OR NEWSLETTER

December 2011

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

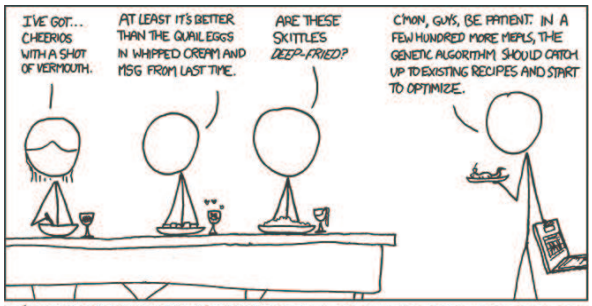
Contents

The newsletter is published three times per year. Regular dates are April, August, and December. Submissions deadline is the 15th of the month for the following month's issue. Send contributions by email to the Newsletter editor at newsletter@orsnz.org.nz.

President's Report

This president's column comes from the Danish Technical University (DTU), located just out of Copenhagen, where I am on sabbatical. Thanks to the ongoing collaborative work of Professor David Ryan (ORSNZ President 2003-2007), the University of Auckland enjoys very strong connections with DTU. David holds a position as an Adjunct Professor at DTU Transport and DTU Management Engineering. As part of this role, David visits DTU every year to deliver a specialised PhD course on set partitioning and column generation techniques which has proven to be very popular with the DTU students.

David's 2011 visit here finished a few months ago, after which he travelled to the UK to deliver an invited plenary address at OR53, the 53rd conference of the UK OR Society. An invitation such as this is a great honour that reflects well on the reputation of NZ OR. I am told that David gave a provocative and challenging presentation in which he expounded his views on traditional heuristic approaches (perhaps summarised by the cartoon below?) and argued that optimisation techniques and heuristics should be used together to create more powerful blended solution approaches. David's talk was most timely in that it echoes a growing interest I have observed in the new field of MIP-heuristics (aka 'math-heuristics' or even 'matheuristics'); I'm sure we will continue to hear more about these blended approaches over the next few years.



(Used with permission; see http://xkcd.com/720/)

One benefit of David's regular visits to Denmark has been a steady stream of high quality Danish PhD students coming down to Auckland to fulfil a DTU requirement to spend time at an overseas university. This has resulted in many excellent DTU students visiting Auckland, including amongst others Anders Dohn who was placed second in the 2008 ORSNZ Young Practitioners Prize. I'm sure our OR conferences will continue to benefit from these visitors.

A few weeks ago, I attended the PhD defences of three students, including Matias Rasmussen who worked with David Ryan on a novel "subsequence generation" technique for solving large set partitioning problems. These defences are public, and were attended by other students and family members, as well as several external examiners. (The examiners included ORSNZ member Professor Mikael Rönnqvist from Bergen, Norway, whom I mentioned recently as an Edelman finalist.) The examination was followed by a departmental celebration, complete with champagne, to which, again, family mem-

bers were invited. It was great to see such public recognition being given to the completion of a PhD. There is a lot to be said for a public defence process.

One of the other PhD defences was examined by Professor Dr Marco Luebbecke, a column generation expert from RWTH Aachen University, Germany. I recently attended a session organised by Marco at the OR 2011 conference in Zurich, Switzerland, where I learnt about his work on automatic decomposition techniques. His group has developed software that can take a Mixed Integer Programming formulation, and automatically identify an appropriate subproblem for use in Dantzig-Wolfe decomposition. This automatic reformulation can give a stronger relaxation that is easier to solve. His results showed some good run-time improvements on the harder problems in the standard MIPLIB problem library. This approach is similar to that that used in the DIP framework being developed by the ORSNZ 2008 Visiting Lecturer Ted Ralphs, which lies at the heart of the Python DiPPY software being developed at Auckland. If Marco's automatic reformulation techniques prove successful, then it is only a matter of time until they are incorporated within commercial software such as Gurobi and CPLEX, meaning that off-the-shelf solvers will come closer to replacing many of the bespoke column generation solutions that are being developed today. This will represent a very significant advance in the application of OR solution approaches.

Talking of Gurobi, I have been enjoying developing Gurobi optimization models using the built-in Python interface. It really makes a difference having data structures such as dictionaries and lists built-in to the language syntax rather than being simply provided by libraries. I first came across Python a decade ago when a colleague recommended we embed Python into our ambulance simulation software. We followed his advice, a decision we are very pleased with. It is a sign of Python's success that Gurobi chose this open source scripting language as their primary means of controlling their optimiser. If you haven't tried Python, then give it a go or recommend it to a student, perhaps via the free Python-based PuLP system for building optimization models. And if you're an academic, then don't forget that Gurobi is free for academic use.

At DTU, I have been sharing an office with fellow New Zealander and ORSNZ member John (Fritz) Raffensperger, also visiting DTU on sabbatical. Fritz has inspired me to look at a districting problem that he solved recently to help with planning for the New Zealand Census.[1] This problem involves partitioning a graph into a forest of trees, with each tree containing nodes whose weights sum to a value lying between user-specified bounds. Fritz has built some great tools for visualizing his solutions, which really help in getting insights into the properties of solutions. I hope that we will be able to present jointly on this work at a future ORSNZ conference.

Our excitement at making progress on the districting problem was rather tempered by reports in the news that Canterbury University appears to be pushing forward with plans to axe 350 jobs. My thoughts continue to be with our Christchurch members during these difficult times.

IFORS 2011 & APORS 2012

Before heading to Denmark, I attended the triennial International Federation of OR Societies (IFORS) conference in Melbourne. This conference was most successful, despite the conference organiser, Patrick Tobin, having to deal with a rapidly rising Australian dollar which threatened to reduce registration numbers. The attendance included over 1000 participants, including a good representation from ORSNZ members. My duties at the conference included meetings for both IFORS[2] and APORS (Asia Pacific OR Societies). I learnt, to my surprise, that IFORS is extremely wealthy with $1.4 million in the bank, thanks to strong journal revenue and prudent management by their treasurer, Peter Bell. APORS, on the other hand, has no resources and operates on a much more informal basis. Our APORS meeting included a discussion of the next triennial conference, APORS 2012, which will take place from July 28-30 2012 in Xi'an, China. Xi'an is an ancient city best known as home of the famous terra cotta warriors and horses. See http://apors2012.csp.escience.cn for more details of this conference, which I recommend to ORSNZ members. Also keep an eye out for the new APORS web site, under the likely address of www.apors.asia, that is being developed.

ASOR + ORSNZ

During the IFORS conference, I presented at an IFORS OR Practice Survey session (see http://ifors.org/web/ifors-or-practice-survey/) which concluded with a discussion about possible structures for the future of OR societies. This lead to an interesting discussion with Simon Dunstall from ASOR (the Australian Society of OR) about the possible benefits of greater collaboration between the NZ and Australian societies, including possible closer ties between the memberships of the two societies under a combined self-service low-cost internet based model. I would be interested in hearing what members think of this as a possible future direction for the ORSNZ.

Before the IFORS conference, I attended *Integer Programming Down Under: Theory, Algorithms and Applications*, a workshop in Newcastle, Australia, organised by Natashia Boland, Martin Savelsbergh (one of the ORSNZ 2011 conference plenary speakers) and Hamish Waterer (recent ORSNZ secretary extraordinaire). Natashia is doing a great job in growing the OR group at Newcastle. It was fantastic to see so many internationally recognised members of the OR community travelling down-under for this occasion. I hope there will be more high quality events like this in the future.

Andrew Mason
President

[1] "A New Algorithm for the Collection Area Problem," John F. Raffensperger, *Proceedings of the 43rd Annual Conference of the ORSNZ*, 2008, p187-189.

[2] Minutes of the IFORS Board of Representatives Meeting, July 12, 2011.

http://ifors.org/newsletter/september2011_cp.pdf

Chapter News

Auckland News

Greetings from Auckland (actually I write Auckland news in NY for this issue, so read with a Yankee accent)! :) The semester and the year have finished with success and we have completed well over a dozen OR related part iv projects ranging from patient stay lengths of time to operations research applied to electric vehicles.

We have had several OR visitors this quarter including Professor Mike Powell from Cambridge University. Our most important news is the award of the prestigious Pickering medal to Professor David Ryan. The criteria for the award read:

> *"The Medal is to be awarded annually to a person who, while in New Zealand, has through design, development or invention performed innovative work the results of which have been significant in their influence and recognition both nationally and internationally, or which have led to significant commercial success."*

To the best of your correspondent's knowledge, David is the first operations research expert to win this medal.

To add to the OR success in Auckland, Matthias Ehrgott was awarded the Edgeworth-Pareto medal, Andrew Mason won the Coin-OR cup and Andy Philpott received a service award from Operations Research.

Lastly, Tony Downward and Golbon Zakeri attended INFORMS (in Charlotte) and were present at the ceremony where Fritz, Mark and Grant were presented with their ENRE best paper prize. Many congratulations to you all.

Happy holidays from the Auckland branch.

Golbon Zakeri

Wellington News

Prof Matthias Ehrgott kindly travelled to Wellington in September to give a talk entitled "Bridging the Gap between Real World Decision Making and Mathematics: Multiobjective Optimisation in Action". This was a repeat of his inaugural professorial lecture. It was well received by a large group of undergraduates, academics and the local ORSNZ faithful.

Huge congratulations to Vicky Mabin who has been promoted to Professor of Management in the latest round of promotions. Some snippets from her citation ... Vicky has an established international reputation for her research in the domain of Theory of Constraints. She is a dedicated and innovative teacher who effectively weaves together her research, consulting and industry experience to inform her teaching. Vicky is an effective postgraduate supervisor, and her teaching performance profile has been

of a remarkably high standard throughout her career. In her role as Associate Dean Learning and Teaching for the Faculty of Commerce and Administration, Vicky has taken key responsibility for the Assurance of Learning requirements for the Faculty's AACSB accreditation and used this as an opportunity to bring about fundamental changes in the attitudes to learning and teaching within the Faculty which has greatly enhanced the learning experiences for students. Many congratulations from us all.

Mark Johnston

Photos of the Kirkwood Village, Canterbury.

Canterbury News

Latest news on the Commerce Building is that "the building core" now needs "demolition to the ground level", with re-design and re-construction lasting until mid 2013. Volume limits on what could be retrieved from offices saw mountains of journals, books, and papers head for the dump, so we now head towards a bold new eco-friendly paperless future. Unfortunately, collateral damage from the quakes may include some deconstruction of the MSCI group too. Campus wide enrolments only dropped by 13% this year, and voluntary redundancies are being called for first, but "teachers of smaller classes" are definitely at risk as the university sheds staff to deal with a 25% drop in first year students and a 30% drop in overseas students. For now, though, the MSCI group is able to teach all its classes (somewhere) on campus (no more Sunday School rooms etc) and is settling into new quarters at the Kirkwood Gulag .. er Village. With 16 desks per "hut" the open plan office areas are not really great for doing any actual work, or meeting students, but apart from that it's actually not all that bad, with a funky alpine sort of "national park" vibe… AND AT LEAST IT CAN'T FALL DOWN.. or not very far down anyway!

Meanwhile, Fritz Raffensperger has been very sensibly away, visiting Denmark Technical University, where he developed new work on the regionalization problem in collaboration with Andrew Mason, and then California Institute of Technology, learning about experimental economics with Charles Plott. While in the US he was pleased to learn that the Water Markets Research Group had (jointly) won an INFORMS ENRE Best Paper prize for "A Deterministic Smart Market Model for Ground Water", published in *Operations Research* in 2009. Fritz has also been enjoying the opportunity to bask in the sun, well away from the Christchurch quakes, and sends this photo for the newsletter. We assume it to be reflective of his state of mind, as he quietly relishes the prospect of new classes in 2012.

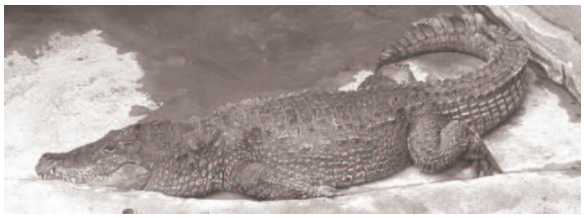


Photo provided by Fritz Raffensperger.

Back home, on the PhD front, Antonio Pinto is back from Chile and writing up his thesis on market mechanisms to allow trading in "impervious cover" and/or sediment discharge permits, Stephen Starkey is back from Europe and powering into his work on stochastic water markets, and Peter Jackson, having spent the last year mainly battling with bureaucracy in a heroic effort to get the quake-damaged Lyttelton supermarket back up and running, is off to Melbourne, where he hopes to find more peace and quiet to write up his thesis on the (perhaps closely related) topic of risk impacts on investment in electricity markets. The Water Markets Research Group expects a new arrival soon, but for now the latest PhD recruit is Alex Dunn, studying methodologies for evaluating potential food-safety interventions.

Alex says that: "Foodborne illness is responsible for a considerable burden on both the health and productivity of New Zealand society. Demand for safe food is going to increase dramatically over the next half century. It is essential that potential strategies for improving food safety are evaluated in an efficient, transparent and evidence driven manner. But the assessment of interventions is no easy task as there are often multiple impacts which can be measured using a variety of metrics and techniques." So Alex's research aims to investigate and compare some of the popular techniques for the ex-ante evaluation of food-safety interventions.

E. Grant Read

Seeking a New Newsletter Editor

Kenneth Kuhn has done a great job putting together our ORSNZ newsletters over the last few years. It is never an easy task extracting material from contributors, particularly when you are based in shaky Christchurch, and yet Ken has succeeded in getting the newsletter issues completed to a very high standard. Ken is heading offshore, and so it is time to say thanks, Ken, for a job very well done.

We are now looking for a volunteer to step into Ken's shoes. If you'd be interested in contributing in this way, then please contact me at: president(at)orsnz.org.nz.

Andrew Mason, President of ORSNZ

Top Technology Award for Professor David Ryan

I am pleased to inform ORSNZ members that the Royal Society of New Zealand has awarded the 2011 Pickering Prize to ORSNZ member and ex-president, Professor David Ryan. The press release from the Royal Society includes the following:

The top award for achievement in technology, the Pickering Medal and $15,000, was awarded to Professor David Ryan FRSNZ, Professor of Operations Research and Deputy Dean of Engineering, at The University of Auckland for developing technology which is at the heart of optimisation software used worldwide for solving complex logistics problems, such as airline scheduling.

A more detailed citation is available at:
http://www.royalsociety.org.nz/2011/11/17/medals-awarded-to-top-new-zealand-researchers/#PickeringMedal

David's contribution to Operations Research was recognised by the ORSNZ in 2001 when David won the inaugural ORSNZ Daellenbach Prize. It is great to see his work now being recognised in New Zealand at the highest levels. Please join me in congratulating David on this well deserved recognition of his contributions to Operations Research.

Electronic AGM

Because there was no ORSNZ annual conference this year, the ORSNZ Annual General Meeting will be held electronically this year with gatherings in the regional centres coming together over Skype. Members are also welcome to join us individually on Skype. You will need the latest version of Skype, version 5, if you wish to include video with your group call. We will be sending out notices shortly confirming details of this meeting. We look to seeing you at the AGM.

Meetings Calendar

New Zealand

46th Annual Conference of the Operational Research Society of New Zealand
November/December, 2012, Wellington

Asia Pacific

2012 IEEE World Congress on Computational Intelligence (WCCI 2012)
10 – 15 June 2012, Brisbane, Australia
http://www.ieee-wcci2012.org

INFORMS 2012 International
24 – 27 June 2012, Beijing, China
http://meetings2.informs.org/beijing2012/

International

25th European Conference on Operational Research (EURO 2012)
8 – 11 July 2012, Vilnius, Lithuania
http://www.euro-2012.lt

9th International Conference on Computational Management Science
18 – 20 April 2012, London, UK
http://cms2012.doc.ic.ac.uk

9th International Conference on Modeling, Optimization & Simulation (MOSIM 2012)
6 – 8 June 2012, Bordeaux, France
http://www.mosim12.org

25th Conference of European Chapter on Combinatorial Optimization (ECCO 2012)
26 – 28 April 2012, Antalya, Turkey
http://www.eccoxxv.org

INFORMS 2012 Annual Meeting
14 – 17 October 2012, Phoenix, USA
http://meetings2.informs.org/phoenix2012/

2012 INFORMS Conference on Business Analytics & Operations Research
15 – 17 April 2012, Huntington Beach, USA
http://meetings2.informs.org/Analytics2012/

Editor's Farewell

It's been wonderful being involved with ORSNZ the last two and a half years. I have enjoyed getting to know many of you, and will miss the camaraderie of the ORSNZ.

Fritz Raffensperger and Matthias Ehrgott, past ORSNZ Newsletter editors, were a great help. Fritz helped me adjust to life in Christchurch. I will miss being able to walk over to Fritz's office unannounced and to spend an hour or two discussing research ideas. I went into academia hoping to spur radical rather than incremental change, and Fritz is full of radical ideas.

I will also miss working with Andrea Raith, in the Auckland Engineering Science department. Andrea has been my closest collaborator and is a dear friend. We speak a common language which is half operations research and half transportation engineering.

About a decade ago, I was struggling to find meaning and support in my post-graduate studies in Operations Research (OR). I moved into transportation engineering, where there are many interesting and practical problems (some of which can be solved using OR). I want to thank the members of ORSNZ for rekindling my interest in the theoretical side of OR and showing me how recent advances in OR can improve transportation engineering.

This past year was another difficult period in my life, and in the lives of many others, due to the Canterbury Earthquakes. On 22 February, I was enjoying lunch with Katharina Beygang. Kathi was visiting Canterbury as part of the Optimization and its Applications in Learning and Industry (OptALI) project. We had just walked out of Fritz's office where Fritz has instructed us on what to do in the event of an earthquake. Living in a city with no centre and working in a university struggling to recover has been challenging in ways that are difficult to explain. I want to thank Kathi, Fritz, the ORSNZ, and the OptALI project members for their support.

I'm not positive what comes next, but ORSNZ and New Zealand will always have a special place in my heart. Thank you,

Kenneth Kuhn
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