



NEWSLETTER

December 2002

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

Teaching OR/MS: Buckets, Blocks and Scaffolds

By Nicola Petty

Expertise in Operational Research/Management Science does not guarantee the ability to teach it. Neither does teaching ability in the absence of a strong understanding of OR/MS make for effective teaching. Clearly, it is necessary to have teaching skills and thorough content knowledge to be able to teach OR/MS competently. These conditions are necessary, but are they sufficient? Research suggests that they are not.

Educational research suggests that what is needed for good teaching is pedagogical content knowledge. Pedagogical content knowledge is more than the combination of content knowledge and generic teaching strategies. It is subject specific and includes "information about typical difficulties that students encounter as they attempt to learn about a set of topics; typical paths students must traverse in order to achieve understanding; and sets of potential strategies for helping students overcome the difficulties they encounter." (Bransford and Brown, p 45)

The following are three key findings in educational research, and their application to the pedagogy of OR/MS. The key findings are well expressed in a very readable and informative book, "How people learn: brain, mind experience and school", (Bransford and Brown) hereafter referred to as HPL. The applications given relate mostly to the teaching of introductory management science to first year students at the University of Canterbury. As the course is a pre-requisite for management, operations management, operations research and marketing papers, it has between 600 and 800 students with varied backgrounds, many of whom are not at all mathematically inclined. Over the years, I have been teaching these students I have reflected on their difficulties, necessary paths, and desirable strategies.

Finding 1

"Students come to the classroom with preconceptions about how the world works. If their initial understanding is not engaged, they may fail

to grasp the new concepts and information that are taught, or they may learn them for the purposes of a test but revert to their preconceptions outside the classroom." (HPL p14).

A metaphor for this is the bucket. There is a tendency to view the students as 'empty buckets' that need filling with knowledge from the instructor's larger bucket. However the students buckets are not empty, and if the preconceptions in the bucket do not combine well with the new information being poured in, then it is often the new that is rejected, not the old.

It is instructive to think specifically about OR/MS and what concepts students have difficulty with, and what preconceptions may be hindering their comprehension of new ideas. For example, modelling is a key skill and concept for OR/MS. The idea of a model is not an easy one for many students.

One common preconception pertains to the relationship between a model and the reality it is modelling. Students at high school use scientific formulae that describe physical relationships, such as acceleration of falling objects, filling of water tanks etc. It is easy for them to believe that the model is the reality.

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Then in OR/MS, we propose mathematical models that represent the reality much more approximately. (Or is it that we propose a reality that fits the model more approximately?) This is difficult to assimilate if the student has the preconception that the model is the reality.

Students use different mechanisms to cope with this conflict. They may dismiss the model as useless because it is too far from the reality. They may insist that a more complex model is needed. They may see it as necessary to change the reality to fit the model. They may take a dislike to the subject as it causes painful cognitive dissonance.

These difficulties have a long term impact on a student's ability to use models for problem solving, a somewhat pivotal skill in our discipline. So how does the teacher overcome this? An awareness that the difficulty exists is a pivotal first step for both student and teacher, especially as the teacher is likely to find mathematical modelling intuitively easy and may have little perception of challenges that other people may face in this area.

In a lecture, the instructor can outline common misconceptions so that students can identify their own position. It is important not to ridicule or belittle common misconceptions in this process.

Frequent formative assessment is a useful tool. Assessment does not have to be handed in and graded and count towards the final grade! One or two multi-choice questions at the beginning of a lecture can alert students and instructor to areas of misconception. Self-assessment exercises also encourage meta-cognitive skills, which will be discussed later.

Finding 2

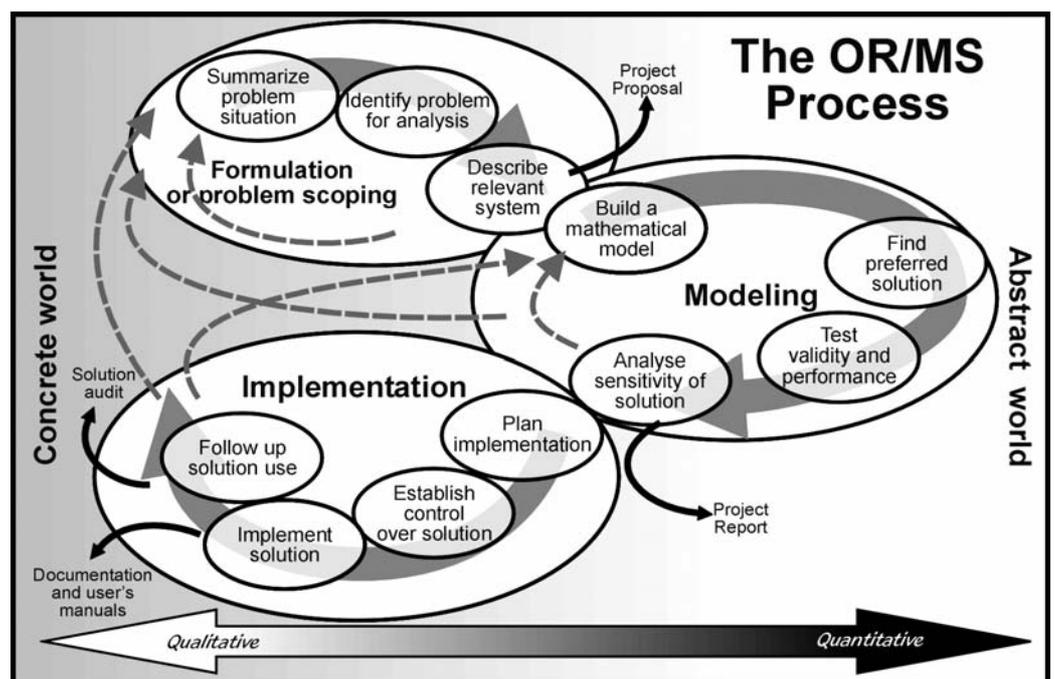
“To develop competence in an area of inquiry, students must (a) have a deep foundation of factual knowledge; (b) understand facts and ideas in the context of a conceptual framework, and (c) organise knowledge in ways that facilitate retrieval and application.” (HPL p16) In order to

facilitate this, “Teachers must teach some subject matter in depth, providing many examples in which the same concept is at work and providing a firm foundation of factual knowledge.” (HPL p20)

A metaphor I describe to the students is that of a Lego model. New ideas and concepts can be seen as blocks which the student is collecting. If the blocks are fitted together well in an organised way, rather than thrown in a pile, then fewer blocks will be lost. Similarly, knowledge which is organised in a conceptual framework is going to be better retained, retrieved and utilised.

Our intention is to help our students become ‘experts’ who have much well-organised content knowledge that they can apply to real problem situations. At Canterbury, our first year papers concentrate on the OR/MS process as a whole. This comprises how to tackle a problem situation, build a model and use the information gained to improve things. Students are introduced in the first semester to a process approach, developing models from first principles, and then in the second semester they use a structural approach, and become acquainted with elementary linear programming, queueing and simulation. A diagram outlining the OR/MS process helps to develop the conceptual framework which can be used to organise later knowledge.

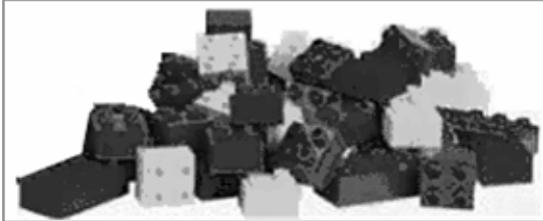
The first semester course is currently being remodelled to provide more examples using the same conceptual framework. Other underlying skills and knowledge, such as discounting and cost



analysis will be taught within the same framework, using case examples to continue to build on the understanding of the relationship between the model and the reality.

Finding 3

“A ‘metacognitive’ approach to instruction can help students learn to take control of their own learning by defining learning goals and monitoring progress in achieving them.” (HPL 18) These metacognitive skills need to be imbedded into the curriculum. It is less effective to teach ‘study skills’ out of context.



Recently I asked a successful first year student to accompany me to talk to students completing a foundation studies course prior to entry to first year university study. She talked about how to learn Management Science, and clearly had well developed metacognitive skills. She explained how when she was given a formula she would ask herself, why does it work and when doesn't it work, and why. She felt that she was not good at memorising, but found that if she understood the material, then it was much less necessary to memorise. This approach worked well in several subjects. Her excellent metacognitive skills enabled her to learn new disciplines effectively. We would like all of our students to develop these skills.

An approach that encourages the development of metacognitive skills views the course as an integrated package made up of lectures, tutorials, assessment, textbook, other materials and communications. When the package fits together well, it will help students develop skills that will help them with later learning.

Clearly defined learning objectives make the aim of the course obvious to the students. We are not trying to ‘trick’ them into learning or not learning. Clear learning objectives articulate for the students what they need to do to gain proficiency in the area of study. They also help the teacher to keep the learning and assessment materials aligned.

In our first year papers, we have a course handbook which was developed in response to comments from the students that it was difficult to see how the materials fitted together. These provide a scaffold, to help the students develop good learning

habits and metacognitive skills – to read reflectively, prepare for tutorials, consider learning objectives and assess their own progress. At the beginning, it is very specific, but the scaffolding is gradually removed as the students develop their skills.

Lectures are important to inspire the students and keep them on the path, while tutorials provide more active learning opportunities. Because of this, tutors are given very clear guidelines for each tutorial session, and helped to be successful in teaching. The lecturer teaches one weekly tutorial to help develop better materials and approaches over the years and keep in touch with what the students are doing and thinking.

We also provide other sources for learning, including a computer aided learning module within the MENTOR framework. This module covers the material in MSC1102 and is linked in with the lectures, text and tutorials. Many students find this a useful tool for learning.



Summary

The ideas presented here as ways of teaching OR/MS are not meant to be THE answers. The key is to be a reflective teacher – to read and ponder on how people learn in general and to relate this to the specific pedagogy of OR/MS. There is much room for research and contemplation on the pedagogy of OR/MS, and we and the students will be better off as a result.

Nicola Petty, nicola.petty@canterbury.ac.nz.

References

Bransford, J. D., & Brown, A. L. (Eds.). (2000). *How people learn: brain, mind, experience and school (Expanded edition)*. Washington D.C.: National Academy of Sciences. Quoted as HPL in text. www.nap.edu/catalog/9853.html.

Information on the MENTOR project and the systems module is available at www.managementscience.org/mentor/mentor.asp.

Letter from the President



ORSNZ has, among other activities, encouraged branch meetings, sponsored visiting lecturers, organised annual conferences, subsidised student conference travel, awarded prizes, liaised with corporations and kindred societies, published a quarterly newsletter, and maintained an active website. Recently we had a membership drive and now offer free membership to top students.

Yet, for a long time there have been suggestions, from many members, that perhaps our Society should be doing more about the promotion of OR and the recruitment of new members. Recently, there have been proposals for, and discussions about, the creation of Society brochures and posters and enhancement of the website. This debate raises concerns about the need for an overall promotional and recruitment strategy. There is evidence in the literature (e.g. Reiss [1], Hahn and Mangun [2] and the WWW [3]) of the worthiness of these concerns.

So, at the Council Meeting on 5 November last, it was agreed that the Society would engage the services of a professional marketing consultant who specialises in promotion and membership matters for not-for-profit organisations, such as ours. Her brief was to devise a promotional /publicity plan to promote OR and to sustain and increase ORSNZ membership. She investigated the activities of our Society, especially those formerly mentioned, and produced a report containing recommendations to address these issues. The main points she makes are:

- The universities (not ORSNZ) should attract school leavers and beginning tertiary students to OR courses and OR in general, and ORSNZ should promote OR and Society membership to senior students and young practitioners.
- A brochure is preferable to a poster for this latter purpose.
- The Society website provides good information for existing members. What is needed is a lively "Join Now" sublink.

I look forward to hearing your views on this important matter.

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

1. Reiss, A. "CPR for nonprofits: Creative strategies for successful fundraising, marketing, communications, and management". Jossey Bass, San Francisco, 2000.

2. Hahn, F., and Mangun K. "Do it yourself advertising and promotion: How to produce great ads, brochures, catalogs, direct mail, Web sites and more". J. Wiley, New York, 1997.

3. www.netguide.co.nz/useful_stuff/tutorials/

Call for ORSNZ Visiting Lecturer Scholarships in 2003

ORSNZ will award scholarships to worthy candidates, according to available funds.

The application deadline is 15 December 2002.

A Visiting Lecturer Panel, appointed by the President, will make the awards in February 2003.

The emolument of each scholarship is up to \$1000. 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, to be held in November 2003 in Hamilton, 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 Visiting Lecturer must provide a guest editorial to the Society newsletter.

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.

The application must include the c.v. of the proposed Visiting Lecturer, the dates and location of the visit, the name of the Champion and an undertaking by the Champion to negotiate and help arrange talks at the four centres named above.

Enquiries concerning, or applications for, ORSNZ Visiting Lecturer Scholarships for 2003 should be sent to:

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

Images of the 37th Annual ORSNZ Conference

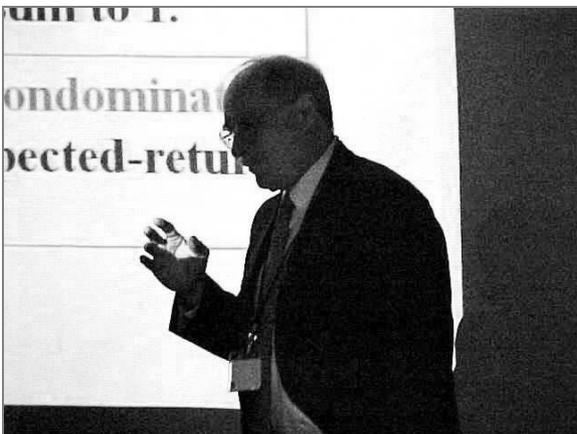
Thursday 28 November 2002, Registration (thanks, Mathias!). Pre-conference gathering at Old Government House.



Friday 29 November 2002. 8:00 Breakfast.



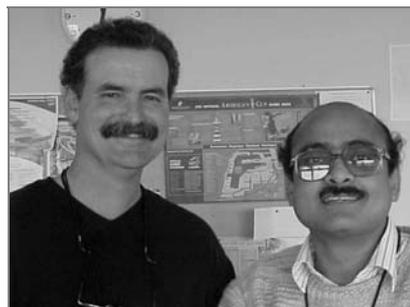
9:00 – 10:00 Plenary Talk, Steuer, Ralph E., Multiple Criteria Optimization in Portfolio.



10:30 – 11:50 Stream B. Zakeri, Golbon; Pritchard, Geoffrey; Philpott, Andrew, Halliburton, Tom; Everett, G.R.



11:50 – 12:50 Lunch



1:05 – 2:45 Young Practitioner Presentations

Chen, Jessica,
Minimising
IMRT
Treatment
Time by
Optimal
Configuration
of Multileaf
Collimators



Engineer, Faramroze
G, A Solution
Framework for the
Generalised Rostering
Problem



Johnston, Lenrick A.,
Optimisation of
Irradiation Directions
in IMRT Treatment



McLean, Stephen M.,
Finding Efficient Plans
in Radiotherapy
Planning



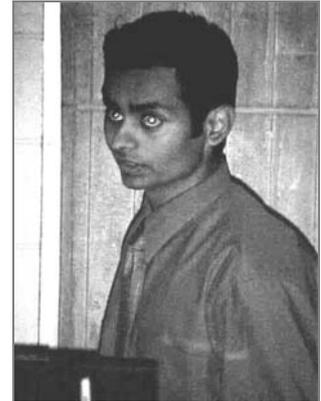
Mistry, Hiren,
Exploring a Feasible
Optimisation
Technique for Packing
Measurands in Data
Cycle Maps



O'Sullivan, Matthew
L., Optimal Fibre-
Optic Cable Layout
using Dynamic
Programming



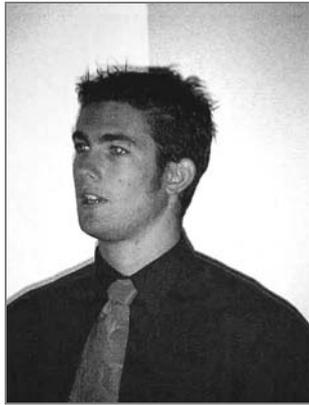
Singh, Kavinesh J.,
Electricity Distribution
Network Expansion
Planning



Talwar, Monica,
Location of Rescue
Helicopters in South
Tyrol



Tipping, James,
Scheduling and
Routing Grass Mowers
Around Christchurch

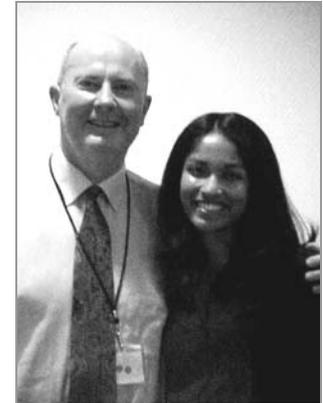


7:30 Banquet

Treby, Asher, Optimal
Weather Routing
Using Ensemble
Weather Forecasts



A gem of a
presentation: YPP #1.
Congratulations,
Ambili
Viswambharan!



Viswambharan,
Ambili, Optimisation
in Diamond Cutting



Lawn mower
man! YPP #2.
Congratula-
tions, James
Tipping!



5:30 AGM zzzzz



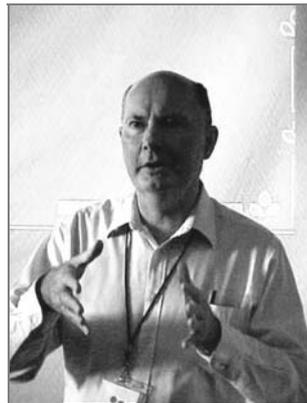
Nearly missed it! YPP
#3. Congratulations,
Lenrick Johnston!



11 pm – 8 am, O’Rorke
Hall of Residence



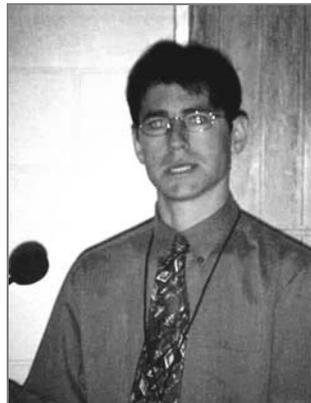
11:30 – 12:30 Stream B: Foulds, Les R.; Johnson,
D.G.; Patel, G.N.; Rouse, Paul; Harrison, Julie.



Saturday 30 November 2002. 8:00 Breakfast.



9:00 – 10:00 Stream
A: Galligan, David P;
Dillon, Stuart;
Buchanan, John;
Corner, Jim; Gao,
Shan; Sundaram,
David; Paynter, John.



1:45 – 3:05 Stream A: Raffensperger, John F.;
Mason, Andrew J; Panton, David; Day, Amanda;
Meehan, Rochelle; McNaughton, Alastair.



10:30 – 11:30
Plenary Talk,
Saigal, Sanjay,
Decision-Support
System
Development
Beyond Linear
Programming



Apologies to those people I missed or mixed up.

*John F. Raffensperger,
john.raffensperger@canterbury.ac.nz.*



The APORS Session at the Conference of the Operations Research Society of Japan



By Mathias Ehrgott

Having applied for the support in April, the president Les Foulds informed me on 18th June that I had been unanimously nominated as the ORSNZ representative for this final year of the APORS programme of

ORSJ. The conference was held at Hakodate Mirai University, Hakodate, Hokkaido on 11th and 12th September. The APORS delegates and ORSJ representatives were to meet in Tokyo the day before.

I took the opportunity to do some sightseeing in Tokyo: the Imperial Palace, the National Museum with its impressive exhibitions of Japanese art, some temples and shopping districts. Then I decided on a trip to Mt Fuji and actually climbed the mountain. It was out of season (which ended two weeks earlier), so instead of 2,000 people there were only about 20 undertaking the trip, of which the saying goes that you are wise to do it once, but you are a fool to do it twice. Although of impressive stature at more than 3700 m, Fujisan is quite shy and likes to hide in a shroud of cloud. So it was on that day.

Starting the climb at 2 pm I paid a hefty 5,000 Yen (about 90 \$) to sleep for a couple of hours on a bunk in a mountain hut. From there I left at 3 am next morning to reach the top at 4.30, in time for sunrise. Finally, there was a view of the mountain, its shadow cast on the top of the clouds beneath.



Hakodate Mirai University, Venue of the 2002 ORSJ Conference

Back to Tokyo, I met the other delegates and our hosts at the hotel lobby a day later for an informal get together. Seven APORS member societies were represented: Singapore, Malaysia, the Philippines, China, Hong Kong, Australia and New Zealand. The Korean and Indian delegate had to cancel on short notice. The food at the reception would have satisfied delegates from a few other continents.

Next morning we made our way to Haneda airport (using a variety of rail systems, including monorail) to fly to Hakodate, where a B747 brought us in just one hour. At the conference venue, most of us were eager to get access to email. In a country where internet cafes are virtually non-existent not an easy feat. On the other hand, many public phones and most hotel rooms provide facilities for connecting a laptop to the internet.

The day concluded with a reception where we were introduced to the Japanese delegates. As most of us had taken the instructions for the trip literally ("The conference is casual, a jacket is probably not required.") we felt severely underdressed: 90% of delegates wore suit and tie. The reception was followed by a dinner in some local noodle shop.



APORS delegates and their hosts. Standing from left: Qiyong Hu, China; Lee Chulung "Charlie", Singapore; Zulkifi Mohd Nopiah "Dr Zul", Malaysia; Naoki Makimoto, Japan; me; Simon Dunstall, Australia. Kneeling from left: Wan-Lung Ng, Hong Kong; Masato Koda, Japan; Yutaka Umesawa, Japan; Emmanuel B. Macalalag, Philippines

The day of the APORS session had finally come, and seven good quality papers were delivered to an almost exclusive APORS audience, with a few Japanese attendants. Unfortunately, the fact that most talks were given in Japanese made it impossible for us to attend any of the regular sessions. Immediately after the conference closure, seven exhausted delegates and the organisers of the APORS programme departed for the hotel. We relaxed in the Onsen (Japanese hot bath) and

dressed up in Yukatas (see picture below) to proceed to the dinner. This event will undoubtedly be remembered for life by all delegates: set in a traditional Japanese room (i.e. sitting on the floor, but with a cavity under the table for westerners' convenience) we were waited upon by women clad in Kimonos and enjoyed a sumptuous meal of seafood, beer and sake.

The next day we went on a sightseeing trip in the area of Hakodate and took the return flight to Tokyo, where we said good-bye to our hosts in a traditional Japanese pub. I had another day left to visit the world heritage listed shrines and temples of Nikko before embarking on the flight back to Auckland.

“jacket is probably not required”

Although the APORS programme to support attendants from member societies to attend the ORSJ conferences has now run out, our hosts extended invitations to future events, and it is a pleasure to pass these on to ORSNZ members: A visit to Japan is highly recommended. Finally, I want to thank the ORSNZ selection committee for the nomination.

Matthias Ehr Gott, Auckland

Auckland News

The Department of Engineering Science continues to be busy promoting Operations Research. David Ryan gave the IFORS Distinguished Lecture at the INFORMS Meeting in San Jose in November. The subject of his talk was robust airline crew scheduling, and it was by far the best of the plenary addresses at the meeting. At the same meeting he was also honoured with the INFORMS Prize for the Teaching of OR/MS Practice. This is the first time a New Zealander (or indeed someone from this hemisphere) has won this prestigious award and it is richly deserved. After a glowing citation read by Rick Rosenthal, Dave gave a stirring acceptance speech that firmly stated the case for Operations Research to be a practical discipline.

Apart from Dave, other kiwis spied at the INFORMS meeting were Andy Philpott, Matthias Ehr Gott, Cameron Walker, Michael O'Sullivan, Steve Batstone, and Mark Stewart, as well as recent ex pats Shane Henderson, Tava Lennon, and Kevin Ross. The Palo Alto residence of famous New Zealand mathematical programmer Mike Saunders was a focus for much social activity, as was the local San Jose microbrewery.

The INFORMS Conference was also a great chance to catch up with old friends of ORSNZ, like Saul Gass, Mike Rothkopf, Larry Wein and Garret van Ryzin.

Andy Philpott, a.philpott@auckland.ac.nz

Canterbury News

Almost everyone in Management Science seems to have been lying low, keeping quiet, or hiding their lights under bushels (or the metric equivalent). Typical ploys for the post-exam season, I suppose.

On 03 December, at 22:12, Thomas John James (3660g) was born. Both Dale and baby are continuing to do well; Ross seems to be spending more time at work.

Nicola Petty won a thoroughly well deserved recipient of a University of Canterbury 2002 Teaching Award, just reward for her year-on-year sterling efforts with the masses in MSC1102 Systems and Decision Making.

This year's Honour class was enthusiastic and a joy to teach (although your correspondent had only one bite at the cherry, and was lucky last for the year, following on from Ross James, whose module's intensive assessment meant that I was talking with bleary-eyed automatons!). Their final project presentations were professional and exemplary – I think the staff learnt a lot about how it should be done!

Apart from the Honours presentations, a seminar highlight was that of Gerd Islei, whose thesis title was “Performance Measurements and the Supply Chain”. Gerd is a Fellow in Information Management in Templeton College, University of Oxford, and it was fascinating to hear how ‘the other half’ lives: the success of their Strategic Leadership Programme, the 7 million pounds annual revenue that the College is required to generate, the 1 million pound annual ‘retainers’ that companies willing pay to the researchers, and the realities of Supply Chain Management in the EU. It was both inspiring and gobsmacking!

Steve Batstone's PhD Oral is close...good luck, Steve! Mark Stewart is in the final throes of the final draft of his thesis, with a pre-Christmas submission date still in sight.

Don McNickle is currently away in Oz, with Ross as the Acting HoD in his absence, we have only one day left to stage a coup!

John Giffin, john.giffin@canterbury.ac.nz

Waikato News

Please Switch Your Brain on Now!! Here is a brainteaser to see if you are awake! Count the “F’s” in the following text:

FINISHED FILES ARE THE RESULT OF YEARS OF SCIENTIFIC STUDY COMBINED WITH THE EXPERIENCE OF YEARS.

The answer is given at the end of this column.

How many grandparents does your department have?

While being one of the smaller departments staff-wise at the University of Waikato, Management Systems is perhaps a little over-represented in the grandparent stakes. Chuda Basnet is the most recent addition to the “I am a grandparent but still look 35” Club. Membership currently sits at four and a quick survey of the remaining staff suggests that membership revenues are unlikely to increase in the near future.

Reflections on a career change, by John Buchanan

Given my 13+ years in the Management School at Waikato University, there was some reason to expect that I would be fairly well prepared for management, leadership and particularly problem solving in the real world. Back in May 2001, I moved to be one day a week at university and four days a week as pastor of Chapel Hill Community Church – an organisation of some 250 ‘volunteers’.

Just yesterday, I was talking with a plasterer who was plastering our garage wall. He said that these days there were more ‘young ones’ on the block who, having read a book on plastering, thought they could tackle anything. I asked him how long it took for him to master the trade of being a plasterer and he said about 15 years.

It is like that for me, as I expect for many of us in new careers. Mastery does not come easily and it often comes through mistakes and failings—an often effective but frustrating way to learn. Things that I thought would work well at our church sometimes don’t. So presently, I am going up a steep learning curve, one with rich challenges. The graduate course that John Scott and I teach on The Learning Organisation now has more meaning.

I also asked the plasterer (Clem) what would happen to his knowledge when he passed on – would his knowledge and experience be passed on? Aside from the few apprentices he has had, he didn’t think so. Is there a substitute for learning as

you go? Does such valuable knowledge and experience have to be lost?

People ask me, “Do you enjoy your new job?” I often hesitate, which is not a good sign. Do I enjoy taking funerals? Of a five-month old cot death? No. But funerals are significant times, an important rite of passage – they have to be done and how they are done matters. Weddings, though, are splendidly happy occasions.

Amidst the grief and the celebration however, there is actually a lot of ordinary work. Organising a Sunday service, managing the other part time staff at church, talking with people and trying to listen well, preparing sermons, planning ahead, trying to establish a shared vision and keep on telling people about it (harder than I thought!).

And, I should add, there are good opportunities for applying decision-making expertise. I recall one meeting when we were talking about alternative forms of a church service and I raised the issue of criteria. What criteria would we use to discriminate among different alternatives? Then, and it was probably not the best thing to do at the time, I went on to explain that alternatives have no existence without criteria and vice versa. Aside from my friend Kemp, whose training is in linguistics and saw parallels with form and meaning, the rest of the group wondered where I was going. Even so, it underscored yet again the need for good decision-making processes.

Finished files are the result of years of scientific study combined with the experience of years.

Longer term, and hopefully coming out of my post-graduate Biblical Studies, I’d like to tackle a thesis on decision making in churches. I expect there to be some similarities with decision making in non-profit or volunteer organisations, but with significant differences. Suggestions and speculations welcomed.

So I continue to enjoy the teaching and research at Waikato—the balance between the two occupations is slowly being righted.

So...Can You Count? Did you find 3? Wrong, there are 6 (have another look if you disagree). Apparently, the brain has difficulty in processing the word “of”. Three is normal, four is quite rare. Anyone who spotted all 6 “F’s” on their first attempt will be invited by the Royal Society to find new stars with their unaided eyes.

Wellington News

We had a quieter year in 2002. Our first meeting was in September. Not only did Vicky Mabin arrange the venue and the catering but she also made the presentation. Her seminar was on Goldratt's Critical chain, an alternative to critical path. She explained how it was five years since Eliyahu Goldratt (author of the business novel, 'The Goal') published the critical chain method for project management as an alternative to critical path, which had been in widespread use since its introduction 40 years earlier.

Now critical chain is increasingly used and is available as an add-on to Microsoft's MS Project for project management. So what is critical chain? She explained the critical chain method and the main differences between critical chain and critical path, and talked about some interesting applications.

I gave the October presentation on "The Learning Organization, A Post Modern Style of Business Management." I had submitted the paper on the subject to the Christchurch Conference, 2001, but had not been able to attend to present it in person.

Let me know what you really want (as the Spice Girls would say). – David Boland

My thesis is that we are each directed by our philosophy of life, or "world view" to use the jargon of sociology, and the two opposing philosophies are modernism, and post modernism. As operational research is a modernistic technique, I raised the question as to how operational researchers would have to adapt if they were to have a place as management adopts a post modern style, by transforming their businesses into a 'learning organisation'.

We are planning a final meeting for the year on 12 November, which will be a description of a practical dynamic programming application. The details are still being arranged.

We have been promoting the annual conference in all our notices, and we wish our Auckland colleagues all the best. We are sure it will be a good one.

The Wellington Branch congratulates Les Foulds on his appointment as a Research Fellow in the Centre of Excellence in Industrial Optimization, at Curtin University in Perth. The appointment is for

the first six months of 2003, and we look forward to hearing from him about his experiences and new developments in Industrial Optimization when he returns.

David Boland, Chairman, Wellington Branch

Puzzle Corner

Demonstrate your DP prowess by formulating solutions to generalisations of the following.

The famous Student Prince Pub, in Melbourne, offers a special deal on Friday nights. You can drink as much beer as you wish, provided that you consume only exactly 100 ml at a time. The Pub provides the beer in 200 ml mugs. At your disposal, there is also one empty 125 ml mug and one empty 75 ml mug.

In case you have already had some beer today and are unclear about the problem, here it is in a crystal clear form: devise a plan that involves the minimum number of pourings that will produce a mug containing exactly 100 ml of beer, given that you start with one full 200 ml mug, one empty 125 ml mug, and one empty 75 ml mug.

Needless to say, if you decide to pour beer from mug A to mug B, then the volume you pour is the smaller of the volume of beer in A, and the free, unfilled volume available in B.

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

ILOG Optimization Technical Web Seminars

Rapid Development and Deployment of ILOG CPLEX Applications Using ILOG OPL Studio

ILOG OPL Studio provides the quickest path from model development to application deployment of the powerful ILOG CPLEX optimizers. In this Web seminar, you will learn the methodology for developing ILOG CPLEX applications with ILOG OPL Studio. After a brief introduction to ILOG OPL Studio, examples will be given in Visual Basic and Java that illustrate the ease of creating ILOG CPLEX applications with the ILOG OPL Studio Component Libraries.

Getting Started With ILOG OPL Studio:
December 20, 2002

This web seminar will illustrate the basic features of the product, including model-data separation, math programming, constraint programming, scheduling, database integration and spreadsheet integration. The presentation will be followed by

an open Q&A and discussion period where we encourage you to ask questions. After this seminar, you should be able to get started solving your own problems with OPL Studio.

Please see the web site for specific times in your area and to register today. The seminar teleconference calls and simultaneous online presentations are sponsored by ILOG and are free for attendees. These seminars will be presented by Irv Lustig, Ph.D.

There will be an open Question and Answer session at the end of each presentation.

ILOG Optimization Web Seminar Schedule:
<http://seminar.ilog.com/iccdocs/seminarList.shtml>.

Mathematics-in-Industry Study Group Workshop (MISG 2003)

The Mathematics-in-Industry Study Group Workshop (MISG 2003) will be held at the University of South Australia from Monday February 3rd. to Friday February 7th.

Special Theme---Operations Research

Although we expect to have a similar range of problems this year, we intend to highlight our interest in Operations Research. As a first step in this process, we have invited two top-line researchers from the United States as special guest researchers.

Professor Walter Murray from Stanford University and Professor Bob Storer from Le High University have accepted our invitation to attend MISG 2003. They will join previous guests Dr. Peter Howell and Professor John King. Although the list of problems has not yet been finalised we are looking at several interesting problems in the general area of network performance, planning and operation.

This is your opportunity to meet and work with some leading experts in industrial modelling and optimisation. You can read more about MISG 2003 on our website www.unisa.edu.au/misg, where you will see details of previous MISG problems and information about registration.

Phil Howlett, Professor of Industrial and Applied Mathematics, Univ. South Australia, Director, MISG 2003.

International Transactions in Operational Research, official journal of IFORS

Building on a very successful conference, ITOR will publish a selection of the best papers presented at the IFORS conference as well as continuing to cover:

- International problems, such as those of fisheries management, environmental issues, and global competitiveness,
- International work done by major OR figures,
- Studies of world-wide interest from nations with emerging OR communities,
- Broadly relevant professional issues, such as those of ethics and practice.

All delegates of the recent 2002 Tri-annual IFORS Conference in Edinburgh automatically receive a subscription to ITOR as an inclusive part of their attendance.

SPECIAL IFORS CONFERENCE OFFERS - only £1.83 per issue!

However, IFORS are proud to announce that for a limited period all members of affiliated OR societies can now have the opportunity to subscribe to the journal at the special conference rate. Therefore, all ASOR members can now choose to receive either a one-year print subscription or 3 year's electronic access for only £44.

IFORS would like to offer all OR researchers who were unable to travel to the conference the opportunity to access the conference papers and subscribe to this uniquely international OR journal. If you wish to subscribe, please contact Brant Emery at Blackwell Publishing by email at bemery@blackwellpublishers.co.uk or by fax: +44 1865 381265.

Meetings Calendar

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/orsci-chennai/icord2002/

2-5 Jan 2003, Fourth International Conference on Operations and Quantitative Management (ICOQM), National Cheng Kung University, Tainan, Taiwan. www.icoqm.itgo.com.

31 Jan 2003, symposium to honour the retirement of Prof. Ernie Tuck, Univ. Adelaide, dinner to follow. Mrs D. Parish, School of Applied Mathematics, Univ. Adelaide, SA 5005, or David Scullen, dscullen@maths.adelaide.edu.au.

3-7 Feb 2003, 2003 Mathematics-in-Industry Study Group (MISG), Univ. South Australia (City East Campus), www.unisa.edu.au/misg, Kevin White, Kevin.White@unisa.edu.au.

1-4 Mar 2003, International Conference on Fuzzy Information Processing Theories and Applications, Beijing, China. Prof. Dr. Guoqing Chen. School of Economics and Management, Tsinghua University, Beijing 100084, China, fip03@em.tsinghua.edu.cn, <http://fip03.em.tsinghua.edu.cn>

4-6 May 2003, INFORMS 2003 Conference on OR/MS Practice, Sheraton Wild Horse Pass Resort and Spa in Phoenix, Arizona. Conference chair is Grace Lin, gracelin@us.ibm.com.

16-19 June 2003, ICIL2003, Vaasa, Finland. Preliminary call for papers. Abstract deadline 31 Dec 2002. Prof. Lilian Barros, Intern'l Centre for Innovation & Industrial Logistics, POB 212 Southampton SO14 0HG UK, lilianbarros@yahoo.com

6-10 July 2003, EURO/INFORMS Joint International Meeting, Istanbul, Turkey. Gulay D. Barbarosoglu, meeting chair, barbaros@boun.edu.tr, Murat Tarimcilar, organizing chair, muratt@gwu.edu.

7-9 July 2003, CTAC 2003, Computational Techniques and Applications Conference, Sydney Convention and Exhibition Centre, a meeting embedded in ICIAM 2003 July 7-11. Papers will be reviewed for publication after the meeting. Students are encouraged to submit papers. www.aeromech.usyd.edu.au/ctac2003, www.iciam.org, Jerard Barry, ctac@iciam.org.

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

20-24 July 2003, PICMET'03 "Technology Management for Reshaping the World." Submission deadline 31 Dec 2002. Dundar F. Kocaoglu, Professor and Chairman, Dept of Engineering and Technology Management, Portland State University, Portland, OR 97207-0751, USA, kocaoglu@etm.pdx.edu, <http://www.picmet.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/>.

Minuted by: Chuda Basnet

Minutes of the Thirty-Seventh Annual General Meeting, 2001

Date: 30 November 2001, 5:50 pm. **Place:** Riccarton House, 16 Kahu Road, Christchurch

Attending: Chuda Basnet, Kevin Broad, Shane Dye, Matthias Ehrgott, Les Foulds (in the Chair), John George, Vicky Mabin, Andrew Mason, Alistair McNaughton, Phil Neame, Nicola Petty, Andy Philpott, Fritz Raffensperger, Brendan Ring, and Cameron Walker.

Apologies: Tiru Arthanari, David Boland, John Buchanan, Jim Corner, Kerry Mayes, and John Paynter.

Minuted by: Chuda Basnet

A. Minutes of 2000 AGM: Les Foulds proposed that the minutes of the previous AGM (as sent out to all paid-up members) be accepted as true and correct. Seconded: Shane Dye. Carried unanimously.

B. Matters arising from the 2000 AGM: None.

C. President's Report. The report was circulated at the meeting. Les Foulds made a short presentation, highlighting membership growth from students, and proposed future conference venues. He expressed appreciation over the distinction and contribution of the visiting scholars for this year. He drew the attention to the two council meetings, the inaugural ORSNZ Hans Daellenbach Prize presented this year, and to the summer project award to World Vision. He gave thanks to all the people associated with the Society.

D. Treasurer's Report: The Treasurer's report and the Auditor's report for the 2000-2001 financial year were sent out to all members with the notice of the AGM. Kevin Broad pointed out that the 2000 annual conference did not make as much money as the 1999 conference, which resulted in a deficit. Even though the budget for 2001-2002 showed deficits, he felt that these were one-off, and an increase in membership fee was not merited. He also felt that if the Society wanted to spend money for web site or publicity, nothing was to be gained by deferring these expenses.

E. Membership Fees: Andrew Mason proposed that all the subscription fees stay unchanged for the forthcoming year. Seconded: Andy Philpott. Carried unanimously.

F. Honorary Auditor: The current auditor, Paul Rosse, was nominated for the next year by Andrew Mason, Seconded: John George. Carried unanimously.

G. Conference Venue: Andy Philpott proposed that the next annual conference be held at Auckland around late November / early December. The specific dates are to be decided later.

H. Election of Officers: The election of Society officers was chaired by John George. The following nominations were received.

Position	Nominee	Nominated by	Seconded by	
President	Les Foulds	Andrew Mason	Andy Philpott	
Vice President	John Davies	Vicky Mabin	Les Foulds	
Treasurer	Cameron Walker	Andy Philpott	Chuda Basnet	
Secretary	Chuda Basnet	Vicky Mabin	Shane Dye	
Council Members	Kevin Broad	Vicky Mabin	Andy Philpott	
	John Buchanan	Chuda Basnet	Les Foulds	
	Jim Corner	Chuda Basnet	Les Foulds	
	Eric Deakins	Les Foulds	Chuda Basnet	
	Stuart Dillon	Les Foulds	Chuda Basnet	
	Shane Dye	Andy Philpott	John Raffensperger	
	Matthias Ehrgott	Andrew Mason	Andy Philpott	
	Graeme Everett	Les Foulds	Vicky Mabin	
	Liaison Officer	Vicky Mabin	Les Foulds	John Raffensperger
		Andrew Mason	Vicky Mabin	Shane Dye
Nicola Petty		John Raffensperger	Shane Dye	
Auckland Branch Chair	Andy Philpott	Andrew Mason	Kevin Broad	
Wellington Branch Chair	David Boland	Vicky Mabin	Chuda Basnet	
Christchurch Branch Chair	John Raffensperger	Shane Dye	Nicola Petty	

John George proposed that all nominees be elected to these positions. Seconded: John Raffensperger. Carried unanimously.

I. Other Business

Les Foulds Away. Les Foulds informed the meeting that he may be away for the second half of 2002 and may make it difficult for him to function as the Society President. Vicky Mabin suggested delegating tasks to the Vice-President. John Raffensperger suggested that the problem could be alleviated by electronic communications.

Thanks to David Boland. Vicky Mabin proposed a vote of thanks to David Boland for his stewardship of the Wellington Branch. Carried with acclamation.

Thanks to John Raffensperger. Les Foulds proposed a vote of thanks to John Raffensperger and his Committee for hosting ORSNZ Twenty Naught One. Carried with acclamation.

Thanks to Kevin Broad. Les Foulds proposed a vote of thanks to Kevin Broad for his service as Society Treasurer in 2000-2001. Carried with acclamation.

Hosting APORS Meeting. Vicky Mabin sounded out interest in hosting the APORS conference in 2007. Andy Philpott felt that it did not do much for ORSNZ. There was a general feeling that further information, including the financial implications for ORSNZ was needed before a decision could be made. John George moved that the Council examine the opportunity of hosting APORS in 2007 and to bring a recommendation to the AGM. Les Foulds invited Vicky Mabin to investigate the matter. Carried unanimously.

Thanks to outgoing ORSNZ Council. John George proposed a vote of thanks to Les Foulds and other Council members. Carried with acclamation.

The meeting closed at 7:00 PM.

Note: The following spreadsheet has been reformatted for this Newsletter. – Editor.

Statement of Receipts and Payments of the Operational Research Society of New Zealand (Inc) Year: 1st July 2001 - 30th June 2002

Receipts		2001/02		2000/01	
Conferences	2000 conference	0.00		177.35	
	2001 Conference	9,725.00	9,725.00	7,530.00	7,707.35
GST¹	Refunds	316.56	316.56	380.03	380.03
Other Receipts	Interest & Donations	1,251.94		1,286.14	
	Newsletter advertising	255.00		0.00	
	Student Prize Sponsorship	0.00	1,506.94		1,286.14
Subscriptions	Corporate	1,340.00		480.00	
	IAOR			0.00	
	Individual	3,725.00		3,675.00	
	Journal etc	0.00		0.00	
	Past Years	1,300.00	6,365.00	985.00	5,140.00
Total Receipts			17,913.50		14,513.52
Total Payments (see next page)			25,783.39		18,471.79
Excess of Receipts Over Payments			-7,869.89		-3,958.27
Cash Balances	Opening Balance		32,198.18		36,156.45
	Closing Balance		24,328.29		32,198.18
	Cheques outstanding		0.00		
	Change in balance		-7,869.89		-3,958.27
Payments					
Branch Expenses	Auckland	101.01		0.00	
	Wellington	675.00		168.75	
	Christchurch	0.00	776.01	0.00	168.75

Conference Expenses	Website fees	249.50		83.25	
	2001 Conference	13,978.53		12,888.88	
	Previous Conference	1,000.00	15,228.03		12,972.13
Education	Visiting Lecturers	4,000.00		0.00	
	Daellenbach and YPP prizes	2,000.00		1,000.00	
	Student travel grants	515.13	6,515.13	271.00	1,271.00
GST	Payments				
Society Memberships	IFORS Subscription	241.83		0.00	
	RSNZ pre 2001	281.25			
	RSNZ 2001	281.25			
	Royal Society of New Zealand	309.38	1,113.71	0.00	0.00
Journals	APJOR purchases	0.00		594.96	
	Postage & stationary	0.00	0.00	25.10	620.06
Newsletter	Postage	374.46		429.41	
	Packing and administration	231.71		538.94	
	Printing and Design	447.40	1,053.57	496.06	1,464.41
Secretarial	Statement of Accounts & Auditor's Report	36.75		117.65	
	External Contracting				
	PO Box rental/redirection	215.00		215.00	
	Postage, packing & stationary	103.70	355.45	1,311.31	1,643.96
Treasury	Bank Charges (not VISA)	32.50		2.50	
	VISA	386.20	418.70	228.98	231.48
Miscellaneous	Miscellaneous	322.79	322.79	100.00	100.00
Total Payments			25,783.39		18,471.79

Notes: (1) Above figures include GST whenever GST applies.

Dr Cameron Walker, Treasurer

Report to the members of the Operational Research Society of New Zealand

The Operational Research Society of New Zealand is responsible for the preparation of the attached receipts and payments statement.

I have examined the accounting records of the Operational Research Society of New Zealand. This included agreeing opening and closing bank balances to bank statements and a review of receipts and payments recorded. The above Statement of Receipts and Payments for the year 1/7/01 - 30/6/02 is in agreement with the accounting records which, from my review, have been properly kept.

Control over income and expenditure prior to its being recorded is limited, and there can be no practical audit procedures to determine the effects of this limited control.

Based upon my review, and subject to the limitations mentioned above, nothing has come to my attention that indicated that any of the information disclosed is incorrect.

Dr. Paul Rouse, Hon Auditor, Ph.D. C.A.

ORSNZ Annual Report 2002

Membership: The current membership of the ORSNZ is as follows:

	2001	2002
Corporate Members	3	4
Corporate Sponsors		2
Life Members	2	2
Corporate Representatives	5	7
Standard Members	82	89
Overseas Members	12	14
Members (no branch)	12	13
Retired Members	4	4
Student Members	41	57
Total Membership	161	192

Carried unanimously.

It is pleasing to note that membership stayed at least the same level in all categories, and rose significantly in some, especially the student category. It is hoped that an enhanced ORSNZ website will increase membership even further.

Finances (Treasurer's Report attached). The Statement of Accounts, and Honorary Auditor's Report are available on the ORSNZ website and will be tabled at the 2002 AGM.

Conferences. The 36th Annual Conference of ORSNZ was held in Christchurch during 29 November - 1 December, 2001. The Council would like to thank the Organizing Committee, including: Fritz Raffensperger (Conference Secretary), Stephen Batstone, Hans Daellenbach, Shane Dye, Terri Green, Joan Mawson, Don McNickle, Nicola Petty, Grant Read, and Mark Stewart, for their splendid work in making it such a success. The 37th Annual Conference will be held in Auckland, during 28 – 30 November 2002, and the 38th Annual Conference will be held in Hamilton, during 20 – 22 November 2003.

The Branches. Branch activities are vital to the Society. Judging from the mix of meetings and visitors of the Branches this year, it is clear from the Branch Reports that OR is doing well in New Zealand. ORSNZ is pleased to continue to support Branch activities financially. The Council wishes to thank the Branch Chairs: Andy Philpott, David Boland, and Fritz Raffensperger, for their ongoing work, and also those Branch members who have supported them.

Newsletter. The Council is grateful for the high standards that the Christchurch group, especially Fritz Raffensperger as Editor and Joan Mawson as Coordinator, have maintained in producing the Newsletter. It is also gratifying that there has been a sustained level of interesting contributions.

Liaison. This important role, which has been formalised, has been ably carried out by Vicky Mabin. Any suitable OR teaching materials, as recently solicited by INFORMS, can be sent to the Liaison Officer.

Meetings. A Council meeting was held on 5 November 2002 in Hamilton. At the meeting, sponsored visiting lecturers, the Budget and other financial matters, the Summer vacation project, and publicity were discussed. The minutes of the meeting are attached. The decisions made at the meeting will be discussed at the AGM, and subsequently published in the next newsletter.

The AGM will be held in Auckland, on 29 November 2002, during the Annual Conference. All members are invited to attend. A further Council Meeting will be held immediately after the AGM.

The ORSNZ Hans Daellenbach Prize. This prize was awarded, for the first time, to Professor David Ryan of the University of Auckland, at the 36th Annual Conference in Christchurch in 2001. This was a prestigious and joyous event for the Society. The Council seeks nominations for the next award, in 2003.

Membership Database Development and the Documentation of Society Processes. There has been a pressing need for some time to alleviate the burdens of the Treasurer and the Secretary by improving the ORSNZ membership database and providing assistance. The Society will also function more efficiently if its processes defined by the portfolios of its officers were documented. These goals have been achieved with an enhanced membership database to be place for 2003, the provision of assistance for the Treasurer, and documentation of Society processes available on the ORSNZ website.

Relations with the Royal Society of New Zealand. ORSNZ has been represented at a number of RSNZ meetings. The Society congratulates Professor Andy Philpott on his being elected to chair the RSNZ Standing Committee on Mathematical and Information Sciences for two years.

Visitors. There were no visitors funded by ORSNZ in 2002. Nominations for the first half of 2003 are now invited, with a deadline of 15 December 2002.

Publicity. It was agreed at the last Council meeting to spend up to \$5000 in the coming financial year on publicity for the Society, subject to the condition that an independent competent party be hired to examine the needs of the Society and suggest a way forward. The remaining money is to be spent implementing the proposal subject to the approval of the Council.

The Summer Vacation Project. In 2001, ORSNZ constituted a mechanism to donate some OR expertise over the summer. This was the Summer Vacation Project, for which applications were called in July of that year. Unfortunately, it was not possible to find a suitable project – student combination and no project was carried out under the scheme. It was agreed at the last Council meeting to suspend the scheme.

Thanks. It is gratifying to learn that most Council members are willing to remain in office in 2003. I would like to thank all members, especially those on the Council, for their patience and support during the past 12 months. – Les Foulds, President, ORSNZ, 8 November 2002.

Treasurer's Report 2002. The funds available at the start of the period were \$32,198.18. The funds at the end of the period were \$24,328.29. This is an excess of expenditure over receipts of \$7,869.89.

The previous year's excess was \$3,958.27. It is worth noting that in the financial year 2001-2002, the Society spent \$4000 on visitors. This accounts for an additional \$4,000 expenditure over the previous financial year. This more than explains the discrepancy between the excesses between the past two financial years. It has since been agreed that at most \$2000 will be spent on visitors in any future financial year. The loss of the 2001 conference was another large contributor to the excess of spending over revenue in the last financial year.

Cameron Walker, Hon. Treasurer, 8.11.02

Auckland Branch Report 2002. The Auckland Branch held two meetings during the year, both meetings to encourage students to join ORSNZ. In March, the Auckland Branch hosted their annual student induction ceremony trading cans of ORSNZ beer in return for signatures on ORSNZ student membership forms. This proved to be a big success in stimulating student interest in OR, at least for the first fortnight of the academic year! We offer free ORSNZ student membership to students topping our OR/MS courses. The implicit contract is that they must enter the Young Practitioner Prize.

In July, we ran a special function to honour the three top students in our Year 3 Operations Research class. The students are Richard Kramer and Jack Lee from Engineering Science, and Wendy Lau from Statistics. These students were awarded complimentary student memberships of ORSNZ. Watch out for these names in upcoming Young Practitioner Prizes. The function was an opportunity for all the student members of ORSNZ to get to know each other and the faculty. We regard this activity to be an enjoyable and essential part of the education of the next generation of OR/MS professionals.

A number of our new student members will be presenting papers in the Young Practitioner Prize at the current conference.

Andy Philpott, Auckland Branch Chair, 21.10.02

Wellington Branch Report 2002 Please see "Wellington News" above. - Editor

Christchurch Branch Chair & Newsletter Editor's Report 2002. The Canterbury ORSNZ branch has been tracking along with the activities in the Department of Management. We bid farewell to our distinguished visitors, Hsiao-Fan Wang, and Lawrence and Anne Wein. Grant Read retired, but is still occasionally in the office as an adjunct professor. We had two new hires - Cita Wood and John Giffin. We have nominated two ORSNZ Visiting Lecturers for 2003 - Hsiao-Fan Wang and Mike Wright.

We have continued to edit the Newsletter in the most heartfelt way! Many thanks to all those who have contributed. Thanks to Joan Mawson for sorting out missing addresses and for managing sticky labels.

John F. Raffensperger, Christchurch Branch Chair, Newsletter Editor, 15.10.02

Liaison Officer's Report 2002. We have continued to keep in touch with overseas and local organisations through various media, including newsletters and email bulletins, and have provided a conduit for information to flow to members, for example with excerpts and articles in our quarterly ORSNZ Newsletter. Likewise, we have continued our outreach by sending our newsletter to outside organisations and maintaining links with individuals and kindred bodies.

On the international front, IFORS was held in Edinburgh in July 2002, with four ORSNZ people in attendance. Papers from the conference will be available in International Transactions of OR. We have supported three new societies in their applications to enter the IFORS fold, and are contributing to a compilation of OR teaching cases being coordinated by IFORS.

Vicky Mabin, 4.11.2002.

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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.