THE SCIENCE OF BETTER AT THE HEART OF ANALYTICS

NOVEMBER 2013 NO 515

SIMULATION IN DESIGN

: : INSIDE THIS MONTH : : : : :

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EDITORIAL

JOHN CROCKER

Congratulations to all those who have been elected to serve on General Council and to John Hopes who has been re-elected to serve another 3 years as Vice President.

At a time when the Society appears to be doing even more for its members, it is rather paradoxical that membership numbers are apparently in decline. One of the first tasks that the new Council members will no doubt be asked to look at is why this is happening and, more to the point, what can be done to reverse this trend.

I am afraid I was guilty of making a glib, unsupported statement last month (only one, I hear you cry). The particular one was by coincidence related to the above issue. It would be interesting to know whether people who pay by Direct Debit are, in general, more or less likely to switch suppliers, continue subscribing or remaining members. It would also be interesting to know whether these people choose to pay by DD because they intend to remain 'loyal' or, whether having so decided they are less likely to think about leaving or take the positive step to cancel rather than the negative step to not renew.

At the risk of being accused of being too backwards looking, Saturday 10th November is the 60th anniversary of the official formation of the Operational Research Society. Membership was made unlimited and anyone could join provided they were doing what could loosely be described as Operational Research. The OR Club had been formed in April 1948 but membership was limited to a maximum of 100 and not more than one person from any given organisation. The Operational Research Quarterly (subsequently renamed the Journal of the Operational Research Society) was first published in 1950. The first courses in O.R. were also being given so it was a natural progression to create a charitable Society.

For it to have lasted 60 years, suggests it is perhaps more than a passing fad but what of its future? We already have 3-D,

interactive, visual simulation in which we can model agents who behave as if they were rational human beings (whatever one of those is). We also have numerous optimising algorithms which, although they may not always find the best solution, can be relied on to find very good solutions generally within an acceptable time. Soft Systems Methodologies can help us understand complex relationships and improve the way these work. There are few areas of human endeavour where O.R. has not played a part and, it could be argued, even fewer where it could not be used beneficially. And yet for all that, very few people have heard about Operational Research and even fewer are aware of what it has done and can do.

We only have to look to the President's Medal contenders (ibid) to see what O.R. can achieve in three very different applications. Are we too modest – is it that we think/know anyone could have arrived at the same solutions (given time)? Are we too introvert – we have to convince our sponsors that what we are proposing is sensible, addresses their problems and will be an improvement on the existing situation so we cannot all be introverted? Maybe we are elitist – certainly this is one possibility even though we do not make it at all difficult to join the Society (but because so few know of our existence, we do not have to make it difficult to keep people out). One problem is that we still do not have a simple definition of what it is we do but then again, have you ever tried to define 'classical music'?

<OR>

CONFERENCE NEWS





FELICITY JOINS THE TEAM

Hello, I'm Felicity McLeister the new O.R. Pro Bono Project Manager.



Just to give you a little bit of information about me, I have worked in an array of places from an insurance company, a charity, a school to an arts centre. My experience is in Human Resources and Project Management. Having worked in the third sector¹ for six years and having never heard the term O.R. I can really see the need to raise O.R.'s profile in general and in the third sector in particular.

My first exposure to O.R. was the OR55 conference in Exeter which was excellent. All the streams I attended were fantastic and I found the case studies fascinating. What struck me most was how widely O.R. can be used in any sector and the variety of O.R. techniques that can be applied. On the back of this I am extremely pleased to be working for the OR Society and am looking forward to seeing the results of the O.R. Pro Bono project.

The idea of providing pro bono O.R. support to the third sector has been discussed among OR Society members for a number of years; a pilot scheme run by volunteers has been successfully running since 2011. In my new role I now aim to build on its current success and establish a sustainable, thriving programme of voluntary O.R. support to the third sector.

The aim of O.R. Pro Bono is:

- To help third sector organisations to do a better job, impacting upon desired outcomes, and build capacity by using the skills of volunteer O.R. analysts and consultants both established and student.
- To promote awareness and understanding of the benefits of O.R. across the third sector and to wider audiences.
- To give O.R. analysts an opportunity to practise in a wider arena and develop their knowledge and skills.

If you are interested in becoming a volunteer or just want to find out more about O.R. Pro Bono please send an email to felicity.mcleister@theorsociety.com

If you are an organisation looking for pro bono support please write to felicity.mcleister@theorsociety.com with a brief outline of the issue you would like help with or to simply find out more, write an email quoting 'ORITS'.

You can also connect with me on Twitter: @FMcLeister and LinkedIn: Felicity McLeister

I look forward to hearing from you!

 $^{\scriptscriptstyle 1}$ Note that 'third Sector' refers to organisations with charitable status.

<OR>

REGIONAL SOCIETIES

Contact details for all regional societies and meetings past and present are listed at:

http://www.theorsociety.com/Pages/Regional/RegionalList.aspx



Agent-Based Modelling: What, When and Where

This is a practical training course aimed at developing expertise in agent-based modelling and simulation (ABMS). You'll gain practical experience of how to develop and implement agent-based simulation models and how to interpret the model outputs. You'll also understand how to exploit the huge volumes of new data available to add an extra level of model granularity and learn how to tell the difference between good, bad and dangerous models. You'll learn:

- When and why to use the main modelling paradigms (DES, SD and ABMS)
- General principles and techniques used in modelling and simulation
- Design methodology for ABMS; an introduction to the AnyLogic simulation tool

Course provider: David Buxton, DSE Consulting Limited

OR Society Ref. 3238 5-6 November 2013, Birmingham £1,120 + VAT Members £1,220 + VAT Non-members

If you are interested in further information, have any requirements (e.g. an alternative course date), or have difficulty booking a course online then please contact **Jennie Phelps**. It is recommended that courses are booked online. If this is not possible, then please print off, fill and fax or post the <u>Training Course Booking Form</u>.

Jennie Phelps Email: jennie.phelps@theorsociety.com

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TOO MUCH OF A GOOD THING?

JOHN CROCKER

In most of our work, you seldom have a complete population of data; indeed, more often than not the population is infinite and the data is scarce.

The question then becomes how much data is enough or what is the best sample size. Again for O.R. projects, very often this has to be a compromise between confidence and time. If you are under pressure to produce answers (and let's face it, when aren't you) then you may have to run with whatever data you have and then try to convince the customer that the results are subject to considerable statistical error. (This is very much the situation the IPCC is in although in their case, they also have the additional problem of having an incomplete model since not all of the variables are known and not all of the relationships between the known variables are known either.)

In the case of analytics and Big Data, the situation is very often the opposite. In this case, there is often an enormous amount of data, but some, or all of the data may be of dubious provenance and very often the relationships between the variables are unclear or even unknown. Indeed, in some cases, there may actually be no cause and effect relationship at all, even though there could be quite a high [linear] correlation.

It is very tempting to assume that there is a relationship when the correlation is high. But as David Edelman pointed out in his letter (ibid) we may not know which is the cause and which the effect even if one exists.

Supposing we have a mass of data taken from the social media (e.g. Facebook) and we do a search for references to 'flu' or 'influenza' by region. We might assume the volume of 'traffic' would be indicative of the number of people suffering from this illness since people with it are likely to tell their friends or give this as a reason for not making an appointment. Why might this not be the case? Firstly, it could be that people are telling their friends that this year they will not get a letter inviting them to have a 'flu jab' so they will need to ring the surgery. Secondly, there may have been a bad case which got reported in the local paper and this has raised awareness so people are telling each other. Thirdly, there may have been a television programme about, amongst other things, influenza in which one of the participants happened to be something of a local celebrity or maybe it was filmed in a nearby village. Fourthly, the region may have suffered particularly badly during a previous epidemic so everyone is that much more alert. Fifthly, the region may be temporary home to a large number of immigrants from a region which has recently suffered a serious outbreak and they are talking to each other to try to get news of their relations back home. Sixthly, there could be a small group of people who, having heard about this analysis, are determined to upset the results. I am sure you can think of several more possibilities.

Using data from clinical trials, particularly those carried out under strict double-blind protocols would, on the face of it, seem to be a valid source. The problem here is that very often these samples are not completely random. Trials to determine the efficacy of a particular drug will generally use a cohort in which all of the sample have a certain condition and they are divided into two groups such that one receives the drug and the other receives a placebo. This is a perfectly valid trial for the given drug but it is not a random sample for some other factor. Suppose the cohort suffer from sleep apnoea and the drug is to relive afternoon tiredness. Now suppose someone gets hold of the data relating to this trial and uses it to 'determine' the prevalence of obesity in older people. They remove the people who are too young and use the remainder. This will show that a very high percentage of older people are obese – why, because most people who suffer from sleep apnoea are obese.

In clinical trials, it is normal to collect as much information about an individual as possible such as age, gender, marital status, weight, height, previous operations/treatment, current prescription drugs and over-the-counter treatments, use of tobacco and alcohol, dietary factors and so on. It may be very tempting to include all of these factors as parameters in an analysis. Modern computers can handle an enormous number of parameters so why not include them all? Remember there are less than 10 billion people alive today that is less than 2³⁴ so in theory you only need 34 independent binary variables (male/female, non/smoker, etc). Thus, if you include more than 34 variables some must either be correlated with others or add no significant benefit. There are some quite simple tests one can perform to check whether a variable is making a significant contribution – you can find these in any reputable statistics text book.

Regression can never tell you whether there is a relationship only that the data confirms or refutes such a hypothesis within the bounds of that data at a given level of confidence given that sample is truly random.

<OR>

'Using data from clinical trials, particularly those carried out under strict double-blind protocols would, on the face of it, seem to be a valid source.'



THE OR SOCIETY'S 7TH SIMULATION WORKSHOP (SW14) CALL FOR PAPERS

Website: www.theorsociety.com/SW14 1 – 2 April 2014







HELD IN COOPERATION WITH: THE INFORMS SIMULATION SOCIETY; THE SOCIETY FOR MODELING AND SIMULATION INTERNATIONAL (SCS).

SUBMISSION DEADLINE APPROACHING

IMPORTANT DEADLINES:

1 November 2013: Submit electronically contributed papers not previously published or presented.

10 January 2014: Contributors will be notified whether or not their paper has been accepted.

14 February 2014: Authors provide the final manuscript for inclusion in the conference proceedings. These should be in the format required for the conference. See Workshop Author Guidelines at www.theorsociety.com/SW14.

14 February 2014: Submit **poster** title and abstract of 150 words. These should be submitted using the electronic submission

form for full contributed papers. Submission implies that an author will register and pay to attend the conference. Posters abstracts will be published in the conference proceedings and should follow the guidelines for conference papers.

If you require any further information on paper submission, please contact the programme chairs: Dr Cathal Heavey cathal.heavey@ul.ie and Dr Stephan Onggo s.onggo@lancaster.ac.uk. For further information on poster submission, please contact the Poster Chair, Dr Tom Monks t.monks@exeter.ac.uk.

<**OR**>

EARLY CAREER ADVISORY GROUP – YOUR SOCIETY NEEDS YOU

GAVIN BLACKETT, SECRETARY & GENERAL MANAGER

Not surprisingly, the Society has long recognised that its members in the early stages of their careers are vitally important to its future health and well-being. It has supported the 'young to O.R.' through its YOR conferences, its training programme and other networking events.

It has now agreed to include more formally the Early Career members in the Society's mechanisms for shaping and actioning policy, direction and activities. Its first step on this path is to create an Early Career Advisory Group as a means for gathering, understanding and acting on the views of the profession's newer additions. It is envisaged that the Group will hold a couple of face-to-face meetings per year at the Society's offices in Birmingham with other business conducted by email or video calls. If you fall into this group and would like to contribute ideas and actions to Society business, please email or telephone me to discuss this further (gavin.blackett@theorsociety.com, or 0212 233 9300).





SORRY!

JOHN CROCKER

This is the word staff managers probably most hate to hear. It is usually followed by, 'I cannot make it today, tomorrow or whenever due to...'

If you have a hospital ward to run and a nurse cannot make it to work, then your number one priority job will now be to find a standin. Hospital wards have to keep going 24/7 and need a minimum number of staff, nurses, auxiliaries, cleaners and so on to keep them going. If there is no pilot, train-driver, bus-driver then it can be very inconvenient, even expensive, but you always have the option to cancel the service – this, alas, is not an option with hospitals except under very extreme circumstances where patients' lives would be at more of risk if the ward was kept open than to close it (usually due to some pathogen).

The first task is to find out what job they were down to do. This will tell you whether the ward could, as a last resort, function without that person but it also will tell you what grade of person the standin will need to be. If the person is only going to be off for one shift (to bury their grandmother for the 10^{th} time this year) then it is probably not worth reorganising the schedules but if he or she is likely to be out for several days then this may be the best option.

Nurses, like everyone else, can only work one shift at a time, cannot be expected (or asked) to work more than so many shifts in so many days, cannot work a day shift in the day following a night shift, might be willing and able to work a double day-shift, cannot be expected to work every weekend (unless they have chosen to only work weekends) and so on. There may also be other constraints such as husband and wife may not be allowed to work together, two men may not be allowed to work together on a women's ward, or two agency nurses may not be allowed to work together. (Not all of these constraints will necessarily apply in all cases.) Some individuals may find it very difficult/inconvenient to change shifts at short notice (due, usually to domestic situations). Others may be quite happy to fill-in especially if it means more money.

In an insightful talk, Alistair Clark told the WORDS audience of the difficulties and potential solutions to these problems. He also explained some of the hoops analysts have to jump through in order to do any work for the NHS. Apparently it is not sufficient to simply provide literature review references in some health journals, it is also necessary to describe how these were obtained – what searches were performed of which journal databases using what keywords and how these were whittled down to the 'relevant' ones. All researchers also have to attend a course to convince the authorities that they know the correct NHS research procedures and take the necessary care in ensuring all conclusions are statistically sound. Needless to say they also have to meet the ethics requirements.

Alistair's talk was followed by the AGM at which there were no changes to the officers. A number of talks were suggested including holding joint meetings with SWORDS and IMA.

<**OR**>

AN OPEN EVENT TO DISCUSS THE FUTURE INFLUENCE OF O.R. ON PUBLIC POLICY

LSE'S ROSEBERY HALL, 90 ROSEBERY AVENUE. LONDON. EC1R 4TY 12 DECEMBER 2013, 16.00 to 18.00

If you have aspirations to help expand the contribution of O.R. in developing public policies, you are encouraged to apply for a place at this free event, which is the first of two planned within John Friend's new charitable project on the *Future Policy Influence of O.R.*

Evidence of the distinctive contributions of O.R. has been gradually accumulating over the decades. **But what can today's and tomorrow's O.R. practitioners contribute** to the development of public policies to address the uncertainties, complexities and political intricacies of our 21st century world? We are by no means without professional competitors here, either in the service of governments or elsewhere.

The purpose of this first event is to begin engaging ambitious members of our Society – especially those at a formative stage of their careers – in the development of strategies for training, research and global exchange of experience that can build on the record of achievement of O.R.'s pioneers in the public policy field. John Friend will refer, in particular, to the influence of the Institute for OR, which has spread worldwide among public policy professions since its launch as an initiative of our Society fifty years ago this year.

We plan to launch an **informal network** of interested Society members and others as a catalyst to continued progress in developing O.R.'s resource base.

For more details of the *Future Policy Influence of O.R.* project, more about this event and to reserve your place, go to http://tinyurl.com/plpedt5



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- **Impact Explorer**[™] a voting, ranking and matrix assessment tool. Groups use radio based handsets coupled with the Impact Explorer software to register their opinions or cast votes on the subject being discussed. The system supports up to 250 participants. Cost depends on the handsets being used. Prices start from as low as 31 GBP + VAT per handset. Handsets can be purchased in any quantity. Accompanying software license starts from £395 + VAT. System requires both hardware and software.
- Interwrite[™] Response a classroom response system. Using radio frequency or infra-red handsets, students respond to questions presented in PowerPoint, the internal question editor, or to impromptu questions asked verbally. The system can support thousands of students. Cost depends on the handsets being used. Prices start from as low as 31 GBP + VAT per handset. Accompanying software is included with the receiver kit, cost depends on the system being used. Discounts available for volume purchases of handsets.

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CAREERS OPEN DAY 2013

LOUISE ORPIN, EDUCATION OFFICER

Exhibition places at the Careers Open Day are now fully booked. It's great to see such a variety of exhibitors, thus demonstrating the diversity that one can have with a career in O.R. and analytics.

I am pleased to announce all 25 exhibitors below:



Please visit the website, www.TheORSociey.com/CareersOpenDay, to see the programme for the day and to register to attend. This event is a great opportunity for anyone interested in a career in O.R. and analytics to come and speak to both employers and postgraduate course providers.



FIND OUT ABOUT THE BEST CAREERS IN OPERATIONAL RESEARCH AND ANALYTICS CAREERS OPEN DAY 2013



- Meet employers and discuss opportunities for O.R. and analytics careers
- Discuss post graduate courses with course providers
- Talks on O.R. with lots of interesting case studies
- Hear graduates' experiences of working in O.R. and analytics
- Find out how to get into O.R. and analytics
- Free snack lunch and refreshments

THINKTANK SCIENCE MUSEUM, BIRMINGHAM WEDNESDAY 20 NOVEMBER 2013 10AM TO 4PM



For more details about the event and to book your place visit, www.TheORSociety.com/CareersOpenDay



SIMULATION IN DESIGN

NIGEL CUMMINGS

A lecturer in the College of Engineering at Swansea University, Dr Rubén Sevilla is investigating numerical simulation techniques for different physical and engineering problems.



Dr Sevilla

A firm believer in the application of computer simulation, he is convinced that simulation may one day take the place of traditional laboratory experimentation.

Already mathematics is routinely applied to problems associated with improving air travel, building faster F1 cars and reducing fuel consumption of road cars, so why not go further and simulate problem conditions to arrive at rapid and reliable solutions?

Dr Sevilla believes that simulation can provide a unique opportunity to improve and speed up the design process of many mechanical, electronic and aeronautical components. The processes involved seem remarkably simple, but the results from such simulations could be hugely useful.

Simulation could be used to build 'virtual prototypes' using computer aided design and then perform virtual tests - apart from reducing the design cycles, simulation could dramatically reduce R&D costs provided of course that these results can be calibrated to the real world.

Wind tunnels are expensive to both build and operate. They also generally require a lot of running time to produce enough data to enable an accurate analysis whereas simulation of the air flowing around a car can be done using computational fluid dynamics and a small cluster of computers much more cheaply and quickly. Dr Sevilla inspired by the possibilities of simulating rather than physically building prototypes is actively developing expertise in the development, analysis and application of advanced simulation techniques that, he is convinced, will form the basis of the next generation of industrial software.

The complexity of some problems of interest to industry, he says, such as the effect of wind gusts on an aircraft for example, prevents the successful application of traditional numerical simulation software available in industry. So the application of such simulation technologies will not completely remove the need to build prototypes.

However, research in this area is partially motivated by the European Commission objectives of promoting competitive, clean, safe and secure aviation by 2050, with citizens' and society's needs at the heart of the strategy. Bringing together concepts of mathematics, engineering and computer science, Dr Sevilla has already developed a novel numerical simulation technique.

Its main feature is the integration of the geometric modelling and the simulation stages, providing a much more accurate, efficient, reliable and robust framework. These properties apparently, are very rarely embraced by a single numerical simulation technique and it is this 'unique approach' that is attracting the attention of other research groups in the UK and abroad.

Typically it can take from five to ten years for a new computational methodology to mature from initial assessment in an academic research group to actual use in industry, so he expects during the next decade to see the routine application in industry of the methods he is developing now.

The main beneficiaries of his research will be, he says, firstly the UK and European aeronautical companies, but in the long term, he believes the main beneficiaries will be society and the environment.

The competitiveness of UK and European industry will probably lead to an improvement in the quality of life of society and on the other hand, a further reduction of laboratory based experiments, in favour of computer based experiments – these will provide a more sustainable way of testing engineering components.

More information about Dr Sevilla and his work can be found at: http://www.swansea.ac.uk/staff/academic/engineering/sevillaruben/





LETTER TO THE EDITOR

Dear Sir

I read with some interest your article ('Coming or going', October 2013). This is especially as I have been reviewing the value I get from the OR Society.

However, I must point out one flaw in your argument - the type of flaw that is becoming increasingly current in the popular press and media.

Cause and effect.

You have suggested that it is possible that paying by DD may discourage people from leaving.

The only reasons for making such a statement are to fill out the article or to generate a discussion on possible reasons and whether we can actually do the requisite analysis. There are so many other possible reasons. Also, even if these two things are related, is it the DD payment that reduces the probability of leaving or the other way round?

To put it simply, I am disappointed that such a statement, even if couched in 'may also be' terms, was included.

David B. Edelman

<OR>

RESPONSE FROM THE EDITOR

Dear David

I totally agree with you that we do not know whether people who pay by DD have done so because they have decided to stay with the Society or whether having done so for whatever reason, they are less likely to make the effort to cancel.

In my defence, I often choose not to change suppliers with whom I have set up a DD because I cannot be bothered to make the effort to look to see if there is a better alternative available on the grounds that if the amount I am paying out is relatively small then the savings will be even smaller.

As to my ploy to get a discussion going or elicit ideas on how we might hang on to members, clearly this has not worked. You say

em. Donec posuer ator. Curabitur sec there are many other possible reasons, of which, of course, there is no doubt, but have not suggested any. You also say that you have been 'reviewing the value [you] get from the OR Society' but again you do not indicate the results of your review or the decision you have made following it.

Yours etc. John Crocker

If any of you who have read this far have any suggestions on how we might encourage people to stay, or discourage people from leaving, we would love to hear them.

SPECIAL INTEREST GROUPS

Contact details for all special interest groups and meetings past and present are listed at:

http://www.theorsociety.com/Pages/SpecialInterest/SpecialInterestList.aspx



A SOFT SYSTEMS APPROACH TO IDENTIFYING CYBER DEFENCE CHALLENGES

NIGEL CUMMINGS

Andrew Beard (DSTL) gave a presentation in OR55's problem structuring stream which drew on elements from a presentation he had given at a symposium for Military Operations Research during the summer of 2013.



Andrew Beard

As such its content was extremely up-to-date and also to a certain extent sensitive, so this article will only touch on some of the points which illustrate his Soft Systems approach.

He spoke of how the UK Ministry of Defence (MOD) had embraced cyber defence as both a capability and an operational environment. Nowadays military systems were, by necessity, increasingly digitallyenabled and interconnected and thus vulnerable to cyber-attack.

It was important therefore that the MOD possessed confident systems and modus operandi that reduced cyber defence risks. The acquisition process for new systems over the past years had to take this into account and apply the principles of Information Assurance (IA) to ensure the integrity, availability and confidentiality of its information systems.

The MOD is no ordinary customer. It is a high-level, stakeholderinformed organisation subject to reviews of policy and procedures that are in place within its infrastructure. These include an Appreciative Inquiry Method (AIM) and Soft Systems Methodology (SSM), which are employed to engage stakeholders across organisational boundaries at the MOD, and at various levels of influence, to explore the problem space.

Although the principles of the IA process were generally sound, its implication could be ineffective when managing cyber defence risks and so follow-on work was necessary to ensure IA oriented processes were thoroughly effective.

'Much has been written on the subject of defence acquisition at the moment with defence acquisition reform, and more recently there has been quite a lot of literature about cyber defence. However it is the integration of cyber defence into the acquisition process that remains kind of curiously absent despite widespread concerns that capabilities were being acquired without due consideration. Of particular concern are the platforms and so-called non-network systems that tend not to be subject to the same level of cyber scrutiny that network systems applications and services demand during acquisition'

The fear is that without intervention, existing acquisition practices could introduce capability into service with undisclosed vulnerabilities that could be exploited by adversaries. A short high end review was commissioned to investigate the process of information assurance and acquisition. 'Information assurance' systems are those in which information that is handled is not susceptible to unauthorised manipulation, it is protected from unauthorised disclosure and remains accessible to authorised users.

In this context SSM was found to be appropriate to the design of conceptual systems. That is then used to test against the real world. SSM describes a series of steps which are best done alongside stakeholders rather than in isolation. AIM on the other hand is well-suited to individual consultation, at least in the early stages and is predicated on exploring the 'as is' rather than the 'as should be'. AIM is a specific technique in the field of appreciative inquiry'.



FAILURE DEMAND IN HEALTHCARE

NIGEL CUMMINGS

A presentation by Sian Joel-Edgar at OR55 provided an interesting insight into the concept of failure demand within the NHS.

Sian Joel-Edgar (Exeter University Business School) presented the findings of work done within the South Devon and Torbay NHS Region, though the results of the study undertaken could easily be applied to many other NHS regions.

A 'failure demand' in this context is when a patient presents at a minor injury unit (MIU) or Accident and Emergencies (A&E) either because they were unable to get an appointment to see their GP or because they were not happy with the diagnosis and/or treatment prescribed by their GP.

The main problem is to determine how many people are visiting hospitals unnecessarily as a result of a failure in their primary care system. There was found to be a significant increase in the number of admissions to A&E from 2004 onwards. This was partly due to admissions to MIUs being included in the A&E figures after 2004 (previously these were recorded separately).

The research was basically concerned with addressing three issues: what was the level of failure demand; what the implication on the wider healthcare system was and; why failure demand occurred. The research concentrated on four primary care practices (GP surgeries) in the South Devon and Torbay area. It took into account freely available data form a GP/patient survey, data from questionnaires and descriptions captured from patients as well as interviews with primary care professionals from the four different practices to get an understanding of what was going on in primary care.'



Sian Joel-Edgar

'When interviews were conducted with primary care professionals it was revealed that there was little understanding of demand (with no measurement), whilst there was a variation in the deployment of GP and nursing staff capacity.' On average (across the four sites) 26.5% of patients were not able to get an appointment at their first attempt (failure demand). The survey also showed that a significant proportion of those 'failure demand' patients were presenting to A&E.

When self-presenting patients were further surveyed within secondary care, 27% answered that an influencing factor for their attendance related to a GP issue. When interviews were conducted with primary care professionals it was revealed that there was little understanding of demand (with no measurement), whilst there was a variation in the deployment of GP and nursing staff capacity. The result of which was that primary care capacity and patient demand did not match optimally, leading to capacity short-falls and failure demand patients attending A&E.



AND THE WINNERS ARE...

NIGEL CUMMINGS AND JOHN CROCKER

Traditionally, the three finalists for the President's Medal are invited to present their case studies in a plenary session held on the Wednesday afternoon at the annual OR Society conference. 'The President's Medal is awarded for the best practical application of O.R. ... [provided] the work has been implemented before submission.'



Andrew Long

In the order in which they were presented, this year's submissions were from British Airways (BA), Ernst & Young (EY) and the Ministry of Justice.

Informing British Airways' Longhaul Fleet Purchase

Andrew Long, Daniel Welsh, Michael Lockett and Justina Jankauskaite (*British Airways*)

The presentation from **British Airways** was given by Andrew Long and Daniel Welsh. Daniel and Andrew explained that long-haul airliners typically have a useful life of around 20 years. As a result, there is a need to consider the replacement of 37 Boeing 747s. This will involve the spending of several billion dollars. Since the new aircraft will also be expected to be in service for 20 years, or so, it is essential that those selected will allow BA the flexibility to adapt to changing environmental and business factors.

The replacement aircraft will need to be cheaper to operate, more fuel-efficient, quieter and be acceptable to potential customers. Airframe manufacturers generally will not launch a new aircraft unless it is at least 15% cheaper to operate than the ones it is intended to replace but the way they calculate these figures may not use the same assumptions as the operators.



Daniel Welsh

O.R. modelling techniques were applied to a wide range of aircraft types, configurations and combinations. The models incorporated a vast array of factors affecting how the aircraft could be brought into service. The results from each of these models were then fed into an LP. A number of scenarios and sensitivities were run to ensure the final answers given were robust.

The work was carried out over a period of 18 months and besides being used to recommend to the Board which aircraft should be bought and in what numbers it also allowed BA to negotiate a better deal with the manufacturers. The final decision was to opt for 18 B787s and 18 A350s.

Optimising the Retail Network for New Zealand Post

Tony Lewins, Simon Mardle and Louise Fildes (Ernst & Young)

Tony Lewins and Louise Fildes presented the work Ernst & Young (EY) had done for New Zealand Post (NZP) concerning the optimisation of the retail network for New Zealand Post. Like our British postal service the NZP's retail operation is undergoing major transitions. The traditional business of handling letters has been in decline for some years although the handling of packages is still



relatively healthy. At the same time New Zealand's population is becoming much more urbanised and there is a major trend for shops to move from the high streets out into out-of-town malls. This has left NPZ in a far from optimal situation and a need to adapt rapidly if they are to stay in business.

Once set to task, the EY team had several weeks of problem formulation and specifications to design and develop in close collaboration with NZP analysts and regional managers – the work was split, time-wise between working in the UK and in New Zealand. A 'hot start' optimising algorithm was chosen because it



Tony Lewins and Louise Fildes during their President's medal presentation

gave significant speed improvements over pure simulated annealing. Around three months of calibration was required, particularly with regard to business flow.

The work has been in use on a weekly basis since February 2011 by NZP's network strategy team for a range of purposes which included: designing a national transformation strategy, planning new outlet types, local planning in growth areas, and exceptional event recovery. The work successfully identified how to evolve NZP's business into a radically new operation whilst, at the same time, improving annual performance by tens of millions of pounds.

Tony Lewin's team was able to provide NZP with powerful models capable of optimising the retail network under a wide range of specified conditions. During the construction of the models, his team had to take into account possible scenarios for future changes in customer habits and needs – this included the introduction of new types of outlet, new products and future business volume assumptions. His team's modelling for NZP was also required to accommodate operational, financial and social constraints - tasks which were performed admirably.

A Criminal Justice Modelling Landscape: Using O.R. to understand the CJS

Kathryn Sloane, Mike Marriott and Katherine Byrne (*Ministry of Justice*)

Katherine Sloane, Mike Marriot and Katherine Byrne dealt with the criminal justice modelling landscape where using OR has gained understanding of the criminal justice system. The MoJ is one of the

largest government departments, with a budget of approximately £9 billion per year. Each year millions of people use the Ministry of Justice's services across the UK, and the Department manages offenders from the point at which they are charged to the end of



Kathryn Sloane during her President's medal presentation at OR55

their sentence. The ministry is composed of many agencies. This work helped to highlight which processes were in use in these agencies and described the many different data systems— a huge challenge in analysis and modelling terms!

Needless to say, as with almost all large organisations data is stored in a vast array of databases using different architectures and access methods. O.R. has developed a suite of detailed models each covering different caseload and workload forecasts called the Criminal Justice Landscape (CJS). The models use a range of techniques including time-series forecasts, micro-simulations, process flows and stock-flow modelling to create a complete and accurate picture of work being done by the MoJ.

CJS is being used to assess the impacts of proposed policy and operational changes. It also provides an accurate picture of the department's financial position and was used in the negotiations as part of the spending review settlement with the Treasury.

The Winners

One of the best bits about this plenary session is that not only does one get to hear about some of the successes of OR but that the presentations are invariably very well-presented and easy to follow as they are usually based on those made to the clients who seldom have any O.R. background. The judges were faced with a difficult decision – all three projects had been implemented successfully (one of the criteria) and all had had a big impact on costs.

The three presentations vying for this year's Presidents Medal all provided compelling arguments for why they were worthy of gaining the award. After much deliberation and active input from delegates attending the conference the winner was announced. This year's award goes to Tony Lewins, Simon Mardle and Louise Fildes of Ernst & Young for their work in optimising the retail network for New Zealand Post.





THIRD SECTOR O.R. AT OR55

BY JANE PARKIN

The growing profile of O.R. in the Third Sector was reflected in an inspiring collection of talks at OR55, within the Community and Third Sector stream. Six speakers described a wide variety of work, in the UK and overseas.

David Pritchard, Head of Measurement and Evaluation at New Philanthropy Capital, talked about using Operational Research tools to help charities become more effective.



He discussed why O.R. methods are not used more widely and considered that: lack of awareness of what O.R. can bring; the culture (the sector defines itself as driven by concern for compassion/equity/needs; this can be at odds with interest in efficiency/optimisation/'cold' analysis); the data-poor environment; and weak mechanisms for rewarding effectiveness all contribute. He highlighted some exemplars of good practice, and listed potential areas for O.R. to contribute as:

- 1) Systems analysis / soft systems methodology
- 2) System dynamics
- 3) Data mining and visualisation



He gave examples of each in action, and suggested that we need more case studies emphasising successful O.R. interventions (if you have any examples, please add to the current set of case studies available on the OR Society website). Sue Merchant described a successful facilitation workshop she had run for the Welcome Centre, a Huddersfield-based food bank, which resulted in a number of quick wins for the charity as well as a fundamental re-examination of their working culture and management styles.

Huw Evans spoke about his experiences of pro bono O.R.; he has helped four charities with their strategic planning by using community O.R. approaches that sought to draw upon the widest human capital available to the organisation. He ran participative workshops and stakeholder surveys to develop thinking, build capacity, challenge current arrangements, and enable new organisational models to emerge in a way that enabled people to be heard with an emphasis on action. His emphasis throughout was on supporting organisations to do their own planning better. He found it interesting, fun, met new people, worked in new areas and learned a lot; he also said that this boosts experience and adds to a CV and CPD.

Paul Randall compared his experiences of working in the third sector in Namibia and the UK. He finished with reflections on the moral compass (need to ensure public benefit, objectivity, sustainability by training staff) and personal benefit in volunteering in terms of knowledge, profile and impact.

Andrew Dobson, who spends 6 months of each year in Africa, spoke about his work in remote rural Uganda, with a locally-based relatively large not-for-profit health service provider which seeks to meet the health needs of a population of 100,000. The core focus of the work is to help the organisation to make progress with the challenge of achieving greater self-sustainability in a complicated and difficult context. This involves several aspects: a) 'capacity building' b) support to the income generation strategy c) input to the development of a new computer system d) support to the planning for a new nursing school e) inputs to the strategic decision-making of the organisation. A lively discussion opened up on how O.R. could support similar organisations in developing countries.

And finally, I spoke about a simulation model that I developed for the Crimestoppers call centre; the implementation of the agreed staff rosters led to Crimestoppers being able to handle a large increase in business with improved performance but no increase in staffing costs.

All the talks were well-attended, and the novelty of much of the work and the settings triggered considerable interest.

If you want to see either abstracts or slides from these talks, look in the document repository on the OR Society website; if you are interested in getting involved in third sector O.R., please contact Felicity McLeister, the new OR Society pro bono project manager Felicity.McLeister@theorsociety.com

science festival



MATHEMATICS AT THE BRITISH SCIENCE FESTIVAL NEWCASTLE, 7-12 SEPTEMBER 2013

PETER GIBLIN, FIMA

The British Science Festival has been running, under a variety of names, since 1831.

The Mathematical Sciences Section of the Festival is a small committee which solicits ideas for events from the mathematical sciences community and aims to put on a programme covering a wide range of interests within the discipline, including statistics and aspects of computer science. Each year they choose a President from among those well-known for their ability to communicate to a wide audience; recent Presidents have included Simon Singh, David Spiegelhalter, Caroline Series and John Barrow; this year's President is Celia Hoyles OBE, of the Institute of Education and President-Elect of the IMA.

For 2014, when the Festival will be at Birmingham University (6-11 September), the President will be Professor Peter McOwan, a Vice-Principal at QMUL and author with Matt Parker of 'The Magic of Computer Science'. Matt, the Stand-up Mathematician, regularly presents their joint show 'The Maths and Computing Magic Show' at the Festival and this year there were two performances during the Family Weekend, on Saturday, attracting audiences of adults and children to the Discovery Museum in Newcastle. On a similar theme, Steve Humble, Dr Maths and now based at Newcastle University, presented his 'Randomness Show' on the Sunday. Maths Busking in the City Centre was organized by Sara Santos. Sara also introduced the public to the idea of a Museum of Mathematics (MathsWorldUK) at sessions in the International Centre for Life and, together with Katie Steckles, a colleague of Matt Parker's, represented Maths at a 'Sections Evening' on Tuesday where the different disciplines could entertain the public. Everyone I spoke to agreed that the 'Maths Table' was the best.

The main thrust of the Festival is presentation of exciting new science to an audience of interested members of the public, schoolchildren and the press. There are always well-known scientists giving 'star lectures' but the majority of the programme is, like the contribution from mathematical sciences, less sensational but no less authoritative for that. There are also intermediate examples; one is the extraordinary 'Festival of the Spoken Nerd' in which the irrepressible Matt Parker also participates, combining real science with songs and stand-up comedy. Another very different example was provided by the European Mathematical Society, in a session 'Be a Maths Millionaire' given by Sara Santos, Ehrhard Behrends (Berlin) and Jorge Buescu (Lisbon). This was a rapid tour of the maths underlying Google Search, the Clay Millennium Prizes (principally boundedness of solutions to the Navier-Stokes equations and including the famous film of the collapse of the Tacoma Narrows Bridge in 1940) and the early history of the solution of cubic equations, where the issue was not so much winning large sums as preserving your reputation or avoiding being

'The main thrust of the Festival is presentation of exciting new science to an audience of interested members of the public, schoolchildren and the press.'

killed in a duel. Ian Bethune (EPCC, Edinburgh) talked about the hunt for ever larger explicit primes, and the involvement of huge numbers of personal computers through the PrimeGrid initiative.

Celia Hoyles in her Math Sciences Presidential Lecture, 'Do The Maths: Potential and Challenges of the Digital Age', made the case for judicious introduction of digital technology into the classroom. She started with altogether alarming archive footage of B.F.Skinner's 'Teaching Machines' from the 1950s but moved through to video games, computer programming and animation, suggesting that even though these could not be fully explained, there was considerable value in digging down a little of the way below the surface to show how they work, allowing school students, for example, to design their own simple mobile games. Celia's lecture was followed by a wine and sandwiches reception generously sponsored by the IMA.

Chris Budd, together with Peter Cox from Exeter and Vicky Pope from the Met Office, gave a presentation, followed by lively discussion, on 'Climate Change: Does it Add Up?' They took the large audience through simple climate models based on physical laws; uncertainty, caused both by nature's randomness and by human ignorance; calibration of models using historical data; and the new weather-forecasting and climate prediction models being used at the Met Office using smaller grids and increased computing power. These can take into account such seasonal variation as the movement of the jet stream, the El Niño phenomenon, ice retreat in the Arctic and the solar cycle, though not as yet the melting of the permafrost for which the science is not yet understood. Chris and his team had a successful news conference after their event.

The Mathematical Sciences Section is actively seeking proposals for the 2014 Festival and ideas and offers of help should be sent to Peter Giblin, pjgiblin@liv.ac.uk, Chair of the Section.



O.R. AMBASSADORS IN SCHOOLS PROJECT (ORAIS)

IMOGEN DUNNE, CARDIFF UNIVERSITY

For six weeks during June and July 2013, three undergraduate students from Cardiff University (Imogen Dunne, Martyn Deverell and Alex Whitmarsh) and two students from the University of Greenwich (Dilly Rasarathinam and Richard El-Chamaa) took part in a schools project funded by the Society's Charitable Projects Initiative.



The main objective of this project was to create a variety of teaching resources which could be used to teach GCSE or A-Level students primarily in the classroom, which incorporated O.R. In order to consolidate our lesson plans and ensure that they became as well-structured and interesting for the students as possible, we were linked to local secondary schools. This allowed us to gain first-hand



experience at teaching, as well as have the opportunity to deliver our lesson plans and receive valuable feedback on how to improve them.

Throughout the six weeks, we were given the opportunity to observe lessons in the secondary schools and act as teaching assistants to gain an understanding as to the different ways of teaching students. From this, we were able to take away new ideas which we could incorporate into our own lesson plans.

The main aims for our lesson plans were to make them interesting (by incorporating some sort of physical activity for example), to incorporate real life examples in relation to O.R., and to encourage



students to think about how they would find the solutions to different problems before teaching students the formal methods.

Creating the lesson plans was excellent experience, especially for those of us who are interested in a career in teaching. It allowed us to think about the different ways we could teach different methods in order to appeal to students of all kinds of abilities and backgrounds.

In our lesson plans we covered a range of different topics including Queuing Theory, the Travelling Salesperson Problem, Critical Path



Analysis, Bin Packing, Prim's and Kruskal's algorithms and many more, all of which were considered in a creative and interactive way. Some examples of the approaches we took involved creating a life size model of Prim's algorithm, applying bin packing methods to theatre booking and applying algorithms to board games. Finally, one lesson plan involved a crime scene investigation covering the topics of minimum connector trees and flow charts. The extent to which the ambassadors went to, to encourage and inspire the students in their lesson plans was boundless! To see the lesson which were created. please visit plans www.LearnAboutOR.co.uk/ORAiS and share.

After creating our lesson plans we were then able to deliver one or more of them in the classroom. This was a really valuable experience because we were able to test out our lesson plans to see if they would be viable in the classroom and then gain constructive criticism afterwards. It was interesting to see how the students reacted to our lesson plans and the general consensus seemed to be that they enjoyed the fact that the lesson plans incorporated 'fun activities' and they liked the fact that they could see how the methods they were being taught related to real life (i.e. there was an obvious purpose for them learning these particular topics in Mathematics).



It is certain to say that we learnt a lot from this whole project. The lesson plans we created at the beginning for example seemed to be quite different from the lesson plans we created nearer the end of the 6 weeks, indicating that the experience we had working in the schools had helped us to improve quite substantially. An example of this was the timings. In the classroom, we found that different activities seemed to take either much longer or much shorter time than expected. This therefore meant altering the timings in our lesson plans or making sure that we had extension activities available. Additionally, we realised that no matter how long you spend improving a lesson plan, there are always more improvements to be made! Not only this, but students reacted differently to the lesson plans due to their varying abilities so, in numerous cases, we had to add in extra teacher notes so that the lessons could be taught in a way which would suit the different abilities of students.

Overall, the experience was beneficial to all of us. We did not only learn a lot from this experience, but we thoroughly enjoyed it and were able to complete the project having created over 20 resources in total between the Cardiff and Greenwich students! These will be displayed on the Learn About OR website for teachers to use in the classroom. It is our hope that more and more students will be able to learn about and understand O.R. through the distribution of these lesson plans in schools.



In the future, we hope that more lesson plans can be made, to meet our initial aims stated earlier. We furthermore hope to encourage the creation of lesson plans which link to the curriculum, so that O.R. can be introduced in schools throughout the year as well as during enrichment sessions.

A large amount of effort and commitment was put in by all five ambassadors which was aided by the support of their supervisors: Paul Harper and Vincent Knight for the Cardiff University students and Noel-Ann Bradshaw for the University of Greenwich students. Support was also provided by Louise Orpin (Education Officer, OR Society) and Sue de Pomerai (Further Mathematics Support Programme).

Two of the five O.R. Ambassadors were funded by the OR Society, with the other three supported financially by the two Universities.





TRAINING, TRAINING, TRAINING

LOUISE MAYNARD-ATEM

Whether you are from an operational research background or not, in fact whatever stage you are at in your career, training is absolutely vital for both your personal and professional development.

There are so many different options available to enhance your knowledge these days, it can be difficult to know where to start and what kind of courses or training would suit you best. In light of this I thought I would use this month's column to talk about some of the resources I have found invaluable during my time in the Civil Service Fast Stream Program to date. You may have used/come across some or all of these before but if there is anything really useful that I have not mentioned, do not hesitate to let me know, maybe even write a brief piece about it so we can share it with the rest of the O.R. community.

Technical Training Courses

Perhaps the most traditional form of training is to attend a classroom/lecture based training course that can normally last anywhere between a one day short course to a five day residential course. Courses of this nature are incredibly valuable as they give you a large amount of information, often broken down into manageable chunks, over a relatively short period of time. The advantages of formal training are that they are delivered by experts in the field and often combine lecturing with practical sessions which allow you to test your understanding of the information you have been given as well as to ask questions. There are also valuable networking opportunities as you will get to meet people from different organisations but working in similar areas.

The obvious disadvantages are the time spent away from the office and the cost, however both of these can be offset by the fact that any training you undertake can only ever be a benefit to your organisation; you will gain new skills and will be able to share them with other members of your team.

A number of universities offer short training courses which can give an insight into how O.R. is used in both academia and industry; I recently attended a three-day applied health economics course at York University that was particularly relevant to my work here in the Department of Health.

The O.R. Society offer a wide range of training courses ranging from the five day 'Introduction to O.R.' course that Rose Drummond described in June's issue of Inside O.R. (and one I am hoping to attend in the near future), to one day courses that focus on specific techniques, e.g. soft systems methodology coming up 7 November 2013.

A fellow O.R. colleague within my team recently attended an Excel advanced VBA course organised by QA (www.qa.com) and

found the mixture of theory and practical exercises very useful. Since Excel is the primary spreadsheet modelling package for most of us, it is vital to understand the full extent of the features the software has to offer.

Distance Learning

As a civil servant I am very fortunate to have access to a new tool called Civil Service Learning

(CSL – https://civilservicelearning.civilservice.gov.uk/learning/), which acts as a gateway for staff to access various personal and professional development courses. These range from several day courses which must be attended in person to entirely online learning which can be slotted in around your working day. If you are a civil servant and have not registered with the site, I would suggest you do it ASAP.

The advent of websites like Coursera (www.coursera.org), MOOC (www.mooc-list.com) and EdX (www.edx.org) have made e-learning a viable alternative for those who do not have the time or the resource to attend out-of-office courses. Top academic institutes from around the world are offering a wide range of courses that combine video lectures with weekly assignments and interactive forums where you can discuss the course materials with your fellow participants, lecturers and teaching assistants. I cannot really think of many downsides to this method of training, however the onus is very much on you to stick with it and motivate yourself to watch the lectures and complete the assignments. You will get out exactly as much as you put in so these courses can be very useful and are very flexible.

I have enrolled on a range of course including Discrete Optimisation (Coursera), a statistics refresher (Coursera) and 'Learning from Data' (MOOC). I will keep you posted on my progress and any other potentially helpful resources that I spot.

The University of Strathclyde offer a number of the modules from the O.R. MSc as standalone units for continued professional development. These modules can be taken individually as and when required, they are done entirely online and each one runs for one month. Some of the modules are linked and should therefore be taken in a pair, but topics range from specific techniques, e.g. discrete event simulation, to more general areas e.g. Managing Business Operations. (see http://www.strath.ac.uk/mansci/prospectivestudents/mscoperat ionalresearch/)



Mentoring (Professional & Peer)

Enlisting the services of someone a considerable way along their career path can be a great way to help you shape your career into exactly what you want it to be. I think that having a professional mentor is a great way to help focus on exactly what you want from your position and your career at large; it can help you isolate exactly what it is that drives you and you will benefit from the experience of someone, either within or without your organisation. Whilst I think it is important to have a mentor early on in your career, it is never too late to start looking and your manager or a senior member of your team will undoubtedly be able to help you identify an appropriate person.

The O.R. society accreditation scheme enables you to gain letters after your name that will certify achievements in your job. There are four grades of accreditation, the first of which is the Candidate Associate of the O.R. Society (CandORS) for those either completing a degree with substantial O.R. content or embarking on their first O.R. role. Candidate associates are assigned a mentor to help guide them through the first few years of their career and help them to achieve higher accreditation grades. It is certainly something worth thinking seriously about as you begin your O.R. career and something I am currently undertaking myself. For more information of how to start this process or on the different stages of accreditation visit the O.R. Society website:

http://www.theorsociety.com/Pages/Membership/Grades.aspx

As well as professional mentoring, I think there's a lot to be said for peer-mentoring too. This can be someone in a similar role to yours who has perhaps been with the organisation for a slightly longer period of time. I was given a 'buddy' on my first day of starting here in DH and she has been incredibly helpful and supportive, from things as trivial as navigating my way to the canteen to slightly more serious issues including objectives and appraisals. Peer-mentors can also act as a bit of a sounding board for things you would not want to discuss with your manager.

On-the-job

Training courses, whether in the classroom or distance learning, are by no means the only way to gain the skills that will help you to do a better job; sometimes those skills might be sitting at the desk right next to you. I cannot emphasise enough how important it is to find out where the expertise of people within your organisation lies. It is likely that someone within your team or at least your department can give you the benefit of their wisdom and experience to help you develop. On-the-job training can take both formal and informal routes, from shadowing a more senior member of your team to simply asking the person at the desk next door for their thoughts on a project you are working on or the way you have chosen to tackle a certain piece of analysis. Communication is key to helping you carry out your role in the most efficient way possible and you will build up a network of valuable contacts at the same time.

DISCLAIMER – The opinions given above are solely those of the author and do not reflect the views of the Department of Health, the Government Operational Research Society (GORS) or the wider Civil Service.

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EVENTS WORLDWIDE

To see the full listing go to:

www.theorsociety.com/Pages/NonSociety/NSEvents.aspx

NOVEMBER 2013 INSIDE O.R.

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SANJA PETROVIC

NOTTINGHAM UNIVERSITY BUSINESS SCHOOL



'Three decades of experience with ESWI show that ESWIs have very positive impact upon future generations of O.R. specialists.' My first introduction to the EURO Summer Institute (ESI) came through my sister who attended the ESI on Decision Support Systems in Madeira back in 1989.

::::LEADER

She commented then that she was very tired, but I realised that it was very demanding not just due to the daily research activities but also to the rich social life that is nowadays popularly called networking. The participants of this ESI still meet at the EURO conferences and remember happy days that they had at their ESI.

If we take a look at the European O.R. calendar of events for the next year, 2014, we shall find nice news, namely two British universities, Cardiff University (organisation chaired by Dr Vincent Knight) and University of Southampton (organisation chaired by Dr Honora Smith), together with the University of Torino, Italy, are coordinators of the 31st ESI with the theme 'O.R. Applied to Health in a Modern World'.

ESI 2014 is the 31st in the series of institutes which was launched in 1984. The main objective of the EURO Summer and Winter Institute (ESWI) gatherings was to establish many international networks of talented and promising young O.R. researchers who would start and continue working together on selected O.R. themes. In each ESWI around 30 (in fuzzy sense) participants, most often PhD students, meet for usually two weeks. They discuss their research within the selected O.R. theme under the guidance/co-ordination of invited senior experts in the field. There are no parallel sessions, no talk selection problem, everyone listens to everyone's talk and all provide feedback.

The first ESI was organised in Belgium in 1984 and was dedicated to Location Theory. After that a wide variety of topics were covered in ESI including Decision Support Systems, Decision Making in an Uncertain World, Urban Traffic Management, Production Planning and Control, Systems Science, Environmental Planning, Protection and Exploitation of Renewable Resources, Optimisation Challenges in Engineering: Methods, Software, and Application, and many others.

What is the procedure for organising an ESWI? A national OR society submits a proposal to EURO. The role of the society is to define a theme, invite speakers/coordinators, nominate an organising committee, find a location, fix the dates (at least 18 months before the proposed date for the ESWI), prepare a social program, etc. It is important that EURO provides a financial support to the organisers. However, domestic public or private sponsors should be approached also. For details see the guidelines at the EURO Web site

http://www.euro-online.org/web/pages/458/euro-summerwinterinstitutes-eswi



Three decades of experience with ESWI show that ESWIs have very positive impact upon future generations of O.R. specialists. In some European countries, ESWIs are particularly popular with respect to hosting an ESWI and in sending good participants. However, there is a hard constraint in this assignment problem, and that is no one can participate [as a student] in more than one ESWI. Having in mind a strong historical role of the UK in the development of O.R. as a scientific discipline and in the application of O.R. in practice, we would like to encourage our members to have a more active role in ESWI both in hosting future ESWI as well as in selecting the best candidates to participate in an ESWI.

<**OR**>

ELECTIONS TO BOARD & GENERAL COUNCIL

GAVIN BLACKETT, SECRETARY & GENERAL MANAGER I'm delighted to announce the results of the recent call for nominations to Board & General Council.

John Hopes, EY (the new name for Ernst & Young), has been reelected to the Board and General Council as Vice-President. He'll serve three more years in this role from 1 January 2014.

The following members have been elected to General Council, to serve for three years from 1 January 2014:

Sayara Beg, Datanut Bo Chen, Warwick Business School Kevin Connell *, formerly MoD John Crocker, formerly Optimized Systems and Solutions James Crosbie, Dept. of Health Alessio Ishizaka *, University of Portsmouth Martin Keys, Dstl Vince Knight *, Cardiff University Djamila Ouelhadj, University of Portsmouth, Regional Member – South

Antuela Tako *, *University of Loughborough* Mike Wright *, *Lancaster University*, Regional Member – North West

* Renewed for a second term.

There being no more than one nomination for any vacant post, there will be no elections this year and the above are therefore returned unopposed.

I would also like to thank, on behalf of the Society, Dylan Jones and Hazel Squires for their time served on General Council.

<**OR**>

MAKE SURE YOUR CONTACT DETAILS ARE UP-TO-DATE

Contact Carol Smith carol.smith@theorsociety.com or go online to www.theorsociety.com log on and click 'My Contact Details'



WHAT'S HAPPENING ABOUT A COMMUNITY O.R. SPECIAL INTEREST GROUP?

DR HUW EVANS E: HUWDEVANS@GMAIL.COM T:07595 419938

During the summer you might recall a link to a web-based survey being sent round the OR Society membership.

It was inspired by my interest in community O.R. (COR) and the absence of much happening on the OR Society website. I'd joined the OR Society in 2000 because it seemed to offer links to like-minded people and as I was in the throes of a PhD concerned with community O.R. it seemed like a good idea at the time but it seemed that the COR agenda was slipping out of sight.

I promised to make the results of the survey available and I have already circulated them to those who responded and gave me their email address. Here's a quick summary:

Fifty-nine people responded from across the world – but predominantly from the UK.

- 1 was not in favour of a COR SIG
- 25 'Didn't know' if there should be a COR SIG
- 32 in favour of a COR SIG
- Of the thirty-two in favour of a COR SIG
- 18 saw a community development role for COR
- 3 saw it as a link to practice and academia
- 2 were unclear of the role/purpose of COR
- 5 saw it as connecting O.R. with the Third Sector

There appears to be a lack of common understanding within the OR Society about what COR is. Is it about the approaches and techniques to build capacity and empower people and communities – building a better society? Or is it about introducing the spectrum of O.R. approaches, 'hard' & 'soft', to third Sector organisations?

There were many views on the purpose of a SIG including, developing a community of practice, raising the profile of the whole spectrum of O.R. activity, networking and, sharing knowledge.

Perhaps greater clarity is needed about what the OR Society understands when people talk about community O.R. With that in mind I ran an hour long workshop at OR55 where about ten of us gathered together to begin to explore ideas around the arrangements desired to further the COR agenda. You won't be surprised to learn that we couldn't reach a definite conclusion from the ideas that emerged. But I'd suggest that 'emerge' is the key word. As far as I am able, as a self-employed, semi-retired, independent consultant, I want to explore the COR agenda using a community O.R. approach and see what emerges from the dialogue, networking and interest of the people who choose to engage in this.

The workshop was about people sharing their ideas on outcomes, values, scope, options and other ideas and comment. Not everyone who had expressed interest in shaping a COR SIG, or whatever, could be present at this first workshop and there's more work to do, and dialogue to share, before something tangible emerges.

My take on it after the workshop is that there is an agenda around community O.R. that is not addressed by other SIGs and that there is a lack of common understanding within the OR Society about what COR is, and around its status or position vis-à-vis 'hard' O.R. and even where decision-making and problem structuring approaches are placed. There is a view that trying to define rigidly what COR is might not help. There were opinions that saw a stereotypical SIG emerging and others who felt a looser arrangement was more appropriate. There was divergence about how, or whether, this emerging community of interest should be linked to academia. There was talk about publishing material, holding events and seminars. There was clear agreement to do 'something'. How the 'something' agenda emerges has yet to develop.



Beginning to understand where a COR agenda might sit: So how will this develop, you must be wondering? I'm still wrestling with the tension of developing this via a COR approach, given my constraints, with the temptation to just 'do' something on my own initiative. I'm resisting the latter urge. What I intend to do is keep a dialogue going. I want to talk to more people to see how academia can be involved. I am hoping to start putting together options in the coming weeks to share with you – and we'll see what emerges – it'll be 'something'



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HAVE A HEART!

NIGEL CUMMINGS

Heart failure is still one of the most commonly registered causes of death. It is also difficult to diagnose and expensive to treat if not caught in its early stages.



For those who have genetic predispositions to heart related illness or progressive cardiac illness some expectancy of heart failure risk can be estimated, but every case is unique, although there are a certain number of similarities.

IBM has teamed up with by Sutter Health and Geisinger Health Systems, to utilise a \$2 million grant to use big data to detect the signs of heart disease years earlier. The project is designed to build overviews of the continuity of patient care by improving communications and integrated care among health, social services and other providers where the focus is on the best patient care possible.

Analysis of Electronic Health Record (EHR) data could reveal the unique presentation of symptoms at earlier stages and allow doctors and patients to work together sooner to do something about them. IBM is developing advanced tools for analysing medical data, including text, and reviewing a patient's health records for new insight.

Recently IBM has taken to analysing Unstructured Information Management Architecture (UIMA) to extract the known signs and symptoms of heart failure from available text in EHRs. The challenge though for differentiating heart failure patients from the controls, prior to diagnosis, is that there is no single strong indicator. But there are many weak indicators called co-morbidities, such as hypertension and diabetes, and associated medications that can be extracted from text.

IBM cardiac analytics uses a Hadoop cluster to manage and schedule tens of thousands of models in parallel to facilitate and speed up the model development. Besides unstructured text and other structured medical information, IBM is also looking into other data sources such as Electrocardiography (ECG) and genomic data in a bid to present the most accurate picture possible of patients' cardiac health.

By pairing IBM's Big Data analytics with domain knowledge and data, this project should result in the development of new analytic algorithms for more accurate detection of the early onset of heart failure. The research team from Geisinger said that earlier research showed that signs and symptoms of heart failure in patients are often documented years before a diagnosis and that the pattern of documentation can offer clinically useful signals for early detection of this deadly disease thus leading to a better prognosis for patients.

(At this rate, the only way left to die will be via suicide (assisted or otherwise) which will make Life Assurance completely redundant!)



'The project is designed to build overviews of the continuity of patient care by improving communications and integrated care among health, social services and other providers where the focus is on the best patient care possible.'



IT'S MORE FUN TO TWEET!

NIGEL CUMMINGS

Sandy Wilson's musical, *The Boy Friend*, taught us it was, 'Never too late to fall in love', similarly it's never too late to learn to tweet, or for that matter indulge in other social media activities...



Louise Orpin OR Society Education Officer at OR55

A recent study from social media researchers Anderson Analytics showed how different generations use social networks like Facebook, MySpace, Twitter, and LinkedIn. A breakdown of the study revealed that 75% of Generation Y users (15 to 29 years old) used MySpace compared to Facebook at 65%.

Usage of Twitter was 14% in the Generation X (30 to 44 years old), baby boomers (44 to 65 years old), and the WWII categories are more likely to use Facebook, followed by MySpace, Twitter, and LinkedIn. In other words, Facebook had become the popular site among the older generation, but the more telling stats here would be on growth and engagement for social media resources provided by the likes of LinkedIn and Twitter.

According to a recent article in the *New York Times* just 11% of Twitter users are in the 12 to 17 age category, yet Twitter's unparalleled explosion in popularity has been driven by a decidedly older group (35-54). A group which has apparently increased in size by 60% over the last year. The increased interest by the older generation in Twitter has shattered a widely held belief that young people lead the way to popularising innovations.

The OR Society has long embraced social media as a conduit for spreading information about O.R. Our education officer, Louise Orpin has worked tirelessly to promote the use of social media resources such as Twitter, Facebook and YouTube by and for our society.

At our national conference, held in Exeter during September this



Frances Sneddon at OR55

year, Louise Orpin, OR Society and Frances Sneddon, Simul8, hosted an interesting workshop session, it was called Social Media & The OR Society - How to Get Involved and be Part of the Community. It was designed to show delegates that the OR Society has a social media presence and to encourage the sharing of it amongst others. Focussing on the use of Twitter and formulating Tweets, both Louise and Frances demonstrated how members could share thoughts, comments and content and how it was possible to use social media such as Twitter to, 'Raise your own profile in the O.R. community as well as that of O.R. to the rest of the world'.

A video of their presentation will soon be available via our website. When it is available to view or download, I urge you to take the time to view it as it provides compelling commentary and demonstrations of how easy, and yet how influential Tweeting can be when utilised by the O.R. community.

If you have never really had the understanding or the time before to consider what Tweets, short comments and the use of hash tags in Tweeting can mean to O.R. and your own personal profile, Louise and Frances will inform you clearly how to get started. Their considerable presentation skills will illustrate for you, how to establish a personal presence on Twitter, communicate with other society members and increase your own personal O.R. profile within the O.R. community. By the way, Louise and Frances will show you that Tweeting is not only a powerful communications tool, it is also great fun!

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EVERY LITTLE HELPS

NIGEL CUMMINGS

Tesco saves millions with supply chain analytics

Tesco has a team of analysts modelling buying patterns, allowing it to plan stock better, cut waste, and optimise its retail operation.

In 2006, an executive from Tesco Direct, the company's online retail division, moved over to the supply chain department and spotted an opportunity to run a small sales forecasting project. After persuading Tesco to provide some budget to fund the project, Tesco soon began reaping the benefits of analytics.

Since that time Tesco has been applying sophisticated analysis to its supply chain data to identify opportunities to cut waste, optimise promotions and match stock to fluctuations in demand, Tesco's supply chain analytics function has saved the company millions.

Tesco recognised the value of analytics at an early stage in developing its supply chain optimisation strategies. They enlisted the help of retail analytics provider Dunnhumby and saved £16 million in one year. In those early days, the Tesco analytics team numbered only five, today after continuing to demonstrate the improvements that analytics affords, it has grown to over 50.

The analytics department is staffed mainly by science and engineering graduates, who are then trained in retail expertise and programming skills. Tesco's analytics department continues to grow and may be fertile ground for O.R. graduates looking to engage a career in analytics.

There are many items whose sales are affected by the weather, however the effects are not the same throughout its 3000 plus stores. Accurately forecasting the weather in each area means that each of these stores will receive deliveries of the goods most likely to be in demand. Of course, filling the shelves with these items might also encourage people to buy them especially if they are placed at the right height and in the right locations within the stores.

People it seems are more likely to set up their barbecues when a sunny day follows a prolonged cold spell. These contexts can be added to Tesco's statistical modelling to refine sales estimates. According to Tesco, there is a 97% chance of customers finding what they want in their local stores.

It is not just weather that influences customers. At any one time there can be thousands of promotions running. Determining how popular each of these will be in any given store is another job for the analytics department. As with weather, the take-up of



promotions can be regional. They can also be affected by what other offers are running at the same time, where they are placed in the store or by the type of offer. Apparently, 'buy one get one free' works best with non-perishables whereas '50% off' tends to work better with fruit, vegetables and other perishables.

These insights are made available to Tesco stores by a supply chain analytics, web-based workflow system that allow stock controllers to access sales and forecast data for their specific store and use it as part of their decision support strategy when planning their orders.

This system, so far has allowed Tesco to take £50 million-worth of stock out of its depots. All of this has been made possible because Tesco sorted out its data infrastructure 15 years ago, when it implemented a Teradata enterprise data warehouse alongside its IBM mainframe and began looking at the benefits of analysis.



ATTENTION!

NIGEL CUMMINGS

The British Army has saved £770m by applying SAS analytics tools to reduce data errors, integrate disparate sources of data and more efficiently allocate manpower.



SAS®, the business analytics software provider, is working with the [British] Army to rationalise its personnel data. Like most large organisations, there has been a proliferation of systems designed to improve data handling invariably developed in a multitude of different [programming] languages using different storage media and operating platforms. Equally invariably, these systems are totally incompatible, often having been designed to meet quite different requirements.

Bringing these systems together is always going to be a major undertaking but until it has been done, it is often virtually impossible to bring about significant improvements. Inevitably, such activities will claim to save the customer enormous sums of money, they have to otherwise they would never get authorised. Unfortunately, there are seldom any real savings until this initial stage has been completed by which time, all too often, the organisation will have run out of funds. Hopefully, this will not happen in this case.

The problem may not be quite as large or complicated as rationalising the NHS databases but with over 120,000 soldiers

spread over 17 ranks with nearly 9,000 in training plus nearly 20,000 in reserve (TA), the task is certainly formidable.

Elaine Drummond, head of public sector at SAS UK, said that SAS was able to provide the British Army with, 'a much greater insight into vast volumes of information held within their systems'. It achieved this by aligning and simplifying the data held on the many and varied army legacy data systems, the application of this simplification and reduction in duplication of data sets has enabled the Army to make better-informed decisions about manpower planning, gaining efficiencies and new opportunities for innovation.

SAS maintains that the insight afforded by its software has allowed the army to realign and so avoid wastage of expenditure totalling £770m. Personnel costs account for 27% of the defence budget overall, but 74% of the Army's budget so there should be plenty of opportunity for further savings.

: : ANALYTICS : : : : : : : :

ARE UTILITIES MISSING OUT?

NIGEL CUMMINGS

A new study published by BRIDGE Energy Group has revealed that many utilities companies are still using old analytics tools and failing to take advantage of new technologies and trends in analytics.



This may in part be due to inertia in the information technology acquisition side of their business, but also due to ignorance in recognising trends and the new type of problems that are best dealt with by accessing big data resources.

According to the report, more than half of utilities companies are hampered by managing data through basic reporting and dashboards, and they are unable to analyse data beyond description, classification and clustering.

At the time of the survey that was taken to provide data and formulate a report from BRIDGE, only 10% of respondents said they were aware of new trends and using new tools in their analytics program. Of those that were using new tools many had switched over to the use of sophisticated analytical frameworks like Hadoop.

Another surprise which resulted from analysis of the responses was that many of the utilities had only limited experience in determining return on investment (ROI) for predictive analytics. Yet almost 2/3 of the total number of respondents were aware of the ROI for basic and dashboard monitoring.

Companies outside of the utilities markets seem to have adopted predictive analytics because they are aware of the big business benefits that this type of analytics affords – reliability based maintenance, load curtailment, and better demand curve projections. Yet for some reason utility companies fail to recognise these benefits at present.

46% of those respondents, however, had recognised there was a need to employ staff with the right analytical skills and intended to supply additional staff to their analytics departments to make better use of the business benefits afforded by detailed analysis.

A further 32% of the respondents were aware of the benefits of integrating related systems and data stores and accessing cloud computer processing facilities for gaining speed, efficiencies and economies. Yet only 40% of the surveyed utility companies planned on major analytics projects within their company in the coming two years, and only a further 36% were planning to consolidate their existing business intelligence/analytics tools they use over the next few years.

Outside the results of this survey it is encouraging to note that the rollout of SAS Visual Analytics in many utilities companies is helping transform their decision-making processes by the application of advanced analytical processes. In a smart power grid, when the lights are turned off, or an electric vehicle is plugged in, or a cooker switched on, data is generated that can be logged by new sensor technology. This data stream provides real-time demand information which can assist with the provision of smarter infrastructure within energy companies, help them devise better business models, and look for further insights in their operational and customer data.

SAS Visual Analytics software has already been installed by Essent Belgium NV and OMV Solutions GmbH in Austria to analyse consumption trends, identify demand patterns, target customer segments, and manage asset performance. Utilities and oil and gas companies in the US, South Africa, Portugal, Italy, New Zealand, and China have also selected SAS Visual Analytics to help them analyse smart grid data, and enhance sensor data and customer behaviour data so they can uncover opportunities for improvement and make more precise decisions. More information on SAS Visual Analytics can be found by accessing the following link: http://www.virtualstrategy.com/2013/09/23/sas%C2%AE-visual-analytics-helpingenergy-companies-transform-big-data-power-betterdecisions#rRxfYFGbMVOwtFJK.99



ALTOGETHER NOW!

NIGEL CUMMINGS

Loyalty cards, health records, social media, credit/debit cards are all examples of what can be regarded as single source data.



The data is generally held in a single format although as in the case of social media, it can be unstructured. Such data is relatively easy to handle and analyse even though there may be an enormous amount of it. Combining data from several sources, however, is a lot more difficult

Suppose there is a 'new' recipe on one of the infinite number of food-related programmes. Tweet traffic may indicate that a lot of people are thinking about trying it out. This could generate a sudden increase in the demand for certain exotic items. However, it could be just talk so if one now relates this data to loyalty card data this should indicate how often each customer tries new recipes or buys items they have tweeted about. One could also run through the loyalty card data to see how many people tend to buy items that are mentioned on this particular food programme. What one could also do is see how many of the items on the recipe each individual

already is likely to have in stock (by checking how often they buy each item and how long it has been since their last purchase). If the take-up of an exotic item was poorer than expected, the stores with surplus could target individuals likely to buy with coupons or vouchers.

This is a trivial example of multi-source or multi-channel data analysis. A website 'ClickZ' has given this the name 'Convergence Analytics'. In particular it is all about combining 'big data', access to cloud computing, high-level algorithms, and innovative visualisation techniques to create a new class of analytics tools for the marketer.

The report said it was all about the 'un-siloing' data from a variety of places within the organisation. The sources of data could be as disparate as the desktop, the internet, mobile phones, or social networks; but that was not all, the data used in convergence analytics could also be derived from demographics, campaign data, ad-buy data, e-commerce data, in-store data, call-centre data, CRM data, and unformatted data from a variety of sources.

The ability to see more data at once, more quickly is advantageous to analysts but also cost effective to the companies employing them, as adoption of convergence analytics has been shown to be more cost effective than single channel analytics.

If you are a Facebook user you may be interested to know there is a Convergence Analytics Facebook page, it is worth taking a look at it because it contains news and information links to developments in this new area of analytics.

<OR>

JOIN OUR ANALYTICS NETWORK Visit: www.analytics-network.com



IS IT EVER WORTH IT?

NIGEL CUMMINGS

How do you measure the return on investment in the health service? One way is to use the concept of a 'quality-adjusted life year' (QALY). These are used in conjunction with an 'ICER' – not a means of saving money, per se, but an 'incremental cost-effectiveness ratio'.



Penelope Mullen at OR55

Penelope Mullen, in the paper she presented at this year's Conference (OR55) in Exeter, explained what these meant with respect to the work she has done on the cost per QALY threshold.

QALY is a metric which attempts to take into account both the additional quality and quantity of life one might expect from a given course of treatment. Each year in perfect health is assigned the value of 1.0 down to a value of 0.0 for being dead. Values between 0 and 1 quantify the quality of life.

The incremental cost effectiveness ratio (ICER) is calculated by dividing the cost by the estimated marginal increase in QALY for a given treatment. A cheap treatment which gives a patient a significant increase in their life-expectancy whilst providing a greatly improved quality of life is clearly ranked higher than

expensive treatment which does little to improve their quality of life or their life-expectancy.

Ms Mullen explained that our healthcare system has the notion of a 'cost per QALY threshold'. What this means is that drugs and other medical interventions that exceed the threshold might be deemed non-cost-effective and could be excluded from the health care system.

Although this metric can provide a useful way of comparing different treatments and drugs, there is a distinct danger that it is being used unquestioningly and indiscriminately. As with all simplifying statistics and metrics, whilst they can make decisions completely objective, it is all too easy to forget that one is dealing with the lives of individuals.

The paper and presentation on the QALY threshold was designed to explore and critically analyse such themes and hopefully arrive at some meaning as to what does or should the threshold represent? Should its level be determined politically or empirically? If the latter, should it be the marginal cost-per-QALY of existing expenditure, the 'value society places on a QALY', the 'marginal social value of health', or what? Do these have different policy implications? Could alternative approaches be adopted from other sectors, such as transport planning? Is the type of individual and collective risk and uncertainty inherent in health and healthcare relevant here?

There was a lively response during the 'Any Questions' period which followed her talk.

This is a very emotive subject. Whilst we may not wish to deny individuals access to treatments that may benefit them, the NHS simply does not have the money to provide medications and treatments that are unlikely to have any significant effect even though many people spend vast sums of money on treatments that have been proven to be not significantly different from placebos. (ed)



REGIONAL SOCIETIES

MIDLAND (MORS)

CONTACT: Jen East (Secretary)

EMAIL: MidlandsORSociety@live.co.uk MORS meeting

Florence Nightingale: using graphical statistical analysis to combat the spread of disease

Date/Time: Tuesday, 12 November 2013 at 18.00

Venue: The Club Room, The Old Joint Stock, 4 Temple Row West, Birmingham, B2 5NY

Speaker: Noel-Ann Bradshaw, University of Greenwich

Abstract: Florence Nightingale (from Lea, Derbyshire) is well known in mathematical and statistical circles for her graphical representations of data. But what exactly did these diagrams show and what other diagrams and statistical methods were being used at the time to analyse data? This talk will look in detail at Nightingale's graphical representation of the causes of mortality during the Crimean War. It will demonstrate how these were used by Nightingale and others to show that preventable diseases contributed to the army's high mortality rate and how the use of this data led to dramatic changes to nursing practices in Army hospitals.

Non-members welcome, no charge is made. After the talks, you are welcome to join us and the speaker for a meal. For further information please contact MidlandsORSociety@live.co.uk

PhD research showcase

Date/Time: Tuesday, 28 January 2014 at 18.00 Venue: Warwick Business School Speakers: Mahdi Noorizadegan and Chenlan Wang

On vehicle routing problems with uncertain demands by Mahdi Noorizadegan

Inefficiency of selfish routing under stochastic demand by Chenlam Wang

Modelling and measuring demand and performance in HMRC call centres

Date/Time: Wednesday, 26 February 2014 at 18.30

Venue: The Club Room, The Old Joint Stock, 4 Temple Row West, Birmingham, B2 5NY

Speakers: Steve O'Donnell, HMRC

Abstract

The management of call centre performance relies heavily on queuing theory work first carried out by Erlang in the early 20th century and much elaborated since. But this approach requires copious and detailed forecasting of future demand and resources and while it is excellent for short term performance management HMRC has found it less suitable for medium to long term performance planning of their call centres. Part of the problem, which any call centre under pressure faces, is it is difficult to establish how much demand the call centre has to handle. The work described here outlines a novel way of measuring the real demand faced by a call centre. This measure turns out to be intimately related to the performance of a call centre and allows the building of extremely accurate models of medium to long term call centre performance. HMRC adopted this model for managing call centre performance from April 2011 and, with the assistance of the improved understanding of demand and performance the model brings, went from handling 48% of calls in 2010-11 to handling 74% of call in 2011-12. This performance has been sustained in 2012-13 with performance in the later part of the year regularly achieving 90% + calls handled. The model was the primary tool supporting the recent decision to reprioritize £34m of HMRC funding into contact centre investment at a time of austerity in Government financing.

Optimising the Retail Network for New Zealand Post Date/Time: Tuesday, 25 March 2014 at 18.30

Venue: TBA

Speakers: Tony Lewins, Ernst & Young Abstract

New Zealand Post's (NZP) retail operation is in major transition. Like equivalent organisations around the world, its traditional business is declining and it is looking to offer new services and products to compensate. In particular, it has created KiwiBank, a retail bank offering home loans, current accounts and other banking services.

Further, the country's demographics are evolving away from rural areas to urban. Customer shopping habits are also changing as they increasingly abandon the High Street in favour of out-of-town malls.

This has resulted in the retail network becoming highly sub-optimal, both in terms of the existing business and for the future.

The project provided NZP with a model that optimises the retail network under any specified conditions. It also allows them to investigate scenarios for the future, including the introduction of new types of outlet, new products and future business volume assumptions. It accommodates operational, financial and social constraints.

Winner of the 2013 President's Medal

A model future for the UK's nuclear legacy Date/Time: Tuesday 13 May 2014 at 18.00-20.00 Venue: TBA Speakers: TBA Details to follow

Air traffic control, business regulation and CO2 emissions (tbc) Date/Time: Tuesday, 17 June 2014 at 18.00-19.45 Venue: TBA

Speakers: Panos Frangos and Simon Hughes *Details to follow*

** Non-members welcome, no charge is made. After the talk, you are welcome to join us and the speaker for a meal. For further information please contact MidlandsORSociety@live.co.uk

Winner of the 2011 President's Medal



SPECIAL INTEREST GROUPS

ANALYTICS NETWORK

CONTACT Sayara Beg **EMAIL**: ANChair@theorsociety.com

Analytics Network Committee Meeting & Dinner Date/Time: Thursday, 28 November 2013 at 18.00 till 22.00 Venue: London Speakers: Chair Committee meeting will be held over dinner.

Analytics Network Xmas Party 2013

Date/Time: Sunday, 08 December 2013 at 18.00 till 22.00 Venue: Google Virtual Hub Speakers: Chair Registration details will be available soon.

CRIMINAL JUSTICE

CONTACT: Ian Newsome TEL. DDI: 01924 292244 Extension: 22244 EMAIL: ian.newsome@westyorkshire.pnn.police.uk CJ sig autumn meeting Date/Time: Monday, 18 November 2013 – 14.00 - 16:30 Venue: London Speakers: See below

Gilberto Montibeller from LSE will talk to us about a paper that he, Val Belton, Alexis Tsoukias and Giulia Lucertini have published in the first edition of a new journal (the European Journal of Decision Processes) on '**Policy Analytics: an agenda for research and practice'**

(http://link.springer.com/article/10.1007%2Fs40070-013-0008-3#page-1)

The intention of the paper is to propose a framework for policy analytics within which approaches such as the analysis of social media and tools such as Google public data explorer and Guardian data blog can be harnessed. I can see there being real value in government analysts contributing to this discussion so we have built some time for questions/discussion into the programme.

Next we have **Toby Davies** from UCL coming to tell us about his **mathematical model of the London riots**.

And finally **Georgina Eaton and James Riley**, who are both statisticians in the Justice Data Lab team and part of Justice Statistics Analytical Services (JSAS) at MoJ, are going to introduce us to the Justice Data Lab. The presentation is titled 'An introduction to the Justice Data Lab - helping move organisations from measuring output to measuring outcomes'. The team's aim is often stated as 'To improve the evidence base on 'What Works' by giving organisations working with offenders access to secure and legal aggregate re-offending data. This should enable them to better

assess the impact of their work on re-offending'.

Please contact Sue Merchant as soon as possible if you are interested in attending at suemerchant@hotmail.com Space is limited so please let me know as soon as possible and preferably by the 13th November if you would like to attend. More detailed joining instructions and an agenda will be issued nearer the time to those booking. NB bring your own refreshments!

PROBLEM STRUCTURING METHODS

CONTACT: Ashley Carreras (Chair) TEL: 0116 2078224 EMAIL: acarreras@dmu.ac.uk

Discussing soft OR in practice

Date/Time: Wednesday 27th November 2013 16.00 till 18.00 **Venue**: Room 3.04, Hugh Aston Building, De Montfort University, Leicester

Speakers: Colin Eden, Ian Mitchell, Rob Angell

There is a growing awareness amongst the O.R. profession that the range of techniques utilised by the Soft O.R. community in general can be pivotal in ensuring commitment to the development and implementation of strategies and plans. These techniques have been successfully employed in a whole range of organisational settings including: Multi-national Corporations , National Chains, SMEs, Community Associations, Nationally and Locally Government funded projects.

You are invited to the latest event organised by the Problem Structuring Methods Special Interest Group. We have invited three experienced practitioners of PSMs to share lessons of best practice.

The presenters are:

Colin Eden – Professor of Management Science and Strategic Management and Vice Dean at Strathclyde Business School. Colin is internationally known for his work in the areas of Problem Structuring Methods, Research Methodology, Project Management and Strategic Management. He has published over 180 articles in general management, management science, and project management journals. He has published 10 books, including: Visible Thinking: Unlocking Causal Mapping for practical business results, 2004, Wiley (with F. Ackermann, J Bryson and C. Finn), and Making Strategy: Mapping out strategic success, 2010, Wiley (with F Ackermann). He continues to work in public and private organisations using causal mapping techniques as a part of work on strategic problems.

NOVEMBER 2013 INSIDE O.R.



Ian Mitchell – O.R. Unit at the Department for Business Innovation and Skills. Ian applies Problem Structuring Methods to a broad range of policy areas and has worked in Operational Research since 1988. In 1993 whilst an independent O.R. consultant Ian found Problem Structuring Methods based on Systems Thinking were essential to support a study for the European Space Agency. As of 1994 he managed the Battle Group War Game, leading infantry studies. Ian moved to Porton Down in 1998 managing force protection studies until 2000 when he was seconded as an O.R. specialist in Whitehall, where restructuring problems as systems led to a new resilient basis for decisions in capability management.

Rob Angell – Rob has been the lead facilitator and process consultant for a range of clients to deliberately involve stakeholders in formulating environmental decisions or resolving conflicts, strategy development and visioning. Examples include identification of marine conservation zones, precautionary measures for electromagnetic radiation, policy & strategy development on waste management and decommissioning approaches for nuclear power stations. He has run several sessions as part of longer term processes to help set horizons in business strategies and community visions and delivered European wide econsultations for the WWF.

We hope you'll agree this is an excellent set of speakers. Hearing the experiences of the speakers will help you make the connection between the PSMs presented in the literature and your area of application. You will also be able to seek support from the many practitioners who will be present. Please join us in Leicester! For more information please contact: Ashley Carreras, SIG Chair, +44 (0) 116 207 8224, acarreras@dmu.ac.uk

<OR>



WHERE ARE THEY NOW?

The following members on the Society's mailing list have recently had their mail returned to the Membership section, presumably because they have changed their address.

Would any member who is currently in touch with them please ask them to email Carol.Smith@theorsociety.com advising us of their current whereabouts so that we can update our database and return to a speedy and efficient service.

Gowtham Bharatwaj Srinivasan Melissa Goodman Canterbury Cardiff Michael Cowham Elena Pershina Bournemouth Edinburgh

NOTICEBOARD

<OR>

NEWS OF MEMBERS

The Society welcomes the following new members,

JOANNE ELLIS, West Sussex; CLINTON HEINZE, Australia; JORGE HERNANDEZ, Liverpool; WILLIAM HUNT, Newcastle on Tyne; JAMES KYLE, Hants; JAMES LOFTHOUSE, London; LAURE MUSELLI, Paris; JON-MARC ROBERTS, London; K TARA SMITH, Fife; MATTHEW WEISMAN, USA;

and Reinstated members,

ANASTASIA ANAGNOSTOU, Middlesex; RICHARD LUMLEY, Darlington; JOHN WHITTAKER, Luton;

and the following student members,

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2205

NEW ACCREDITEES

The Society is pleased to announce that the Accreditation Panel has admitted the following members to the categories shown. These members are now entitled to use post-nominal letters as indicated: -

Admit to the category of Candidate Associate (CANDORS) Louise MAYNARD-ATEM Penelope STANGER



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OR-30

OR -30 November

John Crocker

In September last year I made a fleeting reference to a paper by Crookes and Valentine about the use of microcomputers for simulation modelling. This time it is Peter Jennergren, Odense University who is extolling the virtues of the micro, in particular the Apple II, for this purpose.

In this particular case, Jennergren used PASCAL which includes the almost essential features of being able to declare pointer and dynamic variables as these make list handling particularly easy. With many simulation languages the time-set is effectively held as a time-ordered list although it would appear that this was not the mechanism used in this example.

Why would you bother to try to write a simulation in PASCAL (or any other general purpose language)? The answer was that in 1983 there was almost certainly no specialist simulation language available that would run on a micro. The fact that it was feasible to run reasonably complex models on a micro meant that it would not have been long before the providers of mainframe specialist languages would take up the challenge. What did make life difficult, however, was the number of different operating systems and the speed at which these were developing.

If you have ever wondered how parliamentary constituency boundaries are drawn, R.J. Johnston and D.J. Rossiter provide an interesting description of a program they produced which is intended to assist the commissioners. As they (and incidentally Charles 'Lewis Carroll' Dodgson) recognised, there is no exact solution as there is a multitude of criteria, many of which are not easily quantified. Basically, every constituency is divided into a number of wards (which in turn are sub-divided into polling districts). Each ward has a set boundary and contains a certain number of voters. In the example they gave – the London borough of Wandsworth – there were 22 wards with a total electorate of 208,820. The smallest ward had 6,280 voters and the largest 11,556. The Commission decided this borough should have three representatives which gives an average of 69,607 per constituency compared to the national electoral quota of 65,753. One of the criteria was (and still is) that the wards in each constituency should form a contiguous block. Another is that each should be very similar in size (in terms of electorate) expressed as a percentage deviation.

To solve the problem, i.e. present the Commissioners with a number of feasible options they devised a second parameter which they called the 'shape index'. This is calculated by taking the sum of the lengths of the internal boundaries [between wards] and is roughly inversely proportional to the compactness. Their program which used an heuristic search found 71 feasible solutions which they were reasonably confident formed a complete set. The one the Commissioners chose had a very high shape index (1002, the 6th largest) with a percentage deviation of 3.7% (lowest was < 0.9% and the highest > 6.0%). This solution had the lowest percentage deviation for solutions with a shape index greater than 950.

Incidentally, both authors attended a Parliamentary Boundaries Review on Wednesday 11th January 2012 that was considering reducing the number of constituencies in the UK from 650 to 600.

Crookes, J.G. and B. Valentine, 1982, Simulation in Micro-Computers, *JORS* 33.9, Pp 855-858 (jors1982181a.pdf)

Jennergren, L. P., 1983, Simulation in Microcomputers Revisited, JORS 34.11, Pp1053-1056 (jors1983236a.pdf)

Johnston, R.J. and D.J. Rossiter, 1983, The Definition of Parliamentary Constituencies in Great Britain: A Computer-Based Information system, *JORS* **34**.11, Pp1079-1084 (jors1983239a.pdf)

http://www.ucl.ac.uk/constitution-unit/events/publicseminars/201112/parliamentary_boundary_review

<**O**R>

OR-20

OR20 November 1993

LEADER

Flushing out the issues

The National O.R. Conference has always been enjoyable for me, but this year there was a number of innovations that made the event particularly valuable. One of the most important sessions I attended as a delegate had been billed in preconference publicity as a debate on the future of industrial O.R. The motivation was the simple fact that a number of recognised O.R. groups within industry have ceased to exist in a visible form during recent years. This is of considerable concern to many of us, and the question for the Society to address is 'what should we be doing?'.

The objective of the debate was to publicly flush out the key issues and factors thought to be driving this perceived decline and to



assist in defining the Society's policy and possibly pro-active response. Members of both COPIOR (Committee of professors in Operational Research) and HORC (Heads of O.R. Committee) were known to have particular views on some of the driving causes of evident contraction, and these causes were not simply recession related.

Despite the billing, it was not a debate, since deliberately there was no motion. What it was, was a constructive discussion and airing of views on the subject. Professor Alan Mercer (Chairman of COPIOR) and Keith Backwell (HORC and substitute for Paul Thornton) each gave a ten minute opening statement on their views as to the current state of industrial O.R. and how it got there. Ten minute statements were then given by Professor Lyn Thomas (COPIOR and O.R. President Elect) and by Ian Disley (HORC), which were followed by contributions from the floor, all chaired by Maurice Shutler. No feathers flew and no blood was let, although strong views were voiced and extreme concern expressed by several delegates including potential future victims.

From where I sat, listening to the different perception of possible causes of what was thought might be happening was effective in flushing out issues to be considered, questions to be asked and notions to be checked. For instance: there were evidently different degrees of belief that O.R. groups decline because: their contribution isn't recognised; there is little short term consequence to closure; client groups now do their own research; universities do not provide the type of O.R. graduate needed; academic research output is not related to the problems of industrial O.R. groups; lack of champions at the top level in an organisation; the portfolio of

O.R. activity is far too restrictive; O.R. is not involved in strategic issues; brighter O.R. scientists quickly move on and up leaving a less inspired tail; O.R. is not involved with key business functions.

One view was that industrial O.R. is not declining – but industry was restructuring with O.R. work now taking place within function groups as opposed to a central O.R. group. If this is so, it was seen as a strength by some and as a weakness by others. A strength because it forced closer bonding between modeller and problem owner, and a weakness because of the lack of O.R. exposure, career structure or available role models.

Another view expressed was that central O.R. groups will be born again in some form within major organisations as they again realise the need for a management research capability. One point all agreed on, was that we don't really know what is happening. Whatever the actual causes and trends, there is evidently a dynamic of industrial O.R. groups that is causing some to disperse and others to remain and even grow. We need urgently to understand the mechanisms of success as well as of failure of industrial O.R. – that is, we must do some O.R. on ourselves. Only in this way can the Society hope to constructively influence its desired future.

John Ranyard and Robert Fildes have been commissioned to undertake a fact finding project and more will be said elsewhere about this initiative. If they approach you, please assist them all you can.

Tony Christer

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For an informal discussion in total confidence on any of these positions or the market in general, please contact: Mark Chapman, Teresa Cheeseman, Kate Fuller or Sarah Sambrook. Alternatively visit our website to view our current vacancies.

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