowers – many of them unknown to us. It was the beginning of spring, after a fairly wet winter. So, the hills and fields (and even sides of highways) were alive with wildflowers. Our favorites were the diverse varieties of proteas – red, pink, yellow, orange – which we had never seen before. We even bought some seeds and will try them in the Netherlands (although we are warned to “protect against frost during first winter”). I was also amazed at the fact that Calla lilies are among the common wildflowers.

A second surprising, but very pleasing, discovery was the strength of the euro compared to the South African rand. At 10 rands to the euro, most items in the shops seemed to cost ½ to 1/3 as much as they would have cost in European shops – three or four course dinners for about 10 euros, a bottle of fine wine for 3 or 4 euros, etc.

### The ORSSA National Conference 2002

Sunday afternoon, 8 September, we were driven in a Stellenbosch University van from Stellenbosch to Goudini Spa (Rawsonville – about an hour's drive), with a stop at Cape Town Airport to pick up three other participants in the conference. At the spa, we shared a bungalow with two other participants – Wim Gevers (a Professor at the University of Stellenbosch) and Hans Ittmann (a Programme Manager at CSIR and the President of ORSSA). The bungalow had two floors, with two bedrooms, a kitchen, and a living room on the ground floor, and two bedrooms upstairs. Dorothee and I stayed upstairs; Wim and Hans downstairs. It was an extremely comfortable setup, and we enjoyed the opportunity to interact (even sharing a bottle of wine on our upstairs verandah on the last evening).

### October 2002

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In fact, the fact that the conference was taking place in a resort rather than a conference center provided many opportunities for socializing. All meals were joint affairs with all conference participants. The first night there was a “getting to know each other” barbecue. There also was a pre-dinner wine tasting presented by a local winemaker.



**Warren Walker addresses the conferences delegates during his plenary lecture titled *"PACE-FORWARD: A decision support system for Dutch freight policy analysis"***

I should point out that I am a wine lover, so I was in seventh heaven in and around the Cape. We spent one full day visiting wineries in the Stellenbosch area. At the conference we discovered that we were in the heart of another wine region (Worcester). At the barbecue, we were very impressed by the white wine that was served (a Badsberg Cellars Sauvignon Blanc). The next day, we found out that the winery was about 1 km from the Spa, so we walked over and tasted the full range of their wines. They are fine wines, and amazingly low in price. Dorothee is investigating the possibility of representing them in the Netherlands!

The conference was a very satisfying experience for me. I received my Ph.D. in Operations Research from Cornell University in 1968. After that, I attended National Meetings of TIMS/ORSA and INFORMS practically every year until I moved to the Netherlands in 1994. Since then, I have attended only one (in 1997, to accept the INFORMS President’s Award). Attending the ORSSA Conference felt like returning home. I was pleased to see that Operations Research seems to be alive and well in South Africa. I was impressed by the overall quality of the presentations, and by the variety of topics and applications. Some of the presentations gave me new insights into the culture and the problems of South Africa and how different they are from the problems I normally encounter. Three striking examples were the papers entitled “Problems Encountered When Teaching OR to Students with Poor Mathematical and Statistical Backgrounds” (Zoleka Mahiti), “Some

Initial Experiences in Facilitating the Establishment of an IT Community Centre in a Black Township” (Hans Ittmann), and “Logistics Challenges in Developing Environments: Spaza Retailing” (Isabel Meyer). On the methodological side, I was excited by the potential breakthrough in integer programming suggested by the paper entitled “A Cut and Search Procedure for Solving Binary and Pure Integer Programming Problems” (Juwa Nyirenda).

*\*continued on page 5*

### EDITOR'S NOTE

I really enjoyed putting this edition of the newsletter together. Coming so soon after a successful national conference, there are many interesting articles for you the reader. It is particularly heartening to see some of our newer members making a contribution to this issue.

This is the final newsletter for which I am editor. Leo Tomé will be taking over the mantle from me and I would like to personally wish him good luck in this endeavor. He has some excellent ideas, so I encourage you to support him by providing any articles or news snippets you may be collecting.

Lastly I would like to express thanks to all those who assisted me throughout my tenure as editor, in particular, Wim Gevers, Philip Fourie, Jan van Vuuren and Hans Ittman.

Cheers  
Stephen

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## FROM THE PRESIDENT'S DESK

By Hans Ittmann  
*ORSSA President*  
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**Hans Ittmann**

This year is fast approaching the home stretch and I am again amazed that it has all happened so incredibly quickly. This is the last formal communication to our members for this year and therefore I would like to take this opportunity to wish every one of you a wonderful and joyful Christmas period and a prosperous 2003! I trust that we will be able to find more optimality in the

New Year, with less fuzziness and that we will be able to take our discipline and society to greater heights! Van my kant dus aan al ons lede 'n wonderlike Kersseisoen met die hoop dat almal goed gaan uitrus oor die vakansietyd en mag almal 'n 2003 beleef wat nie met vorige jare vergelyk kan word nie!

When I see an article reviewing OR books, my attention immediately focusses on the topic. **"OR's Top 25"** in books will obviously be of interest, also to our members. One should not get into arguments about what books should be there or not; what is interesting though is the titles that are listed, starting with *"Theory of Games and Economic Behaviour"* by Von Neuman and Morgenstern in 1947. The first book that had the word Operations Research in its title was the one by Morse and Kimball in 1951, *"Methods of Operations Research"*. There is *"An Introduction to Linear Programming"* by Charnes and Cooper (1953) and the very well known *"Dynamic Programming"* by Richard Bellman published in 1957. What is also interesting is the fact that in this list of 25 books there are three on Game Theory within the first ten, indicating the interest in game theory in the earlier years. Let me hasten to add that this list was compiled by Saul Gass who is well known in the United States. He only considered books published in the US and he picked the books in chronological order until he hit 25. It is therefore very biased towards OR in one part of the world, but nevertheless, still very interesting. Looking down the list there were only three or four of the books that I have looked through over the years while I only had one as a textbook! There may be huge gaps in my education!! This short list appeared in the August edition of OR/MS Today (see page 10).

During the past month, we had our annual conference at Goudini Spa in the Western Cape. About 50 people attended which is about the number we have at our conferences nowadays. Nevertheless, I believe it was a very successful conference with many interesting and stimulating papers. It showed that OR is still alive and doing very well in South Africa. We did miss a



**Conference Organiser:  
 Jan van Vuuren**

number of the old hands at the conference though! Our thanks go to Jan van Vuuren and his committee for the sterling work they did behind the scenes in ensuring that this was again a very well organised and thoroughly enjoyable conference.

We were privileged to have Warren Walker from the Netherlands at the conference. Warren is from both Rand Europe and the Technical University of Delft and his area of expertise is policy analysis. His credentials are impeccable having won the Lanchester prize in 1974 for work on New York City's emergency services systems, he was part of a team that won the Franz Edelman award in 1984 for work on water management in Amsterdam and he also received the INFORMS President's award for his work in policy analysis. Those at the conference really benefited from the interactions with Warren.

A first at this conference was the fact that we had five delegates from Eritrea! These are OR students at the University of Stellenbosch who attended the conference through financial support from EURO. They were all very appreciative of this gesture and thoroughly enjoyed this event. Let's hope we can attract more people from Africa to our future conferences.

Conference time is also the occasion where the society recognises top quality work. I would therefore like to congratulate the winners of the Tom Rozwadowski medal, George Groves (University of Stellenbosch), Jan van Vuuren (University of Stellenbosch) and Jeanne le Roux (UNISA) as well as Margarete Louw (University of Stellenbosch) for winning the student competition.



**President Elect:  
 Wim Gevers**

At the AGM that was held during the conference, a new executive was elected. Let me take this opportunity to welcome the new executive and especially Wim Gevers who was elected as our Vice-President. At the same time we say thanks to the old executive and a special thanks to those who completed their terms of office.

IFORS 2002 is also something of the past. It is always difficult to assess the success of such a large conference with over a thousand papers and many parallel sessions. It was nevertheless a great occasion as always to renew old friendships and to be exposed to what others are doing internationally. South Africa was well represented and we were fifth on the list of number of people making presentations. This is something that does make an impact within the international community and it shows that South African OR is very active!

This newsletter is full of very interesting articles and reports. I hope you will all enjoy this! Hierdie is die enigste formele kommunikasiemedium van ons vereniging en ons is baie dank verskuldig aan die redakteur en sy mede-werkers vir al die harde werk. Nogtans moet ons almal die geleentheid gebruik, wat die nuusbrief aan ons bied, om artikels en interessante brokkies aan die redakteur deur te stuur.



### IFORS 2002 CONFERENCE: A Personal Perspective

The sixteenth triennial conference of the *International Federation of Operations Research Societies (IFORS)* was held during the week of July 8<sup>th</sup> – 12<sup>th</sup>, 2002 in Edinburgh, Scotland. The conference was organised by a committee under the leadership of Lyn Thomas (of the University of Edinburgh), while Ben Lev (of the University of Michigan-Dearborn) headed the scientific programme committee. The conference was attended by 1150 delegates from a total of 63 countries - a marked improvement upon the corresponding attendance levels of 768 at the Lisbon meeting (1993), 922 at the Vancouver meeting (1996) and 969 at the Beijing meeting (1999). South Africa was well represented at the Edinburgh meeting with a total of 33 co-authored papers.

The conference started with registration and a welcoming reception on Sunday evening, July 7<sup>th</sup>, 2002. This was followed by two plenary lectures during the conference opening on the Monday morning, on the topics *OR Alone? Social Capital, Branding and the OR Professional* (by Mike Trick, president of INFORMS) and *Branding OR* (by James Gibb, president of the UK OR Society). The conference boasted an impressive scientific programme spanning four full days of lectures and tutorials, divided into 28 parallel streams and covering a diversity of topics, including vehicle routing & transportation problems, cutting & packing problems, data envelopment analysis, multi-criteria decision analysis, inventory theory, queuing theory and mathematical programming. There were also numerous lectures involving real-world applications and case studies in areas such as forestry, electrical power systems, economics, engineering management, health services, education and many more. All and all the number of possible presentations to attend at any given moment during the conference was overwhelming (to say the least), as one has come to expect from an IFORS conference.

Other social events during the conference included a magnificent banquet at Myrrayfield Stadion (“the home of

### The OR for Development Prize Competition for IFORS 2002

IFORS, the International Federation of Operational Research Societies, runs a competition every three years, to coincide with its Triennial conference. The competition is aimed at papers which describe practical OR applications in developing countries and whose principal authors are also nationals of a developing country. The definition of a developing country is deliberately left rather vague, but South Africa definitely qualifies.

I served on the panel of judges for the 2002 Competition (for which the deadline was the end of September 2001) along with operations researchers from India, the Philippines, USA and Switzerland. We considered 22 papers from about 15 countries, including two from South Africa, from which a shortlist of 8 was chosen for presentation at the IFORS2002 conference in Edinburgh during July. The topics ranged from housing construction, underground ore haulage and school location, through to the logistics of tractor distribution, harvesting of tendupatta leaves in rural India and air traffic control. There were some excellent presentations at the conference and the panel had considerable difficulty in selecting the winners, using a scoring system which included the criteria: creativity, MS/OR content, impact and stress on development. However, our unanimous decision was to award the grand prize of US\$2000 to the team from Chile for their paper: “A combinatorial auction improves school meals in Chile”. The runner-up prize of US\$1000 was awarded to the South African team of George Groves, Jeanne Le Roux and Jan van Vuuren for their paper: “Network service scheduling and routing”. (This is the second time that Jan has received the second prize – hou aan, Jan!)

For my sins, I have been asked to chair the panel of judges for the 2005 IFORS competition. At least that will ensure that I get to the conference in Hawaii!

- Paul Fatti

Scottish rugby”) and day trip (on the Wednesday – on which no lectures were scheduled) along any one of the following exciting routes:

1. The Glenturret Distillery, the city of Stirling and Stirling Castle.
2. Glamis Castle, the town (and golf course!) of St Andrews and Falkland Palace.
3. Blair Athol Distillery, Blair Castle and the House of Bruar.
4. Lindisfarne, Berwick upon Tweed, Spittle Beach and the Lochcarron Scottish Cashmere Wool Centre.

The next IFORS conference will take place in July 2005, and will be in the exotic location of Hawaii!

- Jan van Vuuren

## TOM ROZWADOWSKI MEDAL 2002

By Philip Fourie  
ORSSA Past President  
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Op die jaarvergadering van ONSA wat tydens die jaarkongres by Goudini gehou is, is die Tom Rozwadowski-medalje toegeken aan George Groves, Jeanne le Roux en Jan van Vuuren vir hulle artikel getiteld "Network service scheduling and routing". Die artikel is ingeskryf vir die kompetisie vir die beste voordrag uit 'n ontwikkelende land wat deel uitgemaak het van die IFORS-kongres in Edinburgh, Skotland, in Junie vanjaar. Dit is daar voorgedra deur George en Jan, en het die tweede prys verower; dit word gevolglik gepubliseer in die spesiale uitgawe van ITOR (International Transactions in Operations Research) gewy aan die artikels wat die eindronde van die kompetisie gehaal het.

George Groves is 'n MScIng-student in die departement Bedryfsingenieurswese aan die Universiteit van Stellenbosch. Op grond van hierdie werk (waarvoor Jan sy mede-studieleier is, tesame met James Bekker), is besluit om sy inskrywing te verander van MScIng na PhD.

Jeanne le Roux is verbonde aan die departement Kwantitatiewe Bestuur van die Universiteit van Suid-Afrika. Haar bydrae tot die projek was veral die formulering van die probleem as 'n nie-lineêre binêre programmingsprobleem; die kompleksiteit hiervan was so groot dat dit duidelik aangetoon het dat 'n heuristiese oplosmetode gebruik sou moes word.



**ORSSA President Hans Ittmann presents the Tom Rozwadowski Medal 2002 to first time recipient Jeanne Le Roux of UNISA**

Jan van Vuuren is verbonde aan die departement Toegepaste Wiskunde van die Universiteit van Stellenbosch. Hy werk veral op twee gebiede, nl

operasionele navorsing en diskrete wiskunde (grafiekteorie). Jan het in 1999 saam met Werner Grundlingh ook die tweede prys in dieselfde IFORS-kompetisie verwerf. In 2000 is die Tom Rozwadowski-medalje toegeken aan Jan en Grant Huddleston vir die artikel "Seeking optimality in fruit pulping schedules: a case study".



**Jan van Vuuren of the University of Stellenbosch receives the Tom Rozwadowski medal 2002 from ORSSA President Hans Ittmann**

Die werk wat gesorg het tot vanjaar toekening van die die Tom Rozwadowski-medalje het voortgespruit uit 'n unieke bedryfsprobleem van Spoornet. Spoornet beheer duisende kilometers spoorlyn wat gereeld gediens moet word. Verskeie faktore kompliseer die probleem, soos byvoorbeeld die verskille tussen steenkoollyne, hooflyne, sylyne en metrolyne. Omdat die treinspoed en -gewig op die verskillende tipes spoorlyne verskil, verskil hul diensfrekwensies en -spesifikasies. Tweedens, die dienstrook wat die spoorlyne diens, is baie gesofistikeerd en duur, sodat slegs een trok beskikbaar is. Dit is dus belangrik om die beste roete en skedule vir hierdie dienstrook uit te werk. Nie alleen moet die afstand wat die trok moet aflê, so kort moontlik gehou word nie, maar sekere trajekte moet meer dikwels as ander gediens word. Opeenvolgende dienstye van elke individuele trajek moet ook egalig oor die tydvenster versprei word. Met behulp van grafiekteoretiese metodes is 'n kostedoeltreffende roete en skedule vir die

*\*article continued from page 2*

### Three Special People

There are three persons whose help before and during my trip contributed immeasurably to its success and the amount of enjoyment it provided:

First, Esbeth van Dyk, who arranged for me to be invited as Keynote Speaker, set up a meeting for me with Rae Wolpe, Manager of Trade Promotion, Economic Development and

Tourism of the City of Cape Town (perhaps policy analysis can help in the economic development of Cape Town), and devoted a great deal of her precious time on 5 September and 6 September to accompany me to the Rae Wolpe meeting, guide me around the Waterfront, and introduce me to the beauties of The Strand.

Second, Emma Maspero, who works with Esbeth at CSIR Transportek. She interacted with me before my visit to fill the free time during my visit with a set of guided tours, things to see and do, and restaurant suggestions that provided a perfect match with my interests and desires. She also gave up one of her precious Saturdays to provide Dorothee and me with a full-day guided tour of Stellenbosch wineries. In the past few years, I have developed a fondness for several Stellenbosch wines – primarily reds. Emma arranged for me to visit a couple of my favorites (e.g., Neil Ellis), but introduced me to some new ones (e.g., Rustenberg), which will become new favorites (especially for white wines). As if tasting wines at several wineries was not enough, we ended up at the Wijnhuis in Stellenbosch, where we were able to taste wines from all of the wineries we had missed during the day.

Third, Hans Ittmann of CSIR *icomtek* and President of ORSSA, who took me under his wing at the end of the Conference, and made sure that I was well taken care of during 11-14 September. He arranged for me to meet the Executive Director for Aviation Services of the Airports Company South Africa, which may lead to a continuing connection between CSIR and my research on developing a suite of models for airport strategic planning. He introduced me to CSIR and arranged for me to meet with people who were unable to attend the ORSSA conference, but were interested in how policy analysis methodologies might help them in their projects. (E.g., Mabela Qhobela and Killian Manyuchi were interested in how our scenario development methodologies may help them.) He also made sure that Dorothee and I were transported safely and punctually to the Johannesburg airport for our trip back to Amsterdam.

All in all, this was a trip that I will never forget. I hope that some of the connections I have made will lead to continuing interactions and to future visits to South Africa. I would be very happy if this were to happen.



**Current ORSSA president Hans Ittmann thanks guest speaker Warren Walker on behalf of the society for his contribution to the success of the national conference 2002**

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- Vaal Triangle: M Harmse (marthi@sasol.com)*
- KwaZulu-Natal: K Koch (kochkj@nu.ac.za)*

**OPERATIONS RESEARCH SOCIETY OF SOUTH AFRICA  
BALANCE SHEET AS AT 31 AUGUST 2002**

	R
<b>CAPITAL EMPLOYED</b>	
<b>GENERAL FUNDS</b>	
Balance 1 October 2001	60,822.08
Nett income 1/10/2001 - 31/8/2002	57,784.51
	118,606.59
<b>EMPLOYMENT OF CAPITAL</b>	
<b>INVESTMENTS</b>	<b>56,964.46</b>
Nedbank Investment Account	55,538.58
Absa Term Deposit	1,425.88
<b>CURRENT ASSETS</b>	<b>61,642.13</b>
Bank	61,642.13
	118,606.59

## MEMBER PROFILE: PAUL FATTI

By Stephen Berjak  
University of Stellenbosch  
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**Paul Fatti**

*Paul Fatti lectures in Statistics at all levels from first-year through to Honours, as well as in Operations Research at the Honours level. He also supervises research students both at Masters and Doctoral level. His research involves the development of Statistical and Operations Research tools to solve theoretical and practical problems in Science, Medicine, Industry and Business, as well as the application of advanced techniques to problems in these fields. He consults widely, particularly to Industry and in Forensic Statistics. He is past president of both the South African Statistical Association and the Operations Research Society of South Africa as well as of the Mountain Club of South Africa. He is currently the editor of ORiON, the official Journal of the Operations Research Society of South Africa.*

1. *You have a long association with ORSSA during which you served as President. When did you become involved and why?*

My first exposure to OR was during my Honours studies at Wits, in the form of a course on Linear Programming. However, it was my MSc course in Statistics and Operational Research at Imperial College in London that sparked my interest in the subject as a whole and motivated me to apply for a position at the Institute for Operational Research (IOR) in London at the end of my studies. The IOR's mission was to extend the application of the OR approach from the then traditional military and industrial areas to the more "human" areas such as Health and Government. As a result, the problems which we tackled tended to be ill-defined and non-standard, and I had little opportunity for straightforward applications of the OR techniques that I had learnt at University. Instead, we spent a lot of time trying to understand the real issues underlying these problems and in attempting to formulate OR approaches to them. Sometimes the greatest benefit was obtained from these stages, rather than from the actual models which we eventually developed towards their solution.

I returned to South Africa at the end of 1970 to a lecturing position at Wits, and soon became involved in ORSSA, which had been founded while I was overseas. In those days the Johannesburg Chapter held well-attended monthly meetings and I had the privilege of addressing one of them on some of the OR work in Health with which I had been involved at the IOR. Looking back, it must have been quite a change from the mining applications which were the standard fare at chapter meetings in those days! Subsequently I became involved in the Society and served a term as Chairman of the Johannesburg Chapter in the late seventies and another as National President in 1983/4.

2. *You have been the official ORSSA representative to IFORS for a number of years and have been elected as chairman of the IFORS 2005 OR in Development competition. What experience did you gain from your role in this capacity?*

I attended my first IFORS Triennial meeting in 1984 and I have attended every one of them since. While the early IFORS meetings were relatively small, with only a few hundred delegates, they have grown in recent years and IFORS2002 in Edinburgh had well over 1000 delegates and 28 parallel sessions. ORSSA has always been an active participant in IFORS activities and our members were never discriminated against because of the then South African government's Apartheid policy. Indeed, I chaired the organizing committee for the International Conference on Operations Research in Resources and Requirements in Southern Africa at the CSIR earlier in 1984, and a number of well-known international OR personalities accepted our invitation to attend. Sadly, but understandably, we drew a blank response from our invitations to OR practitioners from the rest of Africa.

While my responsibilities as ORSSA representative to IFORS have been minor, it has kept me in contact with the international OR community. I served as a judge on the OR in Developing Countries competition for IFORS2002 (see page 4) and it has given me a good insight into the wide range of OR problems which are being tackled around the world. I look forward to the challenges of organizing the competition for IFORS2005, which will be held in Hawaii.

3. *You are currently editor of ORiON. How do you rate the quality and quantity of our national publications? Do you have any message for would-be contributors?*

I receive a steady stream of submissions to the journal, mostly, but not exclusively, from South African authors. The quality of the submissions vary from excellent to mediocre, but I have a good team of associate editors and with their help, and the input from our referees, we are able to put together a good publication. Understandably, many of our academics tend to submit their work to overseas journals, so it is difficult for me to judge the overall quality and quantity of our national publications. Nevertheless, many of our members also use ORiON, particularly for papers with good local applications, which is one of the focuses of our Journal. My message to would-be contributors is clear: write up your work and send it to me!

4. *You appear to have a very wide range of research interests. Which project/s have you enjoyed the most and why?*

My early experiences at the IOR awakened my interest in non-standard practical problems and taught me the importance of thinking hard about their formulation. My other hat as Statistician and Statistical Consultant has also taught me to listen carefully to the client and not to try and impose my solution on his problem. I believe that OR and Statistics form a very powerful combination; indeed they are essential bedfellows when looking at real-world problems.

One of my early OR projects was concerned with the optimal level of smoothing which a factory had to impose on its use of industrial gas in order to enjoy the best tariffs, and hence minimize its energy costs, while not unduly disrupting the work

**Operations Research Publications by Paul Fatti**

1. L.P Fatti, "Optimal Smoothing of Demand for Industrial Gas". **Journal of the Operational Research Society**, 34, 7 (1983), 583-590.
2. L.P Fatti, "Approach of Identifying Research Needs in Regional Development Planning and Relating them to Research Activity". **South African Journal of Science**, 79, (1983), 184-188.
3. L.P Fatti, "Modelling a Reservoir with Stochastic Outflows. Application to the Optimal Smoothing of Demand for Industrial Gas". In **Operational Research '84**, (Proceedings of the Tenth International Conference on Operational Research, Washington D.C.) ed J.P. Brans, pp. 864-873, North Holland.
4. J.A. Snyman and L.P Fatti, "A Multi-Start Global Minimization Algorithm with Dynamic Search Trajectories". **Journal of Optimization Theory and Applications**, 54 (1986), 121-141.
5. L.P Fatti, A. Mehrez and M. Pachter, "Bounds and Properties of the Expected Value of Sample Information (EVSI) for a Project Selection Problem". **Naval Logistics Research Quarterly**, 34 (1987), 141-150.
6. L.P Fatti and T.J. Stewart, "Quality Control in Export Coal". **Journal of the Operational Research Society**, 37 (1986), 1073-1080.
7. L.P Fatti, "Current Practice of Operational Research/Management Science in South Africa". **OMEGA**, 16 (1988), 181-187.
8. Paul Fatti and Alf Stadler, "Evaluating South Africa's Various Alternative Futures via the AHP". **OriON**, 4 (1988), 26-46.
9. L.P Fatti, "Water Research Planning in South Africa" Appearing in "The Analytic Hierarchy Process: Applications and Studies", Eds B.L. Golden, E.A. Wasil and P.T. Harker, Springer-Verlag (1989), 122-137.
10. L.P Fatti, "Wildlife Management using the AHP". **OriON**, 8 (1992), 54-68.
11. L. Paul Fatti and Kathleen Clarke, "Use of Data Envelopment Analysis and Regression for Establishing Manpower Requirements in a Bank". **OriON**, 14 (1998), 57-66.
12. L.P Fatti and T. Philips, "The National Association of Pharmaceutical Wholesalers' "SAFE" Award: Selecting the Winning Manufacturers". **South African Pharmaceutical Journal**, 66 (1999), 47-50. (Unrefereed Publication).

flow in the factory. It involved a combination of stochastic modeling and optimization and had some very interesting technical aspects. In addition to management accepting the solution derived from my model, I had the satisfaction of receiving both the Tom Rozwadowski award from ORSSA and the (British) Operational Research Society Bronze medal for my paper on this project. At the other end of the scale, in the late 'eighties I was involved in a joint research project with a political scientist, using the Analytic Hierarchy Process to evaluate different future political scenarios for South Africa. Not surprisingly, the scenario which actually evolved after 1994 was not one we considered! More recently, in conjunction with a scientist from the Hluhluwe-Umfolosi Park, I developed a model for improving the estimates for their rhino populations by combining their current census figures with those from previous censuses.

5. *Besides teaching and research, you are also an avid mountaineer. What are the common features, if any, in these three endeavours?*

Teaching has kept me in touch with the basis of our profession, while research has helped me keep abreast on some (but definitely not all) of the modern developments. As for mountaineering...multidimensional scaling and methods of steepest ascent?

6. *What is the most important advice you have for any young OR practitioner?*

Think deeply about problems and be prepared to go back to basics. Don't try to squeeze every problem into a standard OR model.

**JOB PROSPECTS FOR TRAINED OR GRADUATES IN NIGERIA**

By HG Mu'azu & DG Muhammad  
Federal University of Technology, Yola, Nigeria

Operations Research (OR) can be defined as the application of the methodology of scientific investigation to solving decision-making problems (Walsham 1978).

The Federal University of Technology (FUT), Yola, Nigeria is the only university that offers first, second and third degrees in OR. The university has graduated many OR personnel at the first degree. Masters and PhD graduates are yet to be produced. Other courses such as mathematics, computer science, accountancy, management science, system engineering etc. offer some OR courses alongside their respective core courses. Many graduates (PhD, masters and first degree), with little knowledge of OR, have been produced for the various courses mentioned.

The objective of OR training is to have trained OR graduates with the full potentials of an aid to decision making at all levels of the decision making hierarchy (Top management, Strategic management and Tactical management levels). Such potentials



include:

- Skills and abilities in various areas of quantitative analysis.
- Skills in model building.
- Understanding of behavioural and management problems.
- Ability to relate and communicate with clients.

This prepares an OR graduate for providing an aid to decision making relating to health care, agriculture, finance, telecommunication, power supply, economic planning etc. (as is done in developed countries like the USA and Britain). One would therefore expect that the job prospects for a trained OR graduate are bright. However, that is not the case in Nigeria as most OR graduates do not find jobs and even those who do get are not professionally employed. An interview with one hundred and fifty OR graduates from FUT, Yola, revealed that trained OR graduates in Nigeria are always confronted with the question "what is OR", by the organisations they visited. This implies that OR awareness in Nigeria is very low. Hence not much of OR is practiced in organisations in Nigeria. This situation must be corrected so as to pave the way for a brighter job prospect for trained OR personnel in Nigeria, thus providing them with the opportunity to demonstrate what OR is and what it can do. This can be made possible through:

- OR degree awarding institutions (within and outside Nigeria) should create OR awareness by educating Nigeria's employers of labour on what OR is, how it is done, and how they can benefit from OR.
- The National Students Operations Research Society, FUT, Yola (the only OR Society in Nigeria so far), should have close links with ORSSA and IFORS so that the society's activities can expand to cover organisation of seminars, workshops, or even conferences for Nigeria's employers of labour.
- Trained OR personnel especially the most senior (within and outside Nigeria) endeavor to practice OR consultancy work for Nigeria's employers of labour.
- OR personnel should be opportunistic. Always seek for a study, research, or any related thing that can promote OR.
- Efforts should be made to have an OR advocate within the top management and high political circles. Support from this class of people is important for successful OR practice in organisations in Nigeria.

### Conclusion

In this paper, we tried to cite the low level of OR awareness in organisations (private and public) resulting in trained OR graduates finding it difficult to get jobs in Nigeria. A number of possible solutions that can create OR awareness to the employers of labour in Nigeria are proffered. These, if done, are expected to brighten the job prospects of a trained OR graduate in Nigeria.

### References

1. AM Aliyu (2002). "The History of OR in Nigeria: A case study of the Federal University of Technology, Yola." ORSSA Newsletter March 2002.
2. FA Ogbu & DK Smith (1990). "The need for developing an OR/MS approach in Nigeria." Asia-Pacific J. Op. Res. Vol. 7, No. 1. pp 63-75.
3. G Walsham (1978). "Education in OR for developing countries." J. Op. Res. Vol. 29, No. 4. Pp 229-306.

## SAS/ORSSA NATIONAL STUDENT COMPETITION 2002

By Anton de Villiers

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During the past year the SAS ORSSA student competition was run successfully again. A number of student projects from various Universities entered for this competition. In the end there was a runner up and a winner of this competition. The runner-up is Marinda Swart (nee Schalkwyk) from Industrial Engineering at UP. The title of her project was: "Improvement of Performance and Capacity usage at a Water Bottling Plant."

The winner is Margarete Louw from Applied Mathematics at US. Her project was titled: "Finding Good Nursing Schedules".

**Winner of the SAS/ORSSA national student competition, Margarete Louw, receives her award from Johan Heymann of the SAS Institute**

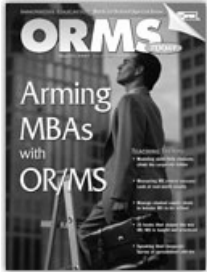


A short outline of what she did is given here:

*"Creating a duty-roster in the nursing environment can be a difficult problem. The objective is usually to ensure that there is always sufficient staff on duty, while taking into account individual preferences, requests for leave and financial restrictions, in such a way that all employees are treated fairly. The problem may be solved via mixed integer programming, graph theoretic, or heuristic methods. This project demonstrates how the problem may be solved using a tabu search, which is a heuristic approach, in the special case of the construction of a nursing schedule for a large hospital in the Western Cape."*

Congratulations to both of these two worthy winners!

The SAS ORSSA student competition is one of the means of promoting our discipline to a specific audience, in this case, university students. This competition is an annual event and we would like to urge universities to support this. We are also grateful to the SAS Institute (Pty) Ltd for their financial support towards this competition.



**OR's Top 25:  
Twenty-five books that shaped  
how operations research is  
taught and practiced**

By Saul Gass.

(Featured in OR/MS today August 2002 -  
Arming MBAs with OR/MS)

**1947: "Theory of Games and Economic Behavior,"** by J. von Neumann, O. Morgenstern; Princeton University Press, 641 pages.. The seminal book that sets forth the modern axiomatic notion of utility, the basic concepts of games of strategy, and their application to economic and social theory. It is here that we first learn about utility and gambles, zero- and non-zero sum games, mixed strategies, and two- and n-person games. The book was originally published in 1944, but the revised 1947 edition is considered the standard reference (it includes, as an appendix, the authors' first statement of an axiomatic derivation of numerical utility theory).

**1950: "An Introduction to Probability Theory and Its Applications, Vol. I,"** by W. Feller; John Wiley & Sons, 419 pages.

The basic reference and text that helped introduce early OR researchers (and many students) to probabilistic concepts with applications to Markov chains, renewal theory, random walks and stochastic processes. The long awaited Volume II was published in 1966.

**1951: "Methods of Operations Research,"** by P. M. Morse, G. E. Kimball; MIT Press and John Wiley & Sons, 158 pages.

Originally a 1946 Department of the Navy classified report, this book introduced the basic concepts of OR to U.S. industrial, business and nonmilitary governmental executives, as well as to the academic research community. Its first sentence gave us the famous definition of OR: "Operations Research is a scientific method of providing executive departments with a quantitative basis for decisions regarding the operations under their control."

**1951: "Activity Analysis of Production and Allocation,"** by T. C. Koopmans (ed.); John Wiley & Sons, 404 pages.

This is the proceedings of the June 20-24, 1949 Cowles Commission for Research in Economics conference held at the University of Chicago (also known as the 0<sup>th</sup> Mathematical Programming Symposium). It is noted for being the first general publication on linear programming and contains Dantzig's papers on the linear programming model, the general and transportation simplex method, linear programming and game theory, plus related papers by Arrow, Brown, Dorfman, Gale, Geisler, Koopmans, Kuhn, Morgenstern, Samuelson, Simon, Tucker and Wood.

**1952: "Introduction to the Theory of Games,"** by J. McKinsey; McGraw-Hill Book Company, 371 pages.

The first text that presented the concepts of game theory as developed by von Neumann and Morgenstern, including a discussion of linear programming and its relationship to two-person zero-sum games.

**1953: "An Introduction to Linear Programming,"** by A. Charnes, W. W. Cooper, A. Henderson; John Wiley & Sons, 74 pages.

This book was the first to give an extended discussion of the economic interpretation of linear programming (using the famous nut-mix problem), coupled with the basic mathematical theory and explanation of the simplex method and duality. It also discusses the perturbation of a linear-programming problem that resolves the issue of degeneracy.

**1953: "The Theory of Inventory Management,"** by T. Whitin; Princeton University Press, 245 pages.

An early compendium of basic inventory control methods, theory of the firm and military applications. The second edition (1957) was expanded (347 pages) to include material published after 1953 by Whitin and co-authors that appeared in *Management Science*, *Journal of the Operations Research Society*, and *Naval Research Logistics Quarterly*, plus an article by Whitin and H. Wagner on "Dynamic Problems in the Theory of the Firm."

**1954: "Operations Research for Management,"** by J. McCloskey, F. Trefethen (eds.); The Johns Hopkins Press, 409 pages.

The first publication that covers the history of OR and the relationship between management and the operations researcher (authors include Goodeve, Henderson, Johnson); the methods of OR including statistics, information theory, linear programming, queueing theory, suboptimization, symbolic logic, computers, game theory (authors include Ackoff, Blackwell, Cushen, Harrison, Hitch, Morse); and case histories including the famous studies of "Utilization of Negro Manpower in the Army" (Hausrath) and "Operations Research in Agriculture" (Thornthwaite).

**1957: "Dynamic Programming,"** by R. Bellman; Princeton University Press, 434 pages.

This book, by the originator of dynamic programming, discusses this important approach to resolving multi-stage decision problems and presents the famous principle of optimality: an optimal policy (set of decisions) has the property that, whatever the initial state and initial decision are, the remaining decisions must constitute an optimal policy with regard to the state resulting from the first decision.

**1957: "Games and Decisions: Introduction and Critical Survey,"** by R. D. Luce, H. Raiffa; John Wiley & Sons, 309 pages.

The first book that integrates in a rather non-mathematical manner von-Neumann and Morgenstern's utility and game theories. It made these concepts accessible to practitioners and researchers, and helped set the future course of decision-making under uncertainty.

**1957: "Introduction to Operations Research,"** by C. Churchman, E. Arnoff, R. Ackoff; John Wiley & Sons, 645 pages.

This is the first integrated text in OR written by three OR pioneers who were then associated with the Case Institute of Technology. Although written for the "prospective" consumer and "potential" practitioner, and without exercises, it served as a basic text for

many years.

**1958: "Linear Programming: Methods and Applications,"** by S. I. Gass; McGraw-Hill Book Co., 223 pages.

This was the first book on linear programming that was written as text. It grew out of an introductory course in linear programming given at the Graduate School, U.S. Department of Agriculture, Washington, D.C. The first and subsequent editions were translated into Russian, Spanish, Polish, Czechoslovakian, Japanese and Greek, and were the first such books in the respective countries.

**1958: "Linear Programming and Economic Analysis,"** by R. Dorfman, P. A. Samuelson, R. Solow; McGraw-Hill Book Co., 525 pages.

The first book that emphasizes the econometric basis of linear programming and its application to a wide range of econometric topics. It introduced the power of linear programming and its application to business and industry to the economic profession. Samuelson and Solow have received the Nobel Prize in Economics.

**1958: "Queues, Inventory and Maintenance,"** by P. M. Morse; John Wiley & Sons, 202 pages.

Written by a prime mover of OR in the United States, this expository book brings together for the first time key theoretical and applied aspects of queueing theory. It was the first book published in the ORSA Publications in Operations Research Series.

**1959: "Mathematical Methods of Operations Research,"** by T. L. Saaty; McGraw-Hill Book Co., 421 pages.

The first graduate-level text that integrated the basic mathematical aspects of OR. It includes chapters on optimization, linear and quadratic programming, game theory, probability, statistics and queueing, with applications and problems.

**1960: "Finite Markov Chains,"** by J. G. Kemeny, J. Laurie Snell; Van Nostrand Company, Inc., 210 pages.

The first English language presentation of finite Markov chains. Designed as an undergraduate text, it describes applications to random walks, Leontief input-output model and occupational mobility.

**1961: "Industrial Dynamics,"** by J. Forrester; MIT Press, 464 pages.

The seminal book by the originator of system dynamics, a computer-based simulation approach that applies a differential equation model with feedback loops to the study of policy analysis and design of complex systems. The technique has been extended by Forrester to "Urban Dynamics" (1969) for analyzing urban growth and decay, and "World Dynamics" (1971) for analyzing environmental and population issues.

**1962: "Flows in Networks,"** by L. Ford, Jr., D. Fulkerson; Princeton University Press, 194 pages.

The first unified treatment of the subject, this book helped to establish network analysis and related results in graph and combinatorics as OR areas of research and application. It includes a detailed discussion of the "out-of-kilter" method for solving minimal cost network problems.

**1963: "Linear Programming and Extensions,"** by G. Dantzig; Princeton University Press, 621 pages.

This book, by the "father" of linear programming and the inventor of the simplex method, has served generations of OR analysts and students as a source and text for both theory and applications. It includes most of Dantzig's theoretical and applied developments in

linear programming and its extensions up to that time.

**1962: "Smoothing, Forecasting and Prediction of Discrete Time Series,"** by R. Brown; Prentice Hall, 468 pages.

Exponential smoothing, developed by Brown in 1944, along with related smoothing and forecasting techniques, is given a full discussion in this first such text. A precursor book was Brown's "Statistical Forecasting for Inventory Control" (1959).

**1965: "Management Models and Industrial Applications of Linear Programming,"** by A. Charnes, W.W. Cooper; John Wiley & Sons, Volume I, 467 pages, Volume II, 859 pages.

Written as a text by two pioneers in OR and linear programming, this book is a collection of their theoretical research and applied developments. It continues to serve as a source book for OR researchers and graduate students.

**1967: "The Theory of Scheduling,"** by R. W. Conway, W. L. Maxwell, L. Miller; Addison-Wesley, 294 pages.

This is the first book that provided a complete and systematic treatment of the theoretical aspects of scheduling. Based on a graduate OR course and written as a text, it brought the full range of techniques (algebraic, stochastic, simulation) for resolving job shop and other scheduling problems to the attention of the OR research, practitioner and academic communities.

**1967: "Introduction to Operations Research,"** by F. Hillier, G. Lieberman, Holden-Day, Inc., 639 pages.

A widely used introductory OR text. Aimed at junior and senior undergraduates and first-year graduate students, it was used both by business and engineering schools. Now in its seventh edition (2001, McGraw-Hill Book Co.), it has 1,214 pages and a CD-ROM, and is as popular as ever.

**1968: "Nonlinear Programming: Sequential Unconstrained Minimization Techniques,"** by A. V. Fiacco, G. P. McCormick; John Wiley & Sons.

Recipient of the 1968 ORSA Lanchester Prize for the best English language publication in OR, this book provided a unified theory (SUMT) on methods and computational procedures for transforming and solving a constrained minimization problem by a sequence of unconstrained minimizations of an appropriate auxiliary function. SUMT has also been shown to provide a basis for more recent work on interior point methods for solving linear programming problems.

**1969: "Principles of Operations Research,"** by H. Wagner; Prentice-Hall, Inc., 1,039 pages.

Written as an undergraduate and graduate text for students in business, economics, engineering, liberal arts and public administration, this book set a new standard for such texts in terms of its inclusiveness and clarity of writing. It received the ORSA 1969 Lanchester Prize and the AIIE Book Award.

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## PERSPECTIVES OF THE ORSSA NATIONAL CONFERENCE 2002



Neil Manson

I only joined ORSSA in late 2001, so the 2002 National Conference was my first. If all the previous conferences have been as good, then I have really missed out! My impressions of the conference can be summed up in the following 7 words: Informative, Exciting, Entertaining, Passion, Stimulating, Friendly and Fun

**Informative:** Many of the papers presented ideas and methods that I had not encountered before, such as Marthi

Harmse's paper on 'Strategy Formulation for Information Management'. It is always good to be exposed to new ideas.

**Exciting:** Some of the papers also presented exciting new developments in OR techniques, for example Juwa Nyirenda's paper on 'A Cut and Search Procedure for Solving Binary and Pure Integer Programming Problems', and in OR Teaching like Isabelle Nieuwoudt and Jan van Vuuren's 'Methods of OR: A New Graduate Course at Stellenbosch'.

**Entertaining:** Some of the papers presented were also very entertaining. Paul Kruger's paper on Don Quixote 'Surfing the Stimulating, Stochastic Search Surfaces of Simulated Systems' was truly entertaining, as well as being exciting, informative and stimulating.

**Passion:** I have often told my students that if they don't love what they are doing, then they should find something else to do. That kind of passion for one's work was very evident at this years conference. One example among many would be Willem Fouché's presentation on 'Discrepancy and Randomness', and his description of Pythagoras's Theorem as "really nice"!

**Stimulating:** A good conference should stimulate one to think new ideas and try new things. This conference, and particularly Paul Kruger's presentation, stimulated my thinking with regard to an idea for a PhD topic.

**Friendly:** I also particularly enjoyed the friendly atmosphere at the conference. It was obvious that many people knew each other as friends, but people were also extremely friendly to newcomers like myself.

**Fun:** And lastly, but definitely not least, with barbecues, banquettes, wine tasting, and the beautiful Cape countryside, much fun was had by all!

- Neil Manson

The ORSSA 2002 conference, which was held on the interesting place called Goudini SPA, has left us a very remarkable and long lasting memory, which will be engraved in our heart.



The Eritrean contingent to the national conference

Not only the enjoyable moments of gathering and fellowshiping with intellects, but also the occasion has stimulated our passion and kindled our interest towards the application of our field, Operations Research. Our first and utmost impression in the moment was Prof. Warren's experience,

his apt way of solving real world problems and his passion of bringing a change in the real world. It was a unique opportunity for us in a way that his first educational background goes in line with ours-Mathematics. And the fact that the ORSSA conference had people from different institutions acquiring diverse experience also added to the beauty of it. It has really stirred us and we are optimistic about the outcome this experience will bring to our future. And we are thus, yearning the days our dreams become realized to bring forth a fruit-applying our field into solving real world problems in line with our nation.

We are therefore, grateful and indebted to our instructors, Dr van Vuuren and Mrs I Nieuwoudt for offering us the privilege of partaking this golden moment, ORSSA 2002. Our gratitude also goes to ORSSA president, Mr Hans Ittmann, for his tenacious effort to find the necessary funding without which none of us would have made it happen.

In general, the ORSSA conference has indeed paved us a way to diversify our thinking and see in multi-dimensions the way an OR expertise does with the real world.

To this end, we look forward to hearing ORSSA being a stronghold to the nation, the continent and to the world at large.

Wishing ORSSA an advancement in its future.

Best regards,

Eritrean Honours Students, University of Stellenbosch

# NATIONAL CONFERENCE 2003 NASIONALE KONFERENSIE 2003

The Pretoria Chapter, as the host of the 2003 ORSSA National Conference, has provisionally decided on the following dates:  
**Sunday 7 September to Thursday 11 September,**  
with the Thursday a day for site visits.