



NEWSLETTER

September 2003

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

Analysis in Our Changing Times

By Saul Gass

Earlier this year, WINFORMS, the Washington, DC area chapter of INFORMS, held its annual two-day symposium in the lush downtown headquarters of the American Association for the Advancement of Science (AAAS). The symposium theme was “Analysis in our Changing Times.” Four technical paper tracks were scheduled: military applications, business applications, future applications, and homeland security. I was invited to participate in a four-person panel that addressed the theme – say a few words (10 minutes!) and be ready for questions from the audience.

Having been around the OR world for a number of years, I have been asked to write about the future of OR and to serve on committees whose purpose was to predict OR research areas that would likely produce significant results in the next decade or so. After reviewing those past global OR crystal ball efforts (a somewhat painful experience), I decided to approach the “Analysis in our Changing Times” panel in a different way by addressing the more local question: What do I do and what developments would I (and possibly others) need to further my OR research agenda? This caused me to take as my theme Shakespeare’s famous line that is chiseled across the main entrance of the National Archives, just a few blocks south of the AAAS: “What’s past is prologue.”

From my perspective, for OR to adapt to “changing times,” we must further the development and use of (1) Multi-objective/multi-criteria analysis and (2) Verification, validation and accreditation (VV&A) of models. I discuss why in order.

Just about all OR problems – decision problems – are, in general, multi-objective, while just about all OR decision-aiding methods are restricted to a single quantitative objective. To be specific, think homeland security and the tradeoffs necessary to allocate funds, personnel, and technical resources to combat terrorism.

“What’s past is prologue.”

Yes, we often fudge things a bit by translating objectives (both quantitative and qualitative) to constraints and broadening the study by scenario comparisons and sensitivity analyses. But, I think we can do better, that is, where appropriate, we need to apply integrated multi-objective (criteria) techniques.

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Newsletter publication dates are March, June, September, and December. Submissions deadline is the 15th of the month for the following month’s issue. Send submissions by email to the Newsletter editor, John Giffin, newsletter@orsnz.org.nz.



A basic problem here is that the requirements of the three major multi-objective methods (vector maximization problem, goal-programming, and decision analysis), all need to translate qualitative information into quantitative data. How do you select *the* “best” Pareto optimum solution in a vector max problem? How do you set the under- and over-achievement penalty weights in a goal-programming problem?

And, especially, how do you select the “best” from competing alternatives when they are evaluated against conflicting criteria in a decision analysis problem? The answer to all of these questions requires some way of determining (establishing, guessing) weights for the criteria and weights for the alternatives against each criterion.

To do this, the analyst needs a consistent framework that facilitates the conversion of qualitative information into acceptable quantitative data. Most current analyses use ad hoc input from the decision maker or, to give it a name, methodological manipulation. There are better ways, but here I choose not to bias the reader in doing what I think is appropriate. The reason for being reluctant is that I cannot say – cannot prove – that what I do is the way to go. Why? Because we lack real-world, controlled experimentation in how we should resolve such problems. It is tough to do that for decision problems. How do you evaluate the outcomes of “the roads less traveled”? A problem for “changing times.”

The answer for “changing times” is that model development must include continuous verification and validation processes, and the modeling team must develop the model under the assumption that it will be evaluated by independent third parties.

A few years ago, VV&A, was a hot topic in the Washington, DC area. Military models of combat and future weapons systems were being questioned; energy models that were being used by the executive branch to develop energy legislation were being deconstructed and debated

by congressional committees. From these concerns, much effort was devoted to defining and refining the processes of model validation and verification. This led to the concepts of model accreditation and model evaluation. The two latter terms may be new to some readers: (1) accreditation is the official determination that a computer-based model is acceptable for a specific purpose, and (2) evaluation is a process by which interested parties, who were not involved in a model’s origins, development and implementation, can assess the model’s results in terms of its structure and data inputs so as to determine, with some level of confidence, whether or not the results can be used in decision making.

Accreditation has been tried within the military modeling community without much advancement, while evaluation is rarely applied. From an OR perspective, it all adds up to what can we do to improve the development and use of our models. The answer for “changing times” is that model development must include continuous verification and validation processes, and the modeling team must develop the model under the assumption that it will be evaluated by independent third parties. We need to impose an OR-oriented model life-cycle approach to the resolution of the future’s important OR applications, especially those that require real-time decision making. (Space does not allow me to expand on these ideas, but interested readers can contact me for references.)

I hope that future developments in multi-objective/multi-criteria analysis and VV&A will not cause us to say, “Plus ça change, plus c’est la même chose.”

Professor Saul Gass is an ORSNZ Visiting Lecturer for 2003. Refer to the Visiting ORSNZ Lecturers item on page 6 for more details.

LETTER FROM THE PRESIDENT



As many of you know, recently I spent a very productive and enjoyable six months at the Western Australian Centre of Excellence in Industrial Optimization, at Curtin University of Technology in Perth. Having been back at the University of Waikato long enough to settle back in, it is now time for some personal reflection.

After careful deliberation, I have decided not to stand for President of ORSNZ for next year. This has not been an easy decision but, for health and family-related reasons, I have no choice but to stand down. This is somewhat disappointing, as I had hoped to serve the Society as President for as many years as it was perceived that I was making an effective contribution. But as it is no longer to be, so let's look over what has been achieved in the last three years.

There have been three excellent conferences, held in Wellington, Christchurch, and Auckland. Some of the highlights of those stimulating meetings have been the famous plenary speakers, the high standard of the contributed talks, and the consistently impressive performance of the young practitioners.

Many of the plenary speakers at recent conferences have been ORSNZ Visiting Lecturers. The formalizing of this activity at two lecturers in each financial year is something very dear to my heart. We have been fortunate to have had some outstanding visiting lecturers in recent years, including: Mike Rothkopf, George Nemhauser, Larry Wein, Stein Wallace, Wang Hsiao-Fan, Mike Pidd, and coming soon on a screen near you, Saul Gass, and Russell Cheng. This aspect of the Society's activities is valuable, as it allows members who cannot attend conferences to hear a world-class speaker at their branch.

Another conference event of significance was the inauguration of the ORSNZ Hans Daellenbach Prize. To honour the considerable contributions of Emeritus Professor Hans Daellenbach to OR/MS in New Zealand, the Society established the ORSNZ Hans Daellenbach Prize. The purpose of this award is to elicit, recognise, and reward outstanding examples of management science and operations research in New Zealand, and to encourage their dissemination in the international literature. Candidates for the prize must be members of ORSNZ. At the 36th Annual Conference in Christchurch in 2001, I had much pleasure in announcing that the unanimous decision of the prize panel was to award the inaugural Prize to Professor David Ryan, of the Department of Engineering Science, of the University of Auckland for his focused and groundbreaking body of work on scheduling problems, and its application to crew scheduling in the New Zealand airline industry. This is an excellent example of the kind of theoretical and applied work that this award is designed to recognize.

We have also seen the retirements of some of our more senior and eminent members, including: Tapas Sarkar, Tony Vignaux, Grant Read, and Hans Daellenbach. Towards the other end of the age spectrum, the Society has been fortunate to have a Young Researcher hosted annually by the OR Society of Japan at its Fall Annual Conference.

Also, we are fortunate to have a very good newsletter, and excellent relations with related bodies, including the RSNZ. There have also been a number of administrative advancements including: vibrant branch activities, the introduction of the "North-to South" cycle of conference venues, the enhancement of the membership database, documenting the responsibilities of the Society officers, and a significant growth in membership, especially amongst students. There are many challenges before us, such as formulating and carrying out a publicity strategy, but I shall leave these to my successor.

I would like to thank all members of the Society for their generous support over the last three years, especially those who made the conferences such a success and the Council members who brought about the achievements mentioned above.

LES FOULDS, PRESIDENT

president@orsnz.org.nz

"New Zealand Needs Mathematics Graduates"

In the Weekend Herald, February 22-23 it was reported that Professor John Hattie, Professor of Education at the University of Auckland stated in a speech delivered at the 2003 Knowledge Wave Conference that "graduates in science and maths were among the highest in the ranks of unemployed university graduates. Boosting their numbers might simply drive more of them overseas." Further in the Editorial of the New Zealand Herald of February 25 it was suggested that "there is not much call for more of them unless the science or technology industry grows".

Firstly Professor Hattie's remarks do not necessarily reflect what is actually happening in the country. I believe that he may have misinterpreted the figures from the "University Graduate Destinations" Reports produced by the New Zealand Vice-Chancellor' Committee. Secondly we have a major problem in that the country is producing too few graduates in the quantitative areas and little is being done to alleviate the situation.

Let's focus on Maths/Operations Research and Statistics graduates (fields that interest me!) and delve a little more deeply. I'll compare some figures from the NZVCC reports from the last four years:

BACHELOR AND HONOURS GRADUATES

Fulltime Employment:

	1997	1998	1999	2000
Mathematics/Operations Research	34%	47%	18%	38%
Statistics	37%	44%	32%	50%
All Bachelor & Honours	54%	53%	50%	55%

Not Employed:

	1997	1998	1999	2000
Mathematics/Operations Research	33%	23%	38%	37%
Statistics	37%	33%	37%	12%
All Bachelor & Honours	22%	23%	24%	22%

Fulltime Study:

	1997	1998	1999	2000
Mathematics/Operations Research	52%	42%	60%	48%
Statistics	26%	44%	53%	63%
All Bachelor & Honours	31%	33%	36%	32%

One of the problems is that while Maths and OR graduates superficially appear to have higher unemployment rates than other Bachelor and Honours graduates they also have a much higher rate of being involved in "Fulltime study" than other disciplines. The NZVCC reports combine both Bachelors and Honours graduates and does not provide separate statistics for each category. In many disciplines students leave university as soon as they can after a Bachelors degree while in the Maths area in particular many continue for an Honours degree or an additional qualification that makes them much more employable.

I was a the Chair of a committee which in 1998 produced a major report for the Ministry of Research Science and Technology on the state of Mathematical Sciences in New Zealand. We pointed out that New Zealand has a low numbers

of graduates in the maths & the computing sciences (0.8% of total graduates in the Mathematics and Computer Sciences versus an average of 3.5% for the OECD countries in 1996), poor performance in our schools (as evidenced in the Third International Mathematics and Science study in 1997), a

shortage of Mathematics teachers, a diminished research capacity in our Crown Research Institutes, generally undervalued and under-utilised in New Zealand business and government yet Mathematics directly underpins a significant proportion (often over 50 per cent) of total business and government activity.

Earlier this year I attended a seminar delivered by the Government Statistician, Mr Brian Pink, on "Some Challenges for Official Statistics" at Massey University, Palmerston North.

Let me quote direct from his overheads on one of those challenges: "Shortage of Quantitative Skills"

- Demand within Government now obviously exceeds supply
 - Premium for skills in the marketplace
 - Major capability challenge for the sector
 - Impacting very specifically on Statistics New Zealand capability
- No real signs on an increased supply from within New Zealand.

I questioned him as to his requirements and he spoke of the need for around 25 graduates a year (preferably at Honours level).

The rather superficial comment attributed to Professor Hattie unfortunately gives the public the perception that the country does not need mathematicians and quantitatively trained graduates. To the contrary we have a major national problem with diminished capabilities because of a lack of graduates in these areas.

[In private correspondence since the conference, Professor Hattie agreed that his comments are factually incorrect. He says that he did not mention this matter in his speech because he had been unable to verify his viewpoint, and for this reason had asked before the conference that the relevant section of his paper be changed. It was the original version however that was picked up by the press.]

Jeffrey J Hunter,
Professor of Statistics,
Massey University, Albany Campus, Auckland

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The 38th Annual Conference of the ORSNZ in 2003

ORSNZ'03: "OR Making a Difference in Industry"

The Department of Management Systems at the University of Waikato, in Hamilton, is pleased to host the 38th Annual Conference of the Operational Research Society of New Zealand, ORSNZ'03, on Friday 21 and Saturday 22 November, 2003 (with a pre-conference social on the evening of 20 November).

Call for Papers

We welcome papers on any aspect of operational research, especially practical applications. Please submit your abstract, in 200 words or less, in plain text, to the conference organiser, Stuart Dillon (conference@orsnz.org.nz). We prefer submission by email, but you may post a hard copy of your abstract instead to:

ORSNZ'03

Department of Management Systems

University of Waikato

Private Bag 3105

Hamilton 2020

NEW ZEALAND

Submission deadline for abstracts: 30 September, 2003.

Following acceptance of your abstract, we shall invite you to submit a full-length paper for publication in the conference proceedings. A copy of the proceedings will be given to every attendee at the conference. Full papers must be submitted by email in Postscript (.ps) or Adobe Acrobat (.pdf) format to the proceedings editor, Les Foulds (conference@orsnz.org.nz). Guidelines for the preparation of full papers, and further information about the conference, will be available on the conference website www.orsnz.org.nz/conf

Submission deadline for full papers: 31 October, 2003.

VISITING LECTURERS:

30 June 2003 – 1 July 2004

The ORSNZ Visiting Lecturers for the present financial year are: **Professor Saul Gass** and **Professor Russell Cheng**. They will visit universities in Auckland, Hamilton, Wellington, and Christchurch in November this year.

Saul Gass received his B. S. in Education and M. A. in Mathematics from Boston University, and his Ph. D. in Engineering Science/Operations Research from the University of California, Berkeley. He is currently Professor Emeritus at the Robert H. Smith School of Business, University of Maryland. He is a University of Maryland Distinguished Scholar-Teacher and a Dean's Lifetime Achievement Professor for the Robert H. Smith School of Business.

Dr. Gass first served as a mathematician for the Aberdeen Bombing Mission, U. S. Air Force, and then transferred to Air Force Headquarters where he began his career in operations research with the Directorate of Management Analysis, the organization in which linear programming was first developed. For IBM he was an Applied Science Representative, Manager of the Project Mercury Man-in-Space Program, and Manager of IBM's Federal Civil Programs. He was a member of the Science and Technology Task Force of the President's Commission on Law Enforcement. He was Director of Operations Research for CEIR, Senior Vice-President of World Systems Laboratories, and Vice-President of Mathematica. He has served as a consultant to the U. S. General Accounting Office, Congressional Budget Office, the National Institute of Standards and Technology, and other operations research and systems analysis organizations.

Included in his many publications are the texts *Linear Programming* (fifth edition) and *Decision Making, Models and Algorithms*, and the book *An Illustrated Guide to Linear Programming*. He is co-editor of the *Encyclopedia of Operations Research and Management Sciences* and *A Guide to Models in Governmental Planning and Operations*.

He is a past president of the Operations Research Society of America and Omega Rho, the international operations research honour society. He served as vice-president for international activities of the Institute of Operations Research and the Management Sciences (INFORMS). He is a recipient of ORSA's Kimball Medal for service to the society and the profession, INFORMS's Expository Writing Award, the Military Operations Research Society's Jacinto Steinhart Memorial Award for outstanding contributions to military operations research. He is a Fellow of INFORMS.

He was a 1995-1996 Fulbright Research Scholar, and is currently a Fulbright Senior Specialist.

His research interests include: linear programming, large-scale systems, model validation and evaluation, game theory, multi-objective decision analysis, and the application of operations research methodologies.

THE YOUNG PRACTITIONERS' PRIZE, TO BE AWARDED AT THE ANNUAL CONFERENCE OF ORSNZ, HAMILTON, NOVEMBER, 2003

Full-time students who: will be under 25 years of age on 21 November, 2003, are members of ORSNZ, and plan to present a single-authored paper at the above conference, are invited to compete for the ORSNZ Young Practitioners' Prize. When registering for the conference, competitors should request that their paper should be scheduled in the Young Practitioner's Prize Session and must provide evidence of their eligibility.

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

Les Foulds

President

ORSNZ

**ORSNZ STUDENT GRANTS-IN-AID FOR
THE ANNUAL CONFERENCE OF ORSNZ,
HAMILTON, NOVEMBER, 2003**

**REMINDER ABOUT AVAILABILITY OF
ASOR BULLETINS**

Full-time students who are members of ORSNZ, and plan to present a paper at the above conference, are eligible for travel assistance from ORSNZ to attend the conference. Applications, countersigned by the student's supervisor or Department Chair, confirming that the applicant is enrolled in a full-time university course, together with the abstract of the planned paper, should be made to the President of ORSNZ by 1 September, 2003.

ORSNZ members are reminded that ASOR Bulletins are now available electronically and they are accessible from the URL:
<http://www.cs.adfa.edu.au/~ruhul/asor.html>

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

Les Foulds
President
ORSNZ

PUZZLE CORNER

Imagine that the five symbols below are printed on separate pieces of paper. How can you rearrange them so that the equation is correct? No other symbols are to be introduced.

$$67 = 24$$



(Source: Jim Corner's Dad.)

CALL FOR PAPERS

INTERNATIONAL CONFERENCE ON RESPONSIVE SUPPLY CHAIN AND ORGANIZATIONAL COMPETITIVENESS

You are invited to submit paper(s) for the International Conference on Responsive Supply Chain and Organizational competitiveness (RSC 2004) which is to be held in Coimbatore (India), January 5-7, 2004. This conference is jointly organized by the Coimbatore Institute of Technology (Coimbatore, India) and the University of Massachusetts (Dartmouth, USA).

This conference will focus on the key issues in the design and implementation of responsive supply chain for improving organizational competitiveness in new economy. Academicians and practitioners around the globe will attend. As post-conference publications, selected papers

will be published in the following peer-reviewed journals:

1. Benchmarking: An International Journal
2. Business Process Management Journal
3. Integrated Manufacturing Systems: The Int'l J of Manufacturing Technology Management
4. Int'l J of Production Planning & Control
5. Supply Chain Management: An Int'l Journal
6. Computers in Industry: An Int'l Journal

Please submit an abstract of your paper for consideration. For further information, please visit the conference home page at <http://www.rsc2004.com/>

Online submissions (email) are accepted. Please do not hesitate to contact Professor V. Selladurai (profvsdcit@yahoo.com) or Professor R. Sivasubramanian (rss1960@rediffmail.com) for any further assistance regarding your submission. **Abstracts will be accepted until September 30, 2003.**

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Notice of Annual General Meeting

All members of the Operational Research Society of New Zealand are invited to attend The Annual General Meeting of the Society, which will be held in Hamilton, during the Annual Conference of the Society.

Date: Friday, 21 November 2003

Time: 17.30

Venue: Room MSB1.01, Waikato Management School Building, University of Waikato, Gate 7 Hillcrest Road, Hamilton

Agenda

1. Apologies (to lfoulds@waikato.ac.nz).
2. Amendments to the Agenda
3. Approval of the Minutes of the 2002 AGM
4. Matters arising from the 2002 AGM
5. Treasurer's Report
6. Annual Report
7. Venue of the 2004 Annual Conference of the Society
8. Election of the Officers of the Society for 2004
9. General Business

Chuda Basnet
Secretary

Enclosures:

1. Minutes of the 2002 AGM
2. Annual Report 2002
3. Postal Nomination form for Council Membership for 2003
4. Proxy Voting form

Please note that the Statement of Accounts for 2002-2003 and Report of the Honorary Auditor will be available on the ORSNZ website and will be tabled at the AGM.



NOTICE OF A COUNCIL MEETING OF THE ORSNZ

Date: Friday 1 August, 2003.

Time: 15.30

Place: Room MSG8.17, Waikato Management School, University of Waikato, Hamilton.

AGENDA

1. Apologies (to lfoulds@waikato.ac.nz).
2. Minutes of the 2002 AGM and the Council Meeting held on 29 November, 2002.
3. Matters arising from the Minutes.
4. Revision of the IFORS statutes (Appendix 1).
5. The ORSNZ Hans Daellenbach Prize.
 - a. Amendment to the rules to disallow self-nominations (Appendix 2).
 - b. The RSNZ awards night, Auckland, 13 November, 2003 (Appendix 3).
6. ORSNZ'03
 - a. Approval of the budget (Appendix 4).
 - b. The format of the proceedings (Appendix 5).
7. The venue and arrangements for the 2004 conference (Appendix 6).
8. The visit of Saul Gass (Appendix 7).
9. Other Business.

CALL FOR PAPERS
THE INTERNATIONAL ACADEMY OF
BUSINESS AND PUBLIC
ADMINISTRATION DISCIPLINES
CONFERENCE

The International Academy of Business and Public Administration Disciplines will hold its conference on January 23-25, 2004 at the DoubleTree Hotel in New Orleans, Louisiana. The link to the hotel is:

<http://www.doubletreeneworleans.com>

For information on call for papers, registration, and conference site please go to the website:
<http://www.iabpad.com>

Please note the following deadlines:

1. Abstract submission: October 1, 2003
2. Registration: November 15, 2003
3. Paper submission for the proceedings: December 1, 2003

This conference will provide opportunities for participants from business and related fields to attend and interact with members from inside and outside their own areas of specializations.

The IABPAD Conference Organizing Committee looks forward to your participation.

Death of Brian Kingsman

We are sorry to report that Professor Brian Kingsman died unexpectedly from a heart attack on Saturday evening (30 August).

Brian joined the newly-founded Department of Operational Research at Lancaster University in 1964. In 1990 he was appointed to a departmental chair.

He was a major influence in establishing the Department's focus on using modelling techniques on practical problems. His great strengths were perhaps best revealed in his role as both supervisor and mentor to many masters and doctoral students from around the world.

His personal qualities of intellectual integrity and enthusiasm will be sorely missed. (Funeral arrangements are not yet known but will be circulated.)

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

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