NEWSLETTER

March 2009

Operational Research Society of New Zealand, Inc.
PO Box 6544, Wellesley St. Auckland, New Zealand, www.orsnz.org.nz

Contents

1 President's Report
3 Operations Research at the Other Side of the World
4 43rd ORSNZ Conference
5 People
5 Branch News
8 OR Theses from NZ
9 Books
10 ILOGCPLEX 11.0 Performance Revisited
10 IFORS/APORS News
11 Conference Announcements
12 Pictures from ORSNZ 43
14 Meetings Calendar
15 Officers of the ORSNZ 2008

The newsletter is published three to four times per year, regular dates are March, June, September, and December. Submissions deadline is the 15th of the month for the following month's issue. Send contributions by email to the Newsletter editor, Matthias Ehrgott, at newsletter@orsnz.org.nz.

President's Report

Welcome to 2009. I hope your year has got off to a great start.

Wellington Conference:

I'd like to start by thanking the Wellington ORSNZ team for organising such a great conference. Mark Johnston and the rest of his conference committee – Stefanka Chukova, John Haywood, Tony Vignaux and Ginny Whatarau – did a great job at making us welcome in the capital city and ensuring the smooth running of the event. The standard of the presentations was excellent, with our Young Practitioners showing once again that they can make a huge contribution to the range and quality of the talks. I'd like to thank Craig MacLeod and Prof Anita Schöbel for their plenary presentations. As Managing Director of Orbit Systems, Craig makes a huge contribution to OR practice in NZ; he shared with us some of the lessons of his twenty years using OR in logistics, electricity markets and fisheries. Prof Anita Schöbel, Professor of Optimization at the University of Göttingen and ORSNZ Visiting Scholar, presented her work on using optimization to better design public transport networks, an area of increasing interest in NZ. I'm looking forward to our next conference in Christchurch at the end of this year; I'm sure it will be another excellent event.

Edelman Prize Finalists:

Professor Andy Philpott (top) & Graeme Everett, Edelman finalists.

I'd like to congratulate Andy Philpott (past ORSNZ President and Daellenbach Prize winner) and Graeme Everett (ORSNZ member and Engineering Science graduate) on being accepted as finalists in the international Franz Edelman prize run by INFORMS. As an employee of the pulp and paper company Norske Skog, Graeme has been working for many years with Andy to develop optimisation models for the company. Regular attendees at past ORSNZ conferences will remember Andy and Graeme presenting papers such as "Supply Chain Optimisation in the Paper Industry" in 1999, and talking about their PIVOT and COMPASS software systems developed for the company's Tasman mill, and now used by the company worldwide to save Norske Skog (US)$200 million over 11 years. As Edelman finalists, Andy and Graeme are in the esteemed company of fellow ORSNZ mem-

bers Mikael Rönnqvist (Scheduling Patient Visits in Stockholm, 2008) and David Ryan (Optimisation for Air New Zealand, 2000). We wish Andy and Graeme all the best for their presentation in April at the INFORMS Practice Conference in Phoenix.

ORSNZ Council: A few months ago Hamish Waterer, our ORSNZ secretary since 2003, left our shores to join Natashia Boland at the University of Newcastle, Australia. Hamish made a huge contribution to the ORSNZ, and was instrumental in setting up the web site we now use to manage our conferences. I'd like to wish Hamish all the best in his new position, and hope that his being in Australia will help strengthen our ties to the Australian Society of OR. Fernando Beltran takes over Hamish's role on Council.

Visiting Scholar: In January, Auckland hosted the ORSNZ Visiting Scholar Ted Ralphs from Lehigh University, Pennsylvania. Ted is actively involved in the Open Source COIN-OR project as the author and developer of the Symphony optimisation

Ted Ralphs presenting to the Auckland ORSNZ Branch, January 2009

package. He chairs the Technical Leadership Council of the COIN-OR Foundation, and is the Vice-chair for Computational Optimization and Software for the INFORMS Optimization Society. He is currently developing CHiPPS – The COIN High Performance Parallel Search Framework. As well as giving an an excellent presentation on *Mixed Integer Bilevel Programming*, Ted was game enough to head out to the west coast for a climb and (small) river crossing.

Ted Ralphs braves a river crossing at Piha Beach, Auckland

Updating our Constitution: Along with almost 20,000 other organisations, the ORSNZ recently applied to register as a charity under the new Charities Act 2005. This registration is currently on hold pending a change required by the Charities Commission to the ORSNZ constitution. The ORSNZ Council is using this opportunity to update and modernise the constitution. These changes must be approved by a 2/3 majority of a postal ballot of members. Please complete the enclosed voting form and return it in the enclosed envelope to the address shown by April 20, 2009.

A document showing all the proposed changes is elsewhere in the Newsletter. These changes include:

- Changing the name from Operational to the more modern Operations Research Society of NZ
- Adding "advancement of education" into our aims, being a term recognized by the Charities Commission as specifying a charitable activity
- Introducing a non-voting Associate Membership category, and introduced concept of a Full (i.e. voting) member
- Specifying that Council makes decisions by majority vote, allow remote attendance at meetings (e.g. via Skype) and allow Council to make decisions without meeting in person. (This generalizes an earlier modification made to permit email voting by Council.)
- Allowing formal communication with members using email, fax etc, not just posted documents
- Allowing members to be removed from the Society when their email or postal address goes out of date
- Updating the wording describing our non-profit charitable status, clarifying for example that members can be reimbursed for expenses. This new wording is based on that provided by the Charities Commission
- Specifying that upon dissolution, any assets go to a charity (as required by the Charities Commission)
- Formally allowing electronic banking
- Allowing the AGM to change the Society's Financial Year

- Reducing the quorum to 10, not 12 members
- Specifying who chairs meetings, who can vote, that decisions are made by majority vote, and that the Chair has a casting vote
- Allowing for attendance at meetings using Skype etc with the agreement of the meeting attendees.
- Allowing the Constitution to be changed at an AGM (as well as via a written vote of members)

Please record your vote on the attached Voting Form and return it to us by post to:

ORSNZ

PO Box 6544
Wellesley Street
Auckland 1141
New Zealand

You can find out more about the changes on the ORSNZ web site, at

http://www.orsnz.org.nz/constitution

Andrew Mason

Operations Research at the Other Side of the World

Anita Schöbel, Professor of Optimization at the Institute for Numerical and Applied Mathematics at Georg-August-University of Göttingen, has visited New Zealand as ORSNZ visiting lecturer from October 2008 to March 2009.

Having been in New Zealand for my sabbatical for nearly five months now, Matthias asked me to write a few words about my experience with Operations Research here.

So I asked myself: Is Operations Research in New Zealand different to Operations Research in Germany? The answer is: No, basically it is the same. Certainly, methods, results, and algorithms stay valid everywhere in our word.

However, there are some differences on how Operations Research is performed here.

These became evident to me already in November when I joined your annual Operations Research conference in Wellington but also when reading this newsletter or when giving seminar talks.

First, I appreciate very much how you care for your young researchers in New Zealand. The sessions of the Operations Research conference devoted in particular for them are an excellent idea. It was great to see with which enthusiasm and motivation the young people prepared and presented their talks and how proud and happy they were after their successful presentations. With such sessions you show your respect to the young researchers and give them a great motivation to carry on and to understand the value of their work.

A second difference comes from the relatively small size of the Operations Research group in New Zealand. I experienced and enjoyed the natural and friendly atmosphere on the conference in Wellington on which I had the feeling that everyone knows each other. I also like the personal touch of the newsletter – it is really good to see how you not only work together but also care for each others personal situation.

Compared to New Zealand, the Operations Research community in Germany is rather large. As an illustration, the national OR conference in Germany usually hosts more than 600 participants , the papers are presented in up to 20 parallel sessions. The advantage of a conference of this size is the variety of their subjects; on the other hand, it is a crowded and rather formal event that misses the personal touch of a smaller conference. In Wellington it was easy for me to get into contact with many of you and I enjoyed talking to you and learning about your research. Maybe this is one reason why I felt so welcome.

The third difference I want to mention concerns the relation to the non-academic world. People from practice seem to be more open here. In European countries, practitioners are often reluctant, only few of them show up to seminar talks or on our conferences and it is often not easy to establish even a first contact. In contrast to this, here in New Zealand quite some people working in practice just came to me! Some were interested in what I do and we discussed things while having a flatwhite (my favorite coffee here). Having practitioners within your

community is a great opportunity to bring our methods to work in practice and to show what can be done with the help of Operations Research.

Altogether, it was a pleasure for me to be an ORSNZ visiting lecturer and I enjoyed the fruitful and friendly environment in your community. I certainly plan to come back --- and also my kids and my husband who were able to join me for this semester will miss New Zealand when we return back home to the other side of the world.

Anita Schöbel

43rd Conference of the Operational Research Society of New Zealand

The 43rd annual ORSNZ Conference was held on Monday 24th and Tuesday 25th November, 2008, at Victoria University of Wellington. We had 47 talks (including 12 in the Young Practitioner Prize) packed into 13 sessions over two days, with speakers from Australia, Singapore, Scotland, China, Taiwan, Malaysia, Canada and New Zealand. The full conference proceedings can be downloaded from the conference website (https://secure.orsnz.org.nz/conf43/), together with lots of photographs thanks to Andrew Mason and Matthias Ehrgott.

The keynote speakers were Craig MacLeod (Orbit Systems, Wellington) and Prof Anita Schöbel (University of Göttingen, Germany). Craig kicked off the conference with his talk on "Making a career in OR: where theory meets tarmac". On the second day, Anita talked about "Stops, lines, delays and tariffs: discrete optimization in public transport". The conference banquet was held at the Skyline Restaurant at the top of the cable car on a very wet and windy evening. A new initiative of the society was to give free registration and free conference dinner to (almost) all students giving talks, thanks to very generous sponsorship.

We are most grateful for the financial support from ILOG Australia, Dalton-Yee Strategy Consulting, Orbit Systems, Hoare Research Software, Paragon Decision Technology and The Optima Corporation. We also acknowledge the generous support we have received from Victoria University of Wellington. Thanks very much to the organising team of Mark Johnston, Stefanka Chukova and John Haywood.

The next conference will be hosted by the Christchurch Branch of ORSNZ at a similar time in 2009. We look forward to seeing you there.

A highlight, as always, was the

Dalton-Yee Strategy Consulting Young Practitioner Prize. The winners were:

- 1st prize: Brendan Kite and Kevin Lao (University of Canterbury) on "Evaluation of Clean Development Mechanism and Joint Implementation Projects".

- 2nd prize: Anders Dohn and Esben Kolind (Technical University of Denmark) on "Optimizing Manpower Allocation for Ground Handling Tasks in Airports using Column Generation".

- 3rd equal prize: Antony DePont (University of Auckland) on "Order Picking in Warehouses",

Gemma Clark (Victoria University of Wellington) on “Elder Care in NZ: A Multi-framing Approach”

and Andrea Raith (University of Auckland) on “Traffic Assignment with Travel Time and Toll Cost Objectives”.

More photos from the conference can be found later in the newsletter.

People

In December Matthias Ehrgott was appointed as area editor for the new area of "Decision Analysis and Decision Making Techniques" of the Asia-Pacific Journal of Operational Research http://www.worldscinet.com/apjor/apjor.shtml. APJOR is the journal of the members of APORS, the OR societies of Australia, China, Hong Kong, India, Japan, Korea, Malaysia, New Zealand, The Philippines, and Singapore.

Matthias also joined the new editorial board of 4OR, the quarterly journal of the Belgian, French, and Italian OR societies http://www.springer.com/business/operations+research/journal/10288 as an area editor for multicriteria optimization. He continues to serve on the editorial boards of Management Science (INFORMS), OR Spectrum (German OR Society), Computers & OR, INFOR (Canadian OR Society), TOP (Spanish OR Society), and Algorithmic OR.

Branch News

Auckland News

Since the last newsletter, we have had several visitors. In November Professor Shmuel Oren (UC-Berkeley) visited Golbon Zakeri. Shmuel is site director of the Power Systems Research Center and a world expert on optimization in electricity markets. He delivered 2 well attended public lectures during his 10 day visit. In January the ORSNZ visiting lecturer Professor Ted Ralphs (Lehigh University) visited Auckland and delivered a public lecture on "Mixed Integer Bilevel Programming". Ted then got into his campervan and made his way to Wellington for his next stop in NZ. Professor Anita Schöbel (Göttingen University), another ORSNZ visiting lecturer, has also been visiting our department and engaging in research with Matthias Ehrgott. Finally, Professor Mike Todd (Cornell University) is visiting in March and giving a series of lectures on semidefinite programming.

At the start of this year we sadly saw the departure of Hamish Waterer and Stu Mitchell from our department. Hamish has moved on to a full time research position at the University of Newcastle in Australia, collaborating with Natashia Boland.

In happier news Andy Philpott has been shortlisted for the prestigious INFORMS Franz Edelman Award. “This is another great achievement for the Department of Engineering Science and once again demonstrates the value of operations research. In a market where newsprint demand is in decline, Norske Skog was able to increase

its profitability using the operations research models developed by our team," Andy says. The model called PIVOT (Paper Industry Value Optimization Tool) used by Norske Skog was developed by Andy, Graeme Everett, an Engineering Science graduate and employee at the company's Tasman paper mill, and Kjetil Vatn from the company's Oslo office. The team will travel to Phoenix, Arizona, in April for the competition final presentations after which the overall winner will be announced.

Late last year we have also seen the completion of 2 PhDs, Oliver Weide and Richard Lusby (see elsewhere in the newsletter for details). Oliver has moved on to UoA spin-off company Optima Corporation, while Richard has taken up a postdoctoral position at the Technical University of Denmark.

Mike O'Sullivan Jr. has been on sabbatical the last semester at Brigham Young University and UC-Santa Cruz. Mike says of the Network Design and Simulation Group at UoA, of which he is a co-founder: "NDSG has Operations Research at the core of their work on innovative data storage systems. Data storage is heading down the same path as supercomputing, with clusters of commodity hardware beginning to compete with monolithic storage devices. NDSG are using mixed-integer programming to design large data storage clusters that cost significantly less than competing monolithic storage. They are also working on simulation models to compare the performance of their clustered systems with existing data storage systems that use traditional architectures. Collaborations with UC Santa Cruz and Brigham Young University are ongoing."

And that's all the news that's fit to print, at least from the City of Sails.

Golbon Zakeri

Canterbury News

In the teaching area, Nicola Petty has been developing YouTube videos to teach aspects of Excel and statistics, and the use of Excel Solver. The Excel Solver video has been viewed over 2000 times in the last 5 months. You can view these at http://www.youtube.com/UCMSCI.

On the research front, Fritz Raffensperger has been forging ahead with work in on markets for water, water-borne pollution, and impervious cover. A paper (with Grant Read and Mark Milke from Canterbury's Dept of Civil Engineering) has been accepted in Operations Research. Fritz recently gave a community presentation on his research in water allocation. The presentation came about through an on-line forum discussion about ECan's approach to water management, http://forums.e-democracy.org/groups/canterburyissues/. Two ECan councillors and an MP were in attendance. Discussion, needless to say, was robust, but quite positive overall. PhD student Ranga Prabodanie has been joined by Antonio Rodriguez, from Chile, and an informal "Water Markets Research Group" (WMRG) has been formed. See: http://www.mang.canterbury.ac.nz/research/waterresearch/ The group operates along similar lines to the "Energy Modelling Research Group" (EMRG), which has operated somewhat sporadically in recent years. The two groups are effectively operating as one for now, with Grant Read, Shane Dye, and their new PhD student, Peter Jackson, all actively involved.

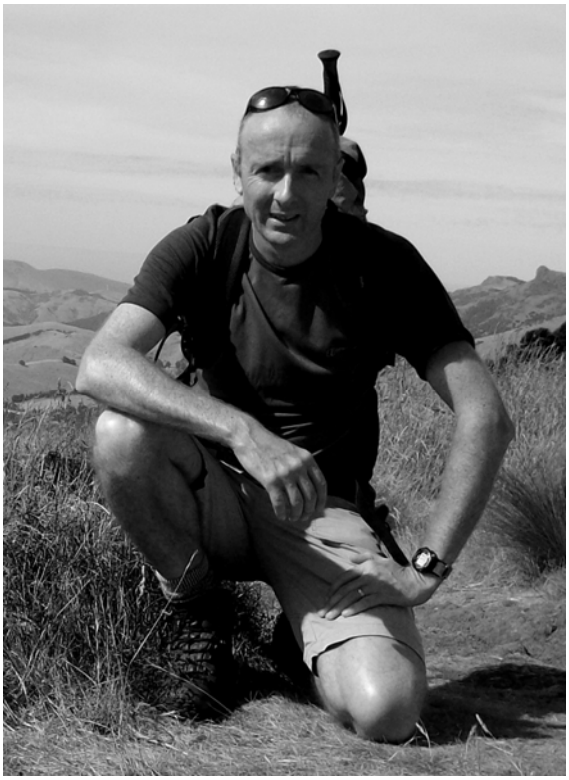
Grant Read has taken over as ORSNZ branch Chair, so that Shane Dye can focus on organising this year's conference. Our branch membership is still largely confined to the department, but we would like to encourage the few non-university OR people resident in Christchurch to be more involved this year. In particular, it has been good to see more of John George, now fully retired from his position with PA Consulting in Wellington. Our first meeting for the year, as we go to press, will be with ORSNZ visiting lecturer, Ted Ralphs and we expect to hear soon from another ORSNZ visiting lecturer, Anita Schoebel.

We are expecting Gary Koehler, from the Department of Information Sciences and Operations Management at the University of Florida, to visit the Department at the end of February, while Stewart Robinson, Professor of Operational Research at the Warwick Business School, is already with us.

Profile: Stewart Robinson

Stewart Robinson, Professor of Operational Research and Associate Dean for Specialist Masters at Warwick Business School (UK), is currently spending 4 months at the University of Canterbury as a Visiting Erskine Fellow. Stewart specialises in simulation, with a particular focus on discrete event simulation, but also with an interest in system dynamics and agent based modelling. He has authored/co-authored three books on simulation. Recent research projects

have looked at automated simulation output analysis, simulation conceptual modelling (deciding what to model), comparing discrete-event simulation and system dynamics, and modelling energising relations in social networks using agent based simulation.



Stewart is actively involved with the OR community in the UK and USA. He is Vice President of the Operational Research Society, co-chair of the biennial UK Simulation Workshop and a member of the Council for the INFORMS Simulation Society. Stewart is also co-editor of the Journal of Simulation. For more information see Stewart's home page: www.btinternet.com/~stewart.robinson1/sr.htm

Outside of work Stewart is keen on outdoor activities, particularly running and walking, making New Zealand an obvious place to visit, as may be seen from this photo, taken on the Port Hills, above Christchurch.

Biographical Note: Gary J. Koehler

Gary J. Koehler is the John B. Higdon Eminent Scholar of Management Information Systems at the University of Florida. He received his Ph. D. from Purdue University in 1974. He has held academic positions at Northwestern University and Purdue University and between 1979-1987 was a cofounder and CEO of a high-tech company which grew to over 260 employees during that period. His research interests are in areas formed by the intersection of the Operations Research, Artificial Intelligence and Information Systems and include such topics as genetic algorithm theory, machine learning, e-commerce, quantum computing and decision support systems. He has published in journals including Management Science, Operations Research, Informs Journal on Computing, Evolutionary Computation, Decision Sciences, Decision Support Systems, the European Journal on Operational Research, the Journal of Management Information Systems, Information Systems and e-Business Management, SIAM Journal on Control and Optimization, Discrete Applied Mathematics, Journal of Finance, and others. He is an area editor for Decision Support System and is on several other editorial boards. He has served as an expert witness for many large firms (including AT&T), has been an External Examiner for several Universities and has worked under grants from IBM and the National Science Foundation.

Grant Read

Wellington News

The Wellington branch hosted A/Prof Ted Ralphs from Lehigh University (USA) for two talks in January 2009. Ted is the current ORSNZ Visiting Lecturer and in heavily involved with COIN-OR. He has been taking amazing photographs during his trip around New Zealand in a campervan (http://coral.ie.lehigh.edu/~ted/sabbatical/).

The new School of Mathematics, Statistics and Operations Research at Victoria University came to life on 1st January, together with a new website (http://msor.victoria.ac.nz/), and staff are gearing up for the new semester. Thomas Liddle has been working with Mark Johnston on "Numerical Simplification in Genetic Programming" over the summer, funded by a University Research Fund grant. Also, Mark received a Vice Chancellor's Strategic Research Doctoral Scholarship for a PhD student to study "Particle Swarm Optimization for Image Recognition" (applications welcome).

Mark Johnston

OR Theses from NZ

Oliver Weide, PhD in Engineering Science, The University of Auckland

Robust and Integrated Airline Scheduling

In airline scheduling a variety of planning and operational decision problems have to be solved. In this thesis we consider the problems aircraft routing and crew pairing: aircraft and crew must be allocated to flights of a schedule in a minimal cost way.

Although these problems are not independent, they are usually formulated as independent mathematical optimisation models and solved sequentially. This approach might lead to a suboptimal allocation of aircraft and crew, since a solution of one of the problems may restrict the set of feasible solutions of the problem solved subsequently.

Also, in minimal cost solutions, aircraft and crew are highly utilised and short turn around times are usually used for aircraft and crew. If such a solution is used in operations, a short delay of one flight can cause very severe disruptions of the schedule later in the day due to the lack of buffer times. We formulate an integrated aircraft routing and crew pairing model that can generate solutions that incur small costs and are also robust to typical stochastic variability in airline operations.

We propose two new solution methods to solve the integrated model. The first approach is an optimisation based heuristic approach that is capable of generating good quality solutions quickly, the second approach can solve the integrated model to optimality.

In an extension of the integrated model we allow the departure times of some flights in the schedule to vary in some time window. This creates additional flexibility that leads to aircraft routing and crew pairing solutions with improved cost and robustness compared to the integrated model without time windows.

Using data from domestic Air New Zealand schedules, we evaluate the benefits of the approaches on real world problem instances. Our solutions satisfy all rules imposed for these problems and are ready to be implemented in practice. We generate solutions that dramatically improve the cost and robustness of solutions obtained by existing methods.

Richard Lusby, PhD in Engineering Science, The University of Auckland

Optimization methods for Routing Trains Through Railway Junctions

Efficiently coordinating the often large number of interdependent, timetabled train movements within a railway junction, while satisfying a number of operational requirements, is one of the most important problems faced by a railway company. This problem, which is known as the problem of routing trains through railway junctions, and which is the focus of my thesis, arises at all levels in the planning process for a railway company and directly impacts the capacity of the entire railway network as well as the quality of the rail service provided.

The thesis describes a generalized set packing formulation of the problem and presents a branch-and-price based solution approach. The formulation is characterized by a resource based constraint system that allows one to explicitly represent the movement of trains over time through a junction and is fundamentally different to all other previous approaches. The train movements are modelled using acyclic time{space networks. We show that our approach should provide a stronger formulation and demonstrate, through computational experiments, that the improvement in the bound obtained from the linear programming relaxation can be as high as 66.7%. The solution method uses ideas from column generation as well as the theory of duality and utilizes a concept that we term the dual representation of a basic feasible solution.

The approach is tailored to circumvent the computational overhead in working with the large basis of the proposed model and equates an iteration of the standard revised simplex in the

Operationsal Research Society of New Zealand(Inc)

Constitution

As amended at the Special Meeting held 1973 October 26.
As amended by postal ballot 1977 September 22.
As amended by postal ballot 17 August 1990.
As amended by postal ballot 18 January 1991.
As amended by postal ballot 27 February 1992.
As amended by postal ballot 29 December 2000.
(See 4(d) for changes in italics.)
As amended by postal ballot 20 April 2009.
This revision dated 31 10 January March 20089
(replacing an un-filed version dated 16 Feb 2001)

1. The Society

(a) The Society shall be known as the "Operationsal Research Society of New Zealand Incorporated".

(b) The membership of the Society shall be open to any person interested in either the theoretical aspects or practical applications of the subject of Operationsal Research.

2. Aims and Objects

The objects of the Society are the advancement of education through to encourageing and extending the knowledge and use of Operationsal Research techniques in New Zealand, by:

(a) Holding meetings for the purpose of reading papers on and discussing Operationsal Research subjects.

(b) Publishing papers on Operationsal Research.

(c) Encouraging the formation of branches where appropriate.

(d) Such other methods as the Council shall from time to time determine.

3. Membership

(a) Members
The Society shall have five six categories of membership; : Honorary Life Members, Members, and Student Members, known together as Individual Members, andcollectively as Full Members, and Corporate Members and , Corporate Sponsors, known together as Collective Membersand Associate Members.

(b) Qualification of Members
The Council shall have power to fix, from time to time, the qualifications appropriate to each category of membership, and in particular may sub-divide the above categories and may differentiate between such classifications in respect of qualifications.

(c) Election of Members
The Council shall have full power and discretion in the election of members.

(d) Collective Corporate Membership Representation
Except where otherwise provided in this Constitution, two nominees of a Corporate Member shall have the rights and privileges of full members of the Society, but only one of these nominees shall have voting rights; five nominees of a Corporate Sponsor shall have the rights and privileges of full members, while two of these nominees shall have voting rights. Only those nominees with voting rights shall be eligible to hold office on Council.

(e) Members' Addresses
Members shall furnish the Society with their postal and electronic addresses for correspondence. All notices posted or sent electronically to such addresses shall be considered to have been delivered. Any change of address shall be immediately notified to the Society.

(f) Conduct of Members
In the event of any member's conduct being considered detrimental to the interests of the Society, such member may be expelled by the unanimous vote of Council.

(g) Resignation
Any member in good standing may at any time resign from membership of the Society by notice in writing to the Society.

(h) Arrears of Subscription and Incorrect Addresses
Any member whose subscription is twelve months in arrears, or who fails to provide a correct postal or correct electronic address,

shall be liable to have their name removed from the list of members.

(i) Reimbursement of Subscriptions
No member leaving the Society shall have any claim for refund of subscriptions paid.

4. Management

(a) The general management of the Society–, together with its finances and the election of members-, shall be the duty of the Council.

(b) The Council shall consist of a President, a Vice-President, an Honorary Secretary, and an Honorary Treasurer and six other members. In addition, not more than five members may be co-opted annually by the Council.

(c) The members of the Council shall retire annually but shall be available for re-election.

(d) The Council shall hold meetings as it sees fit. Five members of the Council shall form a quorum. The President, or in the President's absence the Vice-President, or in the absence of both of these, any member chosen at the meeting, shall be Chairperson of the Council meeting. Decisions at Council meetings shall be by majority vote. The Chairperson shall have a deliberative and casting vote.

(e) By a majority vote of attendees at a Council meeting, a Council member may be permitted to partake in the meeting as an attendee by using a communication medium or device that allows the member to fully participate in the meeting's deliberations.

(f) The Council may also decide questions and take action as a result of written responses from Council members to a written motion sent to all Council members by the President or nominee. Where possible, all communication shall be broadcast to all Council members. At least three working days shall be allowed for discussion and responses. The approval in writing of a clear majority of responding members (who must comprise no fewer than a quorum) shall constitute a decision of Council. Any such decisions shall be reported to the next Council meeting.

~~*From time to time the Council may make decisions on the basis of an email vote. To hold such a vote, at least two working days notice of a Council email meeting must be broadcast to all Council members by the President, or in the President's absence, the Vice-President. To form an email quorum at least five members of the Council must respond to this notice. All votes will be conducted through the designated email address of the President, or in the President's absence the Vice-President. The President, or in the President's absence the Vice-President, shall have a deliberative and casting vote. All votes cast will be broadcast to all members of Council.*~~

(eg) In the case of a vacancy occurring on the Council any member of the Society may be co-opted by the Council to fill the vacancy. In the case of the temporary absence of any Council member, the Council may co-opt any member as a replacement. Any member of the Council who misses three consecutive meetings of the Council without good reason shall be liable to be declared vacant.

(fh) Branches
Branches may be set up by groups of members with the approval of Council. Each Branch shall elect its own Committee to manage local affairs. Council may delegate to such Committees such responsibilities as are necessary to manage these affairs.

(gi) Sub-Committees
The Council may appoint such sub-committees as it seems necessary to carry out such functions as it may delegate to them.

(hj) By-Laws
The Society may by resolution in meeting make by-laws amplifying and further defining the principles of this constitution as they shall apply to the operation of the Society.

(ik) Honorary Secretary and Honorary Treasurer
It shall be the duty of the Honorary Secretary to make and keep proper minutes of all proceedings of the Society and of the Council, and to send out all notices required by these rules or as instructed by Council. It shall be the duty of the Honorary Treasurer to receive and pay all moneys on behalf of the Society and to prepare an Annual Account of the finances, which shall form part of the Annual Report referred to below.

(jl) Common Seal
The Common Seal of the Society shall be fixed only in the presence of any two of the President, Vice-President, the Honorary Secretary or the Honorary Treasurer.

(m)Communication

All references in this document to 'written' communication and communication 'in writing' shall include communication by letter, facsimile, email, electronic communication and other written messaging systems. Such communication may include references to information available online or via other electronic means.

5. Finance

(a) Entrance Fees and Subscriptions

An entrance fee shall be paid by each member on joining and an annual subscription. The amount of the entrance fee and the annual subscription, together with the date when payment becomes due, shall be decided by the Annual General Meeting.

(b) Branch Committee Finance

The Council shall allocate Branch Committees such finance as is necessary to maintain their local affairs.

(c) Non-profit Charitable ~~s~~Status

Any income, benefit, or advantage must be used to advance the charitable purposes of the organisation. No member of the organisation, or anyone associated with a member, is allowed to take part in, or influence any decision made by the organisation in respect of payments to, or on behalf of, the member or associated person of any income, benefit, or advantage. Any payments made to a member of the organisation, or person associated with a member, must be for goods or services that advance the charitable purpose and must be reasonable and relative to payments that would be made between unrelated parties.

~~The Society shall not make any distribution, whether by way of money, property, or otherwise howsoever, to any member.~~

(d) Dissolution of the Society

If upon the winding up or dissolution of the Society there remains, after the satisfaction of all its debts and liabilities, any property whatsoever, the same shall not be paid to or distributed among the members of the Society, but shall be given or transferred to some other charitable institution or charitable institutions having objects similar to those of the Society to be determined by a Special Postal Ballot of the Society at or before its dissolution.

(e) Honorary Auditor

The Honorary Auditor shall be elected annually and shall be eligible for re-election.

(f) Cheque Signatures

Signatories (or the electronic equivalent of these) to any bank account or investment of the Society shall be any two of the President, the Vice-President, the Honorary Secretary and the Honorary Treasurer except that for Branch accounts, any two of four members approved by Council shall be signatories.

(g) Financial Year

The Financial Year of the Society shall end on 30 June or at such date agreed upon at an Annual General Meeting.

6. Business Meetings

(a) Annual General Meeting

The Annual General Meeting, fourteen days written notice of which shall be given to members, shall be held as soon as conveniently possible after the end of the financial year. A written report of the transactions and general activities of the Society for the past year shall be drawn up by the Council and presented to the Annual General Meeting. Such report and balance sheet shall be ~~circulated~~ sent to all members with the written notice summoning the meeting.

(b) Special Meeting

The President or nominee may, or upon written request of any ten members of the Society shall, summon a ~~s~~Special ~~m~~Meeting by sending to members, within 21 days of receipt of such request, fourteen days written notice thereof specifying resolutions to be moved. The business at such meetings shall be confined to such resolutions.

(c) Quorum

At an Annual General Meeting ~~twelve~~ ten full members, at a special meeting fifteen full members, shall constitute a quorum.

(d) Meeting Chair

The President, or in the President's absence the Vice-President, or in the absence of both of these, any member chosen at the meeting, shall be Chairperson of the Business Meeting.

(~~d~~e) Voting

Decisions at Business Meetings shall be by majority vote of full member attendees. Associate Members shall have no right to vote at Business Meetings. The Chairperson

shall have a deliberative and casting vote. The method of voting at Business Meetings shall be by show of hands or equivalent unless a specific request by a ~~financial~~ member is made for the vote to be a secret ballot. A member may delegate their right to vote~~,~~ to any person by proxy in writing. Such document must be produced at the time of voting.

(f) Attendance

By a majority vote of attendees at a Business Meeting, a member may be permitted to partake in the meeting as an attendee by using a communication medium or device that allows the member to fully participate in the meeting's deliberations.

7. Meetings other than Business Meetings

The Council may at its discretion arrange for meetings to be held for the dissemination of knowledge of Operations~~al~~ Research or its application, or of matters considered by the Council likely to further the objects of the Society by means of lectures, discussions or otherwise, and the Council shall determine the conditions of admission to such meetings and the manner in which they shall be conducted.

8. Relationship with other Societies

It shall be in accordance with the objects of the Society and with this Constitution for the Operations~~al~~ Research Society of New Zealand to affiliate or cooperate with other societies of similar interests. Affiliation and the conditions thereof shall be determined by the Council.

9. Amendment to the Constitution

(a) This constitution may be revoked or amended only by a two-thirds majority of votes cast in either

(i) a written ~~postal~~ ballot of full members conducted by the Secretary, or

(ii) the Annual General Meeting, or

(iii) a Special Meeting called for the purpose

provided that no amendment shall be permitted if it in any way affects the non-profit or charitable status of the Society.

(b) The President may, or upon request of any ten full members of the Society shall, request the Secretary to conduct such a ~~postal~~ ballot.

(c) The close of poll for any such ballot shall be at a date specified by the President and not more than 180 days from receipt of the ballot request.~~(d)~~ The ballot motions shall be ~~in the hands of the Secretary at least 35 days before the close of the poll.~~sent in writing~~(e) Reply-paid ballot papers shall be posted~~ to members at least 21 days before the close of poll.

SCHEDULE

(as amended by Council resolutions of 1972 Feb 10)

Members of the following Branches constitute the Operations~~al~~ Research Society of New Zealand (Incorporated):

Wellington Branch
Auckland Branch
Canterbury Branch

Alteration of Rules

The above form a complete copy of the rules of the Operations~~al~~ Research Society of New Zealand~~, with the latest changes shown in italics~~.

Signature of Members:

Andrew Mason	John Paynter
President	Treasurer

Fernando Beltran
Secretary

Date:

primal with the addition of the variable's constraint representation in the dual. We compare and contrast the proposed methodology with that of the more conventional conflict graph approach for this problem.

We demonstrate that the structure of the resource based constraint system of our model is such that it can easily and dynamically include spatial and/or temporal changes to train movements.

By showing that the methodology can be used in a real-time setting as a disruption tool, we highlight its superiority over the conflict graph methodology. A real life test instance arising in Germany and supplied by the major German railway company, Deutsche Bahn, indicates the efficiency of the proposed approach by confirming that practical problems can be solved to within a few percent of optimality in reasonable time.

Books

Barichard, V.; Ehrgott, M.; Gandibleux, X.; T'Kindt, V. (Eds.)

Multiobjective Programming and Goal Programming – Theoretical Results and Practical Applications

Series: Lecture Notes in Economics and Mathematical Systems , Vol. 618

2009, XV, 298 p. 98 illus., Softcover

ISBN: 978-3-540-85645-0

Online version available

This book gives the reader an insight into the state of the art in the field of multiobjective (linear, nonlinear and combinatorial) programming, goal programming and multiobjective metaheuristics. The 26 papers describe all relevant trends in this fields of research . They cover a wide range of topics ranging from theoretical investigations to algorithms, dealing with uncertainty, and applications to real world problems such as engineering design, water distribution systems and portfolio selection. The book is based on the papers of the seventh international conference on multiple objective programming and goal programming (MOPGP06).

ILOG CPLEX® 11.0 Performance Revisited

In October 2007, ILOG CPLEX 11.0 was released. It contained a large number of enhancements, improving usability and extending flexibility to application developers to let them handle the world's most challenging mathematical programming problems. However, the biggest news in this release concerned the increase in solution speed right out of the box, on Mixed Integer Programming (MIP) models. The message sent out to the user community was a simple one: on average, CPLEX 11 would be 10 times faster than the previous version of CPLEX. Behind this message was actually quite a lot of thought and careful analysis in order to properly set user expectations.

The feedback we have obtained from users in the past year has validated the pains we took in developing this new version. For instance after a recent web presentation by ILOG, participants were polled on their experience with CPLEX 11 features. Of the people who responded, over 65% listed performance as a major feature of most value to them. While it was hardly a scientific survey, we were very pleased to see this result, given the very high expectations generated by publicity about the release.

Clearly no single speedup number can reflect the experience every customer will have. Indeed, some users' models will gain less benefit than the factor of 10, and some will see more. And because of the combinatorial nature of MIP, it is entirely possible for some MIP models to gain no benefit, or even to suffer a mild regression in speed. However on balance, the customer experience seems to have borne out our own evaluations on our extensive test suite of thousands of models, demonstrating that the harder the model, the larger the benefit.

Sometimes this progress is not recognizable at first. For example, a customer shared with us a suite of their own models, with the observation that CPLEX 11 was not much faster than CPLEX 10. Their collection of models turned out to each solve in a short amount of time, a few seconds at most. Our first response was to explain that models that already are being solved quickly by CPLEX 10 probably are not candidates for dramatic speedups in the new version. But then the question was asked, what do these easy models represent? It turned out

that these small models were pieces of an overall optimization strategy involving a larger time frame, broken into segments. Why not solve all of them at once? The model was too hard, they told us. Try it with CPLEX 11, we suggested. To everyone's satisfaction, the full model turned out to then be tractable. By shifting the paradigm, they accomplished more than just a speedup.

A performance breakthrough like CPLEX 11 allows models that were once strategic to now be used in tactical operations. Optimization can be part of a real-time decision support system. It is now possible to add a new destination to a network; or a thousand destinations. Planning horizons can extend to multiple months instead of weeks, or a year instead of a month. What was once considered intractable at the start of a project might now be possible. For those of us old enough to remember the "old days", it even gives thought to getting back to what we thought we were doing when we started our careers.

As you can tell, we are very proud of the product we released, and we certainly have no intention of resting on our laurels. Look for additional performance improvements in future releases of CPLEX. The ILOG CPLEX R&D team is committed to providing the fastest, most reliable, and most robust optimization solver in the market.

For more information on ILOG CPLEX, visit http://cplex.ilog.com.

John Gregory
Senior Product Manager, ILOG CPLEX

IFORS/APORS News

APORS-2009

www.apors2009.com

The Operational Research Society of India is organising the ninth conference of the Association of Asia Pacific Operational Research Societies (within IFORS) during December 6, 2009-December 9, 2009 at Jaipur, India.

Hosting the conference for the third time, India welcomes the delegates from the Asia Pacific and other regions to attend the conference.The conference will provide a forum where:

- Researchers could present their findings dealing with the theoretical, computational, and application aspects of operations research;
- Practitioners could share their experiences on the problems, methodologies and outcomes of applying OR to solve real-world problems;
- OR workers could discuss pertinent academic, theoretical and application oriented issues;

Venue:

Conference will be held in Jaipur, also known as pink city in the colourful state of Rajasthan. Jaipur is about 200 Km. from New Delhi and about same distance from Agra. Delhi --Jaipur – Agra is also known as Golden Triangle of Indian tourism, due to rich cultural and historical heritage of this region. More details can be seen at: www.**rajasthantourism**.gov.in

Workshops and Tutorials:

Several workshops/tutorials are planned for the APORS 2009. Each workshop/tutorial will focus on a particular topic, and consist of several presentations and open discussions. The proposal for a workshop/tutorial should include the title, estimated length (hours) of the workshop/tutorial. Proposals should be submitted to the Program Chair.

Contributed Papers:

SUBMISSIONS OF PAPERS in the following areas are welcome: Mathematical Programming, Corporate Strategies, Modelling, Decision Support Systems, Management Information Systems, Distribution Management, Marketing, Energy, Production Planning, Inventory Models, Scheduling, Expert System, Project Management, Financial Investment, Risk Management , Queuing, Forecasting, System Dynamics, Health and Welfare Services, Transportation, Telecommunication, Innovation/Knowledge Economy, Supply Chain Management, Cus-

tomer Relationship Management, Complexity Theory, Soft Methodologies ,Revenue and Yield management , Any other application of OR

Papers reporting original and unpublished research results and experience are solicited.

Guidelines for abstract submission:

The abstract should be typed in English, and should not include any mathematical notation. Each submission must contain the following.

- Paper/proposal title
- Abstract of not more than 200 words
- Author(s) name(s), Organisation, full mailing address, email address, with an indication of author(s) presenting the paper
- Topic (at most three, chosen from the Conference Topics List) under which paper falls and additional topics if not included in the list.

Authors can submit their abstracts to the Program Chair through email to abstract@apors2009.com

Important Dates:

On-line submission starts: February 15, 2009

Deadline for submission: September 15, 2009

Notification of acceptance: October15, 2009

Deadline for early registration: July 31, 2009

Deadline for author registration: November 06, 2009

At least one author is required to register by Nov 06, 2009

Registration Fees:

	Early	Regular
Delegates	USD 350	USD 450
Accompanying Persons	USD 175	USD 225
ORSI Members	INR 3500	INR 4000
Indian Resident (non ORSI member)	INR 4000	INR 4500

The participant registration fee covers:

- Participation in all scientific sessions
- Access to technical exhibits, demos and book sales
- Conference kit containing the Final Program and Abstract Booklet, a badge, and meal stubs
- Coffee breaks
- Lunches
- Banquet

Accommodation, Tours and Travel:

Jaipur is a major tourist destination in India and December is peak tourist season. Hotels in all price range are available, but due to tourist season advance reservation is recommended. List of hotels and tours will be available shortly on the website, www.apors2009.com

Contact:

Dr Ashok K Mittal Organising Co-Chair mittal@iitk.ac.in

Dr Ravichandran Organising Co-chair nravi@iimahd.ernet.in

Dr B. K. Sinha Advisory Committee chair bani_sinha@hotmail.com

Conference Announcements

International Conference on Operations Research applications in Engineering and Management (ICOREM)

http://www.tau.edu.in/~icorem/

The Anna University Tiruchirappalli is pleased to announce that the International Conference on Operations Research applications in Engineering and Management (ICOREM) will be held from the 27th to 29th of May 2009. The conference will be held in the Academic Block, Anna University Tiruchirappalli, BIT Campus, Tiruchirappalli 620 024

The conference programme will include the following broad topics related to the conference theme and other areas of Operations Research.

- Operations Research applications in Engineering Disciplines; Functional Area of Management; Agricultural & Natural Resources; Industries & Software applications; Infrastructural Problems; Port Development / Management / Operations; and Urban / Town Planning.

- Artificial Intelligence in Engineering & Management

- Heuristics / Meta-Heuristics in Engineering & Management

- Data Mining and Warehousing in Engineering & Management

- Neural Network in Engineering & Management

On behalf of the organizers of the international event: ICOREM, I request you to participate by contributing a research paper. Also request you to disseminate the conference-announcement to your professional-friends and peers and encourage them to participate by contributing a research paper.

The deadline for an extended abstract [maximum of 500 words] is 20 March 2009.

For any questions concerning the ICOREM program please go to the conference Web site at www.tau.edu.in/~icorem. Alternatively you are most welcome to contact Dr M. Mathirajan, Conference Secretary at 0091 – 431 - 2407667 or 0091 – 9840776331 or mathirajan@tau.edu.in, or msdmathi@mgmt.iisc.ernet.in or drmuthu.mathirajan@gmail.com

Pictures from the 43 rd Conference of the Operational Research Society of New Zealand

The Official Conference Photo – Most of the Participants

Young practitioners lecturing

Meetings Calendar

New Zealand

The Sixth International Conference on Theory and Practice in Performance Measurement
14 – 17 April 2009, Dunedin, New Zealand
http://www.pma.otago.ac.nz/default.aspx

Asia Pacific

ICOREM International Conference on Operations Research applications in Engineering and Management
27 – 29 May 2009, Tiruchirappalli, India
http://www.tau.edu.in/~icorem/

APORS-2009 Ninth conference of the Association of Asia Pacific Operational Research Societies
6 – 9 December 2009 Jaipur, India
www.apors2009.com

International

IEEE Symposium Series on Computational Intelligence 2009
30 March – 2 April 2009, Nashville, USA
http://www.ieee-ssci.org

5th International Conference on Evolutionary Multi-Criterion Optimization EMO09
7 – 10 April 2009, Nantes, France
www.emo09.org

INFORMS Practice Conference: Applying Science to the Art of Business
26 – 28 April 2009, Phoenix, AZ, USA,
http://meetings.informs.org/Practice09/

CPAIOR'09 Sixth International Conference on Integration of AI and OR Techniques in Constraint Programming for Combinatorial Optimization Problems
27 – 31 May 2009, Pittsburgh, PA, USA
https://wpweb2.tepper.cmu.edu/rlang/CPAIOR09/index.html

Second Global Conference on Power and Optimization PCO2009
1 – 3 June 2009, Bali, Indonesia
http://www.engedu2.net

8th World Congress on Structural and Multidisciplinary Optimization (WCSMO-8)
1 – 5 June 2009, Lisbon, Portugal
http://www.wcsmo8.org/

CORS-INFOMS International Meeting
14 – 17 June 2009, Toronto, Canada
http://www.meetings.informs.org/Toronto09/

20th International Conference on Multiple Criteria Decision Making
21 – 26 June 2009, Chengdu/Jiuzhaigou, China
http://www.mcdm2009.cn

23rd European Conference on Operational Research
5 – 8 July 2009, Bonn, Germany
http://www.euro-2009.de

ISMP 20th International Symposium on Mathematical Programming
23 – 28 August 2009, Chicago, USA
http://ismp2009.org

5th International Vilnius Conference and EURO-Mini Conference "Knowledge-Based Technologies and OR Methodologies for Strategic Decisions of Sustainable Development" (KORSD-2009)
30 September – 3 October, Vilnius, Lithuania
www.mii.lt/KORSD-2009

See also http://meetings.informs.org/ for extensive listings of conferences.

Officers of the Operational Research Society of New Zealand 2009

President
Andrew Mason
Department of Engineering Science
The University of Auckland
Private Bag 92019, Auckland
Phone: 64 (9) 373 7599 x 87909
Fax: 64 (9) 373 7468
a.mason@auckland.ac.nz

Vice President
Matthias Ehrgott
Department of Engineering Science
The University of Auckland
Private Bag 92019, Auckland
Phone: 64 (9) 373 7599 x 82421
Fax: 64 (9) 373 7468
m.ehrgott@auckland.ac.nz

Council

Treasurer
John Paynter
Manager SRU
Uniservices/SOPH
Tamaki Campus
The University of Auckland
Private Bag 92019, Auckland
Phone: 64 (9) 373 7599 x 82355
j.paynter@auckland.ac.nz

Secretary
Fernando Beltrán
ISOM Department
The University of Auckland
Private Bag 92019, Auckland
Phone: 64 (9) 373 7599 x 87850
f.beltran@auckland.ac.nz

Newsletter Editor
Matthias Ehrgott
Department of Engineering Science
The University of Auckland
Private Bag 92019, Auckland
Phone: 64 (9) 373 7599 x 82421
Fax: 64 (9) 373 7468
m.ehrgott@auckland.ac.nz

APORS/IFORS Representative
David Ryan
Department of Engineering Science
The University of Auckland
Private Bag 92019, Auckland
Phone: 64 (9) 373 7599 x 88398
Fax: 64 (9) 373 7468
d.ryan@auckland.ac.nz

Alastair McNaughton
Department of Statistics
The University of Auckland Private Bag 92019, Auckland
Phone: 64 (9) 373 7599 x 85244
Fax: 64 (9) 308 2377
a.mcnaughton@auckland.ac.nz

Ross James
Department of Management
The University of Canterbury
Private Bag 4800, Christchurch
Phone: 64 (3) 364 2987 x 7015
Fax: 64 (3) 364 2020
ross.james@canterbury.ac.nz

Fernando Beltrán
ISOM
The University of Auckland
Private Bag 92019, Auckland
Phone: 64 (9) 373 7599 x 87850
Fax: 64 (9) 373 7430
f.beltran@auckland.ac.nz

Stefanka Chukova
School of Mathematics, Statistics and Computer Science
Victoria University of Wellington
PO Box 600, Wellington
Phone: 64 (4) 463 6786
Fax: 64 (4) 463 5045
schukova@mcs.vuw.ac.nz

Paul Rouse
Department of Accounting and Finance
The University of Auckland
Private Bag 92019, Auckland
Phone: 64 (9) 373 7599 x 87192
Fax: 64 (9) 373 7406
p.rouse@auckland.ac.nz

Andy Philpott
Department of Engineering Science
The University of Auckland
Private Bag 92019, Auckland
Phone: 64 (9) 373 7599 x 88394
Fax: 64 (9) 373 7468
a.philpott@auckland.ac.nz

Industry Representative
Geoff Leyland
Incremental Limited
Phone: 64 21 717 432
geoff.leyland@incremental.co.nz

Branch Chairs
Golbon Zakeri (Auckland)
Department of Engineering Science
The University of Auckland
Private Bag 92019, Auckland
Phone: 64 (9) 373 7599 x 84613
Fax: 64 (9) 373 7468
g.zakeri@auckland.ac.nz

Mark Johnston (Wellington)
School of Mathematics, Statistics and Computer Science
Victoria University of Wellington
P.O. Box 600, Wellington
Phone: 64 (4) 463 5699
Fax: 64 (4) 463 5045
Mark.Johnston@mcs.vuw.ac.nz

Grant Read (Christchurch)
Department of Management
University of Canterbury
Private Bag 4800, Christchurch
Phone: 64 (3) 364 2987 x 6885
Fax: 64 (3) 364 2020.
grant.read@canterbury.ac.nz

Web Master
Andrew Mason
Department of Engineering Science
The University of Auckland
Private Bag 92019, Auckland
Phone: 64 (9) 373 7599 x 87909
Fax: 64 (9) 373 7468
a.mason@auckland.ac.nz

The ORSNZ web site is http://www.orsnz.org.nz. Email contact: secretary@orsnz.org.nz.

To apply for membership or buy subscriptions, see the application form on our web site, and mail it to: Membership Secretary, ORSNZ, PO Box 6544, Wellesley Street, Auckland, NZ.

Get your free DTS 5 Info Pack!

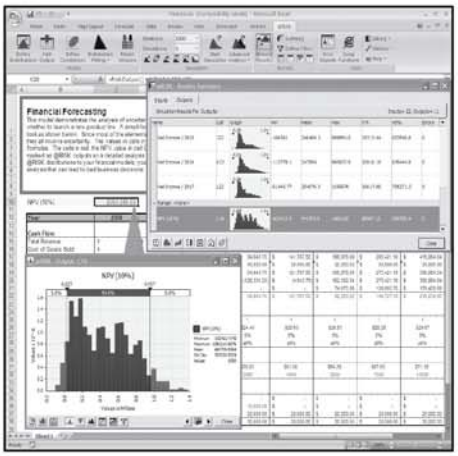
Introducing the DecisionTools Suite 5

HRS
Hoare Research Software Ltd

@RISK PrecisionTree TopRank NeuralTools StatTools Evolver RISKOptimizer

The DecisionTools Suite (DTS 5) is a complete risk and decision analysis toolkit that runs in Microsoft Excel. Browse, define and analyse your decisions in a familiar environment using the following tools:

- ***@RISK*** - avoid pitfalls and identify opportunities by seeing all possible outcomes with Monte Carlo simulation
- ***PrecisionTree*** - identify the best alternative by mapping out decisions clearly with all relevant influences
- ***TopRank*** - identify the most important variables with automated "what if" sensitivity analysis
- ***StatTools*** - identify trends and forecast results
- ***NeuralTools*** - accurately make predictions from incomplete data
- ***Evolver*** - solve complex, nonlinear problems using genetic algorithms
- ***RISKOptimizer*** - combines optimisation with Monte Carlo simulation



@RISK 5.0 for risk analysis using Monte Carlo simulation

Get your free info kit today, including free training software and start making the best decisions with the information you have.

Five Ways to obtain your FREE DTS 5 INFO KIT:
1. Call 0800 477 776 or 07 839 9102 **2. Fax** the form to 07 839 9103
3. Visit www.hrs.co.nz/2259.aspx **4. E-mail** 2259@hrs.co.nz
5. Mail the form to HRS, PO Box 4153, Hamilton East.
Note: Please ask for your FREE DTS 5 information kit and quote lead reference **2259** when contacting us.

Complete the form and return it today to get your FREE DTS 5 Info Kit!

Fax a copy of this form to 07 839 9103

Name:_____
Position:_____
Department:_____
Organisation:_____
Address 1:_____
Address 2:_____
City:_____
Phone:(__)_____ Fax:(__)_____
E-mail:_____
Your industry:_____
Your interest:_____

Yes - Please send me a FREE Info Kit that includes:

☐ **DTS 5 Information**

☐ **Free Training Software**

2259

New Zealand's Technical Software Source