



Newsletter

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



September 2005

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- CONSULTING SOLUTIONS ■
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FROM THE PRESIDENT'S DESK

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



Wim Gevers

This newsletter is the one immediately following the annual conference as well as the AGM. This makes it useful to reflect briefly about this conference, and share information with the membership of the society, especially those who were not in the position to attend the conference.

The Annual conference was a joint conference between ORSSA and the Southern African Institute of Industrial Engineering, the first combined conference since the MANSA conference in Cape Town in 1994. It was very clear from the interest in the themes discussed and the active participation amongst OR specialists and Industrial engineers that these two learned societies have a lot in common and that we can benefit from closer cooperation. Hopefully we will not have to wait for 11 years before we again explore the possibility of a joint conference! The conference was excellently organized by the organizing committee of Marthi Harmse, Lorette Slaghuis and Andy Msiza – you have set the example for future conferences – thank you for the effort that you put into making this conference a reality. Marthi took on a dual task in that she also chaired the programme committee. This deserves an extra round of applause! I also want to use this letter to express my thanks to the president of EURO, Alexis Tsokiàs, for making time available to visit our conference as well as for the keynote addresses that he delivered. Together with the keynote address by Jannie van der Westhuizen of the main sponsor, Sasol, they set the scene for an exciting conference.

The Annual Conference is also the time of year that ORSSA members are honoured for special achievements. Firstly the Tom Rozwadowski award for the best publication reflecting the practice of OR in an accredited journal was won by Esbeth van Dyk for her and E Maspero's paper on "An analysis of the South African fruit logistics infrastructure" that was published in ORiON 20(1). This paper is one of a series that followed from a major project in which Esbeth has been involved for an extended period of time on the logistics of the SA fruit industry. For her exceptional role as OR professional in managing this project to a successful conclusion, also led to the executive committee deciding to grant the first ORSSA Recognition Award to Esbeth. Congratulations on both achievements – they are well deserved and set an example for other OR professionals!

Margarete Bester was responsible for the student competition. This year the competition was expanded to include a prize for both an Honours project as well as a Masters project. The SAS Institute has kindly agreed to sponsor both competitions. We are indebted to them for their generosity. The inaugural Masters-prize goes to Catherine Black, a student of Jan van Vuuren of the University of Stellenbosch, while the Honours

prize goes to David Conradie, a student of Johan Joubert of the University of Pretoria. Congratulations to both prize winners and their supervisors! As well as a big thank you to Margarete for managing the project and the adjudicators who assisted her.

At last year's AGM the constitution was changed to make provision for the election of members of ORSSA to Fellows of the society. We can now congratulate the first four fellows of the society, all four of them seasoned OR professionals who have truly made their mark in the South African OR community: Paul Fatti, Giel Hattingh, Hans Ittmann, and Theo Stewart.

Now we look forward to future activities of the society: Most chapters seem to be planning a number of activities for the remainder of the year – do participate in them. But on a much larger scale, detail planning for the IFORS 2008 conference that ORSSA will be hosting, is being done by a committee chaired by Hans Ittmann. We cannot all sit on this committee – but Hans can use support from persons who can volunteer some time. Even more importantly – we can all participate in making this conference a success by presenting papers on the challenging problems that we solve! ♦

QUERIES AND CONTRIBUTIONS

Address all queries or contributions to the editor:

The Newsletter Editor
ORSSA
PO Box 3184
MATIELAND
7602

E-mail: orssa_newsletter@dip.sun.ac.za
Tel: (082) 320 0313
Fax: (021) 808 3778

Contributions and other forms of communication with the editor can also be conducted from the website at:
www.orssa.org.za.

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.

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FROM THE EDITOR



Cobus Potgieter

The past year was a period full of firsts for the Society and its members. Among these were the first Christmas issue of the now quarterly newsletter and the appearance of the “new look” ORION. This year’s conference, a combined effort with SAIIE, was also something new for most members and an enormous success. At the conference prizes was awarded for the first time to

both the best honours project and the best masters project and the first four Fellows of ORSSA were elected. As for the coming IFORS conference in 2008, I think I speak for all members when I say that we are looking forward to this new challenge and first for South Africa. In this newsletter is published the presidential report by Wim – a reflection on all the activities in the Society over the past year.

We are all driven in some way by our deepest desire – a natural instinct to survive. But how do we contribute to the survival capability of our society? In the book *Collapsee*, Jared Diamond portrays his ideas on how the survival of a society is dependent on the choices they make – he examines a few examples from the past. Phillip Fourie reviews the book and discusses the relevance of Diamond’s ideas and the implications thereof.

The final three articles in this issue concern the two relevant OR conferences that realised this year. The first two articles are personal perspectives of the IFORS conference that was held in Hawaii in July. Hans Ittmann gives us a taste of his experience of the social events during the conference, while Jan van Vuuren enlightens us about the academic aspect of the conference. The third article is a personal perspective by Dave Evans on the SAIIE/ORSSA conference that took place in August this year.

Ubuntu is a philosophy adopted from the Zulu maxim UMUNTU NGUMUNTU NGABANTU, meaning “A human being can only be a human being through other human beings.” As members of a society, it is important to receive from the society, but as important to contribute to the society in one or more of the numerous available ways. And with this in mind, I want to praise those members who have contributed dearly to the Society over the last year and again challenge all members to become involved in the activities of the Society as well as those organised by the chapters.

Until next time,
Cobus

ODYSSEUS 2006

Third International Workshop on Freight Transportation and Logistics

www.uv.es/odysseus2006/

President's Report 2004/2005

by Wim Gevers (wg@sun.ac.za)

INTRODUCTION

A year has passed since the last AGM – and it is quite amazing how rapidly a two-year term of office as president of the society can come to an end. It is good to take stock annually of what we have done (and what not!) to see whether we still do what we set ourselves as goals for the society.

At the beginning of my term of office the executive met for a full day to discuss strategic direction and we formulated that ORSSA is a natural professional home to all persons who are involved in a systematic way of decision support, for the maintenance and advancement of all areas of Operations Research and the creation of opportunities for shared learning and networking amongst all members. How well have we lived up to that vision in the past year?

I hope to show that we have done very well in many respects – but that there is also room for improvement in other areas. In the end all work done by individuals on the executive committee is on a voluntary basis. This comes with a sacrifice of personal time, and often even the sacrifice of work time.

Under the following I shall endeavour to highlight the activities of the society over the past year.

EXECUTIVE COMMITTEE

At the AGM in Cape Town last year the executive committee was elected unopposed. The committee consisted of:

President:	Wim Gevers
Vice President:	Marthi Harmse
Secretary:	Esbeth van Dyk
Treasurer:	Dave Evans
Newsletter editor:	Cobus Potgieter
Newsletter Business Manager:	Leo Tomé
ORiON Editor:	Jan van Vuuren
ORiON Business Manager:	Stephan Visagie
Webmaster:	Petrus Potgieter
Additional Members:	Hans Ittmann Theo Stewart Ozias Ncube
IFORS representative	Paul Fatti
Archivist:	Ilze du Plooy
Chapter chairpersons:	
Johannesburg:	Neil Manson
Pretoria:	Gys Wessels
KwaZulu-Natal:	Yvonne Fletcher
Western Cape:	Margarete Bester
Vaal-Triangle	Marthi Harmse

MEMBERSHIP

Membership is the heart and sole of the society. New members are welcomed by the secretary and treasurer ensures that the member information is kept up to date on the ORSSA database.

The administration of the membership database, ensuring the updating of all membership details as well as updating fee payment records has been done meticulously by our treasurer, Dave Evans. For this he deserves our sincere thanks.

Membership again increased by 29 from 252 to 281. A number of student members became full members while the student population also grew by 10. Approximately 53% of the members were paid up for the 2004/2005 year. This is 10% lower than last year and needs attention.

The membership numbers, as on 31 July 2004, were as follows:

<i>Membership type</i>	<i>Number</i>
Full	211
Full/Foreign	8
Student	44
Corporate	2
Sub-total	265
Honorary/Life	16
Total	281

FINANCES

The finances of the society are in a fair state. Last year the financial year of the society was changed to run from January to December, and as a transition we have a financial reporting period of 18 months, which will end on 31 December 2005. Thus the 2004/5 membership fees were also for a 18 month period, while expenses increased considerably. The expense increases are due to the increased frequency of the newsletter (4 issues in stead of 3), the catch-up of the backlog of ORiON – in the financial reporting period there will be 5 issues of ORiON in stead of the normal 2 which is quite an abnormal situation. In addition, ORiON now has a much improved appearance which has made the editions somewhat more expensive than the previous format. The increase in expenses should be covered by the outstanding membership fees. Thus it is important that the outstanding fees are followed up over the last 4 months of the financial year.

The big cost items are always the publications of the society and the associated mailing costs. One could argue that members that are not paid up should no longer receive hard copies of the publications, but to a large extent that would merely be a saving in mailing costs, since the print costs would not reduce significantly with smaller volumes. Hence it is important that members who are in arrears are followed up in time.

The financial statements will be audited after the year end, and audited statements will be published in the Newsletter as soon as they are available. Members will also be given an opportunity to comment on the financial statements at the next AGM.

Dave Evans has been the controller of the society's purse over the last year and I want to thank him for his effort to keep the funds flowing.

CHAPTERS

The Chapters are the lifeblood of the society. This is where members can network with fellow members. Hence it is essential that a number of members in each chapter steer the chapter towards greater activity. I am getting the impression that a number of our five geographically dispersed chapters are not very active, and I want to encourage them to start looking for opportunities to interact. The Executive is looking into measures to assist semi-dormant chapters to become more active. I want to reiterate what I said last year: If each member were merely to commit to arrange one chapter meeting once in five years, we would have 50 meetings in chapters throughout the year, spreading the message of OR!

Chapters will report individually during the AGM.

AFRICA INITIATIVE

Hans Ittmann attended the ORSEA conference in Dar Es Salaam in November 2004 on behalf of ORSSA. The conference was also attended by a number of other ORSSA members. There is an increasing interest in OR in East Africa, but the societies seem to want to do their own thing. ORSSA should be there to provide a helping hand where required. Theo Stewart in his capacity of IFORS Vice President attended the OR Practice in Africa conference in Ouagadougou, Burkino Faso in April 2005. Letters of invitation to attend the ORSSA/SAIIE conference were sent to the president and secretary of ORSEA.

OTHER SOCIETIES

IFORS

ORSSA remains an active member of IFORS represented by Theo Stewart (Vice-President), Paul Fatti, (who is our IFORS representative, was the chairperson of the IFORS prize for developing countries in IFORS 2005) and Hans Ittmann (editor of the IFORS newsletter for Developing Countries which is published 4 times year). A number of ORSSA delegates attended the triennial IFORS conference in Honolulu in July this year. Initial preparations for the hosting of the IFORS 2008 conference have been made, amongst them an advertising leaflet distributed at the IFORS 2005 conference.

EURO

ORSSA may participate in all of EURO's activities. Theo Stewart is ORSSA's representative at EURO, while Hans Ittmann represented the president at this year's EURO Council meeting during the IFORS 2005 conference.

SACNASP

Currently ORSSA has no representative on SACNASP. On 1 July a SACNASP workshop /conference was held to focus specifically on the regulations of the new law regulating the work of registered scientific professionals and the recognition of voluntary associations. This was attended by Petrus Potgieter on behalf of the executive.

NEWSLETTER

The newsletter continued in its prestigious format and has appeared four times since the last AGM. Cobus Potgieter has continued with the excellent work done by Leo Tomé, who has assisted Cobus on the commercial side to ensure that funds were raised to make the newsletter almost pay for itself. Congratulations on excellent work done.

ORION

Jan van Vuuren has done a sterling job as editor of ORiON. Not only has he eliminated the backlog of more than a year in one grand sweep, but this was done with an ORiON in a totally new appearance, and individual issues of substance where in the past it was often difficult to fill a single volume. ORiON is now up to date and Vol 21(2) should ship in December 2005. Subscription rates have been increased to reflect the higher cost as well as to make membership of the society more attractive than a single subscription. ORiON is accredited by the DoE and is thus a prime vehicle for academics and practitioners to publish their work. ORiON is further exposed by a listing on the African Journals Online website (<http://www.ajol.info>) as well as being abstracted in the International Abstracts in Operations Research. Congratulations to Jan and his business manager, Stephan Visagie.

ORSSA WEBSITE

Petrus Potgieter has taken over the role of the webmaster and information is posted efficiently. All information pertaining to the society is accessible from the website (<http://www.orssa.org.za>). For the website to be a showpiece of ORSSA, it is important that all executive members keep the webmaster up to date with the latest information about their portfolios. This is specifically important for Chapter activities.

TOM ROZWADOWSKI MEDAL

The TR Medal goes to the best OR paper published by a member of ORSSA over the period of a year. Marthi Harmse was in charge of the nomination process this year, while a committee consisting of Paul Fatti, Hans Ittmann, and Jan van Vuuren were responsible for the adjudication and the final selection. This year there was a good crop of papers to choose from (11 papers in total). We thank the committee members for their sterling work. The winner will be announced during the gala dinner on Tuesday evening. A hearty word of congratulations to the (yet unknown)¹ winner!

STUDENT COMPETITION

Margarete Bester took charge of the student competition this year. Firstly the mode of the competition was expanded to allow for two prizes: one for all work done up to Honours-level, and a second prize for work done at Masters level. We are very thankful to SAS for expanding their sponsorship of the competition to R9000 for the two prizes. At the time of writing the winners are as yet unknown, but the prizes will be announced during the gala dinner on Tuesday evening. Thanks

¹ The winner is announced on page 15 of this newsletter.

go to Margarete for running with this project, as well as all the adjudicators who assisted her in making the final selection.

ORSSA / SAIIE 2005

At the time of writing all the arrangements for the conference are in place. We look forward to a bumper conference and are honoured to have the Euro President, Alexis Tsoukiàs as our guest speaker. I sincerely hope that all of you will have a wonderful time. Thanks go to Marthi Harmse and her team for organizing the whole conference. Thanks are also due to the main sponsors of the conference, Sasol and the Development Bank of South Africa, as well as a number of other sponsors.


FELLOWS / RECOGNITION AWARDS

This is the first year that, in terms of the new constitution, members can be honoured as fellows or with recognition awards. A committee under chairmanship of Jan van Vuuren did lot of work in drafting procedures for these merits and the executive will consider the recommendations of the sub-committee just prior to the conference. Announcements will also be made during the gala dinner on Tuesday evening.

GENERAL

It has been two years since I became president of our society. When I reflect on what has been achieved, then some of the steps have been incremental but others significant. I am not going to summarise all these developments. Suffice it to say that the executive have worked hard given the limitations of balancing demanding work environments, a personal social life as well contributing in a meaningful way to ORSSA. Much is still to be done, but with limited hours in a day, especially for voluntary work, there is a limit to what the executive of the society can do. Naturally the more each member contributes, the more the society can achieve. I want to thank each and everyone of my fellow executive members for their contribution this year. At this AGM a stalwart of ORSSA will be vacating her position on the executive: Esbeth van Dyk has served ORSSA as secretary for as many years as I can remember. Thank you for your valued contribution towards the society and OR. You are an example to many. ♦

² The first four fellowships awarded during the conference are announced on pages 15 - 16 of this newsletter.



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Brad Armstrong
wsc2005@earthlink.net
WSC'05 General Chair
<http://www.wintersim.org/>

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PETS AS EARLY PREDICTORS

Researchers at Purdue University's School of Veterinary Medicine, one of 32 veterinary colleges in North America, are using a national pet database to monitor how diseases in dogs and cats could serve as early warning indicators of bioterrorist activities and other health concerns for humans.

Utilising the database, temporal and spatial analyses are performed with solutions from SAS, leaders in business and analytical intelligence, to identify unexpected clusters of disease. Unusual findings are further explored to determine causality.

The goal is to create an integrated surveillance system that allows veterinarians and government officials to log on and see which diseases are occurring where and whether disease rates are increasing or decreasing.

According to researchers, dogs and cats are highly sensitive to four of the six Class A biological agents which can be a threat to national security: anthrax, botulism, plague and tularemia.

With the system, researchers can monitor certain Class A diseases in pets, and because the incidence of such diseases is so rare in animals, they could quickly identify an increase in occurrence and take steps to reduce or prevent harm to humans. Researchers plan to use the system to measure zoonoses (diseases that are transmissible between animals and humans) and other health outcomes, like adverse drug-related reactions or adverse vaccine reactions, as well as to monitor chronic diseases and other epidemics in pets.

The avian influenza epidemic that has spread to game animals like leopards and tigers is an example of how the surveillance system could be used to help monitor and detect potential disease outbreaks and health threats in humans.

Data to populate the system is being gathered in collaboration with Banfield Pet Hospitals, the largest provider of veterinary care in the US.

Banfield's medical records are uploaded weekly to a central data warehouse. The research team uses various SAS tools, to load, merge and extract the data they need for specific analyses. It is used to model the risk factors associated with pets diagnosed with diseases like cancer, as well as the risk factors for flea and tick exposure. Disease frequencies are tracked using .

"In the past, we used SAS to analyse very small data sets – 50 or 100 cases – but we're now looking at 10 million cases, which is totally different," says Dr. Nita Glickman, research co-ordinator and computer analyst at Purdue.

"We really didn't consider working with anyone other than SAS because there is nothing else around with the capability of doing what we needed to do. I think we've established strong with SAS, and they've been extremely helpful in getting our project moving."

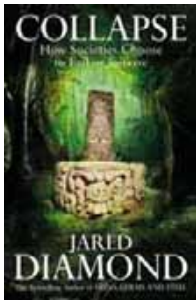
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BOOK REVIEW

By Phillip Fourie (pdfourie@sun.ac.za)



***Collapse: How societies choose to fail or succeed* by Jared Diamond and Viking Penguin, 2005. 575 pages. Price US\$ 29.**

At first glance it might seem that this review had somehow landed in the wrong publication – or was the editor desperate to fill a few columns because of a crisis somewhere? So let me first motivate why I think the book should be of interest to OR practitioners. It deals with what one might call *unsustainable development* – the wrong choices that people made at various times in the past which led to their societies eventually collapsing. As the author says (p.8): "We know that some societies collapsed while others didn't: what made certain societies especially vulnerable?" ORSSA has already taken note of the growing interest in sustainable development, as evidenced by the choice of topic for this year's annual conference; it is not so difficult to take one step further and consider the other side of the coin.

Let me also say immediately that Jared Diamond is a very entertaining writer, as shown by the popular success of his previous book "*Guns, germs and steel*," which attempts to explain the success of Western European society in its competition with other societies during its expansion in the sixteenth and seventeenth centuries. As is always the case with a generalist dealing with such a large topic, the specialists will undoubtedly find fault with some of Diamond's interpretations of the historical evidence in the present book. Whether one agrees with him on specific issues or not, the sweep of the book carries the reader onward.

The basic idea of the book is to look for reasons why societies collapsed in the past, and to use this information to study our own prospects. The most evocative image that we have of such a collapsed society is perhaps that of the ruins of a majestic city hidden in the jungle and only rediscovered many centuries later. Figure 1 shows the temples of Angkor Wat in present-day Cambodia, part of the Khmer Empire which came to an end after A.D.1400, perhaps as a result of problems with water management that reduced the empire's military ability to resist its enemies.

Diamond identifies the following five factors as being of crucial importance to the continued existence of a society: environmental damage, climate change, hostile neighbours, friendly trading partners, and – most important – the society's responses to its environmental problems. He then traces the relative influence of these factors in specific historical and geographical situations. In the last section of the book, called "Practical Lessons," he applies his findings to our present-day situation.

Diamond describes the structure of the book as follows: "Its plan resembles a boa constrictor that has swallowed two very



Figure 1: Angkor Wat, temples of the Khmer Empire, at a city abandoned after A.D. 1400.

large sheep. That is, my discussions of the modern world and also of the past both consist of a disproportionately long account of one society, plus briefer accounts of four other societies". The first "sheep" (Part One: "Modern Montana") is a lengthy discussion of the state of Montana in the USA as an example of a modern society. This is of special interest to South Africans because of many similarities with our own situation, such as its historical dependence on mining and the environmental consequences thereof, and the growing economic importance of nature and tourism. Later in the book, in Part Three: "Modern Societies," other, shorter chapters deal with Rwanda, Haiti and the Dominican Republic, China and Australia.

In Part Two: "Past Societies," the second "sheep" is a set of three chapters on the Norse settlements in Greenland. This was chosen for special attention because of the large amount of information available (the settlements being part of a literate European society). These chapters are preceded by simpler examples of past societies, including the Polynesian settlements on some Pacific islands such as Easter and Pitcairn, and the Native American societies of the Anasazi in the Southwest USA and the Maya in Central America.

Part Four: "Practical Lessons" consists of three chapters. Chapter 14, "Why do some societies make disastrous decisions?" deals with decision-making, and should be of special interest to OR practitioners. Chapter 15 is about big businesses and the environment. Chapter 16 brings together the different strands of the argument, and ends on a positive note, with a final section called "Reasons for Hope." Diamond puts it as follows: "What are the choices we must make if we are now to succeed, and not to fail? ... Two types of choices seem to me to have been crucial...: long-term planning and willingness to reconsider core values."

Thanks to the generous space allotted for book reviews in the Newsletter, we can now concentrate on some specifics. Chapter 13, "Mining' Australia," is of special interest to South Africans for many reasons, not the least important of which is the sporting rivalry between the two countries. Other common factors include the economic importance of mining, the climate and the flora and fauna, especially the role of invasive alien

species. Diamond uses Australia as a case study of a society "mining" its resources in a way that leads to large-scale environmental degradation.

To begin with, Australia's soils are very poor: "Australia is the most unproductive continent: the one whose soils have on the average the lowest nutrient levels, the lowest plant growth rates, and the lowest productivity". In many areas they also contain high levels of salt. Furthermore, a large fraction of the country has low and unpredictable rainfall or is desert where agriculture is impossible without irrigation. The same factors also mean that trees grow slowly, so that sustainable forestry – replanting trees as they are cut down – is not very successful. In spite of these handicaps, Australia produces more food than it consumes and is a net exporter of food, especially meat, wheat and wine; it is the world's largest exporter of wool; it exports wood to Japan, mainly in the form of wood chips which are used to make paper (although at the same time it imports three times more forest products than it exports).

This export success comes at an environmental price, however. The sheep which produce the meat and wool graze down the vegetation faster than it can regrow, especially if stocking rates are too high. In many parts of the country, the pasturage has been irretrievably damaged and topsoils lost to the resulting wind and water erosion. The situation has been exacerbated by clearing of native vegetation; formerly, farmers leasing land from the government were required to clear a certain area of their land every year, or risk losing it. (Another interesting fact is that rotting and burning of the cleared vegetation is estimated to produce greenhouse gases equal to the total produced by the vehicle fleet). As regards the wood, Australia is still logging old-growth forests, especially in Tasmania, although only 25% of the forests standing at the beginning of colonization in 1788 still remain.

Australia is also one of the foremost examples of the impact of the introduction of exotic plant and animal species on natural biodiversity. The best-known example is that of the rabbits which were introduced to feed the foxes which were needed for the British settlers to practice fox-hunting. In spite of strenuous and expensive efforts to get rid of the rabbits, it is estimated that they consume about half of the pasturage which could be used to feed sheep and cattle (see Figure 2). The foxes have driven to extinction many of the native mammals and ground-living birds, which evolved without any native predators. As regards alien plant species, it is estimated that they cause economic losses of \$2 billion (probably US?) per year.

To summarise, if present practices regarding land and water use continue, it seems likely that irreversible environmental degradation will take place, leading to a slow decline in population. Diamond quotes an estimate of 8 million people as the population sustainable at the present standard of living, as compared to the present population of 20 million. However, he sees hopeful signs that Australian society is waking up to the dangers he describes. Mainly as a result of public pressure, legislators are taking action to limit further environmental damage; for instance, the government is now imposing maximum stocking rates for sheep. Furthermore Diamond sees



Figure 2: The plague of introduced rabbits that consume vegetation and contribute to erosion in Australia.

changes taking place in the fundamental values of the society: "Australians are beginning to think radically about the central question: which of our traditional core values can we retain, and which ones instead no longer serve us well in today's world?"

Lastly let's consider Chapter 14, "Why do some societies make disastrous decisions?" Diamond identifies four categories of failures: first, failure to anticipate a problem; second, failure to perceive the problem when it arrives; third, not trying to solve the problem; and fourth, trying but failing to solve it. An example of the first kind might be the problem of acid mine drainage (AMD)¹ now beginning to make itself apparent on the Witwatersrand. Could miners have foreseen more than a hundred years ago that sulfide ores would cause the formation of acids after mining had stopped and the groundwater level had started rising? An example of the fourth kind might well be those infamous Australian rabbits: after more than a century of efforts to eradicate them – poisons, explosives, viruses – they are still merrily multiplying.

The second kind of failure is exemplified by global warming, which takes the form of a slow increase in the global average temperature concealed by wide and erratic fluctuations. Even now that the majority of scientists have accepted that there is an increase which is largely due to human activity, it is quite easy for sceptics who do not share this view – either because they espouse other mechanisms influencing the global climate, such as sunspot activity, or because they have political agendas – to refuse to see the slow warming in the data, or at best to say that "more research is needed." (Two striking expressions Diamond uses to describe this phenomenon are "creeping normalcy" and "landscape amnesia" – the latter meaning that it is easy to forget what a landscape looked like fifty years ago because changes have been so gradual).

The third kind of failure is the most difficult to describe, but arguably the most important. Basically it occurs when conflicts of interest arise, as is the case in the well-known "tragedy of the commons", where rational behaviour of individuals (maximising

¹ See for instance: "A rising acid tide" by Melissa Fourie. *Earthyear* V.1, 2005, pp.36-41.

their own profit from exploiting a shared resource, such as a fishery) leads to destruction of the resource. Another example is so-called "perverse subsidies," where a small group of people, such as sugar-beet farmers in Europe, derive much of their income from government subsidies, in the process driving up sugar prices in the EU and depressing sugar production in tropical countries. They will lobby tenaciously to retain the subsidies, while the losers (all taxpayers) are much less vocal because each loses only a small amount of money concealed in their tax bills. To solve these problems usually takes a large amount of political effort or will, which is difficult to muster where there are many other problems clamouring for attention.

In spite of this catalogue of possible failures of decision-making, Diamond remains (cautiously) optimistic. In the last chapter, "Reasons for hope", he says" ...I mean that, on the one hand, I acknowledge the seriousness of the problems facing us. If we don't make a determined effort to solve them, and if we don't succeed at that effort, the world as a whole within the next few decades will face a declining standard of living, or perhaps something worse." On the other hand, "Because we are the cause of our environmental problems, we are the ones in control of them, and we can choose or not choose to stop causing them and start solving them." It is a pity that most of us now living will not be around to see the outcomes of these choices, and to see what Los Angeles, the epitome of a First World city in the 21st century, will look like in the 22nd century. (see Figure 3). ♦



Figure 3: The freeways and urban sprawl that cover the landscape of much of Los Angeles.



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IFORS 2005: Hawaii

A Personal Perspective of the Social Aspect of the Conference

by Hans Ittmann (*hitman.csir.co.za*)

Telling anybody that you are going to Hawaii for a conference raises all kinds of eyebrows and remarks. The association is immediately surfing, beautiful beaches, holiday and many more... so who do you think you are bluffing? Well the truth is that the 2005 triennial IFORS conference was held on the O'ahu island (the gathering place), one of the many islands of Hawaii, but not the largest. Having to attend the conference during one of our many re-structuring processes at work was not easy but, at the same time, nobody was going to convince me not to go! This was probably a-once-in-a-lifetime opportunity and no matter how many snide remarks I got about how inopportune the timing of this conference was, I just proceeded with me and my wife's travel plans.

Travelling directly to Hawaii from South Africa is exhausting. It took us 36 hours with three flying legs of around 8 hours each. The first leg of our flight was from Johannesburg to the Cape Verde, from there to Atlanta and then from Atlanta to Honolulu another 8 hours. One also gains 12 hours in the process so your biological clock is completely distorted. Honolulu, the largest city in the islands, is located on O'ahu and is a typical vibrant western city. The conference centre venue was the Hilton Hawaiian Hotel, a large five star hotel comprising a number of towers (separate buildings) spread across the Hilton Hawaiian Village Beach Resort and Spa. These towers house the residential areas and a whole range of conference centre venues. The hotel caters both for holiday makers, mainly international ones, and for conferences. So here you are attending some serious business namely a triennial conference but at the same time you are rubbing shoulders, every time you move around, with holiday makers - people enjoying themselves on the beach, in the many swimming pools around the hotel and many meandering from one exclusive shop to the next spending seemingly lots of money! If you really want to know - it is expensive to buy from these small shops located within the

village. When you move away from the hotel vicinity you get to places where things are more reasonable.

One of the first things one experiences are the many Polynesian words that are used on the island. "Aloha" is one of them and it is their way of greeting you - so one hears many times "Aloha and welcome!" Our bus driver on the traditional Wednesday excursion taught us many of these new words but I'm afraid I can't remember them anymore. The other phenomenon that you experience very soon in Hawaii is the fact that it can rain any moment and just as unexpectedly the sun shines again soon afterwards.

There is never sufficient time when attending conferences to do the tourist rounds. We were, however, able to visit Pearl Harbor during our stay (see Figure 2). I have to confess that it just never over the years registered in my mind that Pearl Harbor was not on the west coast of the USA but in fact in Hawaii! Given the historical nature of what happened here on the morning of December 7, 1941, we had to try to visit the place. The tour left early the morning to the National Park and by seven thirty that morning we were already standing in a very long queue and we were in group eight, each group consisting of 150 people - these Americans are very passionate about their national monuments. You first get to see a film of what transpired on that fateful morning and then the group is taken by boat to the USS Arizona Memorial. It is a structure built on top of the final resting place of the ship. The ghostly outline of the ship is still lying there and one can still see some parts of the ship's upper structure. What is fascinating is that still, to this day, some sixty odd years after the ship was sunk, there are drops of oil sipping out of her tanks - we saw it right next to the memorial! Apparently the ship's tanks were filled to the brim just before the attack. They estimate that the oil will keep on seeping out for another forty years!



Figure 1: One of the many Hilton Hawaii Village hotel restaurants, on the waterfront of Waikiki Beach



Figure 2: The USS Arizona Memorial

For me the other highlight during the conference was our early morning strolls, no serious walks, along Waikīkī beach. Yes, the famous Waikīkī beach (see Figure 3) which has been made even more famous by the song with that title. It is a beautiful beach, a long stretch of palm trees, sea and sand with a spectacular view of the iconic Diamond Head. The sea is very calm and there are almost no waves, the waves already break some 50 to 100 yards into the sea onto a coral reef. Diamond Head is Hawaii's most famous natural landmark – a 200 000-year old volcanic crater which looms majestically over Waikīkī (the colcano visible in Figure 3). Somehow I never saw what many people thought is the main attraction to Hawaii, female replicas of the human species dressed in skimpy bikinis!



Figure 3: Waikiki Beach, with Diamond head in the background

During the IFORS conferences it is now tradition that the middle day is used for an excursion as apart of the social programme. This time round the excursion was to the Polynesian Cultural Centre located on the island. A whole number of buses took all the delegates and their spouses to this venue. On the way there we were entertained by our bus driver who had lots to tell about Hawaii. We stopped half way at a beautiful spot, high up on a mountain pass where the wind nearly blew us away. The place is called the Nu'uanu Pali lookout and it offers one a tremendous view of the Kāne'ohe, Kailua and Ko'olau mountains. The Polynesian Cultural Centre is a non-profit organization dedicated to preserving the cultural heritage of Polynesia while providing scholarships for hundreds of Polynesian students attending the adjacent university. There are many different cultures portrayed at this centre including those of Tonga, Samoa, Fiji, Tahiti, Aotearoa, Marquesas and Hawaii. What we saw of these were somewhat of a disappointment, because it is all so geared towards the tourist masses and it is all "westernised." There is also an IMAX theatre where an inspiring documentary, called "Coral Reef Adventure", was shown. These fragile ecosystems in some parts of the world are under huge threat. The music used for this documentary was music written by Crosby, Stills and Nash and I really enjoyed listening to, inter alia, Teach Your Children. On the way back to the hotel we passed a few interesting spots, namely where Jurassic Park, the film, was shot, the famous surfing beaches and also the Pineapple Garden Maze at the Dole Pineapple Plantation, the largest such maze in the world.

International conferences allow one to meet many interesting people from all over the world. One has the opportunity to make new friendships and to renew already established friendships. This IFORS was no exception. Many people are also very keen to interact with us from Africa and specifically South Africa. A number of ORSSA members were able, and privileged, to attend this conference. Most of us also presented papers which does indicate that OR is still alive and well in our country. It was also great to meet with one of our old colleagues in the person of John Hearne who now resides in Australia. I was able to personally present John with his Tom Rozwadowski medal from last year – he was a joint winner last year, but we were never able to hand him his medal!

The closing banquet on the Thursday night of the conference was also a highlight. It was an authentic Hawaiian luau held in the open, almost on the beach (see Figure 4). Many Hawaiian delicacies were served during this banquet, some of these included: poi, lomi lomi salmon, kalua pig, sautéed mahi mahi with macadamia nuts and appetite teriyaki steak. The luau is a family type meal and everything is served family style with the various dishes put onto the tables and everyone can help themselves. During this event Paul Fatti, chairman of the panel of judges for the IFORS 2005 OR in Development Award, announced the winners and handed out the prizes. There was a hula performance by the Na Keiki o Halau Hula Olana group of performing children. A delightful evening was enjoyed by everyone.



Figure 3: The beautiful setting of the IFORS Conference Dinner

For us this was a great experience and we have many great memories of our visit to Hawaii. I have tried to capture some of these memories and share them with you. At the same time I am sure others who were there had many other interesting experiences. Oh what is that you are wondering? A conference you say.....yes, yes I almost forgot there were also many meetings that required our presence, sessions with many interesting papers that delegates attended, scientific papers that many of us presented and a whole range of other business related activities, as described in the next article of this newsletter. Indeed a-once-in-a-lifetime experience! ♦

IFORS 2005: Hawaii

A Personal Perspective of the Academic Aspect of the Conference

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

The 17th triennial conference of the International Federation of Operational Research Societies (IFORS) took place from 11 to 15 July 2005 at the Hilton Hawaiian Village on Waikiki Beach, Hawaii. As were evident in the previous article, it was indeed an experience to discipline oneself into attending talks all day on one of the most famous beach resorts in the world, enjoying typically excellent tropical weather! However, there was some time to swim and sightsee during the weekends before and after the conference, during the traditional Wednesday excursion and after hours (with the sun setting very late).



The view just outside the conference centre in the Hilton Hawaiian Village and the fabulous weather made it hard to concentrate on academic matters!

The standard of the programme was very high, as one has come to expect from an IFORS conference. The academic part of the conference spanned four full days – each day being divided into four sessions (with lunch and coffee breaks in between), each session in turn consisting of no fewer than twenty five parallel streams on diverse hard and soft OR topics such as Renewable & Natural Resources, Scheduling & Timetabling, Vehicle Routing, Telecommunications & Network Design, Supply Chain Management, Inventory Control, Cutting & Packing Problems, Research & Development, Manufacturing, Health Care, the Military, Auctions & E-markets, Transportation, Education, Economics, Finance, Marketing and the Aviation Industry – utilising techniques from sub-disciplines as diverse as Linear, Nonlinear, Dynamic & Goal Programming, Combinatorial Optimization, Stochastic Programming, Simulation, Multi-criteria Decision Analysis, Meta-Heuristics, Probability Theory, Game Theory and Graph Theory ... to name but a few!

This triennial conference has grown steadily in recent years (see Table 1), with a record number of 1 268 delegates attending the Hawaii meeting. Counting spouses, dependants and guests, there were more than 1 700 participants at the Hawaii meeting!

Year	Venue	Attendance
1993	Lisbon, Portugal	768
1996	Vancouver, Canada	922
1999	Beijing, China	969
2002	Edinburgh, Scotland	1 150
2005	Honolulu, Hawaii	1 268

Table 1: IFORS Conference attendance since 1993

South Africa was the 15th-best represented member of IFORS at the conference, with 10 delegates present at the conference and a total of 12 authors of papers (see Table 2). The South African delegates were Pieter du Plessis (North West University), Paul Fatti (University of the Witwatersrand), Giel Hattingh (North West University), John Hearne (RMIT University, Australia, but a member of ORSSA), Hans Ittmann (CSIR), Riaan Oberholzer (North West University), Frank Ortman (University of Stellenbosch), Theo Stewart (University of Cape Town), David van der Merwe (North West University) and Jan van Vuuren (University of Stellenbosch).

United States	401	Australia	16
Japan	157	Belgian	16
United Kingdom	79	The Netherlands	16
Canada	68	Singapore	15
Taiwan	61	Finland	14
Germany	36	Mexico	14
Hong Kong	32	Philippines	12
South Korea	32	South Africa	12
Spain	29	Sweden	12
Brazil	28	Chilli	11
Italy	22	China	10
France	17	Norway	10

Table 2: Number of Authors of IFORS 2005 Papers by Country (top 24 countries)

The conference opened on Monday morning 11 July 2005 with a fascinating plenary lecture by the master mixed-integer programmer, George Nemhauser (School of Systems and Industrial Engineering, Georgia Institute of Technology), on the computational challenges that currently face us in discrete optimisation. In this lecture he highlighted recent advances in mathematical programming computation technologies.

Of the South African conference talks that I attended, the following three are amongst my personal favourites (see pictures of the authors presenting these conference papers below):

- **Paul Fatti**, *A Bayesian approach to personnel ranking*. In his talk Paul described recent consulting work that he had done for a large corporation in South Africa who sought a fair method of evaluating employees in terms of their performances in the working environment.



The South African delegates at the IFORS 2005 Conference during the conference banquet. Standing, from left to right, are Paul Fatti, Theo Stewart, Giel Hattingh, Hans Ittmann, Jan van Vuuren and John Hearne. Seated, from left to right, are Pieter du Plessis, Frank Ortmann, Riaan Oberholzer and David van der Merwe.



Paul Fatti (Department of Statistical Sciences, University of the Witwatersrand) giving a fascinating talk on a Bayesian approach to personnel ranking.



The audience at the opening plenary lecture by George Nemhauser on the numerical challenges faced today in discrete optimisation.



Hans Ittmann (icomtek, CSIR) giving a very interesting talk on the life and times of his Operations Research group at the CSIR.

- **Hans Ittmann**, *The life and times of an Operations Research group*. In this paper Hans described the challenges and successes over many years of his OR group in the CSIR (based in Pretoria and in Stellenbosch). He also focussed on the challenges that he himself faced as manager of the group and he concluded the talk with a very interesting overview of some of the major projects in which the group was involved over the past 20 years.
- **John Hearne**, *The potential of portfolio selection theory in African wildlife management*. In this talk John suggested the use of an efficient frontier with respect to wildlife management. His idea was to determine an optimal trade-off between the numbers of individuals from a variety of different herbivore species on a game ranch that will maximize expected return in terms of trophy hunting profit (from tourists) and the risk of managing such a collection of herbivores in terms of stochastic environmental factors (such as rainfall). He illustrated the workability of his idea by means of a realistic example, and his talk was very well received, as was evident from the lively discussion that ensued during question time directly after his lecture.



John Hearne (Department of Mathematical and Geospatial Sciences, RMIT University, Melbourne, Australia) giving a talk on the potential of using portfolio selection theory in African wildlife management. Although John now lives in Australia, he is a longstanding member (and past president) of ORSSA and we still count him as a South African.

Of the non-South African talks that I attended at the conference, the following five are perhaps amongst my personal favourites:

- **Yindong Shen** (Wuhan University of Science & Technology, China), *Integrated bus transit scheduling for the Beijing Bus Group based on regionalised operation modes* (a paper in the OR in Development Competition stream).
- **Marcos José Negreros** (Universidade Estadual do Ceará, Brazil), *A framework of computational systems and optimisation models for the prevention and combat of Dengue* (also a paper in the OR in Development Competition stream).
- **Mitsutoshi Kenmochi** (Kyoto University, Japan), *Exact algorithms for the 2-dimensional strip packing problem with rotations*.
- **Jacques Teghem** (Faculté Polytechnique de Mons, Belgium), *A genetic algorithm for the cover printing problem*.
- **Martin Zachariassen** (University of Copenhagen, Denmark), *Movie shoot scheduling*.

Amongst the conference delegates, South Africa boasted no fewer than four young, relatively new ORSSA member representatives, showing that OR is alive, well and thriving in South Africa. These young members were Frank Ortmann who has just submitted his masters thesis in Applied Mathematics at the University of Stellenbosch and Pieter du Plessis (currently a full-time PhD student in Computer Science), Riaan Oberholzer (who has just obtained his PhD in Computer Science, and who has been a full-time lecturer since February this year) & David van der Merwe (who is on the verge of submitting his PhD dissertation in Computer Science and who has also been a lecturer since the beginning of the year), all three from the North West University. Two of these young representatives are shown presenting their conference papers below.



Frank Ortmann (Department of Applied Mathematics, University of Stellenbosch) giving an overview talk on modelling the capacity of the South African fresh fruit export supply chain. His work formed part of the award-winning project by Esbeth van Dyk (as described in the last article of this newsletter).

The conference closed on Friday afternoon 15 July 2005 with a very interesting plenary lecture by Alfred Blumstein from Carnegie Mellon University in Pittsburgh, Pennsylvania on a large variety of uses and applications of OR in the criminal justice system during the period from the mid 1960s to 2005 (see picture below). ♦



Riaan Oberholzer (Department of Computer Science, Potchefstroom campus of the North West University) giving a talk on heuristic function selection for a class of cutting stock problems.



Alfred Blumstein (Carnegie Mellon University) delivering the IFORS 2005 closing plenary titled “An OR missionary’s visits to the criminal justice system.”



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19TH SAIIE & 35TH ORSSA ANNUAL CONFERENCE 2005

by Dave Evans (davee@dbsa.org)



ORSSA held its National Conference this year jointly with the South African Institute of Industrial Engineers. OR and IE have a lot in common, and many individuals are members of both societies. The Vaal Triangle effectively runs a joint chapter of ORSSA and SAIIE, so they offered to run a joint national conference which, with hindsight, was a very good idea. There was considerable banter between several of the long standing members at the gala dinner as to whether this was the first time this had happened – Theo Stewart and Paul Kruger finally agreed there had been one once before, some 15 years ago.

The venue was the Emerald Casino Resort on the Vaal River in Vanderbijlpark, with the conference proper starting with a social function on the Sunday evening, sponsored by the Development Bank of Southern Africa, although the ORSSA Executive Committee had held their traditional pre-conference meeting during that afternoon.

After the official opening on the Monday morning by Ralph Gunn, president of SAIIE, Jannie van der Westhuizen, an Executive Manager of Sasol Ltd., the conference's main sponsor, gave an extremely interesting plenary talk on the strategic turn-round of Sasol Coal a few years ago. Guest speaker Alexis Tsoukias, president of EURO, gave a very thought provoking talk on the role of OR in sustainable development, particularly emphasizing the distinction between decision analysis, which he believes the OR profession is quite good on, and decision "aid" (which supports decision making), where he feels there is still much scope for improvement. He also emphasized how the direction of OR is driven by the demand of "market" problems, from the early days of military OR in World War II, addressing topics such as convoy management and code breaking, to the modern day, where he suggests we should be focusing on issues such as sustainable development, global governance, the environment, humanitarian security and molecular biology. He took serious issue with Russell Ackoff's famous quote of thirty years ago that "The future of OR is past," so watch this space!

The afternoon consisted of four parallel sessions involving 12 papers grouped into economic modeling, perishables, agriculture and advanced techniques. The ORSSA annual general meeting was then held, which is reported on in detail on the ORSSA website (<http://www.orssa.org.za>).

The evening social event was a river cruise followed by a cocktail party and buffet supper, where the process of renewing old acquaintances and catching up on the latest news continued very pleasurably.

Tuesday was largely parallel sessions, with almost 40 papers in streams ranging from petrolchemicals, manufacturing and transportation, to education, government and knowledge management – a striking demonstration of just how broadly applicable OR and IE are. It finished with keynote addresses from Fayaz Sacoer of the Automotive Industry Development Centre and Danie Schoeman of Barloworld, two more

conference sponsors, and then a panel discussion on the past and future contributions of IE and OR to the supply chain profession – quite a demanding day.

The gala dinner, also sponsored by Sasol Ltd., was held that evening, where the year's awards for both ORSSA and SAIIE were announced. The ORSSA ones were as follows:

Tom Rozwadowski medal: Esbeth van Dyk, for her paper on "An analysis of the South African fruit logistics infrastructure," published in ORION volume 20(1).

Masters level student prize: Catherine Black, for her thesis on "Optimal inventory control in cardboard box producing factories," submitted at the university of Stellenbosch under supervision of Jan van Vuuren.

Honours level student prize: David Conradie, who did his honours under supervision of Johan Joubert at the University of Pretoria on the topic: "A genetic algorithm for the vehicle routing problem with multiple constraints."



Esbeth van Dyk receiving the Tom Rozwadowski medal from the president, Wim Gevers.

In addition, last year the Society introduced fellowships for outstanding contributions to ORSSA, and recognition awards for outstanding OR interventions – typically major projects. The first fellowships were awarded to Paul Fatti, Giel Hattingh, Hans Ittmann and Theo Stewart, for their outstanding contributions to ORSSA over very many years (citations for these fellowship awards will appear in the December edition of the newsletter). The first recognition award was also made, to Esbeth van Dyk, for the extended OR contribution she has made in the South African fruit industry in recent years. Again, an outstanding evening was had by all. Alexis Tsoukias, the invited guest speaker, is a Greek, who lives in Italy, works in Paris, and is totally fluent in English. Throughout the conference, he also demonstrated what convivial company he is, slotting into the long established ORSSA conference social environment with complete ease.

The guest speaker was Bertie du Plessis, a gentleman with a fascinating CV, including some quite heavy religious studies, who talked to us about innovation and change management in a way both entertaining and thought provoking. Topics such as evolutionary psychology, the psychology of financial behaviour, and marketing psychographics, somehow crept in. Hans Ittmann was master of ceremonies and tried valiantly to maintain some semblance of order. Unfortunately for him, with a group such as us, many of whom have known each other for a decade or two, various factions of the audience took delight in light heckling at every opportunity (and very entertainingly so, on most occasions.)

Friday morning continued with the final parallel sessions, followed by a plenary address by Dave Evans, this time wearing his DBSA hat, on the almost limitless opportunities for OR in sustainable development, and what the DBSA is doing to take the lead in that area.

Alexis Tsoukias then spoke again, this time with a case study on some of the problems of using indices. The final input was the closing address by the ORSSA President, Wim Gevers, and speaker prizes were then awarded.

An early lunch was taken, allowing delegates who were going to the industry visits, at Eskom, Mittal Steel, Sasol Chemicals and Sasol Mining, to get away to an early start.

The conference was outstanding from start to finish – papers, social events, facilities and general organization, and we owe a big debt of gratitude to Marthi Harmse and her organizing committee, Andy Msiza and Lourette Slaghuis, ably supported by Petra Lawson and several other Vaal Triangle chapter members, who did a magnificent job. As always, the social side of an ORSSA conference is very important, and the team provided us with every opportunity to “optimise” that aspect, as well as the more intellectual side.

There is some talk that next year’s conference may also be combined, as ORSSA and SAIIE are both looking at going to Natal, and a lot of individuals are members of both societies – this conference has set them a hard act to follow. ♦



The Fellows here together with the president of ORSSA. From left to right are Paul Fatti, Theo Stewart, Wim Gevers (president), Hans Ittmann and Giel Hattingh.

VAAL TRIANGLE CHAPTER

Annual Report by Marthi Harmse (marthi.harse@sasol.com)

The main objective of the Vaal Triangle Chapter of ORSSA for 2003 was to raise awareness concerning Operations Research in the Vaal Triangle. The chapter joined forces with the South African Institute for Industrial Engineering (SAIIE) to establish the Vaal Triangle Chapter of ORSSA and SAIIE. The main objective of the chapter for 2004 was to become more sustainable – financial and otherwise. The chapter is deeply indebted to Mr. Jannie van der Westhuizen, General Manager, Sasol Group Human Resources, who still acts as sponsor for all activities of the chapter since February 2004.

In 2005 the main objective of the chapter was to get people to join the societies and the committee of the chapter. The major activity undertaken was the joint SAIIE and ORSSA Annual Conference 2005. Besides the annual conference, three symposia were arranged for 2005:

Enterprise risk management

On 2 March Robbin Hendry, a private consultant, addressed the chapter on enterprise risk management. Robin gave an introduction to the concept of enterprise wide risk, after which he explained how to perform risk mapping and value mapping.

The integration of value engineering into engineering management activities

The next symposium linked well with the first one. Kurt Huber of VM Services (Pty) Ltd and part-time lecturer at the University of the Witwatersrand, explained that value engineering is a decision-making methodology, a dynamic process focusing the collective wisdom of multi-disciplinary groups to define common objectives, prioritising what needs to be done and then identifying how best to achieve the targeted results.

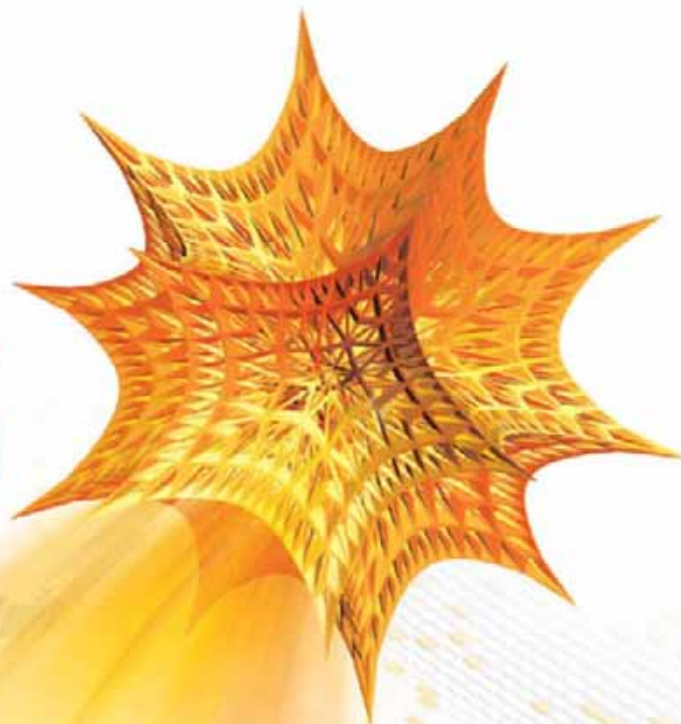
Coal Value Chain optimisation

The last event planned for this year in October is a presentation by Marinda Swart, a previous winner of the ORSSA student competition and currently at Sasol Mining, on a project to optimise the Sasol coal value chain in Secunda.

As in the past, people from different disciplines attend activities of the chapter from all over Gauteng, North West, Mpumalanga and the Free State. Lively discussions are held during interactive presentations and thereafter while having something to eat and drink. Presentations are in the process of being loaded on the intranet of Sasol and on the websites of the societies. After the symposia, some attendees started doing OR type work themselves or commissioned it. Interactions were established between different organisations and between industry and academics.

The Vaal Triangle chapter of ORSSA and SAIIE would like to thank the executive committees of the societies for their support. We would also like to thank Sasol Limited for not only sponsoring all activities of the society, but also for their generous sponsorship of the annual conference. Trevor Munday is thanked for supporting the request for a sponsorship and Cobus Jansen for executing the sponsorship. A special word of thanks to Marinda Thornhill, also from Sasol, for the excellent way she arranged most of the events and for her general support to the chapter. Andy Msiza is thanked for his great contribution as a conference organising committee member. Lourette Slaghuis is thanked for her great contribution as chairperson of the chapter on behalf of SAIIE and as a conference organising committee member, especially as conference treasurer.

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