NEWSLETTER

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

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Newsletter publication dates should be 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, Matthias Ehrgott, newsletter@orsnz.org.nz. Acceptable formats are plain text, word, or graphic formats jpg, tiff, and gif. PDF or postscript documents are *not acceptable*.

Editorial

If you are a regular reader of the newsletter you will find that two of the usual columns are missing, the letter from the president and the chapter news. They were not supplied. It seems that being in France while preparing an issue does not make the job of collecting contributions easier. You will have noticed that the publication dates of March, June, September, December are not actually met. It's been impossible to compile four issues in regular intervals for lack of contributions. Thanks to Shane for his very timely article on the confrence, Lizhen, Andrea, and Oliver for the article on studying OR as international students in NZ.

Matthias Ehrgott

Errata

Doing a cleanup in my room today, I came across the December 2005 newsletter, which had various photos from the conference. On the front is the photo of the attendees, but I've noted that the caption is a bit incorrect. Now normally I wouldn't bother doing anything, but having had such fun last year with the photo quiz, I can imagine that in years to come, you'd get cries of "unfair" from Wellingtonians, who would recognise the venue and realise that Govt House is where the Governor General lives and it's the other side of town, and doesn't have steps like these. So for the record, the place is the steps of the Old Government Buildings (it's actually the back steps rather than the front steps if you want to be pedantic!!)

I expect someone has already mentioned that the captions for the people on page 5 contain an error too? Where you have John George, should read John Scott.

Thanks so much for providing these photos - they were much appreciated by all and will continue to be. As an idea for an article, perhaps you could inveigle someone into writing a report on the conference this year for the newsletter?

Vicky Mabin

41st Annual Conference of the ORSNZ

Many more photos can be found here:

\\Esp005-web.esc.auckland.ac.nz\EngSci-web\Organisations\ORSNZ\conf41\Images\General\index.html
\\Esp005-web.esc.auckland.ac.nz\EngSci-Web\Organisations\ORSNZ\conf41\Images\YPP\index.html

The minutes of the annual general meeting are on the society website at www.orsnz.org.nz.

The 41st Annual ORSNZ Conference was successfully held at the University of Canterbury. The almost 60 participants all had (or at least appeared to this conference organiser to have) a wonderful time. This is thanks, in part, to the kind sponsorship from CRA International, Transpower, the Electricity Commission, Orion New Zealand Limited and Hoare Research Software; and to the efforts of Conference Organisation Committee, who made the Committee's Chair (me) look efficient and well organised — no mean feat by them.

Prof. Nigel Healey

Professor Nigel Healey, Pro-Vice Chancellor of Business and Economics at the University of Canterbury, officially 'opened' the Conference with an address which stressed the importance of operations research for business in New Zealand. The College was pleased to host this year's conference and the organising committee sincerely thanks them for their support.

Prof. Philipott is awarded the Daellenbach Prize with E. Grant Read, far left, David Ryan, left and Hans Daellenbach, right

The two keynote speakers were Professor Andrew Philpott and Professor Alan Stenger. The first keynote address pre-processed the opening with Professor Philipott congratulated on being awarded the Daellenbach Prize by the Society. He gave an interesting reflection on the highlights of his career. A career punctuated by stochastic optimisation and energy markets (perhaps not surprising given the influence operational research in New Zealand has had and continues to have in the energy sector). It was easy to agree with Dave Ryan's early advice to Andy that such a successful career would have been all the harder had he focused instead on infinite dimensional linear programming.

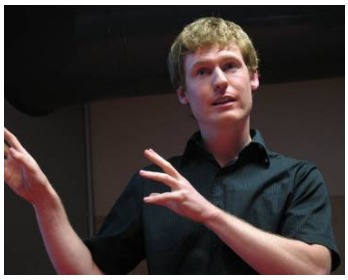
Prof. Alan Stenger

The Friday keynote was from Professor Alan Stenger, a new recruit to New Zealand and the ORSNZ. Alan reflected on 40 years of researching and implementing inventory management systems. He provided some interesting insights into the evolution of inventory management and lamented the many firms who either do not employ the standard, well tested inventory management techniques or who misuse them and thereby reduce or negate their usefulness.

This year a staggering 14 projects were showcased to the ORSNZ during the Young Practitioner's Prize sessions. The standard of presentations was very high, prompting Professor Hans Daellenbach, one of the YPP judges this year, to remark that many of the supervisors could take some tips from the students. The range of projects was also diverse, covering almost everything from the analysis of strategies for the orienteering based rogaining events to improvements to various planning problems for major airlines, and

Bronwyn Erasmuson
YPP entrant

Richard Lusby: 1st YPP Ph.D. Section



Stuart Donovan: 1st YPP Masters/Honours Section

applications from healthcare to electricity generation planning to railways. The judges had an extremely difficult job in evaluating the various projects, choosing to award Richard Lusby first among the Ph.D. projects and Stuart Donovan first and David Richards second among the Masters and Honours projects. Congratulations Richard, Stuart and David, and well done to all of the entrants. Special thanks to this year's judges: John George, Hans Daellenbach and Bruce Benseman.

David Richards: 2nd YPP Masters/Honours Section

The remainder of Conference program was also interesting and diverse, showing that operations research is indeed alive and well within New Zealand, that New Zealand operations research is predominately of a very applied nature and tackles interesting and important problems. Participants were also treated to some interesting international application such as reliability assessment for the NASA space shuttle program and statistical modelling of sports betting.

Terri Green or Green 'T'?

The banquet and other social functions were also enjoyed by all, even the few harried organisers. Thanks to Nicola, Terri and Don for organising this; your efforts did not go unnoticed.

Shane Dye

People & News

Peter Ladislaw Hammer

23 December 1936 – 27 December 2006

Peter Ladislaw Hammer was born in Timisoara, Romania, on December 23, 1936. He earned his Ph.D. in mathematics under Academician Grigore C. Moisil at the University of Bucharest in 1966. He defected to Israel in 1967 where he became a professor at the Technion in Haifa. After moving to Canada, he taught from 1969 to 1972 at the University of Montreal, and from 1972 to 1983 at the University of Waterloo. In 1983, he moved to the USA and became a professor at Rutgers University, where he founded RUTCOR - the Rutgers Center for Operations Research. He remained the director of RUTCOR until his untimely death in a tragic car accident, on December 27, 2006.

For more than 40 years, Peter Hammer has ranked among the most influential researchers in the fields of operations research and discrete mathematics. He made numerous major contributions to these fields, launching several new research directions. His results have influenced hundreds of colleagues and have made a lasting impact on many areas of mathematics, computer science, and statistics.

Most of Peter Hammer's scientific production has its roots in the work of George Boole on propositional logic. More than anyone else, Peter Hammer used and extended Boole's *machina universalis* to handle questions relating to decision making, analysis and synthesis as they arose in natural, economic and social sciences. Over the span of his scientific career, he conducted eclectic forays into the interactions between Boolean methods, optimization, and combinatorial analysis, while adapting his investigations to the most recent advances of mathematical knowledge and of various fields of application. Among the main research topics which received his attention, one finds an impressive array of methodological studies dealing with combinatorial optimization, some excursions into logistics and game theory, numerous contributions to graph theory, to the algorithmic aspects of propositional logic, to artificial intelligence and, more recently, to the development of innovative data mining techniques. His publications include 19 books and over 240 scientific papers. (See the Web site `rutcor.rutgers.edu` for a complete bibliography.)

At the very onset of his career, as a researcher at the Institute of Mathematics of the Academia of Romania, Peter Hammer wrote several important articles on transportation problems, jointly with Egon Balas. At the same time his advisor, Grigore Moisil, directed him to the study of Boolean algebra. In this field, a central role is played by functions depending on binary variables, and taking either binary values (i.e., Boolean functions) or real values (i.e., pseudo-Boolean functions). In a series of papers, Peter Hammer demonstrated that a large variety of relevant problems of operations research, combinatorics and computer science can be reduced to the optimization of a pseudo-Boolean function under constraints described by a system of pseudo-Boolean inequalities. A further main conceptual step in his work was the characterization of the set of feasible solutions of the above system as solutions of a single Boolean equation (or, equivalently, of a satisfiability problem). This led him, in joint work with Ivo Rosenberg and Sergiu Rudeanu, to the development of an original approach inspired from classical Boolean methods for the solution of a large variety of discrete optimization problems.

This research project culminated in 1968 with the publication of the book *Boolean Methods in Operations Research and Related Areas* (Springer-Verlag, 1968), co-authored by Sergiu Rudeanu. This landmark monograph, which founded the field of pseudo-Boolean optimization, has influenced several generations of students and researchers, and is now considered a "classic" in Operations Research.

In a sense, Peter Hammer's early work can be viewed as a forerunner of subsequent developments in the theory of computational complexity, since it was in effect demonstrating that a large class of combinatorial optimization problems is reducible to the solution of Boolean equations. However, this purely "reductionist" view of his work would be quite narrow. In fact, Peter Hammer systematically used the "canonical" representation of various problems in terms of Boolean functions or Boolean equations to investigate the underlying structure, the "essence" of the problems themselves. More than often, this goal is met through a simplifying process based, once again, on the tools of Boolean algebra. This approach provides, for instance, a simple way to demonstrate that every system of linear inequalities in binary variables is equivalent to a set of inequalities involving only 0,1,-1 coefficients, as observed in a joint paper by Frieda Granot and Peter Hammer (1972). It also led Peter Hammer, Ellis Johnson and Uri Peled (1975) to early investigations into the facial structure of knapsack polyhedra.

In a related stream of research, Peter Hammer established numerous fruitful links between graph theory and Boolean functions. In a famous joint paper with Vašek Chvátal on the aggregation of inequalities in integer programming (1977), he introduced and characterized the class of threshold graphs, inspired by threshold Boolean functions. Threshold graphs have subsequently been the subject of scores of articles and of a book by Mahadev and Uri Peled, two of Peter Hammer's former doctoral students. Other links between graphs and Boolean or pseudo-Boolean functions have been explored in joint work with Claude Benzaken, Dominique de Werra, Stephan Foldes, Toshihide Ibaraki, Alex Kelmans, Vadim Lozin, Frédéric Maffray, Bruno Simeone, etc.

Quadratic 0-1 optimization was one of Peter Hammer's main fields of investigation. The theory of roof-duality (1984), jointly developed with Pierre Hansen and Bruno Simeone, builds on concepts from linear programming (linear relaxations), Boolean theory (quadratic Boolean equations) and networks (maximum network flow problems) to compute best linear approximations of quadratic pseudo-Boolean functions and tight bounds on the maximum value of such functions. Further research along similar lines was conducted by Peter Hammer in collaboration with Endre Boros, Jean-Marie Bourjolly, Yves Crama, David Rader, Gabriel Tavares, X. Sun, etc.

Peter Hammer also showed interest in the application of Boolean models to artificial intelligence and related fields, as witnessed by numerous joint papers with Gabriela and Sorin Alexe, Martin Anthony, Tiberius Bonates, Endre Boros, Yves Crama, Oya Ekin, Toshi Ibaraki, Alex Kogan, Miguel Lejeune, Irina Lozina, and other collaborators. His contributions bear on automatic theorem proving, compression of knowledge bases, algorithms for special classes of satisfiability problems, etc. About 20 years ago, he launched an innovative approach to data mining based on a blend of Boolean techniques and combinatorial optimization. The basic tenets of this approach were presented in a joint paper with Yves Crama and Toshihide Ibaraki (1988) and were subsequently developed by Peter Hammer and his coworkers into a new broad area of research, which he dubbed *Logical Analysis of Data*, or LAD for short. The effectiveness of the LAD methodology has been validated by many successful applications to real-life data analysis problems. In particular, some front-of-the line medical centers are increasingly using LAD in the actual practice of medical diagnosis for a variety of syndromes.

Many aspects of Peter Hammer's immense contribution to the study of Boolean functions and their combinatorial structure are to be found in a forthcoming monograph entitled *Boolean Functions: Theory, Algorithms, and Applications*, coauthored by Yves Crama and several other close collaborators of Peter Hammer, to be published by Cambridge University Press in 2007.

Beside his scientific production, Peter Hammer will undoubtedly be remembered for his vigorous contribution to and promotion of discrete mathematics and operations research. He was the founder and editor-in-chief of several highly-rated professional journals, including *Discrete Mathematics*, *Discrete Applied Mathematics*, *Discrete Optimization*, *Annals of Discrete Mathematics*, *Annals of Operations Research* and the *SIAM Monographs on Discrete Mathematics and Applications*. At Rutgers University, Peter Hammer was the founding Director of the operations research program, and he was largely responsible for developing RUTCOR into an internationally recognized center of excellence and an open institute, where seminars, workshops, graduate courses, and a constant flow of visitors create a buzzing and

stimulating research environment. He was also a tireless organizer of professional conferences and workshops, where he always made sure to provide opportunities for interactions between experienced scientists and younger researchers.

The importance of Peter Hammer's scientific contribution was acknowledged by the award of numerous international distinctions, including the "George Tzitzeica" prize of the Romanian Academy of Science (1966), the Euler Medal of the Institute of Combinatorics and its Applications (1999), and honorary degrees from the Swiss Federal Institute of Technology in Lausanne (1986), the University of Rome "La Sapienza" (1998), and the University of Liège (1999). He was a Fellow of the American Association for the Advancement of Science since 1974, and a Founding Fellow of the Institute of Combinatorics and its Applications. Several conferences were organized in his honor, including the First International Colloquium on Pseudo-Boolean Optimization (Chexbres, Switzerland, 1987), the Workshop and Symposia Honoring Peter L. Hammer (Caesarea Rothchild Institute, University of Haifa, 2003), and the International Conference on Graphs and Optimization (GO V, Leukerbad, Switzerland, 2006).

Peter Hammer was not only an outstanding scholar and a tireless organizer, but also a kind, generous and humorous human being. He relished the interaction with students and colleagues, and made everybody feel comfortable to work with him, be it on a mathematical question (which he was always keen to formulate) or on planning a conference. He supervised numerous graduate students with respect and fatherly understanding, considering each one of them as his "best student". He was also a true "citizen of the world": born in Romania from a Hungarian family, he subsequently became a Canadian citizen and afterwards a US citizen, wrote joint papers with co-authors of 28 different countries, fluently spoke 6 languages (or more), travelled the world extensively, spent extended periods of time in Belgium, France, Israel, Italy, Russia, Switzerland and many other countries, and developed an extended network of friends and coworkers on all continents.

Finally, last but certainly not least, Peter Hammer was a loving husband, father and grandfather. He is survived by his wife, Anca Ivanescu, whom he married in 1961 and whose family name he assumed for a few years, by his two sons Alexander and Maxim, and by four beloved grandchildren, Isabelle, Madeline, Annelise, and Oliver.

He will be missed by everyone who knew him, always and forever.

Endre Boros[1], Yves Crama[2] and Bruno Simeone[3]

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19th International MCDM Conference
Auckland
January 7 – 12 2008

MCDM 2008

The 19th International Conference on Multiple Criteria Decision Making will be held in Auckland! The International Executive Committee of the MCDM Society voted unanimously for Matthias Ehrgott's proposal. For the second time in its history, this biannual meeting will take place in the Southern Hemisphere (after Cape Town in 1997). Keep 7 to 12th January marked in your diaries.

Puzzle Corner

PUZZLE 8

Two groups of three yaks in single file meet each other on a narrow bridge in Tibet. The bridge is too narrow for them to walk past each other or to turn around; and yaks refuse to move backwards. The only way that they can get past is by jumping over each other's backs. Any yak can jump over one yak's back, but none can jump over two or more. When they meet there is exactly one yak-length separating the two groups of yaks. What is the minimum number of moves necessay before the two groups can trot on their merry way?

Source: Wilkins, Diversions: Exercises for Mental Athletes, Methuen Publishers, New Zealand, 1982.

SOLUTION TO PUZZLE 7

The village of the man is not bigger than the village of the woman. So the correct answer is "no". Also, the village of the child is not bigger than the village of the man. So, once again, the correct answer is "no". This does not mean however, that the child necessarily answered, "no".

Les Foulds

Chapter News

No chapter news were reported for this issue.

Studying OR in NZ as International Students

We are a group of international PhD students doing Operations Research at the Department of Engineering Science, University of Auckland. We are Lizhen, Andrea and Oliver. Lizhen is from China, Andrea and Oliver are from Germany.

The Department of Engineering Science has one of the best Operations Research groups in New Zealand. The professors and lecturers are knowledgeable in their research fields and are willing to contribute their time and efforts to help students with their research. We feel that we are part of the research group instead of working alone. All PhD students work in the same office. We enjoy the benefits of working together, learning with and from other PhD students.

The Department of Engineering Science has a great academic atmosphere. There are seminars in the department once a week, with professional presentations followed by discussions. Many presentations inspire us with new ideas. We also have many international researchers and PhD students who are doing Operations Research visiting us here. Certainly, the communication with them is rewarding.

As PhD students at the Department of Engineering Science, we are part of an international community. Not only can we attend conferences within New Zealand but also have the chance to travel abroad attending international Operations Research conferences during our PhD studies. This gives us the opportunity to establish a network within our field of interest at the Univer-

sity of Auckland, throughout New Zealand and internationally. Last year, we all attended the ORSNZ 2006 conference in Christchurch. During the conference, every one of us presented her or his work and we had the chance to discuss our work with other researchers in New Zealand. The photo below is taken during the conference. It shows Ziming, Richard, Lizhen, Oliver, Andrea, Amir, Kavinesh and Anthony (from left to right). All but Kavinesh are PhD students at the Department of Engineering Science. Kavinesh finished his PhD last year.

Lizhen's research project is on Multiobjectve Radiotherapy Planning. In 2006, Lizhen had the chance to attend the EURO Summer Institute on "Optimization Challenges in Engineering: Methods, Software and Applications" between August 18 and September 2, 2006 and the GOR conference between September 4 and September 6. At the summer institute Lizhen got the chance to work with another researcher in Germany. It was a great experience for her. During the GOR conference, she presented her work and got guidance from a famous professor in the field of multiobjective optimization, and she also attended a variety of presentations and learned more about areas of her discipline that are not researched in our department.

Oliver works on Airline Scheduling problems and he very much enjoys the close interaction with the airline industry when he presents results of his research. He is looking forward to attend the "Robust Optimization Summer School" in July this year which is held in the Italian alps. After the Summer School he will travel to Prague to present his research at the EURO conference.

Andrea works on Multiobjective Routing and Transportation problems. She is looking forward to visiting two of her supervisors in Nantes, France, later this year. She also had the opportunity to teach a summer school course on Mathematical Modelling. She enjoyed the teaching as well as the contact with students.

We all find our PhD very challenging and therefore we work very hard. Certainly, all work and no play makes Jack a dull boy, so we do relax and exercise during the weekend. New Zealand, as the beautiful country it is, invites to a lot of outdoor activities which we all enjoy, no matter if it is just relaxing on the beach, tramping in the mountains, sailing or doing sightseeing trips. If we do not go away we play badminton in the gym or have barbecues with friends just like real Kiwis.

Living in a foreign country is challenging, especially during the first year. Due to language and cultural differences, it takes a while to feel at home and meet new friends. Since New Zealanders are very friendly and open minded it does not take a long time to adjust. We feel very well at home now and have many friends. Working on challenging research projects and living in the environment New Zealand has to offer makes studying OR a great experience for all of us.

Andrea Raith, Lizhen Shao, Oliver Weide

Meetings Calendar

New Zealand

19th International Conference on Multicriteria Decision Making
Auckland, New Zealand, 7-12 January 2008

Asia Pacific

Fourth International Conference on Evolutionary Multi-Criterion Optimization
Matsushima/Sendai, Japan, 5-8 March 2007-02-14
http://www.is.doshisha.ac.jp/emo2007/

IEEE Symposium Series on Computational Intelligence
Honolulu, Hawaii, USA, 1 – 5 April 2007
http://www.ieee-ssci.org

TRISTAN VI - Sixth Triennial Symposium on Transportation Analysis
Bentota, Sri-Lanka, 10 – 15 June 2007
http://tristan.epfl.ch/

International

INFORMS Practice Conference
Vancouver, Canada, 29 April – 1 May 2007
http://www.informs.org/Conf/Practice07

Industrial Engineering and Systems Management 2007
Beijing, China, 30 May – 2 June 2007-02-14
http://www.i4e2.com/iesm/

Twelfth Conference on Integer Programming and Combinatorial Optimization
Ithaca, USA 25 – 27 June 2007
http://ipco2007.orie.cornell.edu

Seventh Metaheuristics International Conference MIC 2007
Montreal, Canada, 25 – 29 June 2007
http://www.crt.umontreal.ca/mic2007/

7th Annual INFORMS Revenue Managment and Pricing Section Conference
Barcelona, Spain, 28 -- 29 June 2007
http://www.econ.upf.edu/informs/

INFORMS International
Rio Grande, Puerto Rico, 8 – 11 July 2007
http://www.informs.org/Conf/PuertoRico2007

EURO XXII 22nd European Conference on Operational Research
Prague, Czech Republic 8 – 11 July 2007
http://euro2007.vse.cz/

ICCOPT II & MOPTA07 Second International Conference on Continuous Optimization and Modeling and Optimization: Theory and Applications
Hamilton, Canada, 13 – 16 August 2007
http://iccopt-mopta.mcmaster.ca/

11th Conference on Stochastic Programming (SPXI)
Vienna, Austria 27 – 31 August 2007
http://www.spxi.org/

Operations Research 2007
Saarbruecken, Germany, 5 – 7 September 2007
http://www.or2007.de

The 7th International Conference on Optimization: Techniques and Application: ICOTA
Kobe, Japan 12—15 December 2007-02-14
http://www.iict.konan-u.ac.jp/ICOTA7/index.html

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

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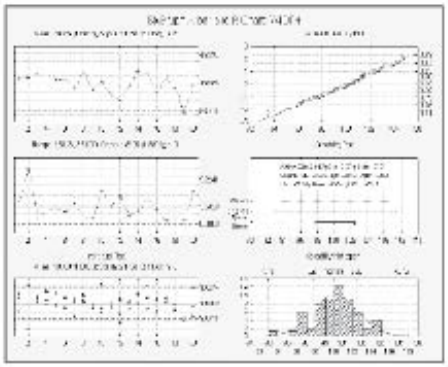

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