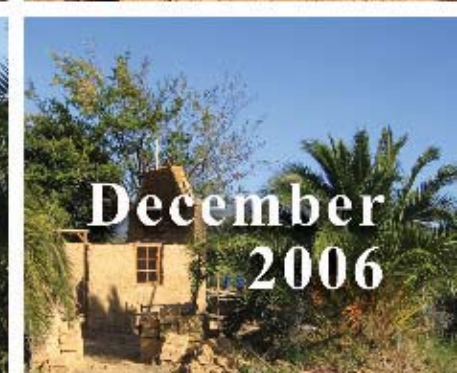
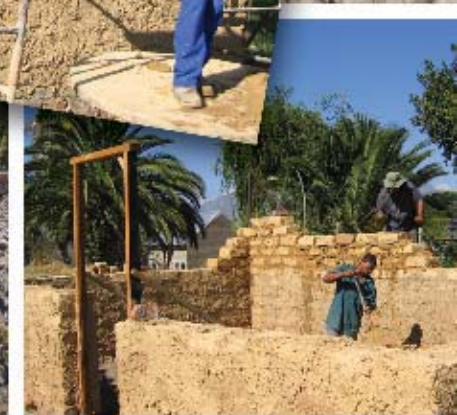




# Newsletter

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## FROM THE PRESIDENT'S DESK

By Marthi Harmse ([marthi.harmse@sasol.com](mailto:marthi.harmse@sasol.com))

ORSSA President



**Marthi Harmse**

And so we are rushing towards the end of another year. Since September Christmas decorations started appearing in shopping malls with spring specials replaced by Christmas specials. The furniture store advertisements doubled in our post box vying for end-of-year bonuses. All holiday accommodation is fully booked and coastal towns stocked up on all things necessary and unnecessary for the summer holidays.

In October we attended at least one year-end concert per week. In November we are constantly double-booked for year-end functions. And soon the back-to-school promotions will start.

Before December is on us and we are exhausted by ending the year, and since this will be the last newsletter for the year, I want to take time out to thank people who will change their roles in ORSSA.

The ORSSA fellows Theo Stewart and Hans Ittmann will step down as additional members of the Executive Committee to become co-opted members of the committee together with Paul Fatti and Ilze du Plooy. I expect very little will change with Theo serving as vice-president of the International Federation of Operations Research Societies (IFORS) and organising the Operations Research in Practice in Africa conference in Cape Town for next year, while Hans is organising the triennial IFORS conference in Sandton for the following year. Thank you both for your invaluable contributions to the Society and the field of Operations Research on national and international level at countless occasions over many years.

Another ORSSA fellow, Wim Gevers, will end his term as vice-president of the Society. Again I expect not too much to change with Wim being elected as the next treasurer. Thank you for the memorable way in which you lead the Society as vice-president and president. Among your many contributions I specifically want to honour you for the improvements you implemented in our constitution.

Dave Evans will resign as treasurer of ORSSA. He too will continue his deep involvement with the Society as treasurer of

## DISCLAIMER

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

the IFORS 2008 conference. Thank you for the amazing way in which you maintained the membership database and kept our books balanced among your many other contributions as treasurer in the small hours of the night and under high work pressures. Thank you for your consistent support and the investments you make in OR social capital.

Cobus Potgieter will resign as newsletter editor. I know that you all will join me and drink a toast on this beloved friend of ours who connected us through this newsletter for the past two years. Thank you for your kind reminders for contributions, your effort to get valuable reading together and your patience with late articles and electricity shortages.

Before January is on us and we made all our resolutions for the new year, and since there will not be another newsletter before 2007, I also would like to welcome new friends who will join the Executive Committee. A hearty welcome to Sarma Yadavalli who was elected as our new vice-president, Basie Kok who was elected as our new newsletter editor and Hennie Kruger who was elected as additional member. I know that you will not disappoint the high expectations we have of you.

May you all be blessed with time to leisure a while and savour the moment with your dear ones each day for the remainder of this year. For who says there will be a tomorrow? ♦

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## FROM THE EDITOR



Cobus Potgieter

The population of the Winelands district is expected to increase dramatically over the next few years and the local government is concerned that the agricultural region may be suburbanised. In our main article Philip Fourie explains a new development, called the Lynedoch EcoVillage, which is an experiment to try and find a sustainable solution to this concern. Philip discusses three dimensions of sustainability at the Lynedoch site and then shares his insights into the future of EcoVillages.

The National Treasurer's report, as read at the AGM in September, together with the provisional income statement for the previous financial year (1 July 2004 to 31 December 2005) is included in this issue.

Sports is becoming more and more influential and powerful in our modern day life and the monetary value of the sports sector is increasing dramatically. In this issue's book review Hans Ittman shares with us some of his best sports memories before discussing the book *Economics, Management and Optimisation*. He explains how issues arising in sports management have been tackled, including ranking of teams, scheduling of tournaments, outcome prediction and optimising strategy.

The winners of the Tom Rozwadowski Medal and the SAS student competitions were announced at the Conference Dinner of the 2006 Annual ORSSA Conference in Pietermaritzburg. The respective processes followed to determine the winners are explained and the winning papers are briefly discussed in two separate articles by Wim Gevers and Margarete Bester.

I have come to the end of my term as Newsletter Editor and I look back on two years of hard work, late nights and inflexible deadlines

and I ask myself: "Was it worth all the effort?" Then I realise that I received a lot more back than I put in. Being part of the society and serving on the Executive Committee was a privilege, an opportunity for which I will always be thankful. I want to wish Basie Kok, who is taking over as Newsletter Editor, the best of luck with his new responsibility and encourage him to take this opportunity to become part of a super society. Besides Basie, who I want to thank for taking interest in the Newsletter, there are a few other members to whom I am grateful.


Thank you to everyone who supported me during my term, especially Wim and Marthi for your leadership and frequent encouragement. I want to thank Hans Ittman for the contributions he made to the newsletter and specifically for his contributions in the form of book reviews. I know that his work requires a lot of his time and on top of that he is a very active member of ORSSA. Thank you Hans for the big part you had in each issue of the Newsletter and I want to wish you and your team the best for IFORS 2008. I also want to thank Leo Tomé, the Business Manager of the Newsletter, for his outstanding work in organising and managing advertisers for the Newsletter. I want to extend a special word of thanks to Jan van Vuuren who introduced me to ORSSA and nominated me for the position of Newsletter Editor two years ago. Thank you for all the hours you put into proof reading each issue and all your advice – you played an undeniable role in the success of the newsletter.

Lastly I want to thank everyone who contributed to the newsletter during my period as Newsletter Editor. I want to encourage all members to keep contributing to the newsletter and use this vehicle to promote OR in a creative way. May you all have an enjoyable festive season and a cheerful time with loved ones. May the holidays be blessed and may you all return safely in the new year!

For the last time,  
Cobus

## Features

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**MEMBER PROFILE: JAN VAN VUUREN***By Cobus Potgieter (pottie@dip.sun.ac.za)***Jan van Vuuren**

Jan was born on the 2<sup>nd</sup> February 1969 in Durban. He matriculated in 1986 and commenced his tertiary studies at the University of Stellenbosch.

Jan is currently associate professor in the Applied Mathematics division of the Mathematical Sciences faculty at the University of Stellenbosch where he lectures in discrete mathematics and operations research. Jan supervises graduate research projects and since 1999 has overseen 13 Masters and 4 Doctoral students. His research focuses on Discrete Mathematics and OR, and over the few years 26 of his papers were published, a further 5 are accepted for publication and 4 more are currently submitted for review. These papers are on a number of topics including the lottery problem, supply chain modeling, graph domination, various scheduling problems and many more.

Jan has been an active member since he joined ORSSA. He has served as an additional member on the national executive committee, as chair of the Western Cape Chapter and is currently editor of ORiON.

**Where did you study? When and where did you make the shift towards OR and discrete mathematics?**

I studied mathematics and applied mathematics at undergraduate level at the University of Stellenbosch during the period 1987–1989 and then continued on postgraduate level with applied mathematics, obtaining an honours and a masters degree in 1990 and 1992 respectively. I then read mathematics at the University of Oxford in the United Kingdom during the period 1993–1995, obtaining a DPhil (Oxford's equivalent of a PhD) degree. Towards the end of my doctoral studies I was offered a position as temporary lecturer in the Department of Applied Mathematics at Stellenbosch University by Gerhard Geldenhuys, who was then head of department. I always thought I would love to retire in Stellenbosch and could not believe my luck at being offered my first job there – needless to say, I took up the post in 1996 – and here I still am today.

My original brief in 1996 was to develop and teach a new graduate course on partial differential equations (the area of research for my doctoral dissertation) and to teach ordinary differential equations and general modelling courses on undergraduate level – all very much on the continuous end of the mathematical spectrum. But then the retirement of Gerhard Geldenhuys in 1998 left an acute vacuum in the department in terms of the courses that were offered on operations research and discrete mathematics related topics. We were basically faced with loosing all of the discrete mathematics courses with Gerhard's departure, and as an experiment I offered to take responsibility for existing courses on graph theory and cryptology, so that we could at least retain these courses in the short term until someone suitable could be found to nurture

these courses further. With the gradual additional loss of operational research stalwarts in our department, such as Philip Fourie and Hennie de Kock (due to retirement and moving on to greener pastures), I also became more involved in teaching operations research related courses, such as classical optimization techniques and mathematical programming, from 1999 onwards for the same reason as becoming involved in discrete mathematics. Almost simultaneously there was a considerable influx into our department of a number of numerical analysts and differential equation experts from the University of the Free State who were very able and keen to adopt and transform the courses on classical applied mathematical modelling techniques and differential equations. As a result I therefore felt that the need for my contributions in discrete mathematics and operations research were less pressing than those in differential equations and classical modelling courses.

Great was my surprise, however, when during this temporary rescue attempt I discovered in discrete mathematics and in operations research my true subject callings. I made the shift in my focus from the continuous to the discrete end of the mathematical spectrum a permanent one – which was one of the best choices in my life – and that purely by chance (teaching me in no uncertain way that one should not be afraid to try something new)! In fact, my fascination with and attraction to these subjects ran so deep that my teaching activities in discrete mathematics and in operations research gradually became research activities in these fields. Today I can probably be described as a graph theoretic operations researcher, preferring to work in the interface between the sheer beauty of abstract graph theory and its concrete, real-world applications.

**Who would you describe as your mentors?**

Well, I would have to name four people. First and foremost there is Gerhard Geldenhuys, my teacher in several undergraduate and graduate courses, my first head of department and indeed a role-model whose care for his students and meticulous nature has inspired me. In terms of teaching style and rigour I was most impressed and most inspired by Johan Uys and Johan de Villiers, who taught several courses to me during my undergraduate years – they showed me that I wanted to become a lecturer. Finally, in terms of research endeavours I am indebted to my doctoral supervisor, John Norbury, who inspired me to pursue the truth in all things, who encouraged me always to dig much deeper than seems necessary at first when attacking a mathematical problem (attempting to penetrate to the essence of the problem by ignoring all its superficial trimmings) and most importantly who taught me to recognize and respect my limitations.

**When did you become involved with ORSSA, and what do you consider the strengths and weaknesses of ORSSA?**

I joined ORSSA in 1997. I have served on the national executive of ORSSA since 1999 – first as additional member, then as chair of the Western Cape Chapter and since 2004 as editor of ORiON. ORSSA is the home of operations research in South Africa, and a very warm home at that. Its strength of

course lies in the considerable collective skills, knowledge and experience of its members over a very wide variety of operations research sub-disciplines both in industry and academia. ORSSA serves as a natural vehicle within which its members can share and benefit from these skills, knowledge and experience. Rather than a weakness I should mention two challenges facing ORSSA at present: To mobilize its members to become more involved at chapter level amidst a host of other commitments in their full and busy daily routines, and to recruit new, young members so as to ensure the future wellbeing of the Society, because I would guess that the average age of members have been increasing over the last ten to fifteen years.

**What do you see as the highlights in your career as OR practitioner?**

I have been involved in a number of interesting operations research projects, including

- the design of a decision support system for release strategies at a large open-air reservoir built for agricultural irrigation purposes,
- finding optimal fruit juice pulping schedules for a large plant in Ceres,
- providing decision support in terms of inventory management at a cardboard box producing factory,
- modelling lion populations in the Kgalagadi Transfrontier Park with a view to ascertain whether the population is sustainable in the face of human persecution,
- modeling the national fruit export infrastructure, with a view to determine capacities,
- developing new heuristics for a variety of two-dimensional packing problems, and
- recently designing a comprehensive decision support system for threat evaluation and weapon assignment in a ground based air defense environment.

These projects have all been so interesting that I would not be able to single one out as a highlight. Would I be forgiven for saying that the last eight years during which I have been involved in the above projects has been one long highlight in my research career?

**How do you rate ORiON against other national publications and what is your message to would-be contributors?**

Since 2004 ORiON has undergone a significant change both in terms of its appearance and the management of its turn-around time. It has also seen a slow but steady increase in the average number of papers published per volume and the number of subscribers both nationally and abroad. I think that the quality of papers that appear in ORiON compare very favourably with those in any national journal and even to some international journals. There are some exciting future possibilities, such as enlarging the author base of ORiON to include other national

operations research societies under its banner, to enlarge the editorial board and subscriptions accordingly and perhaps even the frequency of publication. ORiON is an accredited journal in terms of publication subsidy and is currently going from strength to strength. I would like to encourage the members of ORSSA to utilize ORiON as publication vehicle.

**You have been encouraging students at the University of Stellenbosch to join ORSSA and to consider pursuing careers in OR. What is your message to young aspiring OR practitioners?**

Yes, I believe we need to rejuvenate ORSSA as I mentioned in response to a previous question. My message to young aspiring operations researchers is that practicing operations research can be inspiring and thrilling, especially when the solutions that one comes up with during a quantitative or qualitative modelling process is accepted and implemented in practice. The wealth of diverse application areas in which operations researchers are able to make a difference is perhaps surprising. Each application of operations research related techniques is so distinct that one is never bored with routine work. And one of the most rewarding aspects of operations research work is that one typically functions as part of an interdisciplinary team, enabling one to learn a tremendous amount and at the same time bring to the modeling table something that is unique to one's background, field of expertise and modeling approach, which may be used in conjunction with other contributions to the greater good of a project. What is more, South Africa is in need of operations researchers to help streamline its various development drives and initiatives. ♦



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# Treasurer's Report 2004/05

By Dave Evans (davee@dbsa.co.za)

The following comments amplify the provisional income statement which was presented at the agm, and should be read in conjunction with it.

As the Society's financial year was changed at the last agm to correspond with the calendar year, the current financial reporting period is a one-off eighteen month period, from July 2004 to December 2005. Audited accounts for this period can obviously only be tabled at the next agm. The period has considerably more activities in some respects than a twelve month year (e.g. two conferences, more Newsletters and issues of Orion.) In addition, Orion has been "catching up" on back publications, which has made the number of issues higher still.

At the current time, the Society is showing a loss of

approximately R14 000 for the period in question. This includes a cost of R6 653 for IFORS 2008 brochures which will be recouped in due course from the conference, so the "real" loss is only about R7 500 at this stage. The additional publication expenses referred to above, alone amount to an abnormal charge of some R25 000. In addition, on the credit side, total outstanding membership fees exceed R40 000, although not all of those will be successfully collected.

The Society's bank balance is almost R90 000, which does not include substantial funds held by several of the Chapters. The Society's finances are therefore acceptably healthy.

The Treasurer's current priority is to collect as many of the outstanding membership fees as possible. ♦

## Income Statement for the period 1 July 2004 to 31 December 2005

		2005	2004
	<b>Notes</b>		
<b>Income</b>	<b>1</b>	<b>118,436</b>	<b>67,887</b>
Subscription Fees	2	60,735	39,091
ORION (Foreign subscriptions)	11	120	1,586
Donations received for student prizes			3,500
Advertisements		45,399	16,300
ORSSA 2005 Conference profit	8	-	-
ORSSA 2004 Conference profit		7,255	-
ORSSA 2003 Conference profit		-	3,004
Interest received		4,927	4,405
<b>Expenditure</b>		<b>125,895</b>	<b>68,886</b>
Newsletters and journal production and distribution		85,903	38,549
Medals and gifts		1,383	898
Student competition prizes		4,000	5,000
Bank charges		2,738	1,536
Executive strategy session		691	9,387
Postage, etc.		4,192	-
IFORS 2008 Expenses	10	6,653	-
Website development			1,580
Bad debts provided for	5	14,048	7,380
Bad debts written off	5	2,020	2,570
IFORS subscription fee	9	2,637	496
EURO subscription fee		1,630	1,490
<b>NETT SURPLUS/ (SHORTFALL)</b>	<b>8</b>	<b>(7,460)</b>	<b>(999)</b>



# Lynedoch EcoVillage: An Experiment in Sustainability

By Philip Fourie ([pdfourie@sun.ac.za](mailto:pdfourie@sun.ac.za))



## Introduction

In this note I summarise briefly some of the ideas concerning development that I found in various papers and books by Russell Ackoff. Then I describe some aspects of the history of the Lynedoch EcoVillage, and try to develop some tools for assessing its sustainability. Lastly I give some details about similar developments elsewhere.

## Ackoff on OR and development

Russell Ackoff, one of the founding fathers of OR, was a remarkable person – judging from his writings, that is. I greatly regret never having had the privilege of hearing him speak or meeting him. I would like to refer to a paper and two books of his that influenced my views on OR and development. Firstly, "A black ghetto's research on a university" [1], dealing with the involvement of Ackoff and colleagues from the University of Pennsylvania in the problems of a community ("black ghetto") adjoining the campus of the university. From this comes the following quote: "Little of what we have done is OR, or even research in the conventional sense of the word. But we have never rejected a request for aid because it did not involve research or because it required action that was beneath our dignity".

Secondly, "Management in small doses" [2] – still unrivalled as a succinct, witty introduction to many important topics. From this comes the following quotation on the difference between growth and development: "Neither is necessary for the other. A rubbish heap can grow but it doesn't develop. Poets can develop without growing... Development of individuals and corporations is more a matter of learning than earning. It has less to do with how much one has than how much one can do with whatever one has." Thirdly, a comparatively unknown work called "Compact City", an experiment in city planning which used a three-dimensional layout to optimise many aspects of urban living – for instance, no two locations in the city would be more than 15 minutes' walk apart. Ackoff followed this up with several other books on planning [3]-[4], in line with his dictum "[It is obvious that] ...the best thing that can be done to a problem is to solve it. False. The best thing that can be done to a problem is to dissolve it, to redesign the entity that has it or its environment so as to eliminate the problem".

(I cannot resist also quoting from another paper called "On passing through 80" [5]. "I'm going to recall the principal sources of the fun that I have experienced. First, the fun derived from denying the obvious and exploring the consequences of doing so. In most cases, I have found the obvious to be wrong... My second source of fun has been the revelation that most large social systems are pursuing objectives other than the ones they proclaim and that the ones they pursue are wrong".)

## The Lynedoch EcoVillage

(Disclaimer: I should make it clear that in the following I am giving my personal observations and opinions, which are not necessarily shared by the people involved with the EcoVillage and the LVHOA. Furthermore, my remarks concerning sustainability indicators are no more than a first attempt at developing the necessary concepts).

The three strands of Ackoff's thinking described came together for me in my involvement with the Lynedoch EcoVillage. This has been described as follows: "The Lynedoch EcoVillage is the first ecologically designed socially mixed intentional community in South Africa" [6]. (See also [www.sustainabilityinstitute.net](http://www.sustainabilityinstitute.net) and [www.lynedochvillage.org](http://www.lynedochvillage.org)). It is located about 10 km from Stellenbosch (near Spier on the R310) and 40 km from central Cape Town (see Figure 1). It is being developed on 6 ha of land, bought for R3 million in 1999, which was the site of the old "Drie Gewels" country hotel. At present the site contains the following:

- The Main Building, which houses Lynedoch Primary (475 learners), the Community Hall and the Sustainability Institute (SI). The SI is affiliated with the University of Stellenbosch, and offers several courses accredited by the university, including the MPhil degree in Sustainable Development.
- The Guest House for the use of students and visitors, renovated from the old hotel.
- A crèche and pre-school facility where a Montessori-based educational programme is housed.
- Phase 1 of the housing development, containing 42 approved erven, on which 12 houses have already been built (10 clay houses using the subsidy for first-time owners (see Figure 2), 1 Hydraform brick house and 1 non-subsidised clay house).

The original development was done by a Section 21 (not for profit) company, Lynedoch Development. The management of the EcoVillage has recently been handed over to the Lynedoch Village Home Owners Association (LVHOA), another Section 21 company, which has appointed an Operations Manager, reporting to the Trustees of LVHOA, who is responsible for the day-to-day operations as well as the future development of the EcoVillage. For a period of three months during the handover I was acting Operations Manager, thus gaining some insight into the history, present and future of the Lynedoch community.

## Sustainability at Lynedoch

The key concept in connection with the design of the EcoVillage is *sustainability* (see [7] for a discussion). It is common cause that many aspects of modern urban life are



unsustainable – energy use, water use and quality, sewerage, disposal of solid waste, housing, transport and air quality come to mind. Would it be possible to address some of these problems by changing some of the basic approaches to South African urban living? As popularised in the idea of the “triple bottom line”, sustainability should have at least three dimensions: ecological, social and economic. It is also important that the indicators for measuring sustainability should be developed with the participation of all the inhabitants and other stakeholders [8].

Let us look first at ecological sustainability. The main theme here is the minimisation of the ecological footprint of the community, of which some of the most important aspects are the use of energy, water and other resources, and the creation of waste products. Quantitative indicators can be developed for most of these aspects.

- The traditional building method in urban areas uses baked bricks, which are made by an energy-intensive method. At Lynedoch the first houses have been built using bricks made from the local clay and air-dried on site. It goes without saying that this method has its problems; however, this "adobe" technique has a long history of successful use. (The "cob" technique is slightly different in that no bricks are made, but rather, the house is 'moulded' or 'sculpted' over time using hand sized pieces of clay. The result is a monolithic structure rather than one composed of discrete bricks)
- Sewerage is recycled to provide water for flushing toilets and for irrigation, while municipal ("potable") water is used for drinking and other domestic purposes. It is thought that a saving of up to 40% of the normal use of municipal water can be achieved.
- Energy is supplied by an energy management company called AGAMA Energy using an “energy services” approach, i.e. that customers pay for the energy service (in this instance, hot water) and need not necessarily own the appliance from which the energy service is derived (in this case the solar water heater). The use of solar water heaters saves



**Figure 1: The Lynedoch Village within the Lynedoch Village about 10km South of Stellenbosch**

approximately 40% of electricity usage, and LPG (a more environmentally benign fuel than the coal that the national supplier uses to generate electricity) is used for cooking. There is also a fully functional biogas digester on site (a private initiative shared by 3 residential sites), which supplies biogas (with methane as the predominant constituent) for cooking, as well as being a very effective means of onsite sewerage treatment.

- Recycling of as much as possible of the solid waste produced on site is envisaged, including composting of organic waste.

Social sustainability deals with social interactions and structures, and should probably involve some of the following.

- A socially mixed community, reflecting to some degree the total South African society.
- Social cohesion, based on a common belief in the values of the LVHOA as set out in its Articles of Association. These can be summarised in the following extract: "To promote social justice and an ecologically sustainable lifestyle for Members, including the provision of facilities and educational support programmes aimed at achieving this objective".
- Acceptance of the need to abide by the Code of Conduct which forms part of the Articles of Association (this covers things like architectural guidelines for construction of new buildings, environmental aspects of private gardens and open spaces, traffic, parking and access, behaviour of guests and tenants, and handling of domestic waste and energy supplies).
- Perceived benefits to the inhabitants, through various aspects of the quality of life in the EcoVillage, such as restrictions on traffic leading to a child-friendly environment and the use of common open spaces, but also through cost savings through the diminished use of mains electricity and potable water.



**Figure 2: Builders working on one of the first buildings that form part of the Lynedoch EcoVillage project.**

- A long-term vision of the development of the LVHOA, which will enable the community to overcome the inevitable teething problems.
- Education for sustainability, at pre-primary and primary school level, as well as for adult inhabitants.

In trying to define economic sustainability, one of the main problems is that of scale: the EcoVillage cannot be a self-contained economic unit, and must be considered as part of a larger system – what that should include is both a practical and a conceptual problem.

- At the first level, sustainability must obviously involve the budgets of the individual households.
- The next level will refer to the EcoVillage, and specifically the budget of the LVHOA, which includes the common income (levies paid by the homeowners) and expenditure (e.g. municipal accounts, insurance, staff costs, etc).
- The EcoVillage is part of the Stellenbosch District Municipality, which is part of the Western Cape, which is part of the Republic of South Africa, etc. Obviously the economic health of all these systems is necessary for the long-term sustainability of the EcoVillage.

A heuristic which comes from Ackoff's work on managing systems might be applicable here: it can be briefly formulated as that people operating at one level should be represented in the management of the system one level up (larger), as well as that one level down (smaller). Similarly, it seems reasonable that the economic sustainability of a system should be considered not only on its own terms, but should at least involve both the next larger system which includes it and the smaller system(s) which it includes.

### Into the future

The Lynedoch EcoVillage will (hopefully) be the first of many similar developments. At Oude Molen in Cape Town work has started on the redevelopment of a large expanse of land and buildings, containing the former northern section of the Valkenberg mental hospital which had fallen into disrepair, and has since come to house a vibrant mixed community and highly localized and diversified mini-economy, using many of the sustainability principles mentioned above.

At a very different level, Spier Estate is applying many sustainability principles in its operations, including recycling of wastewater and solid waste. They have also recently announced an architectural competition for the design of an ecologically and socially sustainable arts village.

At Grabouw a project based on sustainability principles has been launched. This is especially significant because this applies not only to a small, fairly isolated unit like the Lynedoch EcoVillage but has been integrated into the mainstream planning processes for the whole Grabouw area. For the long term, it is very important that the striving for sustainability be seen not as a fringe activity, but as a fundamental reorientation of many aspects of modern urban society.

### Conclusion

What I have tried to do here is to give a brief account of some of the writings of Russell Ackoff that first sparked my interest in OR and in development, and the links between the two topics. Gradually I also became aware of the importance of sustainability as an aspect of development, and have tried to motivate why this should be of interest to OR practitioners (see [7]). My involvement with the Lynedoch EcoVillage gave me the opportunity to observe at first hand some of the possibilities and the problems of trying to turn the idea of sustainability into reality. (It also made me realise the enormous inertia of social systems, and correspondingly the enormous energy it takes to alter them significantly). It will be fascinating to see whether and how these ideas take root and grow.

### Acknowledgements

I would like to thank Mark Swilling, Eve Annecke, other Trustees of Lynedoch Development and the LVHOA, and all the members of the Lynedoch community, for the opportunity to participate to a small degree in the exciting venture they have undertaken. Stephen Forder, of AGAMA Energy, and also a Trustee of the LVHOA, has kindly read and commented on this article, and has supplied the photographs – thanks, Stephen!

*(NOTE: After completing this article I came across a book which gave me new insight into the possibility of actually implementing sustainability principles. It is "The local politics of global sustainability" by Prugh, Costanza & Daly (Island Press, Washington D.C., 2000). Essential reading!)*

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# INTELLIGENCE AT THE MOST GRANULAR LEVEL

- *The path to information freedom*



**Carel Badenhorst, Product Manager BI at SAS Institute**

Business Intelligence (BI) is a process used to help decision makers make sense of the vast amounts of data collected by organisations on a day to day basis. True intelligence transforms data into valuable information and helps you to forecast better business decisions based on fact, as opposed to forecasting on ethereal probabilities.

Carel Badenhorst, Product Manager BI at SAS Institute says: "Recent studies indicate that the true benefits of a BI solution to a strategy driven enterprise include: assistance in data access, data integration and quality assurance, reporting and analysis of data, descriptive modelling, simulation, forecasting and optimisation services, all activities which businesses generally performed better after the incorporation of a end-to-end integrated BI solution. In our experience BI is a vehicle that enables the unlocking and delivering of key business information to the end-user."

It is with this that the company developed the EIP or Enterprise Intelligence Platform, which draws information and data from sources throughout the enterprise and then promotes the ability to 'crunch' this data into a single, trustworthy view of the business. The offering includes Customer Intelligence, Strategic Performance Management, Risk Intelligence, Financial Intelligence, HR Intelligence and IT Intelligence, which when presented in a single view allows an organisation to identify its weaknesses, bottlenecks and over-weighted cost centres at the most granular level.

"Too often companies that are bleeding are unable to pinpoint the exact location of the crippling cost centre, but with a single view of the operational structure of the company through the use of intelligence the board now has the benefit of not having the wool pulled over their eyes," adds Badenhorst.

With an EIP solution your organisation is able to reliably gather, derive, manage, distribute and deliver enterprise intelligence. It provides data extraction and integration capabilities across data sources and platforms, integrated data profiling and quality, ETL, data migration, data synchronisation and data federation, customer data integration (CDI) and master data management (MDM) as well as assisting organisations to achieve compliance.

The SAS Enterprise Intelligence Platform has the following benefits for organisations:

- Delivers end-to-end, enterprise level BI functionality;
- Highly scalable architecture which supports cross enterprise use of BI;

- Supports a wide range of open standards to deliver enterprise intelligence services;
- Provides strong data access, data quality and data management capabilities;
- Has the capability to access and work with an extensive range of enterprise data sources; and
- Delivers a range of market leading analytical products and services.

"A company which has embraced a true enterprise intelligence solution will be able to deliver true ROI rather quickly. Those who make use of an end-to-end integrated BI system will have the capability to accurately understand the past and present. Couple this understanding with proven statistical and analytically accurate capabilities and you can enjoy the confidence to predict what is likely to happen in the future of your organisation, and what you should do about preparing for the future, across the board," he adds.

"Always ask yourself why you need intelligence in your organisation. Do you merely need a query and reporting tool? Or are you trying to implement an enterprise solution that will provide you with accurate guidance and sound statistical and analytical backup for key strategic and business decisions facing you on a daily basis. If the latter is your rational then you need to look beyond the silo based reporting tools and look towards a true Enterprise Intelligence Solution," ends Badenhorst.

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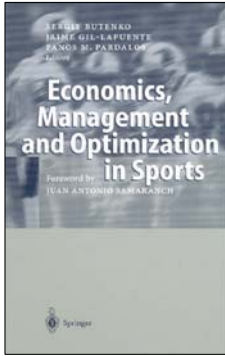
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## BOOK REVIEW

By Hans Ittmann [hitmann@csir.co.za](mailto:hitmann@csir.co.za)



**Economics, Management and Optimization in Sports**, Sergiy Butenko, Jaime Gil-Lafuente, Panos M Pardalos editors, 2004. Springer-Verlag, Heidelberg, Germany. pp. 300. ISBN 3-540-20712-0, 49.95 euros.

Modern sports have changed dramatically over the last decades. Not only has it become much more competitive, but it is operated in a similar fashion as any business. In

addition, technology has been introduced into sports in a significant way and it has had a major impact on how individuals and teams have performed. It is almost unthinkable that any sports played at the highest level will do so without using the latest in technology. Technology in this case is fairly widely defined – it includes technology built into the equipment that sportsmen and women use; the advances in foodstuff, liquids and energy boosting substances, etc. Technology would, for the purposes of this short review, also include those things trainers and athletes use to analyse their opposition, to develop new strategies, etc. Gone are the days that a team or individual just competed on the basis of talent alone.

These changes have occurred over the last forty to fifty years. My most vivid memory of my first involvement in sports is that of listening to a sport broadcast on the radio as a toddler in 1956. The Springbok rugby team was playing the All Blacks in New Zealand and on radio (shortwave) there was a broadcast around four or five in the morning. We were glued to the radio set and the voice of the commentator was sometimes hardly audible. Today technology allows one to sit at home in front of a colour TV set and watch these matches live. One does not experience the atmosphere of a live match, but from a viewing perspective, you see the match much better and the critical incidents are replayed over and over! Everything is also much more focussed on fast and quick entertainment.

A second stroll along memory lane takes me to the fourth rugby test on Saturday 25 August 1962 between the Springboks and the British Lions. Those days there were only a few rugby tests annually and the build up to this specific test started months beforehand. We travelled to Bloemfontein by bus, slept over and then it was the big day! The first match already started at ten and there was continuous rugby till the big game. No loud music, no entertainment to distract your attention and no large screen where you could watch the replays while the match is continuing in front of you! In the first live rugby test I ever watched the Springboks won 34-14 with Marnetjies Roux scoring a most memorable try. We sat on the grass behind the try line and he dived straight towards us in scoring his try! Magical moments! Only years later did I see this try on African Mirror - no replays, no slowmos, just the memories of what you saw and many reports in newspapers reliving those moments.

Modern culture is unimaginable without sports. Baron Pier de Coubertin wrote in his “Ode to Sport”: *O Sport, you are Progress! To serve you, a man must improve himself both physically and spiritually. You force him to abide by a greater discipline; you demand that he avoid all excess. You teach him wise rules which allow him to exert himself with the maximum of intensity without compromising his good health.* This “ode” captures the spirit of continuously striving to better, higher and faster! It was therefore inevitable that modelling, data analysis, simulation, optimization methods, etc. would also be used to assist in improving the performance of both individuals and teams. It is fairly recent that papers on topics in sports started to be presented at conferences and being published in technical journals. At the last EURO conference in Iceland there was a stream on “OR in Sport” with papers on a whole variety of different types of sport. One of the recent joint winners of the ORSSA student competition was a student report on “Spouse Avoiding Mixed Doubles Tennis Tournaments”! This is a fairly complex real-life problem of developing schedules for a tennis-tournament in such a way that spouses don’t play with or against each other!

*Economics, Management and Optimization in Sports* is a recent publication which presents up-to-date research in economics, management and optimization applied to sports. There are 18 stand-alone chapters each covering a different topic on sports. Specific sports covered include American football, soccer, baseball, cricket, basketball, track and field (athletics), and hockey. The book contains research and reviews addressing the following issues:

- Methods for ranking teams and evaluating players’ performance;
- Techniques for predicting outcomes of sport competitions;
- Economics of professional leagues;
- Optimal strategies in sports;
- Optimal referee assignment techniques; and
- Scheduling and managing sports tournaments.

The first topic is an approach to ranking American football teams. There are typically 100 teams participating in this league annually. Each team plays no more than 15 games. Under these conditions the quality of opponents is not the same for different teams and the standard ranking schemes may lead to “unfair” results. In addition there are no playoffs and the national champion is determined in a single game between the number 1 and 2 teams in the rankings. The rankings, in the past, were purely based on the collective opinions of press writers and coaches. Given that sport is so “important”, biased opinions were totally unacceptable and a different more trustworthy approach to determining the rankings was required. The authors present a ranking system that: utilizes simple mathematical techniques, can be verified by non-specialists, use win-loss information only and produce reasonable and unbiased results.

Topics that follow include “Who’s the best? Data Envelopment Analysis and Ranking Players in the (American) National Football League”, “Dynamic Programming and Time Related Strategies in Sports”, “Using Statistics to Predict Scores in English Premier League Soccer” and “Modelling and

Forecasting Match Results". With sports being run more and more like businesses there was a requirement to restructure the Belgian professional football league so as to maximize the return for the different clubs. This led to a study to determine the "optimal" location of the various teams in order to attract the maximum number of spectators etc. Suggestions were also made on mergers, the ideal number of teams – a proper rationalization of the clubs in Belgium.

Many of the chapters report on purely research projects and there is no direct benefit from doing the research. It is, however, interesting to note what people are doing and what topics are being researched. One of the chapters that caught my eye was "betting on the 2003 Cricket World Cup". This event took place in South Africa not long after the scandals concerning betting in our own cricket. Here the authors use a whole range of statistical techniques to assist in getting probabilities for use in head to head betting in one event. The idea is to bet on a specific player to outperform another player in one event. An example presented is that of Ganguly and Kaif, both of India, in the World Cup final. The multivariate log-linear prediction model predicted Ganguly to make 22 runs whilst Kaif was predicted to make 15 runs. In reality Ganguly scored 24 and Kaif 0. The authors conclude that "mathematical models clearly have a role in the setting of prices for sports betting". Personally I'm not sure whether this is where the use of mathematical techniques in sports should go!

The topic of OR is Sports is a fascinating one and one that will attract those of us interested in sport. **Economics, Management and Optimization in Sports** is one of many books available on this topic and one that will be useful for those that are really keen to pursue OR in Sports. ♦

## ORP<sup>3</sup> 2007



Guimaraes, Portugal, 12-15 September 2007  
Minho University (<http://www.uminho.pt>)

### Host City

The city of Guimaraes is located at a distance of 50km from Porto and 35km from Braga. Guimaraes is a nominated city from UNESCO (world heritage), see <http://www.cm-guimaraes.pt>

### Conference Topics

The conference is open to the whole scope of OR, but the following topics are mostly welcome:

*Non-linear Optimization; Derivative free Optimization; Multi-Objective Optimization; Simulation; Integer programming and Combinatorial Optimization; Linear Programming; Bundle Methods*

Organizing committee chair: A. Ismael, F. Vaz (Chair)  
([aivaz@dps.uminho.pt](mailto:aivaz@dps.uminho.pt))



## THE TOM ROZWA- DOWSKI MEDAL

By Wim Gevers ([wg@sun.ac.za](mailto:wg@sun.ac.za))

The Tom Rozwadowski medal is the premier award of the Operations Research Society of South Africa to honour a member of the society for the best written contribution to Operations Research published during the previous year.

This year the nomination committee consisted of the president and vice president. Members were invited to submit their written contributions for adjudication, in addition to all the papers that members had published in ORiON during 2005. In total 12 contribution were received, of which the nomination committee selected 7 to be adjudicated by the adjudication committee. The adjudicators this year were Prof Giel Hattingh, Prof Heinz Prekel and Mr Dave Masterson.

The criteria for adjudication of the papers are: originality, the quality of any theory developed, interaction between theory & practice, new areas of application, new opportunities created for Operations Research and the clarity of exposition. The adjudicators were asked to score each paper on each of the criteria and then a combined score was calculated by using weights for the different criteria developed last year by Prof Paul Fatti. All three adjudicators had a different paper as their first choice, but the winning paper was very obvious since it was the clear second choice of the second and third adjudicators. In addition, when the scores of the adjudicators were combined, the winning paper was a clear first, and the result was not sensitive to changing the weight of the criteria!

The winning paper was written by Dr Leanne Scott of the Department of Statistical Sciences at UCT, with the title: Unpacking developmental local government using Soft Systems Methodology and MCDA tools. It was published in Volume 21 number 2 of ORiON, p 173-195. Since Leanne could not attend the annual conference, the medal was awarded to her at the Western Cape Chapter meeting on 10 October 2006. ♦



Dr Leanne Scott accepting the Tom Rozwadowski medal from ORSSA vice president, Wim Gevers.

# ORSSA STUDENTS COMPETE AGAIN



**THE SAS STUDENT COMPETITION**  
By Margarete Bester (mbester@metropolitan.co.za)



Each year students of the universities and technicons in South Africa compete against each other for the best project produced during the previous year. The students can compete on honours or masters level and respectively win R4,000 or R5,000, sponsored by the SAS organisation.

This year there were 3 honours and 3 master students, all competing for the same prize. On honours level, Christene Pretorius from UNISA entered with a project titled “n Betroubaarheids-, beskikbaarheids- en instandhoudingstudie vir ‘n nuwe aanleg.”, Rikus Jooste from the University of Stellenbosch (US) entered with a project titled *Spouse-Avoiding Mixed Doubles Tennis Tournaments* and Timothy Daniel from the University of Cape Town (UCT) entered with a project titled *Modelling and Forecasting South African House Prices*. Hans Ittmann and Hannelie Nel did us the honour of refereeing these projects and separately decided that both Rikus and Timothy’s projects should be awarded the first prize. Therefore this year UCT and US shared the first prize.

Timothy Daniels focussed on various modelling techniques throughout his project. He indicated that the house prices in Gauteng and the Western Cape are the drivers of the South African residential property market, and that the international property market, especially that of the United Kingdom, influences the South African property prices. Congratulations also to Alan Clark who acted as the supervising lecturer of this project.

Rikus Jooste, in his project, showed that the problem of constructing fixtures of an optimal spouse-avoiding mixed doubles tennis tournament of order  $n$  might be transformed to

the problem of constructing a so-called self-orthogonal Latin square  $L$  of order  $n$ . Congratulations also to Jan van Vuuren who acted as the supervising lecturer of this project.

On masters level, Stephen Davis from UCT entered with a project titled *Mathematical Modelling and Risk Management in Deregulated Electricity Markets*, Reshoketswe Mamabolo from the University of the Witwatersrand entered with a project titled *Maintenance Models with Minimal Repair – A Survey and Numerical Comparisons*, and Frank Ortmann from US entered with a project titled *Modelling the South African Fresh Fruit Export Supply Chain*. Paul Phatti and Dave Evans did us the honour of refereeing these projects and Stephen Davis from UCT walked away with the first prize whereas Frank Ortmann from the US was the very worthy runner up.

Stephen Davis aimed to explore how electricity generation companies cope with the transition to a competitive environment in a newly deregulated electricity industry. The techniques used for tracking issues are diverse and wide-ranging. The global ideology focuses on combining two streams of thought: the production optimisation and equilibrium techniques of the old monopolistic, cost-saving industry and; the new dynamic profit-maximising and risk-mitigating competitive industry. Congratulations also to Theo Stewart who acted as the supervising lecturer of this project.

The winners were announced at the ORSSA conference’s gala dinner and we want to congratulate the students with the very high standard of projects produced. ORSSA would like to extend thanks and appreciation to SAS for sponsoring this competition. ♦

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