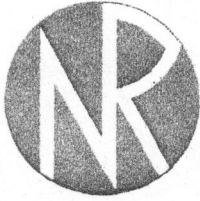


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ONSA



ORSSA

OPERATIONS RESEARCH SOCIETY OF SOUTH AFRICA OPERASIONELE NAVORSINGSVERENIGING VAN SUID-AFRIKA

NUUSBRIEF
NEWSLETTER

AUG. 1974

1. LIDMAATSKAP/MEMBERSHIP

Ons verwelkom die volgende nuwe lede:
We welcome the following new members:

Dr H.C. Duggan
P. Critchley
B.J. Bester

Vol/Full
Mede/Associate
Mede/Associate

Johannesburg
Johannesburg
W. Kaap/W. Cape

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'n Egalige stroom nuwe lede sluit nog steeds by die vereniging aan, maar ons voel dat daar nog baie is wat nog nie so gedoen het nie want hulle het nie aansoekvorms nie of kom maar net nie so ver nie.

Ons sluit dus 'n aansoekvorm by hierdie nuusbrieff in, en versoek elkeen om geïnteresseerdes in hul organisasie of elders aan te moedig om lidmaatskap van ONSA te oorweeg. Aansoeke vir volle lidmaatskap moet deur twee volle lede ondersteun word, maar daar is geen sulke vereistes vir mede lidmaatskap nie. Al wat vereis word, is ware belangstelling in Operasionele Navorsing.

A steady flow of new members continue to join the Society, but we feel that there are many more who do not because they do not have application forms or just "don't get round to it."

We enclosed an application form with the Newsletter this month and ask each of you to encourage interested people in your organisation or elsewhere to consider joining ORSSA. Applications for Full Membership must be supported by two Full Members, but there is no such requirement for Associate Membership. All that is required is a genuine interest in Operations Research.

2. OPNAME OOR SALARISSE/SALARY SURVEY

Lede het al goed gereageer op ons onlangse versoek in hierdie verband, en ons wil dié wat hul voltooide vorms teruggestuur het daarvoor bedank. Die komitee is van plan om die opgawes te ontleed en resultate te publiseer vir die informasie en nut van ONSA lede, maar voel dat die hoeveelheid antwoorde nog nie genoeg is om 'n betroubare prent van die status van ON salarisse in Suid-Afrika te gee nie. Die wat nog nie geantwoord het nie word dus versoek om die aangehegte vorm te voltooi en dit in die ingeslote posgeld betaalde koevert terug te stuur (moet asb. nie 'n tweede vorm voltooi nie!)

Many replies have already been received in response to our recent request and we thank those members who have completed and returned their questionnaires. Your Committee intends to analyse the returns and publish the results for the information and benefit of ORSSA members, but feels that the response to date is not large enough to provide a reliable picture of the state of OR salaries in South Africa. Those of you who have not responded are asked to complete the attached questionnaire and return it in the return paid envelope enclosed. (Please do not submit a second return!)

3. "A NOVENNA TO ST. JUDE"

We reproduce the third case study in our series, published by courtesy of the editors of INTERFACES.

The Amalgamated Conglomerate (Canada) Ltd. Model

As an integer programmer, you often get phone calls from people who are trying to solve one. One that sticks in my memory is the one where a fellow from a company in Canada called and described a capital budgeting problem as follows:

He started off by saying that it had 60 000 0-1 variables, and 10 000 constraints. He than asked me what I would suggest that they do with such a problem. As I couldn't resist, I suggested that he first say a novenna to St. Jude. He replied that they had heard that I was often jocular about such things. What he was doing was coming up with a five-year planning model for his company.

The 60 000 variables came about in the following way: he had 1 000 projects that could be done during any one of the following 60 months. The i th project can be started in any one of the 60 months, so j runs from 1 to 60. We have a thousand constraints looking like

$$\sum_{j=1}^{60} x_{ij} = 1, \quad i = 1, 2, \dots, 1\ 000.$$

And 60 000 0-1 variables. His model is actually maximizing return subject to some discounted cash flow constraints. For each year he has a constraint on cash flow allowable in that year. Also, he had constraints on cash flow allowed for the first two years, the first three years, and all five years. I then pointed out that I understood where he might get the first year's cash flow constraint, as he was probably operating from a budget decided last year. But I did not see, at once, how he got the second year's cash flow constraint. He told me that they had extrapolated the second year's right-hand side from the value they had for the first year. I then inquired if they had extrapolated the third year from the second year the same way, and then continued the process out to the fifth year. He said that they had done so. I then pointed out that if he took a tight first year cash flow constraint and then added to it a loose second year constraint, that the result would be virtually meaningless. As he didn't understand, I tried an analogy: "If I measure the left-hand side of my trousers very carefully, and I measure the right-hand side of my trousers to the nearest foot, my pants would fall down." He said that he understood. Then I said, "Therefore, the fifth year really depends on the fourth year, which depends on the third year, which depends on the second year which depends on the first year, which is where it ends. We now only have one year to solve so we have only 12 000 variables."

"Well," he said, "not exactly, because we got the twelfth month from the eleventh month." So we rapidly get down to one month and 1 000 variables. So, we have one month where we have this tight budget constraint that we believe in, and a thousand projects to consider. He said, "Well, we now have something we can at least look at." Then I asked, "How many hours do you work a week?" He said, "40". I said "Everybody in the company pretty much works 40 hours?" "Sure." "160 hours a month, right?" "Right." "Well," I said, "160 hours a month divided into 1 000 project decisions implies that some-one is making $6\frac{1}{4}$ decisions an hour." I asked, "Who is that?" He said, "Well, we don't do that now, but with the model we're going to do it." I said "Now in order to calculate a discounted cash flow value or net present value, you've got to know the following things: the initial investment, the salvage value, the interest rate, the annual disbursements, and the annual income assuming, of course, that the interest won't change from day to day. Now let's assign each one of those things a cost of \$.50 to collect the data. But now that's today. Next week the interest rates will change and some other things will change and we'll have to recalculate. Do you think you can calculate the necessary data for 1 000 variables before they're like a carload of old fruit (i.e., rotten) and you can't use them anymore?" He thought about that. I said, "Let's consider the cost at \$.50 an item to fill in this matrix and to generate this model." It took me half an hour to show him that the cost of gathering data, punching it, card to taping it, and generally getting it ready for the model, was going to make a noticeable difference in the gross national product of Canada. He had not considered

this. I asked, "Have you begun collecting the data?" He said, he had not. I said, "Well, I have a very simple rule."

IF THE COST OF COLLECTING THE DATA FOR A MODEL IS
GREATER THAN THE AMOUNT YOU CAN SAVE BY SOLVING
IT, YOU SHOULDN'T DO THAT.

He said, "You are telling us that we don't have an integer programming problem." I said, "I am telling you I don't think you should proceed any further with this model before you know what the data is going to cost you. Why don't you discuss this with your superiors."

Two weeks later I got a letter, saying that he had discussed the project with his superiors and the project had been scrapped and was being re-examined in light of money available.

4. INTERNATIONAL WORKING SEMINAR

Operational Researchers in particular and Management Scientists in general have always been eager to deploy their expertise on the planning problems of other people. So far, however, these scientists have not devoted much of their time and energy to their own planning problems.

Those working in this field will be aware of the rapid growth of knowledge. But this growth has never been planned and the resources devoted to the extension of knowledge in different areas have not necessarily been related to their real needs. Consequently, we have evolved to a position in which some problem areas have been almost worked out and in which further research simply enables us to know more and more about less and less, whereas there are other areas of great importance in which few resources are being deployed.

The purpose of this seminar, which is being organised by the University of Sussex and which takes place from 8 to 11 April, 1975, at York, England, is to provide an opportunity for research scientists to evolve a strategy for the development of their own fields. There will be plenary sessions at which aspects of the total problem will be discussed, but the main effort of the seminar will be deployed in smaller parallel sessions.

Each working session will survey the rate at which knowledge will have to grow and applications to be successfully achieved if these objectives are to be met. These plans will not only involve the creation of knowledge but also the logistics of the number of people and resources made available.

Well-known speakers will participate, including C.W. Churchman, A.M. Lee, B.H.P. Rivett and K.D. Tocher. Further information about the seminar may be obtained from the ORSSA Secretary, P.O. Box 462, Stellenbosch, 7600, or directly from:

Prof. B.H.P. Rivett
 School of Applied Sciences, Mantell Building
 University of Sussex
 Falmer, Brighton BN1 9RF, Sussex
 ENGLAND.

5. BOLESLOW MONIC FUND FOUNDATION : PRIZE AWARD 1974

The Actuarial Society of South Africa has notified us of a competition organised by the above Foundation in the area of disability insurance. Entrants to the competition have to answer a question related to the setting of adjustable premiums paid for long-term non-cancellable disability insurance.

Entries close on 28 February, 1975 and three prizes totalling Dutch florins 8 000 are being offered. For further details please write to the Secretary of ORSSA.

6. NATIONAL CONFERENCE : CALL TO HIKERS AND MOUNTAINEERS

Anyone who would like to spend from one to three days, immediately before or after the National Conference in November, hiking and mountaineering in the Western Cape should contact

P. Fourie
 Dept. Toegepaste Wiskunde,
 Universiteit van Stellenbosch,
STELLENBOSCH.
 7600

He is prepared to arrange anything from a one day climb on Table Mountain to three days in the Cedarberg, but must know your interest before going ahead.

(Here's chance for applied hill climbing research - anyone for steepest ascent or conjugate gradients?! Ed.)

7. PERIODICALS LIST

Copies of the list of periodicals of O.R. content in South African libraries were sent to all who attended last year's conference. There are still a few further copies available (gratis) on request from the editor (T.J. Stewart, c/o NRIMS, P.O. Box 395, Pretoria, 0001).

8. CHAPTER NEWS

8.1 JOHANNESBURG

The next meeting of the Chapter is scheduled for Wednesday 21 August at 20 h 00 in the Sunnyside Park Hotel. Mr C. Beeston, Project Leader, Computer Applications and O.R. Dept.,

Anglo American Corporation, Welkom, will speak on

"Optimisation in Strategic Mine Planning"

He will critically review models constructed over the last two years, and will assess their value. Thoughts on the future use of optimisation techniques in strategic mine planning will be discussed, illustrated by a hypothetical case study emphasising the effect of uncertainty on decision making together with a proposal for a possible solution.

8.2 PRETORIA

The Pretoria Chapter plans to meet on Wednesday 28 August in the Assembly Hotel, also at 20 h 00. The speaker will be Dr D. de Jong of Pretoria University whose topic will be:

"The Dynamics of Natural Resource Utilization"

This talk arises out of research at Pretoria on topics related to Forrester's controversial World Dynamics model. As such it should be of profound interest to members and non-members alike.

Refreshments will be served.