FROM THE PRESIDENT'S DESK

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

Hans Ittmann

What happened to the festive season? Not so long ago we sang Christmas carols, we had turkey and we celebrated New Year! That is now all a distant memory. All of us, I'm sure, are deeply engrossed in our work situations, having to cope with the associated challenges and pressures. I trust that 2002 is treating all of you very well! Mag 2002 vir almal werklik voorspoedig wees en laat ons hoop dat iets soos die verskriklike gebeure van 2001 nooit weer sal gebeur nie!

Every few weeks *The Economist* crosses my desk. Usually I scan through it and if something really attracts my interest I read it. By chance I saw the following advert:

"*This is the most exciting time since the creation of the National Health Service (NHS) to be the person responsible for bringing analytical methods and insight to bear on Britain's future health outcomes. The Government's approach is one of modernisation and reform – welcoming challenging questions; demanding the strongest possible evidence base for policy-making; and seeing health as intimately connected to the wider economy, poverty and social exclusion.*

Responsible for the four groups of economists and operational researchers in the Department (50 staff, divided between London and Leeds), you will be the most senior person in the Department responsible for economic and analytic advice. You will work closely with Ministers and senior officials in the Department – and from time to time the Prime Minister – at the heart of policy-making, as well as ensuring that your professional teams (and the Department's use of equivalent skills in universities and consultancies) are high quality and deliver value."

This advert for a Director of Economics and Operational Research

for the Department of Health in the UK appeared in the issue of 5 January 2002.

Why would something like this be of interest to us? Many things crossed my mind when I saw this:

- This is incredible recognition for the value and contribution of OR in a government department;
- The impact of this contribution reaches to the highest level of political decision making in one of the major countries of the world;
- How was this achieved?; and
- What was the driving force towards this realization, leading to this clearly stated need for analytical methods?

I can carry on, but in the end the question arises: "What is the reality in South Africa?" My conclusions are that:

- There must be inputs of an analytical nature provided to decision makers in our government departments. However, we (at least I) know very few such examples;
- Job descriptions for top government officials in South

ORSSA NATIONAL CONFERENCE 2002
ONSA NASIONALE KONFERENSIE 2002
GOUDINI SPA
8-11 SEPTEMBER, 2002

See pages 5 and 6 for further details.
Sien bladsye 5 en 6 vir verdere inligting.

VISIT THE CONFERENCE HOMEPAGE
BESOEK DIE KONFERENSIE WEBTUISTE
http://dip.sun.ac.za/conferences/onsa2002/

March 2002   i n s i d e   t h i s   i s s u e

Africa do not mention any of these requirements; and

- Very little is known in South Africa about the value, and contribution, that OR, or quantitative methods for that matter, could be bringing towards problem solving in the public sector.

This leads to the question whether we as a Society could do anything to change this situation and how we should go about doing this. South Africa has many problems of a diverse nature - surely our profession could and should be contributing significantly towards addressing these.

Unfortunately, I can only state the situation, but cannot offer any solution or suggest an approach to address this situation. Maybe our members can come up with suggestions. From the little experience I have in interacting with government departments, I know there are indeed many problems we as Operations Researchers can help to address. It is, however, difficult and sometimes very frustrating, to get to the right level of decision-makers and to convince them that we can contribute to solving some of the difficult issues they deal with almost on a daily basis. We should not become disillusioned, but must be persistent and determined to get into that environment – surely we would like to have the same impact here, as OR professionals have on the National Health Services in the UK!

This issue of our newsletter carries aspects of a wide variety. Let me state a few important issues regarding our society. There is some progress with our Africa initiative but it is imperative that we get more of our members involved. Please get to the website that has been created for this or if you would like to contribute in any other way, contact any of the members of the Executive.

Anne-Marie Pothas het vir baie jare die studente kompetisie hanteer en ons is groot dank aan haar verskuldig. Sy het 'n nuwe werksomgewing betree wat aan haar groot uitdagings gaan bied en as gevolg daarvan sien sy nie haar weg oop om langer die studente kompetisie te hanteer nie. Nogmaals baie dankie vir hierdie bydrae aan die vereniging Anne-Marie en baie voorspoed in die bankwêreld! Don Petkov who, for the last year or so served as the Kwa Zulu Natal chapter chairman, and his wife moved to the USA. Thanks for your contribution Don and best of luck to both of you in your new work environment!

Towards the end of last year Theo Stylianides, our treasurer, sent out reminders to all our members to pay their membership fees. The response has been reasonably good, but not all members have paid. If you have not paid your membership fees, please do so as soon as possible - it will assist us to get our finances on a healthy footing! Reminders will be sent out to those whose fees are still outstanding.

It is very encouraging to see that our Johannesburg chapter is active again. I am truly grateful to all those involved, especially Dave Evans, the chapter chairman. What is evident in Johannesburg, and probably elsewhere, is that we desperately need new blood in our chapters.

Daar is reeds heelwat voorbereiding gedoen vir ons jaarlikse kongres. Hierdie jaar vind dit plaas in die Wes-Kaap en ek is oortuig dit gaan, soos altyd, 'n groot sukses wees. Maak seker dat julle nou reeds kennis neem van die datum van die kongres. Our annual conference will be held in the Western Cape at Goudini and we would like to see as many of our members there as possible. Be sure to read the notices around this. ∎

EDITORS NOTE

Christmas and the New Year have come and gone like a flash and it seems almost unbelievable that the month of March is already upon us.

This issue of the newsletter carries many interesting articles ranging from an interview with a leading personality in local OR, to an historical account of OR in Nigeria, to a fascinating autobiography on the life of EURO gold medal recipient for 2001, Egon Balas. There is also a comprehensive list of information regarding the ORSSA Conference 2002. From all the documentation I have received thus far, it appears as though the conference is in really good hands. So please mark these important dates in your diary:

01/07/2002: Deadline for submission of abstracts

26/07/2002: Notification of acceptance of papers

02/08/2002: Deadline for early-bird registration

06/09/2002: Deadline for conference registration

and visit the conference homepage at

http://dip.sun.ac.za/conferences/onsa2002.

Lastly, I would like to thank all the people who contributed to this edition of the newsletter for their continued support. I would also encourage you, the reader, to continue sending any OR articles that you would like published in the newsletter to me at sberjak@dip.sun.ac.za

Till the next newsletter. Enjoy your reading.

Stephen

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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, advertisments, etc., appearing in this newsletter. Members should verify those aspects themselves if they intend to respond to them.

MEMBER PROFILE: JOHN HEARNE

By Stephen Berjak
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John Hearne

In the 1970's science was going to save (or destroy) the world. Science would be able to solve all problems. Especially impressive was nuclear physics with its promises of abundant cheap energy. So naively off I went to the Atomic Energy Board to take up my first job as an assistant scientist in reactor physics. Missing the interaction with people in a full-time research position, I grabbed the opportunity to apply for a post at the University of Zululand when it came along. I was very excited a couple of months later when I received a return train ticket from Pretoria to Durban where the interview was held. No extravagant air travel for applicants in those days.

It took me nearly three hours to get to work on my first day at Zululand University in January, 1977. I was staying in Empangeni and the bridge over the Umhlatuze had been washed away during the floods that had just occurred. The alternative route was mainly on a gravel road via Esikhaweni. After making some progress along this route I was turned back due to a washed-away portion of road. The only alternative was via Eshowe so I set off in the opposite direction towards Eshowe. I was to discover that the approaches to a bridge had been washed away along this road and another detour was required. This was all on gravel roads that were very wet and slippery through remote rural parts. After eventually arriving at Ginginghlovu I was able to travel northwards again to the university. I was feeling very embarrassed about arriving so late on my first day but, not surprisingly, I battled to find anyone at the university. I eventually managed to find someone from the Administration who lived on the campus. His only comment was "Why did you come today? Come back when the roads are fixed!"

After 6 years at Zululand, I moved to the University of Natal, Pietermaritzburg, where I have been based for nearly 20 years. During this time I have spent sabbaticals in New Zealand, California, England and the Netherlands.

1. When and why did you first become involved in operations research and ORSSA?

The late Thinus Joubert was my head at Zululand. Together we gradually shifted from classical Applied Mathematics towards Operations Research where we both tackled problems relating to the development at Richards Bay for our Ph.D's. Thinus was an active ORSSA member and organized one of the annual national conferences. He later moved to the Cape and had just completed an MBA when he died from a heart attack.

The exciting thing for me about Operations Research was the breadth of the field and particularly the breadth of the applications. Through this one meets an interesting cross-section of people. Through my work I have interacted with life scientists of many descriptions, engineers, hydrologists, hunters, anthropologists, economists, farmers and more. It has been fascinating to see how the different disciplines have shaped the way people think.

2. What do you consider to be the highlight of your OR career?

Winning the Tom Rozwadowski medal first in 1992 with Johan Swart and again last year.

3. Have you been involved in any major OR research projects?

No, but I have represented an OR component in other major projects. The biggest project I have been involved with was the development of models for estuarine management. The overall objective was to determine freshwater requirements for estuarine ecosystems. The response of biota to changes in the magnitude, timing and frequency of freshwater inflows from upstream impoundments was investigated by developing a suite of mathematical models.

4. Give us your thoughts on the value of OR to society.

I think OR could be much more valuable to society than it is. The problem is that most people are just not aware of the power of OR and what it can do for the systems they manage.

5. How do you envisage OR developing over the next few years in South Africa?

The IT emphasis will start shifting to doing something with all the data in the databases that have been set up. This is where OR is going to be needed.

6. Do you have a message for young aspiring OR practitioners?

Be friendly. You can't do OR unless you learn to interact with all sorts of people. Also, don't focus too much on one field or one technique. It is the diversity of OR that will keep you excited and lead to a happy career. ∎

THE HISTORY OF OR IN NIGERIA: A CASE STUDY OF THE FEDERAL UNIVERSITY OF TECHNOLOGY, YOLA

By A.M. Aliyu
Department of Statistics and Operations Research
Federal University of Technology, Yola, Nigeria

In the early days of formal OR Education, specialization in the field was pursued only at the postgraduate level (i.e at the postgraduate diploma, master's degree level and Ph.D. Degree) after initial degrees must have been obtained in any of the numerate sciences. Today, OR has become a new field of specialization at the undergraduate or first degree level. This paper describes a five-year Undergraduate and One-year postgraduate degree programme in OR which was designed and is running at the Federal University of Technology (F.U.T.), Yola.

1. The Undergraduate Programme in OR at F.U.T., Yola

The Federal University of Technology, Yola was established in 1981 and is presently the only university in Nigeria offering a first and second degree programmes in OR. The OR Undergraduate programme at F.U.T., Yola was one of the programmes approved by the National University Commission (N.U.C) for the University at its inception in 1982.

The first intake of students into the programme was made in 1983. The programme was based in the then Department of Operations Research and Planning of the Faculty of Social and Management Sciences. Like other programmes in the faculty then, it was to be run as a four-year programme leading to the award of a B.Sc. degree. In conformity with the requirements of the faculty where it was based and to reflect the planning aspect in the name of the programme, the syllabus was designed to accommodate many courses in management and social sciences as well as core OR and foundation courses. In 1984, F.U.T., Yola was merged with the University of Maiduguri and became the Moddibo Adama College of the University. Although all the programmes in the former F.U.T., Yola were still run in the college, control and policy decisions were taken in Maiduguri. In 1988, the Moddibo Adama College was demerged from University of Maiduguri and reverted to Federal University of Technology, Yola. However, the faculty of social and management sciences ceased to exist in Yola. As a result, all departments/programmes under the faculty except the OR programmes were transferred to the University of Maiduguri. The OR programme was not because the University of Maiduguri had no department of OR or any closely related Programme in which the students could enroll.

After due considerations of the options put forward by the department of OR to the senate of F.U.T., Yola, it was decided to continue the programme in the existing department of Mathematics and Statistics in the School of Science and Technology Education. Consequently, the new department came to be known as the department of Mathematics, Statistics and Operations Research. As a result of the decision to run the OR programme in the School of Science, the curriculum was revised in accordance with the requirement of the School. Thus, the emphasis shifted from management and planning to mathematics and model building, some of the management courses and application courses were dropped while mathematics and statistics courses were added. Quite recently also, the programme curriculum had to be redesigned from a four-year to a five-year programme, in line with the directive that all Federal University of Technology should run five-year programmes. The OR programme was separated from Mathematics and was merged with Statistics, and the new department formed was called the Dept. of Statistics and Operations Research in the newly created school of Pure and Applied Sciences (The intention being that one year should be used for industrial experiences). During these reviews, accounts of experiences gained from conferences and workshops as well as feedback we received from past graduates and their employers were taken into consideration. References were also made to similar programmes offered in other countries, but were conscious of the differences in environment and culture since "the success of OR in any country largely depends on the circumstances peculiar to that country"(Walsham 1978). It is the objective of the present OR programme run in F.U.T., Yola to train future decision makers at all levels of the problem solving hierarchy in the country. Essentially, the courses offered have the broad aim of producing people who have:

a) Skills and abilities in various areas of quantitative analysis

b) A facility in model building.

c) Awareness of behavioral and management problems.

d) Good relations and communication with people.

These are characteristics and qualities a trained OR person must possess for any meaningful career in the profession.

2. The Postgraduate Programme in OR at F.U.T.

The first intake of students into the programme was made in 1998. The programme was to be run as a one-year programme leading to the award of a M. Tech degree. Both the undergraduate and postgraduate programmes award Technology degree certificates in conformity with the requirements of Federal university of Technology.

3. Conclusion

In this paper we have tried to describe our effort in championing OR Education in Nigeria by discussing the undergraduate and postgraduate programmes in OR run in F.U.T., Yola. Even though as we have claimed, F.U.T., Yola is a pioneer in awarding degrees in OR at the first-degree and second degree level in Nigeria, we are aware that a number of academic institutions in the country have introduced a substantial amount of quantitative techniques in some of their undergraduate programmes. Also a few universities in the country have OR as an area or field of specialization in some of their postgraduate programme. We therefore welcome criticisms and contributions that will help us in our work in F.U.T., Yola. This is necessary because we know that an academic programme is a purposeful system and OR is supposed to be able to improve the effectiveness of such a system. Our success in developing academic OR in F.U.T., Yola will greatly influence successful OR practice in Nigeria.

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NATIONAL CONFERENCE 2002

GOUDINI SPA

8-11 SEPTEMBER 2002

First notification and Call for papers

The annual conference of the Operations Research Society of South Africa will take place from 8 to 11 September 2002 at Goudini Spa in Rawsonville on the scenic Worcester wine route. The conference organizers have decided not to place the conference under the banner of a specific theme since participation over the full spectrum of Operations Research is welcomed at the annual conference. We hope to see many papers, 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 regarding OR. Selected full papers of quality will be considered for publication in ORiON, the journal of ORSSA. This is an invitation to diarise this event and to prepare a paper for the conference.

Important dates

1 July 2002: Deadline for submission of abstracts
26 July 2002: Notification of acceptance of papers
2 August 2002: Deadline for early-bird registration
6 September 2002: Deadline for conference registration

Abstracts

Those interested in participating in the conference by contributing a paper are invited to submit an abstract (not exceeding 300 words) electronically, by visiting the conference website at

http://dip.sun.ac.za/conferences/onsa2002/

and clicking on *Submission of Abstracts*. Alternatively, abstracts may also be e-mailed to Jan van Vuuren at vuuren@sun.ac.za or may be sent via ordinary mail to ORSSA Conference 2002, c/o Jan van Vuuren, Department of Applied Mathematics, University of Stellenbosch, Private Bag X1, Matieland, 7602. The abstract should include the title of the paper, the name(s) of the authors, the affiliation and contact details of the primary author (including e-mail address, telephone number and fax number) and the 300 word summary of the paper in plain text, with no mathematical expressions. Notification of acceptance of abstracts will be given by e-mail by 26 July 2002.

Conference registration

Those interested in attending the conference are invited to register online by visiting the conference website and clicking on *Early-bird Registration*. Paper copies of the registration form will also be included in the next newsletter (due in June 2002).

Conference venue

The venue for the conference is Goudini Spa (about an hour's drive from Cape Town International Airport) in the Breë River Valley. Recreation facilities include four heated swimming pools (27-37°C, inside and outside), jacuzzis, springs, tennis courts, a water slide, a putt-putt course, trampolines, electronic games, pool tables, hiking trails and a volley ball court.

Accommodation available at the conference:

- 10 single level flats comprising 1 bedroom with a double bed, 2 bedrooms each with 2 single beds, 1 full bathroom (bath, toilet and basin), 1 half bathroom (shower and basin) and a spacious living area and fully equipped open plan kitchen.
- 8 double storey flats comprising 1 bedroom with a double bed, a bedroom with two single beds, 1 full bathroom on the top level and the same on the ground level, together with a spacious living area and fully equipped open plan kitchen.
- Many *chalets* comprising 1 private bedroom with a double bed, 2 single beds in the living area & open plan kitchen, and 1 full bathroom.

The single and double storey flats have a semi-luxurious finish and are arranged in a circle with a private swimming pool and lapa in the middle. The *chalets* are not quite as luxurious, but are located closer to the conference facilities, avoiding a slight climb to the conference lecture rooms and will be reserved for delegates who do not wish to share a bathroom.

Delegates have a choice of standard or private accommodation. By standard accommodation is meant a private bedroom in one of the single or double storey flats, sharing a bathroom with one or two other delegates. These flats are situated about 150m from the conference facilities (which are on a hill-top), therefore involving a slight climb along a flight of stairs. The *chalets* are situated apart from the flats and are reserved for delegates who prefer private bathroom facilities. The conference fees will depend on delegates' choice of accommodation type. Accommodation may be booked electronically on the website registration form. Further information on accommodation may be obtained from Isabelle Nieuwoudt at (021) 808 3778 (per fax) or isabelle@sun.ac.za (via e-mail).

Conference fees

R1625 per delegate staying in standard accommodation
R1825 per delegate staying in private accommodation
R1375 per student (sharing a room)

A discount of R100 is available for members of ORSSA and / or early-bird registration (before 2 August 2002) in any of the above three classes of accommodation.

The conference fee includes the welcoming function, breakfasts, lunches, dinner, refreshments during coffee breaks, a wine tasting, the conference banquet and accommodation. Please contact Wim Gevers at (021) 918 4112 (per fax) or wg@sun.ac.za (via e-mail) if you require any further information about conference fees.

Mailing address for further information

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NASIONALE KONFERENSIE 2002

GOUDINI SPA

8-11 SEPTEMBER 2002

Eerste kennisgewing en Oproep vir referate

Die jaarlikse konferensie van die Operasionele Navorsings-vereniging van Suid-Afrika sal plaasvind vanaf 8 tot 11 September 2002 te Goudini Spa in Rawsonville langs die pragtige Worcester wynroete. Die konferensie-organiseerders het besluit om die konferensie nie onder die banier van 'n spesifieke tema te plaas nie, aangesien deelname oor die volle spektrum van Operasionele Navorsing by die jaarlikse konferensie verwelkom word. Ons hoop om baie referate te ontvang, hetsy van 'n meer fundamentele aard, oor die toepassing van ON in die nywerheid of sakewêreld, aktuele onderwerpe in ON, of opvoedkundige sake rakende ON. Geselekteerde referate van gehalte sal oorweeg word vir publikasie in ORiON, die joernaal van ONSA. Hierdie skrywe is 'n uitnodiging om die datum aan te teken en 'n referaat voor te berei.

Belangrike datums

1 Julie 2002: Sperdatum vir voorlegging van opsommings
26 Julie 2002: Kennisgewing van aanvaarding van bydraes
2 Augustus 2002: Sperdatum vir vroeë registrasie
6 September 2002: Sperdatum vir konferensie registrasie

Opsommings

Persone wat belangstel om aan die konferensie deel te neem deur 'n referaat te lewer, word genooi om 'n opsomming van die referaat (wat nie 300 woorde oorskry nie) elektronies in te stuur, deur die konferensie webtuiste by

http://dip.sun.ac.za/conferences/onsa2002/

te besoek en op *Voorlegging van Opsommings* te klik. Alternatiewelik kan opsommings ook per e-pos aan Jan van Vuuren by vuuren@sun.ac.za gestuur word, of per gewone pos gestuur word aan ONSA-Konferensie 2002, p/a Jan van Vuuren, Departement Toegepaste Wiskunde, Universiteit van Stellenbosch, Privaatsak X1, Matieland, 7602. Die opsomming moet die volgende insluit: die titel van die referaat, die name van die outeurs, die affiliasie en kontakbesonderhede van die hoofouteur (insluitende E-posadres, telefoonnommer en faksnommer) en die 300 woord opsomming van die referaat in teksvorm, sonder enige wiskundige uitdrukkings of formules. Kennisgewing van aanvaarding sal per e-pos teen 26 Julie 2002 gegee word.

Konferensie registrasie

Persone wat belangstel om die konferensie by te woon, word uitgenooi om elektronies te registreer deur die konferensie webtuiste te besoek en op *Vroeë Registrasie* te klik. 'n Papierkopie van die registrasievorm sal ook by die volgende nuusbrief (wat in Junie 2002 sal verskyn) ingesluit word.

Hotelakkommodasie

Goudini Spa (ongeveer 'n uur se rit per motor vanaf Kaapstad Internasionale Lughawe) is in die pragtige Breë Rivier Vallei geleë. Ontspanningsfasiliteite sluit in vier verhitte swembaddens (27-37°C, binne en buite), jacuzzis, warmwaterbronne, tennisbane, 'n water-glybaan, 'n putt-putt baan, trampoliens, elektroniese speletjies, snoekertafels, bergstaproetes en 'n vlugbal baan.

Die volgende akkommodasie sal vir die konferensie beskikbaar wees:

- 10 enkelvlak woonstelle, elk bestaande uit een slaapkamer met 'n dubbelbed, en twee slaapkamers elk met twee enkelbeddens, 'n volle badkamer (bad, toilet en wasbak), 'n halwe badkamer (stort en wasbak) en 'n ruim leefarea met 'n volledig toegeruste oopplan kombuis.
- 8 dubbelvlak woonstelle, elk bestaande uit een slaapkamer met 'n dubbelbed, een slaapkamer met twee enkelbeddens en 'n volle badkamer op die boonste vlak, en dieselfde geriewe op die onderste vlak, tesame met 'n ruim leefarea en 'n volledig toegeruste oopplan kombuis.
- 'n Aantal rondawels, elk bestaande uit 'n private slaapkamer met 'n dubbelbed, 2 enkelbeddens in die leefarea, 'n volle badkamer en 'n oopplan kombuis.

Die enkel- en dubbelvlak woonstelle is semi-luuks en is in 'n sirkel rondom 'n sentrale, private swembad en lapa gerangskik. Die rondawels is nie heeltemal so luuks soos die woonstelle nie, maar is nader aan die konferensie lesinglokale geleë, en ideaal vir konferensigangers wat nie akkommodasie wil deel nie of wat verkies om nie trappe te klim nie.

Konferensiegangers sal 'n keuse hê tussen standaard of private akkommodasie. Met standaard akkommodasie word bedoel 'n eie kamer in een van die enkel- of dubbelvlak woonstelle ('n badkamer sal met een of twee ander konferensiegangers gedeel word), terwyl die rondawels gereserveer sal word vir konferensiegangers wat nie badkamer fasiliteite wil deel nie. Die woonstelle is ongeveer 150m vanaf die konferensie lesingsale (wat op 'n lae heuwel geleë is) – inwoners van die woonstelle sal dus 'n effense steilte langs 'n stel trappe na die lesingsale moet klim. Die rondawels is naby die konferensiefasiliteite bo-op die heuwel geleë. Konferensiegelde sal afhang van die soort akkommodasie wat konferensiegangers verkies. Enige verdere besonderhede ivm akkommodasie kan vanaf Isabelle Nieuwoudt by (021) 808 3778 (per faks) of by isabelle@sun.ac.za (per e-pos) verkry word.

Konferensiegelde

R1625 per afgevaardigde vir standaard akkommodasie
R1825 per afgevaardigde vir private akkommodasie
R1375 per student (wat 'n kamer deel)

Afslag van R100 is beskikbaar vir ONSA-lede en / of vroeë registrasie (voor 2 Augustus 2002) vir enigeeen van die bogenoemde drie klasse akkommodasie.

Die konferensiegelde dek die verwelkomingsfunksie, ontbyte, middagetes, aandete, verversings tydens teepouses, 'n wynproe, die konferensie banket en akkommodasie. U is welkom om vir Wim Gevers by (021) 918 4112 (per faks) of wg@sun.ac.za (per e-pos) te kontak indien u enige verdere navrae in verband met konferensiegelde het.

Posadres vir verdere inligting

ONSA Konferensie 2002
P/a Jan van Vuuren
Departement Toegepaste Wiskunde
Universiteit van Stellenbosch
Privaatsak X1
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Suid-Afrika
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THE AFRICA PROJECT

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

During the ICORD conference, which was held last year, we decided to initiate an African project. Some of the aspects we decided on were the following:

- create a website of Community OR Workers in Africa;
- compile an address list of OR people in Africa outside of South Africa;
- encourage people from the rest of Africa to contribute to our newsletter, to attend our conference and also to submit articles to ORiON;
- send copies of our newsletter and ORiON to people in Africa;
- endeavour to submit a collaborative proposal to EURO for the EURO Africa project.

It would be worthwhile to report on progress on these:

1. Leanne Scott has set up a website for Community OR workers in Africa. The website address is:

    http://communities.msn.com/AfricanORpractitioners

    We would encourage members to visit this website and, more importantly, get involved in this! The level of involvement can definitely improve.

2. The last two newsletters have been sent to some 30 people scattered all over Africa. Some have responded very positively and asked whether they can remain on the circulation list. This is very rewarding as it not only takes ORSSA to many countries in Africa, but it creates a special bond with ORSSA and those people in Africa.

3. In the last newsletter an article on "OR in Kenya" appeared written by Prof. Isaac Mbeche from the local University. We hope to have more such articles from other parts of Africa.

ORSSA did submit a proposal to EURO for the Africa project. The EURO executive met recently and decided to support two of the ten proposals they received. The one proposal is from West Africa which was submitted by a Network of Universities (RAMAD) with headquarters in Burkina Faso. The other one is from East Africa, submitted by Joe Kakeneno, who attended ICORD last year. However, with the last one EURO is not that happy with what was suggested and have now asked the East African group and ORSSA to submit a revised joint proposal as soon as possible. In the e-mail both parties received from EURO it is stated that: "we expect ORSSA will have an active part in such a project". This is great news for ORSSA. What is envisaged is the organizing of a regional meeting so that delegates from different countries can meet and discuss the creation of an OR society (or societies) in the region or the different countries. The budget provided is for around 7000 euros, but EURO will assist in trying to obtain funds from elsewhere. The ORSSA executive will obviously take this initiative further. ∎

Dear ORSSA Member / OR Practitioner

The Western Cape chapter of ORSSA are happy to announce the following activities for the year 2002. We plan to have four regular style seminars during the first half of the year, while the second half of the year will be devoted to hosting a half day workshop on an OR topic, hosting the national conference of ORSSA at Goudini Spa and organising a combined AGM, cocktail party & student competition to find the best 4th year OR project by a student of any tertiary educational institution within the Western Cape. Please diarise the following exciting events:

1. *Opening Seminar*: Wednesday February 27th, 2002
    Speaker: James Bekker (Industrial Engineering, Stellenbosch)
    Topic: Discrete-event simulation applications in the South African industry: some case studies
    Time & Venue: 16:00 in Room A409, Main Engineering Building, University of Stellenbosch, Banhoek Road, Stellenbosch

2. *Second Seminar*: Wednesday March 27th, 2002
    Speaker: Theo Stewart (Statistical Sciences, UCT)
    Topic: Evaluation of water supply augmentation and water demand management options for the City of Cape Town
    Time & Venue: 16:00 in the Seminar Room of the new Statistical Sciences Building, University of Cape Town

3. *Third Seminar*: Wednesday April 24th, 2002
    Speaker: Daan Louw (Department of Agriculture, Stellenbosch)
    Topic: Applications of mathematical programming in agricultural economics
    Time & Venue: 16:00 in the Van der Horst Building, US Graduate School of Business, Bellville

4. *Fourth Seminar*: Wednesday May 29th, 2002
    Speaker: Elmien Wagenaar
    Topic: A mathematical approach towards financial asset allocation strategies
    Time & Venue: 16:00 in Room A409, Main Engineering Building, University of Stellenbosch, Banhoek Road, Stellenbosch

5. *Half day Workshop* (Topic to be announced) on Wednesday October 23rd, 2002 from 09:00-lunch (venue to be announced)

6. *National ORSSA Conference*, Sunday September 8th - Wednesday September 11th, 2002 at Goudini Spa (more details may be found on pages 5 and 6 of this newsletter)

7. Combined AGM, Cocktail party & Student Competition on Wednesday November 13th, 2002 at the US Graduate School of Business in Bellville.

If you have any enquiries, please feel free to email Jan van Vuuren (chair, Western Cape Chapter of ORSSA) at

vuuren@sun.ac.za

March 2002

NATIONAL STUDENT COMPETITION 2001

By Anne-Marie Pothas
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For the first time, two prizes have been awarded. The first prize is for an excellent research report by Peter John Theron of the Graduate School of Business, University of Cape Town.

The title of Peter's work is almost intimidating: "Minimising long-term agricultural price risk: a quadratic programming model based on the Markowitz mean-variance approach to risk minimisation". However, when reading his abstract, one can understand why the panel of OR and OR related practitioners decided on Peter as illustrating OR in practice. In Peter's words: "The study focuses on developing an agricultural model based upon proven investment portfolio techniques. The model can be used as a tool to diversify agricultural risk over the long-term by optimising the proportion of land allocated to each of the farming products. Sensitivity analysis allows the strategist to understand the impact that future prices, gross margins and land availability may have on the long-term sustainability of the farming enterprise."

The abstract and title show a use of key OR concepts. For instance: developing a model, used as a tool, programming, optimising, sensitivity analysis are from the more traditional ideas on OR, but then one reads risk, portfolio techniques. The latter shows that Peter realises that OR is also about applying known methods, methodologies, techniques in areas "new" to OR. From experience most of us would agree that it is by addressing new challenges that OR is developed as discipline.

The table of contents of Peter's study also would make any OR'er feel proud: Introducing the concept, Theory behind the model, The structure of the model, Testing the model, Application of the model in the 'real world', Conclusion.

Congratulations to Peter and to Rob van den Honert, his study supervisor, for a job well done! Peter receives R2 500 from the SAS Institute. **ORSSA is very grateful to the SAS Institute for their sponsorship for the next few years.**

'n Tweede prys is toegeken aan Ilse Coetzer van die Departement Toegepaste Wiskunde, Universiteit van Stellenbosch vir haar projek "The application of multi-criteria decision making in municipal budgeting". Ilse het 'n uitstekende stuk werk gelewer waarin sy MCDA toegepas het om vir Helderberg Munisipaliteit rigting te gee oor kapitaalbesteding. Sy het haar so goed van haar taak gekwyt dat die paneel aanbeveel het dat Ilse ook erkenning behoort te kry vir die klaarblyklike ywer en plesier wat sy in haar werk gesteek het. Baie geluk aan Ilse en aan Philip Fourie, haar studieleier. Ilse ontvang 'n bedrag van R1 000 uit die ONSA fondse.

A short note: the first prize was awarded to a MBA student. Traditionally we, as Operations Researchers, provide decision-support to management. An appeal to this year's students: let's show everyone – especially our traditional client, management – what we can do! ∎

WESTERN CAPE CHAPTER STUDENT COMPETITION 2001

Stephen Berjak
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The 2001 Student Competition of the Western Cape Chapter of ORSSA was held on Wednesday October 31st 2001 at the US Graduate School of Business, in Bellville. Students may be nominated by tertiary institutions within the Western Cape to take part in this annual competition, which consists of 20-minute oral presentations by contestants on written OR projects (of fourth year standard). Last year two students were nominated: Marc Levi (Department of Statistical Sciences, University of Cape Town), with a project entitled *Does the United States stock market possess a memory? - An analysis of the S&P500 aggregate index,* and Margarete Louw (Department of Applied Mathematics, Stellenbosch University) with a project entitled *Finding good nursing schedules*. The adjudicators for this competition were Philip Fourie, Wim Gevers and Theo Stewart, who commended Marc Levi for the good work contained in his written project and for his fine oral presentation, but who unanimously awarded the prize of a year's free student membership to ORSSA to Margarete Louw, whose project involved contact with a psychiatric hospital in the Western Cape, for whom an automated decision support system was developed to aid hospital administrators in the difficult task of drawing up fair work rosters for their nurses.

A delighted Margarete Louw receives her prize from Wim Gevers

As an additional prize, Margarete Louw will also be nominated as the official Western Cape contestant in the 2002 National Student Competition of ORSSA, for which results will be announced at the National Conference to be held at Goudini Spa during 8-11 September. ∎

WINNING AT THE NATIONAL LOTTERY

By Jan van Vuuren
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Jan van Vuuren

What would you answer if asked the question "What is the minimum number of *Lotto* tickets one has to buy to be guaranteed a win at the National Lottery?" You might say, "Well, to *guarantee* that one wins the jackpot, one needs to buy all 13 983 816 possible tickets." And if 'to win' means 'to win the jackpot', you would be correct. But consider the possibility of a player being content with a lesser Lotto prize, such as a prize for a 4 or 5 number match. What is the answer then? This is a difficult question that seems to appear for the first time in the combinatorial literature during the early 1960s. The general lottery problem may be stated as follows: Given a universal set $U_m = \{1,2, \ldots, m\}$ from which a player purchases an n-element subset of U_m to construct a single ticket, what is the fewest number of tickets that have to be constructed to win a k-number matching prize? Here we assume that $1 \leq k \leq n \leq m$. Denote the answer to this problem by the so-called lottery number $L(m,n;k)$. For the South African national lottery scheme *Lotto* the parameter values are $m = 49$, $n = 6$ and $3 \leq k \leq 6$. But let us consider a smaller example just to get a feel for the complexity of the lottery problem, before returning to the realistic case of *Lotto*.

Consider the case where $m = 7$, $n = 3$ and $k = 2$. In this case a player purchases triples from the set $U_7 = \{1,2,3,4,5,6,7\}$. One (rather excessive) way of winning at this simple lottery scheme would be to buy all 35 possible tickets – in which case you would not only be guaranteed to win a prize for a pair matching, but you will also necessarily win the jackpot … at a rather high price! A better (but still not optimal) approach would be to buy the following set of 7 tickets: $L_1 = \{\{1,2,4\}, \{2,3,5\}, \{3,4,6\}, \{4,5,7\}, \{5,6,1\}, \{6,7,2\}, \{7,1,3\}\}$. This set of tickets, also known as a so-called *Steiner system*, has the property that every one of the 21 possible pairs of numbers from U_7 appears exactly once in *some* ticket. Therefore a player playing this set will match all 3 possible pairs of numbers appearing in the winning triple and hence win a 2-prize, no matter which triple is chosen as the winning triple from U_7. However, the point is that a player need not match *all* 3 pairs in the winning triple – matching at least one of these pairs will also do the trick. Hence the lottery problem is not isomorphic the well-studied *covering problem* from combinatorial theory – it is harder than this notorious and open problem. If the player instead buys the tickets $L_2 = \{\{1,2,3\}, \{2,4,6\}, \{4,5,7\}, \{5,6,7\}\}$, then he is also guaranteed a 2-prize in the above small lottery scheme, but at a cheaper price, rendering the upper bound $L(7,3;2) \leq |L_2| = 4$. To see that this is true, we introduce the concept of a *lottery graph*. Number all possible lottery tickets lexicographically and consider a graph $G\langle m,n;k \rangle$ with vertex set

$$V\left(G\langle m,n;k \rangle\right) = \left\{1,2,\ldots,\binom{m}{n}\right\}$$

in which two vertices are joined by an edge if the corresponding lottery tickets share at least one k-set. Then the lottery problem translates to a well-known problem in graph theory: that of finding a minimal dominating set of minimum cardinality. Popularly speaking, this means that one seeks a smallest subset L of the vertices of $G\langle m,n;k \rangle$ to play such that the ticket corresponding to any vertex of $G\langle m,n;k \rangle$ is either in the set L or else adjacent in $G\langle m,n;k \rangle$ to a vertex in L. If we play such a set L and the winning numbers correspond to some ticket in L, we have won the jackpot (and hence at least a k-prize); else the winning ticket will share at least one k-set with at least one of the tickets in our set L – thereby still ensuring us at least a k-prize. Figure 1 shows the lottery graph $G\langle 7,3;2 \rangle$ as an example. The reader may check exhaustively that each of the 35 vertices in the graph is dominated by some vertex in L_2. It can be shown, by eliminating all possibilities, that $G\langle 7,3;2 \rangle$ in fact possesses no minimal dominating set of cardinality 3 or less, thereby establishing the lower bound $L(7,3;2) > 3$, and hence the lottery number $L(7,3;2) = 4$ by utilization of the previous upper bound. The general problem of determining the cardinality of a smallest dominating set for a graph is known to be NP-complete. This is the bad news.
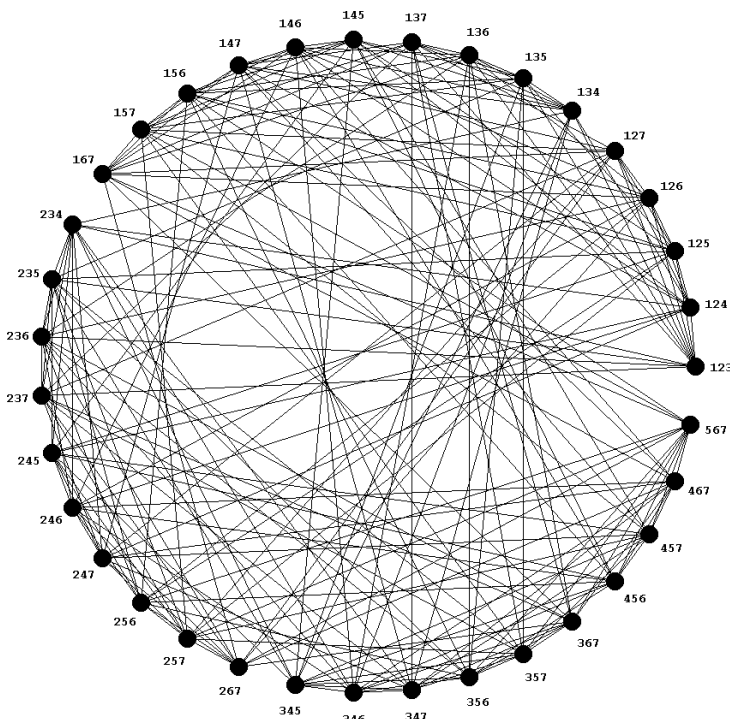

Figure 1: The lottery graph $G\langle 7,3;2 \rangle$

The good news is that there are domination bounds available from graph theory. It can be shown, by using standard combinatorial and graph theoretic arguments, that

$$\left\lceil \frac{1}{r+1}\binom{m}{n} \right\rceil \leq L(m,n;k) \leq \left\lfloor \frac{1}{r+1}\binom{m}{n}\sum_{j=1}^{r+1}\frac{1}{j} \right\rfloor$$

where

$$r = \sum_{i=k}^{n-1}\binom{n}{i}\binom{m-n}{n-i}.$$

These bounds are weak (far apart) for realistic values of the parameters m, n and k. Table 1 shows these bounds for the case of *Lotto*.

k	Lower bound	Upper bound
3	54	700
4	1 014	10 241
5	53 992	331 290

Table 1: Bounds on the lottery number $L(49,6;k)$ for k=3,4,5.

From an operations research perspective it would be natural to try and solve instances of the lottery problem, which is in fact a combinatorial minimization problem, via integer programming methods. Associate with each lottery ticket the decision variable

$$x_i = \begin{cases} 1 & \text{if ticket } i \text{ is included in the playing set} \\ 0 & \text{otherwise.} \end{cases}$$

Furthermore, define the (i,j)-th entry of the adjacency matrix for the lottery graph $G\langle m,n;k\rangle$ as

$$a_{ij} = \begin{cases} 1 & \text{if tickets } i \text{ and } j \text{ share a common } k\text{-set} \\ 0 & \text{otherwise} \end{cases}$$

with the convention that $a_{ii} = 1$ for all i. Then our quest is to

$$\text{Minimise} \quad L(m,n;k) = \sum_j x_j$$

$$\text{Subject to} \quad \sum_j a_{ij} x_j \geq 1, \quad i = 1,2,\ldots,\binom{m}{n}$$

together with the constraint that all variables x_j are binary. The non-trivial constraints merely stipulate that every vertex in the lottery graph should be dominated at least once, thereby ensuring the player a k-prize. The problem with this approach is that integer programming solution techniques, such as the well-known branch-and-bound method, typically enumerate and evaluate a binary tree of sub-problems in the entire solution space, and the computational complexity of this procedure tends to be exponential in the number of variables. For example, solutions to small instances of the lottery problem (together with the number of binary tree branches traversed and the corresponding computing times on an Intel Celeron 667MHz processor with 256MB RAM) are shown in Table 2.

Lottery	Variables	Branches	Time	$L(m,n;k)$
$\langle 7,3;2\rangle$	35	23	00:00:01	4
$\langle 9,4;3\rangle$	126	50 316	00:29:11	9
$\langle 11,3;2\rangle$	165	260 343	05:06:59	10

Table 2. An indication of the number of variables, branches traversed and elapsed time (hh:mm:ss) using the branch-and-bound method for three small lotteries

Apart from a few known small lottery numbers, the lottery problem is still open. It seems that this notorious problem may only be solved for special parameter instances via a combination of computer searches and clever combinatorial designs. This is the approach followed currently by Werner Gründlingh at the Department of Applied Mathematics at Stellenbosch University as part of his masters dissertation. If you are interested in the progress that he has made with respect to finding new numbers (or if you have any suggestions toward the solution of the problem), he may be contacted at wgrundlingh@dip.sun.ac.za

It is not anticipated that this problem will be solved in general in the near (or even far!) future. It will probably remain one of those tantalizing teasers suitable to fill the long quiet hours of many Sunday afternoons to come! ■

BOOK REVIEW

By Hans Ittmann
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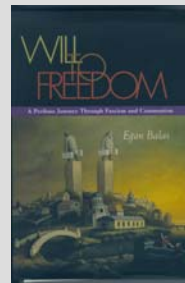
WILL TO FREEDOM -

A Perilous Journey Through Fascism and Communism

Egon Balas

Syracuse University Press, New York, 2000. Price: US$ 29.95.

During the last EURO conference held in July 2001 in Rotterdam, the Netherlands, Egon Balas, at the age of 79, was the recipient of the EURO gold medal. This is a highly prestigious award made to a member of EURO who has contributed significantly to Operations Research over an extended period. Balas spent the first forty four years of his life in Romania and is currently University Professor and Thomas Lord Professor of Operations Research at the Graduate School of Industrial Administration of Carnegie-Mellon University in the USA. He has published more that 180 papers and in 1995 received the John von Neuman Prize from INFORMS, the OR Society of the USA. He has been at the forefront of developments in Integer Programming during the last 35 years His work has been innovative and influential, and has contributed significantly to this field.

Balas referred to a book during his acceptance speech at the EURO conference. It covers the first part of his life, entitled **Will to Freedom**. I was keen to lay my hands on the book but there were only two copies displayed at the book exhibition, both of which Balas had brought with him and which, unfortunately, had already been earmarked for two of his close friends. Nevertheless paging through a copy, it seemed a fascinating book and I was keen to read it. I asked Balas whether he was aware of the fact that the title of his book was very similar to *Long Walk to Freedom*, the autobiography of a person possibly much more famous, Nelson Mandela – he did not know that! Both books are fascinating and, although very different in content and style, there are also remarkable similarities!

Balas was born as Egon Blatt in 1922 to Hungarian Jewish parents in Transylvania, an area that became the North-Western province of Romania in 1918. He spent the first twenty years of his life in the provincial capital of Transylvania. The first years were difficult but he was perceived as a normal young boy. It was only in high school that he started to excel as a scholar.

There were many political incidents during those times that influenced and made an impression on this young Hungarian/Romanian Jew. Throughout his life many extraordinary things happened to him as an individual. He explains why: "First, all or at least most of the things that happened to me also happened to others who were at the same time in the same place; what is unusual is the combination of events, the fact that all these things happened to the same person. Second, life of an individual has always been more or less unpredictable, but especially so in times of war or revolution; and the times I lived through encompasses both. Third, some of my experiences were undoubtedly triggered by my attitude toward life, by the fact that under most circumstances I preferred the role of active participant to that of bystander. If I were a believer in astrology, I would have to consider myself born under a very lucky constellation, not because of the things that have happened to me – which were often horrible – but for having somehow managed to overcome them." Furthermore: "Although in a sense my story is unique, in another sense it is the combination of many typical stories. The thirty years of my life between the mid-thirties and the mid-sixties in a way epitomize the fate of a certain group of people. The group became politically active during World War II in order to resist the Nazis, continued to be politically active after the war under the communists in an attempt to build a better society, then discovered to their horror that the system they were involved in was becoming even more nightmarish. They collided with it and, with very few exceptions, were crushed, marginalized, destroyed as individuals. I count myself among the lucky exceptions whose life took a different turn."

In the book, which almost resembles an action drama movie and makes for fascinating reading, Balas endeavours to relate these experiences. At a relatively young age he got exposed to Marxism and came to believe that capitalism breeds oppression, inequality, greed, exploitation, hatreds of all kinds, nationalism, racism and anti-Semitism. Nazism was in the Marxist view just a particularly vicious form of capitalism. Within this environment, with all its influences, Balas was attracted to the Hungarian Communist Party in 1942 mainly because of its anti-Nazi stance. He became active, helped organize work stoppages and distributed anti-war leaflets. In the book he describes, in a very vivid way, all his activities, his eventual imprisonment and ordeal under torture, followed by his escape and hiding. He spent several months in prison in Budapest under terrible circumstances. In late December 1944 the prison had to evacuated and he and others managed to escape. The end of the war was in sight, but he still had many close calls. During the war most of his family was sent to Auschwitz, the German extermination camp, and he never saw them again.

In April 1945 Balas returned to his hometown, joined the Romanian Communist party and furthered his studies. He also changed his surname from Blatt to Balazs - it was more Romanian sounding! During that period he got his first experience of how the Party operated. At a Party conference the delegates were locked up for six days and were not allowed to go out. These days made a lasting impression on him! Early in 1946 he enrolled as a student in the Economics Department of the Bolyai University. During that time he met his future wife, Edith, who also had been deported to Auschwitz during the war, but was one of the few to return. They married in 1949. He joined the Foreign Affairs Department and was appointed secretary of the Romanian legation to London. Spelling of his name was again changed, this time to Balas.

One of his responsibilities was to report on his impressions of the UK. Almost from the start his report-back presentations were met by severe attacks and criticisms by members of the Party. After having been called back to Hungary, he became head of the Directorate of Economic Affairs in the Foreign Affairs Ministry. Very soon his views on economic planning and those of the Party were diverging significantly. In the book he goes into detail of how previous friends turned against him and soon he and others were accused of "right-wing deviation". All of this led to him being regarded with more and more suspicion by the Party, leading to his arrest. His long nightmare started in August 1952 after which he was kept in solitary confinement for 745 days. Two chapters in the book are devoted to this horrific experience. Anybody who saw the film, *The Green Mile*, would remember the obsession with a rat of one of the convicts – Balas also entertained a rat for a few days! At his release he was shocked to learn that he and his wife had a second daughter! She was born just under nine months after his arrest.

After his release from jail he taught economics and pursued his interest in the economics of socialism. However, in Romania it was hopeless to investigate how a socialist economy actually functioned. Everything was kept secret and there were no data available. This lead Balas to a normative study of some basic proportionalities that had to prevail in any closed economy, whether socialist or capitalist. A book he published on Keynesian economics was castigated and removed from circulation. This was the final straw and he was expelled from the Communist Party in 1959. The period after his release from jail was marked by uncertainty, backstabbing and ultimately losing his job.

Balas now had no alternative but to change his life dramatically. He decided at the age of 37 to transform himself into a mathematician. The new field of applied mathematics called *operations research* attracted him strongly and he decided to become an expert and a researcher in linear programming and optimisation theory! The confidence was there to do this but there was also the realisation that it would take hard work. One full chapter describes his moving into OR. What is most fascinating is that he used practical problems to develop new solution methods to transportation problems. As early as 1960 he started publishing papers on this work. In 1962 a joint paper was published in *Management Science* entitled: *On the Generalized Transportation Problem*. Soon afterwards papers on algorithms to solve problems with 0-1 variables followed in *Operations Research*.

Living in an oppressed society was not the most pleasant experience and as far back as 1960 Balas and his wife decided to emigrate. It was a six-year long struggle before the Balas family finally got permission to leave. They left Bucharest on 26 July 1966 and flew to Italy where they stayed till obtaining entry visas to the USA.

This is a remarkable book by a remarkable person. I can only concur with a quote by Herbert Simon on the back cover of the book: "A welcome reminder that a highly intelligent, stubbornly courageous, and lucky human spirit will sometimes prevail over baneful forces." ▪

UPCOMING CONFERENCES

THE SIXTEENTH TRIENNIAL CONFERENCE OF THE INTERNATIONAL FEDERATION OF OPERATIONAL RESEARCH SOCIETIES
Hosted by the UK Operational Research Society
8 - 12 July, 2002

CONFERENCE THEME:

OR in a globalised, networked world economy.

UNIVERSITY OF EDINBURGH IN THE CENTER OF EDINBURGH, CAPITAL OF SCOTLAND

- The first IFORS conference of the new millennium
- In the UK, the cradle of OR and the country that hosted the very first IFORS conference
- Aimed at both academics and practitioners
- Closing date for abstracts **15 December, 2001**.

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Professor Lyn Thomas, University of Southampton.
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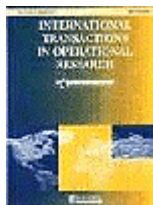### EUROPEAN JOURNAL OF OPERATIONAL RESEARCH

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