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Y2OR

Y2OR: MY FIRST PROJECT & PUZZLE #4

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This month I'm continuing with the series I started last month, entitled 'My First Project'. This time we'll be hearing from Max Moullin, who gave me the idea originally, and his experiences in the Department for Environment and Transport.

If anyone else would like to contribute to the 'My First Project' series then please send your piece (approx. 500 words) to me by email - LMaynardAtem@live.co.uk - and include a recent photo that I can print alongside the article.

My First Project – Max Moullin

My first project, at the Department for Environment and Transport, was a major review of snow and ice clearance on English motorways. It was due to go to expensive external consultants, but my boss Errol Babington persuaded the client to go 'in house' instead. I had just finished my MSc in Management and O.R. at Warwick Business School and this was my first proper job. I was the only full time person on the project, but worked as a team with a couple of senior colleagues.

In terms of O.R. techniques the main model we used was a simulation model that I developed. This was used for predicting snow depths in each lane of a motorway every five minutes, together with accident risk, delays and operating costs for a given number of snowploughs in different snowfall scenarios and traffic flow levels. By weighting each scenario with their likelihood in different areas of the network, we were able to come up with recommendations for each area. We also used cost-benefit analysis and validated our conclusions by checking that they would still be valid in the 'worst winter in 30'.

Data, as always, was a major problem. After spending many days in the Met Office in Holborn, I had my first breakthrough. Father and son had recorded hourly snow depths for over 30 years (including the severe winter of 1947) at their observatory in Edgbaston (now known as Perrott's Folly and probably the inspiration of one of Tolkien's two towers). The Met data provided a mass of information on air temperatures but, alas, nothing on road temperatures which, of course, was what we needed so we had to improvise by using a formula to convert one to the other. When word got out, we suddenly became 'world experts' and were much in demand.

One of the project's key findings was that they could halve the amount of salt spread without increasing accidents or delays. This meant that the maintenance compounds did not need to be so close together and surplus ones could be used as sites for much needed service stations. The analysis also helped the service identify how many snowploughs were needed in different areas of the country, depending on the severity of winter conditions.

A key feature of the project was the formation of a steering group composed of the Director of Motorway Maintenance, several of his staff, and the O.R. team. We produced 15 working papers and presented them at regular monthly meetings. This meant that we got their agreement about our assumptions and analysis as we went on.

The project's recommendations reduced accidents, delays and operating costs, but did mean that the motorway winter maintenance team had to devote much energy into implementing them. If we had produced the final report without the preceding working papers, the likelihood is that they would have challenged some of our assumptions and our report ignored.

The main thing I learned was the importance of working closely with people from the client organisation if you want to get your project implemented. The last of our working papers was written jointly with a former snowplough driver. When I moved to the British Coal O.R. Group, I managed to turn several draft reports *for* the client into joint reports *with* the client. Client involvement is also important for my current work on the Public Sector Scorecard, enabling the benefits to be maintained by staff in the organisation who have ownership of the project.

At the time, I was not very confident and relatively inexperienced at giving presentations. However I once had to drop off a report for the director and he unexpectedly asked me about the project. There was something about his manner that enabled me to forget my nervousness and answering his questions informally gave me confidence for more formal presentations.

I honestly cannot think of anything I would do differently - which demonstrates the guidance given both by Errol and my two other colleagues, Joe Fitzsimmons, and Alan Greaves and I shall always remember my ride on a snow plough on the M62!

Problem Page

I must say I'm really impressed with the number of responses sent in to last month's problem, it's definitely been the biggest yet! As usual thank you to all of those who've sent in solutions, and thank you for your feedback and continuing participation. I look forward to reading your solutions to this the penultimate problem, let me know if you find it easier or more difficult. As usual, answers in an email (LMaynardAtem@live.co.uk) with your workings included and best of luck!

Puzzle #4 – Relief Mission

Figure 1

Coordinating relief efforts after catastrophes such as civil unrest and natural disasters can be a logistically complex challenge. Delivering relief to people in need is the immediate focus of any disaster management plan.

The map in Figure 1 shows the locations of 20 villagers, each represented by a 'hut' icon. The villagers are in need of relief supplies contained in the crates attached to parachutes. There are two identical relief packages available. The only delivery option is by air drop. Each package can be dropped on any cell.

After the crates are dropped, each villager will walk to the nearest drop location to pick up relief supplies. Use a direct line between cells to calculate travel distance. For example, the distance between a1 and a2 is 1km and the distance between A1 to B2 is 1.41 km. Assume that each crate contains an unlimited amount of relief supplies.

Question: Which two drop locations will minimize the total distance that all villagers must travel?

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