OR NEWSLETTER

Operational Research Society of New Zealand (Inc.), PO Box 904, Wellington, New Zealand April 1995

GUEST EDITORIAL

Brian Easton, Director, Economic and Social Trust on New Zealand

In the editorial of the December *OR Newsletter* Hans Daellenbach muses on the state of OR. He argues that there is a world-wide trend in which 'the mathematics of OR (sic) is synonymous with OR'. I wish to push this argument further.

There is a sense in which intellectual activity seems to be leaving the campus. Whether this is a temporary phenomenon, or a long-term trend as when it left the church in the renaissance, only time will tell The phenomenon is not restricted to OR (and economics). An accountant who recently moved from a university chair to a government position told me he is intellectually challenged far more often in his new job than his old. The phenomenon may not even be confined to business related studies. Recently Jock Phillips, government Chief Historian, wrote arguing that there was far more history research being done off campus than on. Meanwhile science academics are expressing doubts about their ability to compete successfully for the contestable public research funds against the private sector and CRIs.

It could be argued this is a consequence of the deliberate policy to convert our universities (back) into teaching institutions. But Daellenbach's editorial came out of a sabbatical visit to Northern Hemisphere universities where he sees the same phenomenon happening. He presents a picture of a world in which real OR is being done by consultants, while teachers are more and more concerned with abstruse mathematical or computational problems and aspects, and less with their practical applications. I would argue that such mathematics is rarely useful for resolving real world problems, not least because they are sensitive to critical assumptions which imprecisely characterize the real world.

Now I am not knocking these investigations of deep mathematical and computational complexities. In the 1970s I valued greatly discussions with the University of Canterbury OR

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Editor: *Hans G. Daellenbach, University of Canterbury*

group on computational algorithms for maximization. Other than they do not occur in real time, they provide useful parallels with how an economy — market or otherwise — operates. Or consider project evaluation, which is the bread and butter of a lot of economic consultancy. It is underpinned by the theory of market price, much of which was originally developed out of linear programming (still probably the best way to give the student a grasp of the underlying principles). Now of course the consultant does not parade her or his knowledge of programming theory to the client, or to the tribunal reviewing such evidence (and to be frank there are not a few consultants who have long forgotten the theory, if they ever knew it). In practice the quality consultant is applying common sense to wide ranging theory, once having mastered the details of the problem, looking for robust solutions. It is a tough discipline. When one succeeds one leaves the presentation (which may be to a tribunal) with considerable pride (often, but unfortunately not always, to be set back by the tribunal's findings which indicates it never quite grasped the issues).

I have emphasized the quasi-judicial test in a consultant's work, because it is one of the most challenging tests. Given another consultant's report, and a client who wants to job done properly, one strips the opposition's work down to individual components and rebuilds, with the same intensity of a Japanese firm reviewing a new product of the competitor. For example, one may ask for the spreadsheets. (On one occasion I discovered the same income flow had inadvertently been put into two different cells, which aided the project's rate of return somewhat.) I have never been subject to the same scrutiny in any refereed paper, as is routine when appearing before a tribunal.

Indeed all one expects is for the referee to check the mathematics, but not the reality. I recall once looking at a piece of econometrics, the publication of which led to a chair, and observing the data structure was such that the results were spurious, but the method was impressive. It was published in an international journal. I am confident the referees did not know anything about the data, or care about their quality. So elegant parts of the subject are easily checked, but the dirty reality is much harder. Similarly, it is easy to assess whether a student can jump through a set of mathematical hoops. It is much harder to assess whether the student can apply the skills, and common sense, to a practical problem.

Thus the academic community is attracted to only part of the totality of problem solving, and its rewards are systematically biased towards that part. If one gives a high priority to international publications, the resolution of a problem which is dependent upon the shrewd application of using local knowledge is going to be devalued against the internationally testable verity of eternal mathematics. The process is compounded if we appoint foreign academics who have little local knowledge, but are anxious to publish internationally. Eventually the products of the academic community become irrelevant for all except foundation teaching.

Thus my accountant friend who made it internationally, but who has found working in the government so much more challenging. Thus the university economics profession which is playing a decreasing role in public debate. Thus, apparently OR!

There is a resulting demoralization. I recently attended an economics paper presentation whose underlying mathematics was essentially a Markov process. However, the data suggested the coefficients of the matrix were varying systematically over time. I suggested to the presenter that this was because the population was heterogenous and that stability could be attained by splitting it into two. The academic did not dissent, but explained that the paper was really a teaching exercise, so it was unnecessary to investigate further. Maybe! But it will go onto the academic's publication list. In any case what point is there teaching students using a model which clearly does not connect with reality? What use are the studens going to be when they graduate and are asked to apply what they have learned to the real world?

At the moment the irrelevant theory and poor problem solving (and problem identification [the ed.]) are being rewarded in the universities. This is not a peculiarity of OR, although it would be good if that were the first discipline to tackle the issue. After all, Hans Daellenbach poses a problem, which ought to be amenable to a solution. How are universities to train their students for the practical realities which, as practising operations researchers (and other professionals), they will face, rather than the oversimplified material they too often get, made academically respectable by mathematical techniques they will never explicitly or implicitly use? Or are universities primarily about enabling an elite to participate in an international circuit that can only relate via the abstraction of pure mathematics?

OPERATIONS RESEARCH PROFILES

In this column I, with the help of others, will profile some of the prominent, or colourful, or influential NZ operations researchers. I will start it off with the current holders' of chairs at universities, in order of their chronological appointment to these positions. (Unfortunately, David Ryan's profile is still outstanding. I will feature it at a later issue.)

Tony Vignaux

Professor of Operations Research, Victoria University of Wellington.

If anybody deserved to be called Mr OR of NZ, it is Tony Vignaux. He has been part of the New Zealand OR scene since OR reached the shores of the land of the long white cloud. He was appointed to the first chair in OR in New Zealand in 1968 and remained in that unique position for close to twenty years, which tells you that the wheels of time turn slowly in NZ. He is a founding member of ORSNZ and one of its first past-presidents. I asked Tony to write about himself and tell us how he got into OR. He only seemed to have heard the second part of my request, and even there his modesty is apparent. Here is what he writes:

"I got into OR out of boredom. I was completing a Ph.D. in acoustics at The Imperial College of Science and Technology. This lies in the Museum district in South Kensington, London. It was set up after the successful 1851 exhibition. We were surrounded by memorials of that time: The Victoria and Albert Museum, the Albert Hall, and the Albert Memorial. We also had the Royal School of Music, the Royal School of Needlework, the scientific museums, and the three science, engineering and mining colleges of Imperial College. It now also has a medical school attached to it.

As I said, I was completing my Ph.D., working on the transmission of sound in water containing bubbles — but that is another story. I had a very bad supervisor who was never available to discuss results or drafts of the thesis. I had resolved that, despite him, I would complete the Ph.D. When I was not blowing bubbles I spent my time in the library of the Science Museum which was in the same building as we were, the Royal College of Science. There I wrote my thesis, read the new journals, and glanced at the new books displayed on arrival.

One day among the new books I saw Morse and Kimball *Methods of Operations Research.* I flicked through it and decided that this OR stuff looked quite interesting. Morse and Kimball had been members of the US Navy OR Group during WW2. P.M. Morse, by the way, is a very famous physicist from MIT. He has a number of important books published in mathematical physics (e.g., Morse and Fesbach), and has published papers and books on queueing and on OR in public systems and in libraries.

Morse and Kimball was released in 1951. Until then it had been classified because of its potential value to an enemy. The authors felt that the method should have important peacetime applications. The book mentions statistics and probability as the major tools of OR and gives as examples, as is natural from its source, military applications of OR: search theory, gunnery problems, and operational experiments. It is worth reading by all operations researchers. It was re-issued in 1970 by Peninsula Publishing, Los Altos, with the same title but with the order of the authors reverse (Kimball and Morse).

My interest was aroused. Here at last was a way of taking many of the techniques I had been using in physics and applying them to the real world. I was fed up with physics. Maybe this was a possible career?

This was such a new discipline that there were no university courses available in the UK to learn it. One was supposed to be able to apply the scientific and statistical approaches collected in the ordinary scientific degree, but to different problems. There were, of course, methods that had proved to be useful in practice. These were the sorts of things discussed by Morse and Kimball. It is not exactly true that there were no courses. My own college put on a series of six lectures at the instigation of the Operational Research Society. It included lectures on queue theory, inventory, and mathematical programming. In the main these were very theoretical and really mathematics lectures in disguise. Does that remind you of a current trend? Anyway, I felt they were a waste of time to me at my stage in the subject.

Apparently, the only way to learn OR was to join one of the outstanding OR groups that were being formed. One learned by being an apprentice. Among the groups was one in United (later British) Steel in Sheffield. I went up for a day at their request and was interviewed by Stafford Beer who was the director of the OR group there. Stafford Beer became later a management consultant and author of several management books on the cybernetics of the firm (*Cybernetics and Management, Management and Control,* and *Brain of the Firm*) and is best known for his 'Viable Systems Model'. The United Steel team had been experimenting with cybernetic machines for optimisation, similar in nature to modern neural networks. Unfortunately, they lacked the computing power we have available nowadays.

Another outstanding OR team was the National Coal Board's Field Investigation Group. It was difficult to get into, about 1 in 10 applicants were accepted. There was a day of interviews and case studies to go through as part of the evaluation process. Once they accepted you they offered a full home-grown training course. Every member of the group had to write part of the training manual. The topics were assigned quite randomly. I know (or knew then) lots about ergonomics. New arrivals got a copy of these duplicated notes and were expected to study them either alone or in conjunction with an occasional course on particular topics, such as game theory, or linear programming. The training course notes were later condensed into the book *Operational Research: Techniques and Examples*, edited by G.H. Mitchell, English Universities Press, 1972.

I did not find OR boring at all."

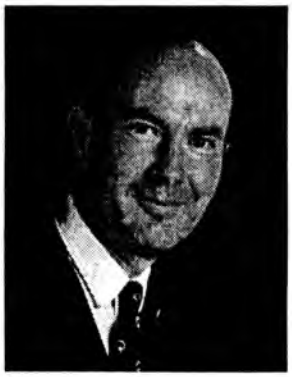
Tony organized the first OR programme in New Zealand. Wellington's natural links with Government, and particular the then DSIR offered a fertile ground for OR, and Tony has developed and nursed these links. In the 70s he got actively involved in the East-West Institute in Hawaii and later did joint work on the use of influence diagrams with Bob Oliver from the University of California, Berkeley. He has just co-authored a book on the use of Bayesian analysis in forensic evidence, to be published by Wiley in the near future — an indication of his wide-ranging interests.

Tony's daughter followed her father's footsteps, got into physics and then started doing OR related work. When asked about his hobbies, he answered 'orienteering'.

Les Foulds

Professor of Management Systems, University of Waikato

Les has been a member of the ORSNZ for over twenty years. Nobody attending one of our annual conferences can have missed his tall figure, greeting people with a welcome smile. A



mathematics graduate from the University of Auckland, with few financial means, he applied to several dozen American universities for a Ph.D. scholarship and accepted the one offered by Virginia Tech in the misty Appalachian Mountains. Graduating in 1975 in industrial engineering (traffic network design), he immediately put his knowledge to work by travelling the long-way back to NZ via Europe, the Middle East, and Asia. (If you have the opportunity, ask him to show you his slides!), before taking up a one-year visiting appointment with the OR group at Canterbury. He must have liked something about Christchurch, because he returned to Canterbury after four years in the Mathematics Department at Massey. While at Canterbury, he guided John Giffin successfully (or was it 'heuristically') to complete his Ph.D.. There is no doubt that Les is ambitious. So in 1984 he was off to the University of Florida as professor of systems engineering. In 1986 he was offered the foundation chair of the new Department of Management Systems at Waikato, where 'the real, commonwealth-style, practical OR is done in Hamilton', as he puts it himself.

After his master's, Les' research interest were at the theoretical end of OR, mainly combinatorial optimization, and graph theory and networks. Although still a renegade math jock, he has gradually mellowed into doing more and more applied work: evolutionary trees applied to genetics, shedding some of the rigour of mathematics and getting into heuristics with facilities planning and vehicle scheduling. This process has continued and he has moved, more or less, lock, stock, and barrel to the interface of OR and operations management, via quality management and world class manufacturing. Les has been a prolific publisher. He credits more than 100 papers and eight books to his name in the above areas — the last one on applications of graph theory is a runaway best seller, into its second edition soon after first appearing.

Les sees himself as a citizen of the world, rather than only a Kiwi. He is a world traveller. His first venture from NZ, at the tender, rosy-cheeked age of 15, plunged him into a rare adventure, carrying Malaysian pilgrims from Kuala Lumpur to Mecca. Les has kept track of the number of countries he has visited: 51 as of the beginning of February this year. He has academic links in North America, Western Europe, and Northern Asia. In fact, his eyes light up whenever anyone shares travel anecdotes/information/questions. He once told me that, when travelling overseas, it was useful to always carry an extra (well-used) wallet with a few worthless old credit cards, etc., for pick-pockets or to hand over to knife-toting robbers — that's what he claimed he was doing. His predilection to roam the world has prompted his Waikato colleagues to ask: 'Do you know the difference between God and Foulds?' Answer: 'God is everywhere; Foulds is everywhere but Hamilton.'

Despite absconding from NZ so often, Les is happily married and has done his small bit to 'produce' two children. In what he refers to as his scarce leisure time, he enjoys Mozart, bridge, magic, social philately, running, yoga, reiki, and TM, not necessarily in this order.

Hans Daellenbach

Professor of Management Science, University of Canterbury

Rather than let tell somebody else about how I got into OR and some highlights and let her write it up, I decided to do it by myself. The result may be a bit biased.

I too was once a very ambitious young man. I looked at the boss of my first job after highschool in the Swiss Alps — selling surveying instruments to Commonwealth countries in Asia, Australia, and New Zealand — and saw that he got his job over a more senior colleague because of his doctorat. So I set my mind on such a piece of paper and studied accounting and economics at the University of Geneva. I discovered pretty quickly that pushing around $-signs (it was Swiss francs then) did not offer enough excitement and that consumer behaviour was more interesting. In search of a suitable doctoral topic, I took my seven-month pregnant wife to Berkeley. Maybe it was just an excuse to get away from my in-laws. I was so impressed by what the Business School offered, that I enrolled in the MBA program. On the advice of a rooky Ph.D. student, who had just finished his MBA, I enrolled in C. West Churchman's course 'Introduction to OR'. I had not the slightest idea what that was. I had never even heard the term before then. I was hooked right away, but I cannot tell anymore whether it was the topic or Churchman as my mentor. Out went consumer behaviour, in came OR — a fortuitous random event. From then on I had a definite bias towards stochastic aspects. I also completely forgot about my planned doctorat at the University of Geneva.

As the holder of the Standard Oil of California MBA scholarship, I was offered a job with their OR group. My first task was scheduling the various queues at the then gigantic IBM 709 computer. This was followed by the company's first inventory control study, and later the initial investigation of a corporate-wide LP planning model. The toy model I developed, using the world's first vector and matrix language, called MATRAN — an add-on to Fortran — had 150 variables and 124 constraints, which took about 30 minutes of central processor time to solve.

Again I looked at who my boss was. He too had a Ph.D. My problem by now was that we had three children and a car to pay off, and Berkeley did not accept part-time Ph.D. students. Fortunately, Churchman, then the director of the Ph.D. program, said that he had something to say about this too, and the following semester I was enrolled in the doctoral courses, while still doing practical OR for Standard Oil. In 1964 I got one of the plush Ford Foundation dissertation fellowships. My association with Standard Oil changed to one of a consultant. I completed my dissertation in stochastic cash management models in 1966, while teaching corporate finance in the business school at Berkeley. After four years in beautiful, but rainy Washington State, referred to by the locals as 'God's own country', I emigrated to the real 'Godzone', New Zealand. Applying to all major NZ universities, my first response was from Tony Vignaux. It was a very nice letter, telling me that he too came to NZ because of its wholesome environment and outlook on life, and that Victoria was very much interested in me. But he forgot to tell me what the next step was. By the time, the next step came, I had already accepted the rather decisive offer from the Economics Department at Canterbury. Having Berkeley as my Alma Mater, with such famous names as Debreu, Papandreou (yes the now Greek prime minister), and Churchman, was a definite draw

card. The rest many of you already know. Before Prof. Brownlie, now Vice-Chancellor of Canterbury, realized, an OR programme had infiltrated the economics curriculum, which ultimately let to OR emerging as a discipline in its own right and later a split from economics.

In terms of my past and present research interests, I am a generalist who dabbled in many things, often right when they emerged. So it was cash management models and inventory control in the 60s and early 70s, mixed hydro-thermal power generation models in the 70s, multi-criteria decision making, particularly with its application to forestry, in the early 80s, MCDM methodology in the late 80s and now soft systems and problem structuring methods and MS/OR methodology in general. I have published some 40 plus academic papers, three books, one of which went into a second edition and was translated into Spanish. The latest one *Systems and Decision Making: A management science approach* was just published with Wiley UK. If you ask me which paper I see as having had the greatest impact, it must be the article in the December 1994 issue of MS/OR Today *Alternative OR.* I have never received so much fan mail for any other paper.

Personal interests: Classical music, skiing, playing games with my wife of 37 years, travelling, and dabbling in writing a novel.

WHAT IS OR?
AND THE JAPANESE EXPERIENCE

Vicky Mabin

In the July newsletter, Hans Daellenbach asked for definitions of OR. That same month I went to Japan to attend the APORS '94 Conference, as the NZ representative. One of the keynote speakers, Professor Tone, told this story which I think serves as a definition of OR:

*Picture a hot-air balloon high over the rolling countryside. The person in the balloon spots a lad below, and calls down "Where am I?" The lad below says "What?" Again, the balloonist calls down "Where am I?" and again the boy re*plies "What?" *A third time the balloonist asks, and finally the boy answers: "In a balloon up in the sky". The balloonist calls down, "You should be an operations researcher!" "Why?" the boy asks, and the balloonist replies:*

"1. You took a long time to give me an answer,
2. Your answer is absolutely correct, and
3. Your answer is absolutely useless?"

Prof. Tone went on to say he thought OR/MS had been an excellent tool up to the 70's, but that now there were new challenges. I'll try to outline some of them.

1 *OR for performance measurement:* New OR methods such as Data Envelopment Analysis can be used for performance measurement. There were four papers on this method at the conference. This is a multi-criteria, multi-input, multi-output method, that is appropriate for many real situations.

2 *Intangible aspects as well as tangible aspects* can be handled with methods such as the Analytical Hierarchy Process (Saaty), and there were nine papers on this at the conference. This method is being used by managers, for many applications, such as portfolio selection, and is popular because it offers a breakthrough in the rank comparison of choices. In a group decision-making context, individuals' scores can be weighted according to the level of their expert knowledge (*Is it? the ed.).*

3. *Back to basics with innovated media:* Little benefit has been gained from Point-of-Sale technology. At worst we have a mass of useless data, but it's vital to create useful information out of the POS data. Lots of possibilities are yet to be tapped.

4. *Efficient algorithms in the background:* here he talked of software packages, e.g., for plant scheduling, as model building languages.

This conference provided many striking contrasts with our own conferences. For a start, with over 300 papers at APORS, the number of streams and topics covered were different. At APORS, papers on DEA, AHP and other multi-criteria methods ran to several sessions, while being absent from our conference, or at least from paper titles. Papers from these topics included some excellent contributions from Korea and Hong Kong. The biggest stream was some 15 papers on

Organisational Intelligence, a new field that according to one paper I attended, appears to measure its success at least partly by the numbers of papers on the topic presented at conferences! The gender mix was a contrast too: the Japanese OR Society has some 3000 members, but only around 10 of these are women! In contrast, I was pleased to note around 1/3 of our conference delegates are female.

The paper presentations at our conference were easily as good as, if not better than, those at APORS. However given that the official conference language is English, (a foreign tongue to many presenters) the papers were pretty good. The student papers were on the whole well presented, while some older presenters were obviously less at ease with English, and read their papers, with poor quality overheads. Luckily this wasn't the norm, and there was a wide choice of streams.

Mid way through the conference, site visits were organised to a number of places, the choice including Yaskawa Motoman Center, where we saw robots making robots; Nippon Steel Corporation; and Mitsubishi Kasei Chemical plant. I was also able to visit the latest Toyota car factory in Japan, which was an amazing experience, through sheer size, attention to detail in planning and operation, environmental considerations, and the balance of workers and automation. At both factories I visited, the guided tours were like an extension of the factory process: the set routines, uniforms, speeches, and hospitality all being very formal, in marked contrast to the very informal site visits I have experienced elsewhere (NZ and overseas).

The Japanese OR Society was very generous in hosting delegates from several APORS member countries, and treated us very well. I came to really like Japanese tea, and found the Japanese food very healthy and refreshing for the most part, and certainly novel: as one of the guests of honour, I was the lucky consumer of a fish eye. My family claims we ate with chopsticks for two weeks after I got back but I can assure you it's not true. There were no snacks with the morning and afternoon teas, and no lunches provided: instead we went to a variety of local eating places from sushi bars and noodle shops, though the unadventurous types could always go to the scores of Western style eateries if they so wished.

The next APORS conference is to be held in Melbourne, in December 1997, and ASOR have already put out a preliminary announcement! There is a lot of interest from other Asian Pacific countries in a conference in this part of the world, and strong interest in pre- and post-conferences tours to New Zealand. We have pledged our support to our Australian neighbours, ASOR, who have the major responsibility of organising the Conference. Judging by this year's conference, I expect it will be a conference not to miss: a good opportunity for us to share our style of OR with these other countries, and to find out what they have to offer us in the way of new approaches.

Vicky Mabin, Victoria University of Wellington

OPERATIONS RESEARCH AND MANAGEMENT SCIENCE AT THE UNIVERSITY OF AUCKLAND

The operations research/management science programme at the University of Auckland is an inter-faculty cooperative programme administered by the Committee on Operations Research. This has representatives from the Department of Engineering Science (54 prefix), the Department of Management Science and Information Systems (74 prefix) and the Department of Statistics (528 prefix).

Undergraduate Courses in Operations Research and Management Science

Operations research courses are offered on both campuses of the University of Auckland: the City campus and the new Tamaki campus. Currently 300 level courses are only offered on the City campus. It is possible to obtain a BSc, BE, BCom, or BA majoring in Operations Research. Conjoint degree programmes BCom/BSc, BCom/BE, and BCom/BA are also offered. The University of Auckland is moving to a semester system starting in 1996, which will enhance the opportunities for students studying inter-disciplinary degrees such as operations research. At present (in 1995) the courses being offered are as follows:

528.293 Introduction to Operations Research

This is a first course in Operations Research or Management Science. It is a practical course emphasising the relationship between business and industrial applications and their associated Operations Research models. Computer package software is used to solve practical problems. Topics such as linear programming, transportation and assignment models, network algorithms, queues, inventory models, and computer simulation are introduced.

528.391 Optimisation in Operations Research = **54.251** Operations Research I

This course focuses on optimisation techniques in a way that facilitates an understanding of the computer software and some of the underlying mathematics. Topics covered include linear programming, simplex and revised simplex methods, duality and the dual simplex method, post-optimal analysis; integer programming, cutting planes and branch and bound; network optimisation, transportation and flow problems.

74.392 Optimisation in Management Science

This paper is intended to provide Commerce students with an understanding of optimisation techniques such as linear and network programming which form the basis of deterministic problem solving and decision making in Management Science. The content of this paper is geared towards the student who only has one-year of university mathematics.

528.395 Math. Modelling for OR = **54.354** Simulation + **54.355** Queueing and Inventory Theory

This course focuses on modelling techniques in which there is a random or unpredictable element. Topics include digital simulation techniques and applications, Monte-Carlo methods and related statistical analysis; introduction to deterministic and stochastic models in such areas as queueing theory, inventory control, reliability, Markov decision processes, risk analysis.

74.396 Stochastic Methods in Management Science

This paper is intended to provide Commerce students with an understanding of simulation, decision analysis and scheduling which form the basis of stochastic problem solving and decision making in Management Science. The content of this paper is geared towards the student who only has one-year of university mathematics.

54.352 Stochastic Methods in Operations Research

Topics such as decision analysis, stochastic programming, time series analysis, and forecasting are discussed.

54.371 Deterministic Methods in Operations Research

Topics associated with the application of deterministic optimisation such as computational complexity, data envelopment analysis, networks, set partitioning and dynamic programming are discussed.

54.304 Project in Engineering Science

This course provides Engineering Science students with an opportunity to work on a real operations research problem in industry, formulate a model, and use the model to gain some insights into the real problem. A project report must be written and an oral presentation given.

74.200 Operations Management

This course is intended to introduce students to a wide range of issues that are relevant in the management of operations (i.e. manufacturing and services). Many of these are quantitative in nature, but in this course the management and organisational aspects are stressed.

74.300 Advanced Operations Management

Productions and Operations Management (POM) is concerned with understanding how goods may be produced and services supplied effectively and efficiently. This course focuses mainly on key concepts in POM at the micro level of the firm, including forecasting, inventory management, MPCC, JIT, project management and human resource management.

74.301 Project in Operations Management

This course is a practically-oriented extension to Advanced Operations Management. Its objective is to provide students with an opportunity to work on real operations problems in industry and to come to grips with all the inherent difficulties.

Engineering Science (Engineering Faculty)

Professor David M. Ryan: Combinatorial optimisation problems arising in scheduling, rostering and timetabling models. Data envelopment analysis.

Dr Chuangyin Dang: Mathematical programming and its applications, especially combinatorial and stochastic optimisation.

Dr Andrew J. Mason: Mathematical programming and heuristic solution methods and their application to combinatorial problems including scheduling, rostering, and network models.

Dr Andrew B. Philpott: Mathematical programming and its applications, in particular to problems of planning under uncertainty in the electricity generation, telecommunications, and finance sectors.

Dr E. Mikael Ronnqvist: Mathematical programming models and their application, in particular to problems in the forestry sector. Decomposition techniques for integer programming.

Mr Andrew Goldie: Optimisation problems arising in the airline industry.

Statistics (Science Faculty)

Dr Ilse Ziedens: Stochastic processes, stochastic differential equations, applied probability, stochastic networks and their application to telecommunications models.

Dr Karla Ballman: Stochastic processes, statistics, simulation.

Dr Steven Butt: Mathematical programming. Combinatorial optimisation problems arising in vehicle routing and facility layout.

Mr Alistair McNaughton: Mathematical programming applied to forest harvesting.

Management Science and Information Systems (Commerce Faculty)

Assoc. Professor Victor Portougal: Production planning and production scheduling.

Dr David J. Robb: Operations research, management, and strategy. Scheduling and inventory management.

Dr Susan J. Byrne: System dynamics models and their application to production, inventory, and strategic decision making models.

Mr John Paynter: Software engineering issues related to operations research, electronic data interchange in transportation modelling.

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SEEN ELSEWHERE

From *Systems Dynamics Review* Summer-Fall 1994, R. Ackoff, 'Systems Thinking and Thinking Systems':

Managers are not confronted with separate problems but with situations that consist of complex systems of strongly interacting problems. I call such situations messes. Therefore, the behavior of a mess, and a mess is a system, depends at least as much on how its parts interact as on how they act independently of each other. However, it is standard managerial practice to reduce messes to aggregations of problems: to prioritize and treat them separately, as self-contained entities. Managers do not generally know how to deal effectively with any system, let alone messes, taken as a whole. Effective managers do not solve problems; the dissolve messes. Ineffective managers mismanage rather than manage messes.

RESULTS OF SURVEY ON APJOR SUBSCRIPTION AS PART OF ORSNZ MEMBERSHIP

Forty-six returns were received or less than a third of the membership responded. Here are their choices, for what they are worth:

Question 1:	I prefer *APJOR* as the ORSNZ official journal	8
	I prefer to 'debundle' journal from ORSNZ subscription	38
Question 2:	If ORSNZ membership and journal subscription are separated, then I would wish (most likely) to receive	
	APJOR	10
	OR INSIGHT	17
	OR/MS TODAY	18
	INTERFACES	19
	NO JOURNAL	8

A rather curious result was that three people who voted for the status quo did not choose *APJOR* as their preferred journal in question 2, while some (like me) prefer to 'debundle' — several people objected to this new word I added to the English vocabulary — selected *APJOR* as their preferred journal, maybe because they already have access to all the others.

I leave it to the ORSNZ Council to pursue this issue further. Although the response rate is only about average for mail surveys, there is no reason to believe that those who did not respond would have radically different preferences than those that voted.

ORSNZ STUDENT PROJECT PRIZE AND YOUNG PRACTITIONER PRIZE

ORSNZ wishes to promote and encourage excellence in student project work in OR. The Council invites students, who completed a practical project during 1994 as part of their undergraduate or first graduate degree at a NZ university or technical institute, to submit their work as an entry into the 1995 Student Project Prize. The deadline for submission is Friday, 12 May 1995. The prize is about $300.

For detailed information and a copy of the entry form, please contact:
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ORSNZ also wishes to encourage young practitioners to submit papers for the Young Practitioner's Prize. To qualify, the paper must be presented at the conference, be singly authored, and the author must be under 25. Two full copies of the paper must be in the hands of the conference organizers, clearly labelled as submissions for the prize, by the 1st of July. The prize is $1000.

MEETINGS CALENDAR

Call for Papers

31st Annual Conference of ORSNZ
31 August - 1 September 1995
Victoria University of Wellington
Deadline for abstracts (maximum 2 pages): 1 May 1995
Deadline for submission of summary paper (maximum 6 pages, including figures, tables, and references): 1 July 1995
Note: Pre-conference proceedings will include summary paper, if submitted by 1 July, or abstract. Please follow the page format and style of the 1994 proceedings for both the abstract and the summary paper.

Dates of other conferences and meetings

For details on information see January OR Newsletter

TIMS XXXIII International Meeting: 25-28 June 1995, Singapore

EURO XIV — 14th Euro. Conference on OR: 3-6 July 1995, Jerusalem

1st Int. Symp. on Energy Models for Policy and Planning: 18-20 July 1995, London

Aitken Centenary Conference - 3rd Pacific Statistical Congress, Annual Meeting of the N.Z. Stat. Ass. & 1995 N.Z. Mathematics Colloquium: 28 August - 1 Sept. 1995, Dunedin

International Symposium on OR with Applications in Engineering, Technology, and Management (ISORA): 28-31 August 1995, Beijing

OR 37: ORS Annual Conference, 12-14 Sept. 1995: University of Kent
Info. from ORS, Seymour House, 12 Edward St., Birmingham B1 2RX

IFORS 4th Specialized Conference on O.R. and Engineering Design: 24-27 Oct. 1995: St. Louis, USA

ORSA/TIMS Joint National Meeting: 29 Oct. - 1 Nov. 1995: New Orleans

TIMS/ORSA Joint National Meeting: 5 - 8 May 1996: Washington D.C.

1996 IFORS Conference: 8 - 13 July 1996: Vancouver, B.C.

APORS' 97 - 4th Conference - PRELIMINARY ANNOUNCEMENT: 30 Nov. 1997 - 4 Dec. 1997, Melbourne, Australia

Additions

Australian Math. Soc. Annual Conference: 3-7 July 1995
Hobart, Tasmania
Deadline for abstracts: 15 May 1995
Information: Austr. Math. Soc. Conference, c/o Dickensons Conference Dept.
111 Main Road, Moonah, Tasmania 7009, Australia
FAX 61 02 782956
e-mail: gardner@hilbert.maths.utas.edu.au

Mathematica in Mathematics Research and Education: 8-10 July 1995
Hobart, Tasmania
Deadline for abstracts: 1 May 1995 (preferably by e-mail)
Information: Mathematica Conference, c/o as above
e-mail: mathematica_conference@hilbert.maths.utas.edu.au

WHAT IS OPERATIONAL RESEARCH?

Operational Research is the scientific approach to solving management problems. Using observation, data and analysis, the OR practitioner builds up quantitative relationships, called models. Models that take an overall system view help management make informed decisions.

The Secretary
Operational Research Society of New Zealand
P.O. Box 904
WELLINGTON

Please enrol me as a member of the Operational Research Society of New Zealand, at the membership grade indicated below. I enclose the appropriate fees*.

Individual members in Auckland, Wellington, Christchurch and overseas $45.00
Individual members in other areas $40.50
Student members † $15.00
Corporate members $150.00

I agree to be governed by the constitution of the ORSNZ, and to remain liable for subscriptions until I notify the Secretary in writing of my intent to withdraw from the Society.

Signature _____ Date _____

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