

# OR NEWSLETTER

June 2002

Operational Research Society of New Zealand, Inc.  
PO Box 6544, Wellesley St. Auckland, New Zealand  
<http://www.orsnz.org.nz>

## How to Make Ants Work for Us

by Hsiao-Fan Wang

Have you ever faced such a situation that one day when you returned home, you found your cheese has changed colour with some black things busy moving around on the top and the surroundings of the cheese? Wait a minute! Before you throw it away, don't you want to get revenge for your delicious cheese? Well, take a close look at what those ants are working! This is what we could find and make use of it for our research.

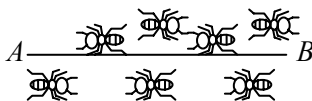


When an ant discovers a piece of cheese, because it is too big to bring back, the ant goes back to ask for more ant fellows as shown in Figure 1 where the ants are walking on a directed path  $AB$  to the target cheese  $B$  and move some cheese back to their colony  $A$ .

target cheese  $B$  and move some cheese back to their colony  $A$ .

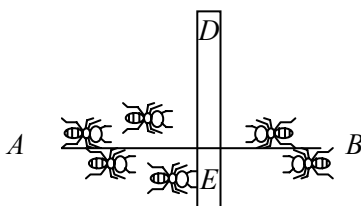
Figure 1.

Ants go straight from colony  $A$  to object  $B$ .



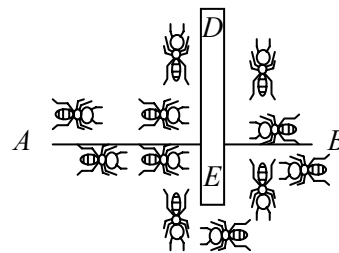
If an obstacle appears in between that blocks the path (Figure 2), then the ants have to choose a new path from either path  $AEB$  or path  $ADB$  with the same probability because no pheromone has been left. The same situation also happens to the ants coming from  $B$ .

Figure 2. Obstacle appears.



Because the path  $AEB$  is shorter than  $ADB$ , the ants walking on the path  $AEB$  will spend shorter time to reach their target than the ones walking on the path  $ADB$  (Figure 3). Therefore, the accumulated amount of the pheromone and the transition probability on the path  $AEB$  will be larger. In consequence, more and more ants will choose path  $AEB$  and less and less ants choose path  $ADB$ . In the end, all ants will walk on the path  $AEB$  because its pheromone is much stronger than that of the path  $ADB$ . Path  $AEB$  is thus the shortest path.

Figure 3. Ants choose new path by probability.



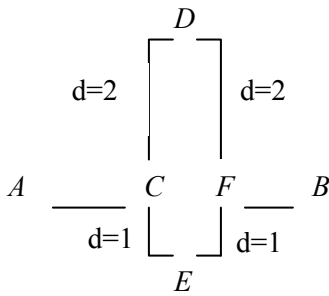
According to the ant colony metaphor, a shortest path problem can be analysed as shown in Figure 4, where the distance between  $CE$  and  $EF$  is equal to 1, and the distance between  $CD$  and  $DF$  is equal to 2. Where an obstacle blocks the path  $AB$  and the ants have two paths to select, the path  $ACDFB$  and the path  $ACEFB$ . (Cont. on page 2)

## Contents

- 1 How to Make Ants Work for Us, Hsiao-Fan Wang
- 2 Letter from the President, Les Foulds.
- 3 ORSNZ Young Researcher for ORSJ,
- 3 ORSNZ Visiting Lecturer Scholarships,
- 4 ORSNZ 37th Annual Conference
- 5-7 News: Canterbury, Auckland, Waikato, Wellington.
- 7-8 Notices & Meetings Calendar

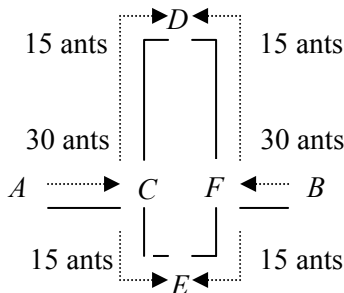
Newsletter publication dates are March, June, September, and December. Submissions deadline is the 15th of the month for the following month's issue. Send submissions by email to the Newsletter editor, John F. Raffensperger, [newsletter@orsnz.org.nz](mailto:newsletter@orsnz.org.nz).

Figure 4. Analytic resolution of Figures 1-3.



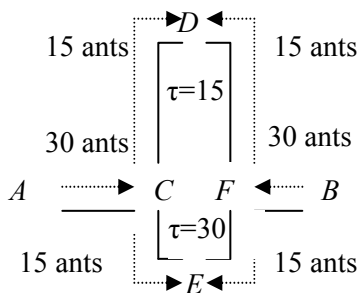
When time  $t=0$  (Figure 5), there are 30 ants coming from  $A$  to  $B$  and 30 ants coming from  $B$  to  $A$ . Both groups follow  $CEF$  or  $CDF$  with the same transition probability but reversed directions. Therefore, 15 ants from  $A$  to  $B$  are choosing path  $CE$  and 15 ants are choosing  $CD$ , the same as those 30 ants those come from  $B$  to  $A$ .

Figure 5.



Then at  $t=1$  (Figure 6), those 30 ants (15 walking from  $A$  to  $B$  and 15 walking from  $B$  to  $A$ ) which choose the path  $CEF$  have skirted the obstacle already and laid their pheromone on the way with 30 units ( $\tau=30$ ). The other 30 ants that select the path  $CDF$  at  $t=1$  just meet each other at the point  $D$ , and make the  $\tau$  value of path  $CDF$  equal to 15. Therefore, if there is an ant now standing at the point  $C$  or  $F$ , the probability it chooses path  $CEF$  is  $30/(30+15)=0.67$ , and the probability of choosing path  $CDF$  is  $15/(30+15)=0.33$ .

Figure 6.



This process continues until all of the ants complete their trips and the overall pattern shows the shortest path!

*Take a close look at what those ants are working!*

Isn't this wonderful? The ants can help us to find the shortest path! Then, how about finding association rules among the most correlated data as what we are doing? It is indeed similar to finding a path with the shortest distance measured between two data. Therefore, we decided to extend this idea to our research on analysing huge amounts of customer data for marketing purposes.

Hsiao-Fan Wang,  
h.wang@mang.canterbury.ac.nz

Professor,  
Dept. of Industrial Engg and Engg Mgmt,  
National Tsing Hua University, Taiwan, ROC  
hfwang@ie.nthu.edu.tw,  
<http://ie54175.ie.nthu.edu.tw>

Reference: Marco Dorigo, Vittorio Maniezzo, and Alberto Colony, "Ant System: Optimization by a Colony of Cooperating Agents," *IEEE Transaction on Systems, Man, and Cybernetics*, vol. 26, no.1, pp. 29-41, Feb 1996.

## Letter from the President



Over four years ago, Andrew Mason, a long-serving member of the ORSNZ Council, developed a membership database for our Society. Written in Microsoft Access, this tool has been vital in supporting our activities. Indeed, the

functions of our officers, especially the Treasurer, would be extremely difficult and exorbitantly time consuming without it. The Society is very grateful to Andrew for creating this invaluable tool.

However, it has become apparent that it would be productive if the system was updated and expanded. The need for this has come sharply into focus due to the unacceptable time that the Treasurer's duties have been taking recently. So ways in which that officer's time could be reduced have had to be found. There has been partial success by redefining the roles of Secretary and Treasurer, resulting in some of the member-



ship-based tasks been transferred from the Treasurer to the Secretary.

But that hasn't been enough. Hence the database system has been examined to discover how the Treasurer's activities might be made less human-capital intensive, with less being required to be carried in people's heads and more processes being automated. What is needed is a system that enables at least the following:

- More efficient entry of transactions, such as payments and deposits (especially subscription income).
- More help functionality.
- Better accessing of members' details.
- Simpler interfaces, requiring less learning, for tasks such as the generation of subscription (and other) notices and balances.

Fortunately, the Council allocated \$4000 in the present year's budget to bring about such improvements. The question was how best to make this investment. I commissioned an independent investigation, which was carried out by one of the University of Waikato graduate students, who is well qualified to look into such matters. Her report confirms previous research into this matter by Andrew Mason and myself. That is, the best thing to do is to have a software house improve our existing system, rather than purchasing an off-the-shelf package or constructing a new system from scratch.

*Young Researcher? Japan?*

*15 June 2002!!!*

Orbit Systems Ltd, an Operations Research Consulting firm based in Auckland and Wellington, is now carrying out the work of the database upgrade requirements. Also, the following three Council members are playing an active part in the proposed project: Kevin Broad, who works for Orbit, is acting as liaison, Cameron Walker (who, as Treasurer, is a major stakeholder) is prioritising the possible improvement tasks, and Andrew Mason is providing detailed specifications of these tasks.

My best thanks to all concerned for their efforts in bringing this important project towards a successful conclusion.

*Les Foulds, lfoulds@waikato.ac.nz*

## Call for ORSNZ Young Researcher for ORSJ in 2002

Commemorating the 40th anniversary of The Operations Research Society of Japan (ORSJ), ORSJ has initiated the "International Cooperative Program for the Promotion of Operations Research". Consequently, ORSJ invites a Young Researcher from ORSNZ to present a 20-minute contributed paper at the Fall Annual Conference of ORSJ, to be held in Hakodate, Hokkaido, Japan, 11, 12 September 2002.

The Young Researcher must be a member of ORSNZ and be under 40 years of age at the time of application.

A Young Researcher Panel, appointed by the President of ORSNZ, will consider making an award in June 2002.

Applicants must submit, to the President of ORSNZ, a two-page abstract of the talk that they would give at the Fall Annual Conference of ORSJ, and their full CV, by 15 June 2002.

The successful applicant must travel to Japan and present a 20-minute contributed paper based on their abstract at the Fall Annual Conference of ORSJ in 2002. The participant's registration fees, travel, and local expenses will be met by ORSJ. If it is possible for the participant to visit a few Japanese universities or institutes before or after the conference, ORSJ will support such activities by covering the extra expense incurred as far as possible.

The successful applicant must submit a report on their trip to the December 2002 ORSNZ Newsletter.

Enquiries concerning, or nominations for, the ORSNZ Young Researcher for ORSJ in 2002 should be sent to:

Les Foulds, President, ORSNZ,  
Dept of Management Systems, Univ of Waikato,  
Private Bag 3105, Hamilton 2020

phone 07 838-4127, fax 07 838-4270,  
lfoulds@waikato.ac.nz.

## Call for ORSNZ Visiting Lecturer Scholarships in 2002

The number of scholarships awarded is normally at most two per year. ORSNZ will award scholarships to worthy candidates, according to available funds.

A Visiting Lecturer Panel, appointed by the President, will consider making awards twice yearly. The emolument of each scholarship is up to \$1,000. ORSNZ will not normally entertain the payment of additional costs to Visiting Lecturers.

Each Visiting Lecturer must give a talk on some topic of general interest to ORSNZ members at each of Auckland, Hamilton, Wellington, and Christchurch. A plenary address at the ORSNZ Annual Conference is acceptable as one of the talks. However, in this case, a talk on a different topic must be given at the other three centres.

Each candidate must be nominated by an ORSNZ member ("the Champion").

The Champion must coordinate the visit of the Visiting Lecturer to each of the four centres.

Enquiries concerning, or nominations for, ORSNZ Visiting Lecturer Scholarships for 2002 should be sent to Les Foulds, President, ORSNZ.

## 37th Annual Conference of the Operational Research Society of New Zealand

The University of Auckland's Department of Engineering Science is pleased to host the 37th Annual Conference of the Operational Research Society of New Zealand on 29 and 30th of November. On 28th November, an optimisation software workshop will be offered. Bookmark [www.orsnz.org.nz/conf](http://www.orsnz.org.nz/conf) and check regularly for updates.

**Call for Papers.** We welcome papers on all aspects of Operations Research, in particular practical applications. Please submit your abstract of 200 words or less, in plain text, to the conference organizer and proceedings editor Matthias Ehrgott (Conference@orsnz.org.nz). We prefer submission by email, but you may also post a printed abstract to

ORSNZ Conference  
Department of Engineering Science  
University of Auckland, Private Bag 92019  
Auckland, New Zealand

Submission deadline: 30 September 2002

Following acceptance of your abstract, we will ask you to submit a full-length paper for publication in the conference proceedings. The proceedings will be made available for all participants of the conference. Full papers should be submitted by email in PostScript (.ps) or Adobe Acrobat

(.pdf) format. Guidelines for preparation of manuscripts will be published on the conference website (<http://www.orsnz.org.nz/conf>). Submission deadline for full papers will be 31 October 2002.

Matthias Ehrgott, [m.ehrgott@auckland.ac.nz](mailto:m.ehrgott@auckland.ac.nz)

## The Young Practitioners' Prize, to be Awarded at the 37<sup>th</sup> Annual Conference of ORSNZ

Full-time students who will be under 25 years of age on 28 Nov 2002, are members of ORSNZ, and plan to present a single-authored paper at the above conference, are invited to compete for the ORSNZ Young Practitioners' Prize.

*Full-time students ...  
are invited to compete ...*

When registering for the conference, competitors should request that their paper be scheduled in the Young Practitioner's Prize Session and must provide evidence of their eligibility.

The level of emolument of the prize, or prizes, awarded will be decided by a Prize Panel at the time of the conference.

Les Foulds, President, ORSNZ

## Student Grants-In-Aid for the Annual Conference of ORSNZ, Auckland, November 2002

Full-time students who are members of ORSNZ, and plan to present a paper at the above conference, are eligible for travel assistance from ORSNZ to attend the conference.

Applications, countersigned by the student's supervisor or Department Chair, confirming that the applicant is enrolled in a full-time university course, together with the abstract of the planned paper, should be made to the President of ORSNZ by 1 September 2002.

Grants, including the level of emolument, will be decided at an ORSNZ Council Meeting, later this year.

Les Foulds, President, ORSNZ

# Images of a Canterbury Reunion

By Vicky Mabin



Vicky Mabin, [vicky.mabin@vuw.ac.nz](mailto:vicky.mabin@vuw.ac.nz).



## Canterbury News

Lawrence Wein, our Erskine visitor, will leave us in July, for a new permanent job at Stanford. At least one more seminar to go! It has been a pleasure having him and Anne here with us.

Hsiao-Fan Wang, also a distinguished Erskine visitor, is visiting Canterbury's Department of Management from the Department of Industrial Engineering and Engineering Management, National Tsing Hua University, Taiwan, ROC. An expert in fuzzy systems, she taught a module for our Honours students. We welcome her article in this issue!



We welcome our newest department member, Cita Wood. Cita hails from Plymouth, England. She will be teaching production management.

Ross James is still away on sabbatical at Lehigh University, Pennsylvania.

## Waikato News

*Staff Graduate Social.* We recently took the opportunity to meet with our graduate students in a social, off campus setting. A large proportion of our students joined us for an evening of frivolity (food, drink, and good (non-academic) conversation) held upstairs at the Bank, Bar & Brassiere, in Hamilton.

*John Scott still on Sabbatical.* John is still hard at work at the Judge Institute of Management at the University of Cambridge. In his last email, he reported that he had just finished another working paper and was planning a short trip across to his old stomping grounds in Denmark. So far, we have had no reports on the state of his golfing handicap - we hope that you are not spending too much time on your research John!

*New Departmental offerings.* The Department of Management Systems at the University of Waikato is proposing to change some of its offerings starting in 2003. The BMS major in Systems is proposed to be replaced with two majors: Information Systems Management (ISM) and Supply Chain Management (SCM). This split exists already in the BECom, and along with another proposal to split the Graduate Diploma in Systems into ISM and SCM, these moves will complete the split in all the sub-postgraduate degrees in which we are found. The PGDip, Masters, and PhD will remain in Systems for at least 2003, but the former two are being considered as split candidates for 2004.

*... a sexy combination ...*  
*... the MISC Dept ...*

This might again motivate us to consider changing our departmental name. If anyone can conjure up a sexy combination of the letters I,S,M, and C, we'd like to hear from you as we try to rename our dept (please keep it clean!). And no, the MISC Dept already has been rejected.

*Les Foulds, President, ORSNZ*

## Auckland News

*Andrew Mason, a.mason@auckland.ac.nz.*

## Wellington News

*David Boland, Chairman, Wellington Branch*

## Call for Papers, special issue of Annals of Operations Research

Staff Scheduling and Rostering: Theory and Applications. Authors are invited to submit their papers electronically by email to the Guest Editors, in either postscript or pdf format. To be considered for this publication, papers must be received by 31 July 2002.

[www.baltzer.nl/journalhome.htm/0254-5330](http://www.baltzer.nl/journalhome.htm/0254-5330).

## Meetings Calendar

1-6 Jul 2002, 2nd International Conference on the Teaching of Mathematics (at the undergraduate level), Island of Crete, Greece.  
<http://www.math.uoc.gr/~ictm2/>

7-10 July 2002, AWOCA 2002. The Australasian Workshop on Combinatorial Algorithms will be hosted by the University of Queensland, with the venue being Kingfisher Bay Resort, Fraser Island, Queensland. Paper submission deadline is 12 Apr 2002.  
[www.maths.uq.edu.au/~njc/awoca/awoca2002](http://www.maths.uq.edu.au/~njc/awoca/awoca2002)

7-10 Jul 2002, 7th International Conference of the UKSS, Systems Research & Practice in the Knowledge Age, University of York, England. Email: [UKSSConference2002@hotmail.com](mailto:UKSSConference2002@hotmail.com).

7-12 Jul 2002, Algorithmic Number Theory Symposium V, University of Sydney. ANTS-V will be held at the School of Mathematics and Statistics of the University of Sydney and will be organised by the MAGMA Computational Algebra Group. [ants5@maths.usyd.edu.au](mailto:ants5@maths.usyd.edu.au), <http://www.maths.usyd.edu.au:8000/u/ants5>.

8-12 July 2002. IFORS 2002: Sixteenth Triennial Conference, University of Edinburgh. Edinburgh, Scotland. Conference theme: OR in a Globalized, Networked World Economy. Program Committee Chair: Ben Lev, [blev@umich.edu](mailto:blev@umich.edu). Chair of Organizing Committee: Lyn Thomas, [L.Thomas@soton.ac.uk](mailto:L.Thomas@soton.ac.uk). <http://www.ifors2002.org/>.

*29-30 Nov 2002,  
37<sup>th</sup> ORSNZ Conference,  
University of Auckland.*

31 Jul - 2 Aug 2002, International Conference on Project Management, Marina Mandarin Hotel, Singapore. Merlin Toh, Conference Secretariat Nayang Technological University, email: [ProMAC2002@ntu.edu.sg](mailto:ProMAC2002@ntu.edu.sg), <http://www.ntu.edu.sg/MPE/ProMAC2002>.

29 Sep - 3 Oct 2002, 5th Biennial Conference of the Engineering Mathematics and Applications Conference, Gardens Point Campus, Queensland University of Technology, Brisbane, Australia. [www.icms.com.au/emac02](http://www.icms.com.au/emac02).

**30 Sep 2002 Abstract deadline for the 37<sup>th</sup> Annual Conference of the ORSNZ.**

30 Sep – 3 Oct 2002, AustMS 2002, Newcastle, Australia. 46th Annual Meeting of the Australian Mathematical Society. Registration forms may be downloaded from the conference website: <http://maths.newcastle.edu.au/austms>. Submit abstracts and other details on-line: <http://maths.newcastle.edu.au/austms/rego.html>. Contact: [austms@newcastle.edu.au](mailto:austms@newcastle.edu.au)

4 Oct 2002, Conference of the International Association of Maritime Economists (IAME), Lisbon, Portugal. <http://rirl2002.iscte.pt/>

4-6 Oct 2002, 3rd UQ Mathematical Physics Workshop, Calypso Plaza, Coolangatta, Gold Coast, following the 46th Annual Meeting of the Australian Mathematical Society in Newcastle. Abstract deadline: 1 Sep 2002. <http://www.maths.uq.edu.au/~cmpworkshop>, email [cmpworkshop@maths.uq.edu.au](mailto:cmpworkshop@maths.uq.edu.au).

**31 Oct 2002 Full paper deadline for the 37<sup>th</sup> Annual Conference of the ORSNZ.**

18-22 Nov 2002, Joint meeting, 4th Asia-Pacific Conference on Simulated Evolution and Learning, 9th International Conference on Neural Information Processing, International Conference on Fuzzy Systems and Knowledge Discovery, Orchid Country Club, Singapore. Paper summary deadline 30 Apr 2002. <http://www.ntu.edu.sg/home/nef>.

27-30 Dec 2002, International Conference on Operations Research for Development (ICORD 2002) under the auspices of Operational Research Society of India (ORSI) will be held at Anna University, Chennai (Madras), India. The announcement and call for papers is released. [www.annauniv.edu/orsi-chennai/icord2002/](http://www.annauniv.edu/orsi-chennai/icord2002/)

7-11 Jul 2003, 5<sup>th</sup> International Congress on Industrial & Applied Maths, Darling Harbour, Australia, <http://www.iciam.org>.

28-30 Aug 2003, POSTA 2003, A Multidisciplinary International Symposium on Positive Systems: Theory and Applications, Univ. of Rome, Italy, <http://www.dis.uniroma1.it/~posta03/>.

**29-30 Nov 2002, 37<sup>th</sup> Annual ORSNZ Conference, University of Auckland, Auckland, NZ, <http://www.orsnz.org.nz/conf>.**

9-12 Dec 2002, ICDM '02, IEEE International Conference on Data Mining, Maebashi TERRSA, Maebashi City, Japan. The 2002 IEEE International Conference on Data Mining. Professor Ning Zhong (ICDM '02), Department of Information Engineering, Maebashi Institute of Technology, [zhong@maebashi-it.ac.jp](mailto:zhong@maebashi-it.ac.jp), <http://kis.maebashi-it.ac.jp/icdm02>

*30 Sep 2002  
Abstract deadline  
for the 37<sup>th</sup> Annual Conference  
of the ORSNZ.*

# Officers of the Operational Research Society of New Zealand: 2002

## **President**

Les Foulds  
Department of Management Systems  
The University of Waikato  
Private Bag 3105, Hamilton  
Phone: 64 (7) 838 4127  
Fax: 64 (7) 838 4270  
lfoulds@waikato.ac.nz

Jim Corner  
Department of Management Systems  
The University of Waikato  
Private Bag 3105, Hamilton  
Phone: 64 (7) 838 4563  
Fax: 64 (7) 838 4270  
jcorner@waikato.ac.nz

Andrew Mason  
Department of Engineering Science  
The University of Auckland  
Private Bag 92019, Auckland  
Phone: 64 (9) 373 7599 ext 7909  
Fax: 64 (9) 373 7468  
a.mason@auckland.ac.nz

## **Vice President**

John Davies  
SBPM  
Victoria University of Wellington  
P.O. Box 600, Wellington  
Phone: 64 (4) 463 5382  
Fax: 64 (4) 463 5253  
john.davies@vuw.ac.nz

Eric Deakins  
Department of Management Systems  
The University of Waikato  
Private Bag 3105, Hamilton  
Phone: 64 (7) 838 4565  
Fax: 64 (7) 838 4270  
edeakins@waikato.ac.nz

Nicola Petty  
Department of Management  
The University of Canterbury  
Private Bag 4800, Christchurch  
Phone: 64 (3) 364 2190  
Fax: 64 (3) 364 2020  
n.petty@mang.canterbury.ac.nz

## **Treasurer**

Cameron Walker  
Business School  
The University of Auckland  
Private Bag 92019, Auckland  
Phone: 64 (9) 373 7599 ext 7009  
Fax: 64 (9) 373 7468  
c.walker@auckland.ac.nz

Stuart Dillon  
Department of Management Systems  
The University of Waikato  
Private Bag 3105, Hamilton  
Phone: 64 (7) 838 4234  
Fax: 64 (7) 838 4270  
sdillon@waikato.ac.nz

**Branch Chairs**  
Andy Philpott (Auckland)  
Department of Engineering Science  
The University of Auckland  
Private Bag 92019, Auckland  
Phone: 64 (9) 373 7599 ext 8394  
Fax: 64 (9) 373 7468  
a.philpott@auckland.ac.nz

## **Secretary**

Chuda Basnet  
Department of Management Systems  
The University of Waikato  
Private Bag 3105, Hamilton  
Phone: 64 (7) 838 4562  
Fax: 64 (7) 838-4270  
chuda@waikato.ac.nz

Shane Dye  
Department of Management  
University of Canterbury  
Private Bag 4800, Christchurch  
Phone: 64 (3) 364 2987 ext 6886  
Fax: 64 (3) 364 2020  
s.dye@mang.canterbury.ac.nz

David Boland (Wellington)  
Boland Associates Limited  
4 Hicks Crescent, Waikanae  
Phone: 64 (4) 902 3889  
boland.d@paradise.net.nz

## **Council Members**

Kevin Broad  
ORBIT Systems  
PO Box 113-200  
Broadway Post Centre, Auckland  
Phone: 64 (9) 523 5407  
Fax: 64 (9) 523 5402  
kevin.broad@orbitalystems.co.nz

Matthias Ehrhoff  
Department of Engineering Science  
The University of Auckland  
Private Bag 92019, Auckland  
Phone: 64 (9) 373 7599 ext 2421  
Fax: 64 (9) 373 7468  
m.ehrhoff@auckland.ac.nz

Fritz Raffensperger  
(Christchurch/ Newsletter Editor)  
Department of Management  
The University of Canterbury  
Private Bag 4800, Christchurch  
Phone: 64 (3) 364 2987 ext 8616  
Fax: 64 (3) 364 2020.  
j.raffensperger@mang.canterbury.ac.nz

John Buchanan  
Department of Management Systems  
The University of Waikato  
Private Bag 3105, Hamilton  
Phone: 64 (7) 838 4470  
Fax: 64 (7) 838 4270  
jtb@waikato.ac.nz

Graeme Everett  
Norske-Skog Ltd  
Tasman Pulp and Paper Mill  
Private Bag 3083, Kawerau  
Phone: 64 (7) 323 3708  
Fax: 64 (7) 323 3699  
Graeme.Everett@norske-skog.co.nz

**Newsletter Coordinator**  
Joan Mawson  
Department of Management  
The University of Canterbury  
Private Bag 4800, Christchurch  
Phone: 64 (3) 364 2987 ext 6606  
Fax: 64 (3) 364 2020.  
j.mawson@mang.canterbury.ac.nz

Vicky Mabin (**Liaison**)  
SBPM, Victoria Univ. of Wellington  
P.O. Box 600, Wellington  
Phone: 64 (4) 463 5140  
Fax: 64 (4) 463 5253  
vicky.mabin@vuw.ac.nz

See the ORSNZ web site at <http://www.orsnz.org.nz>. Email: [secretary@orsnz.org.nz](mailto: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.

