THE SCIENCE OF BETTER AT THE HEART OF ANALYTICS

INSIDE O.R.

NOVEMBER 2012 NO 503

ANALYTICS PROVIDES O.R. WITH FASHION INDUSTRY FOOTHOLD

: : INSIDE THIS MONTH : : : : :

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EDITORIAL

JOHN CROCKER

The need for improving the academia-practitioner interface is the main theme of Stewart Robinson's leader, his last as Vice President – next year they will appear in his new guise as President Elect.

In this he refers to Technology Readiness Levels which were first defined by NASA in the early 1980's. Taking up this theme, there is also an article which looks at the TRL concept from a practitioner point of view.

Improving the A-P interface is one of the primary reasons for starting a new feature which we hope will take-off and prove both interesting and useful. 'O.R.-Now' will be looking at very recently published papers with a view to picking out one or two that are likely to prove particularly useful. They may be new methods, significant improvements on existing methods, new ways of looking at problems or, recommendations that have resulted from research. The first, written by John Lamb, falls in to the last category and looks at how best to develop simulation models. By coincidence, or perhaps not, O.R.-30 also looks at what was then a new development in creating simulation models.

Bees do not have the advantage of the concepts of TRL or, as far as we know, access to simulation models, but it appears that they are rather adept at solving the travelling salesperson problem (TSP). Professor Lars Chittka, Queen Mary, University of London, very kindly gave me access to pre-published version of an open access paper he co-authored on this subject, based on some rather interesting experiments.

Open Access was again the subject of discussion at a recent Publications Committee meeting and the same theme was taken up by the Board, in their meeting in October. This is certainly not something that is going to go away; from next April, all Government funded research will be required to be published as Open access.

It is always good to get feedback on courses especially when it is positive as well as complimentary. Jennie who manages our courses so admirably decided to see what it was like to be a customer for a change and enrolled on Mike Moir's 'Introduction to O.R. for Non-O.R. Professionals'. Her article makes very interesting reading and might put a smile on your faces to boot.

From the world of analytics, we have articles from such diverse fields as energy management, home insurance and glaucoma – to name but a few. Buried deep inside, somewhere you might also come across the fifth instalment in what seems to have turned into a serialisation of Ronald Clark's biography of Sir Henry Tizard (simply entitled *Tizard*). This month's instalment starts with a dispute with Lord Cherwell ('a muddy tributary') and finishes on the banks of the River Wylye (a clear chalk stream) just 2 days before WWII was declared.

As always, your feedback would be much appreciated and if you disagree (or even agree) with anything your views would also be much appreciated.

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.

Edward J Hagger	London	David Crawford	London

WHAT'S MY LINE?

NIGEL CUMMINGS

The gap between man and machine has narrowed so much now that computers can display almost human like intelligence, at least so far as interpreting and understanding the content of simple drawings.

What's My Sketch image recognition app running on an IOS platform enabled device.jpg

The drawing of diagrams or simple sketches to illustrate a point, concept, direction, thought or theme, has for most of our existence, been unique to humans, but now, the next time you're stuck for someone to play Pictionary with, you need not despair because it is possible to 'boot up' a computerised image recognition opponent to play against.

Sketching is a basic human skill, something that nearly any human can do to some degree or another, even if we use inaccurate representations like outsized ears on rabbits, or stick figures to simplify complex objects. The human brain can recognise these sketches, despite their divergence from reality and make assumptions as to the messages they convey.

James Hays, Assistant Professor of Computer Science at Brown University (Rhode Island), and Matthias Eitz and Marc Alexa from TU Berlin, set out to solve this problem and trained a computer to recognise human sketches. The algorithm they developed can recognise semantic sketches - rough, cartoon-like depictions that actually look nothing like the animal or objects they are supposed to represent.

Instead of trying to teach the computer how to recognise sets of fundamental lines and shapes, the researchers have applied machine learning techniques and trained computers to 'learn' from drawings crowd-sourced over the internet, with the computer making a best guess at what category a sketch should go in, based on the layout of its lines.

Computers can already recognise accurate sketches, like a police sketch of a suspect compared to photos of a face, for example. But for the type of abstract sketches we all grow up with, it's a different challenge entirely.

Humans easily outplayed such trained computers though – the research is after all still in its early stages. On a database of 20,000 sketches from 250 different categories, human volunteers placed 73% of all sketches correctly, but the computer could place only 56% of the sketches correctly. Although not as good as humans, it was much better than random chance, which would place sketches correctly only 0.4 per cent of the time.

The recognition algorithm developed at Brown University and the Technical University of Berlin amply demonstrates how computer applications designed to provide 'semantic understanding' of abstract drawings could be utilised in future. The researchers behind this development believe that by building on this research and other line-drawing computer recognition routines, it will soon be possible to finger-draw something on your smart phone or tablet computer and arrive at an accurate description/answer.

Mathias Eitz has created an iPhone app called 'WhatsMySketch' using this research. It is worth downloading to see how far machine intelligence can be applied to image recognition on simple computing platforms. There are plans to extend this range and develop a similar capability for android platforms.

WANT TO ATTEND YOUNGOR18 FOR FREE?

GAVIN BLACKETT, SECRETARY & GENERAL MANAGER

Simpson Scholarships are designed to enable one or two outstanding young operational researchers to attend the OR Society Young OR Conference, and to encourage them to present papers on their work in O.R.

The scholarship covers the conference registration fee, (including lunches, teas/coffees and other meals) conference accommodation and reasonable travel expenses incurred in attending the conference.

To be eligible you must have been in O.R. for less than 10 years. This period needs to include at least two years' working experience, based in the United Kingdom, of Operational Research in industry, commerce, government, or in a University teaching or research post. In the case of multiple authorship of a submitted paper, all of the authors must meet these conditions, although only one of the authors will receive the award.

To apply please send an extended abstract of the paper which the author(s) intend to present at the conference. You also need to supply the names and contact details of two independent referees, one a member of the Operational Research Society, the other a client unless inappropriate, who are in a position to testify as to the accuracy of the submission and the fact that the work described was done by the candidate(s). A detailed curriculum vitae is required for each candidate, and in the case of multiple authorship of a submitted paper, the submission must also include a statement detailing the contribution that each author has made to the work described. Submissions should be sent by email to Gavin Blackett, Secretary & General Manager of the Society, email gavin.blackett@theorsociety.com. The closing date is 31 December 2012.

<OR>

NEWS OF MEMBERS

NEW MEMBERS (November 2012)

The Society welcomes the following new members,
SHIHAB AHMED, Surrey; LOUISE ANNIS, Gloucestershire; MATTHEW CLIFFORD, Fareham; BERRIN DENIZHAN, Turkey; KENNETH McGill, USA; SARAH MILLS, Hants; RICHARD SHERBURNE, Hants; GEORGE THEOLOGOU, Edinburgh; IAN THOMAS, Leeds; BETHAN WINTER, Newport; TIM WOODCOCK, Hants;

and Reinstated members,
EDWARD BERNROIDER, Austria; MOHAMMAD DESA, Malaysia; ANASTASIA GOGI, Cambridge; GARETH LEE, Norfolk; ENDER OZCAN, Nottingham; MARK PETTIT, London;

and the following student members,
JENNIFER AHRENS, Kent; ANNE BERGMANN, Edinburgh; CHARLOTTE BETHELL, Wales; RACHEL CLANSEY, Cardiff; MEHDI FELOUSSI, Kent; PHILIP CARTWRIGHT, Hants; CORINNE FREEMAND, Glasgow; DEBORAH KAYODE, London; LISA KIRCHNER, Birmingham; EKIN KOLBAS, Kent; IBRAHIM KUCUKKOC, Devon; LUCY MOSS, Nottingham; JIM LARCOMBE, Hants; STYLIANOS NASIOUDIS, Kent; GEORGE PRIONIDIS, Birmingham; KEITH PATERSON, Glasgow; STEVIE QUINN, Glasgow; HUMRAJI SAHOTA, Hants; TAERK SALHI, Kent; ELLENA SALT, Cardiff; GROWTHAM SRINIVASAN, Kent; MAURICIO UGALDE-FRANCO, Edinburgh; HANNAH WILLIAMS, Cardiff;

Total Membership
2317

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 Associate (AORS)
Michael DAVIS
John-Patrick RICHARDSON

Admit to the category of Associate Fellow (AFORS)
Stefan RAVIZZA

<OR>

SO HOW DID YOU GET INTO O.R.?

GRAHAM SHARP

I'm sometimes told that people get into O.R. by accident.

Some study another numerate subject at university and, while there, 'discover' a more interesting career option than the subject they're studying could deliver. Others start work in one department and migrate through the ranks to the O.R. people and get hooked.

Our distinguished editor, John Crocker, told us about his own journey:

I failed my 11+ and went to a secondary school which, luckily for me, allowed one class of 30 pupils to take up to 6 O-levels each. I passed 5, failed English (which I passed on re-sit) and was allowed to progress to the VIth Form to take 3 A-levels – PAM (Pure & Applied Maths), Physics and, much to my horror, Geography. At the end of the first year I managed to persuade the Head to let me drop Geography, split the Maths and continue with Physics.

I was accepted by Sheffield University (Hallam didn't exist then) to read Maths. It was in my second year at uni that I attended a lecture by Tocher (complete with pipe) on Simulation – at that time he was working just down the road at Cybor House (United Steel's Cybernetics and Operational Research Department). Apart from the fact that it was very dubious mathematics, it was also highly practical. My love was in Pure Maths, in particular abstract algebra, and was very much of the Hardy school – Maths was done for its own sake and it was considered most unfortunate if it actually had any practical application.

Therefore, I vowed that I would never get involved in Simulation. Incidentally, I had little fear of this happening because one of the predictions Tocher made during his talk was that simulation, or least discrete-event simulation, would be obsolete within five years.

When it came time to apply for a job, I had recognised that there was no chance of doing a doctorate or any form of research. I really didn't want to teach and there was no way I was going to go into accountancy or actuarial work which left me with precious few options particularly as I was rather keen to stay in Sheffield. I had heard that the BSC had vacancies in O.R. so I applied. Unfortunately, it was my only successful application!

Also, as luck would have it, between them offering me the job and me being available to start work, they had one of their many re-organisations. So, instead of working in Sheffield I ended up in the totally alien country called North Lincolnshire (this was before it became South Humberside) where one of my first tasks was to write a simulation model. Incidentally, I have reason to believe that I was offered the job because the band (of bell-ringers) in Burton-on-Stather was in dire need of some new recruits, probably more so than BSC was in need of failed mathematicians. The Personnel Manager who interviewed me was, by coincidence, the tower captain at the said church so I can truthfully say that I got my first job because of what I had learnt at university – i.e. how to ring church bells.

Incidentally, the person who taught me to ring at university and life-long friend also started his career in O.R. also with BSC, in Sheffield but later moving to British Gypsum, although, unlike me, I am sure he was appointed as a result of his 2:1 in Mathematics with Honours. Not only was his degree far better than mine but his ringing skills have also remained far superior.

It's unlikely that any other reader made it into O.R. because of his/her campanology skills but if your passage into the profession was – how shall I put it – 'non-standard', why not share your story? graham.sharp@theorsociety.com

<OR>

BOOKS FOR REVIEW

If you would like to review a book, please contact Jim Chilcott at:

JORS-bookreviews@sheffield .ac.uk

Economic Time Series - Modeling and Seasonality
William R Bell, Scott H Holan, Tucker S McElroy (Eds)

Handbook on Semidefinate, Conic and Polynomial Optimization
Miguel F Anjos & Jean B Lasserre (Eds)

Modeling Dynamic Economic Systems 2nd Edition
Matthias Ruth & Bruce Hannon

Multilevel and Longitudinal Modeling Using State - Volume I: Continuous Responses and Volume II: Categorical Responses, Counts, and Survival 3rd Edition
Sophia Rabe-Hesketh & Anders Skrondal

Stochastic Optimization Methods in Finance and Energy - new financial products and energy market strategies
Marida Bertocci, Giorgio Consigli, Michael A H Dempster (Eds)

An Introduction to Exotic Option Pricing
Peter Buchen

Applied Operation Research with SAS
Ali Emrouznejad

Option Valuation: A First Course in Financial Mathematics
Hugo D Junghenn

Quantitative Problem Solving Methods in the Airline Industry - A Modelling Methodology Handbook
Cynthia Barnhart, Barry Smith (Editors)

<OR>

YOUNGOR18 - CALL FOR PAPERS

THE PETER CHALK CENTRE, EXETER UNIVERSITY 9-11 APRIL 2013

ANTUELA TAKO

Are you interested in presenting at Young OR 18 or do you know someone who is?

Young OR is a highly popular conference for academics and practitioners within the first ten years of their careers in O.R. It provides an excellent opportunity to learn about how O.R. and analytics are used in a wide range of applications. The conference programme will include plenaries, keynotes, workshops and parallel streams, as well as a full social programme, where participants will have the opportunity to meet and network with fellow academics and practitioners working in different sectors and areas of O.R. One key feature that makes the Young OR conference unique is that it provides participants a friendly and supportive environment to present to peers, hence facilitating the sharing of best practice.

Presentations are welcome on a range of O.R. topics and areas of application including, but not limited to, the new and emerging area of analytics, more conventional hard O.R. and soft O.R. methods as well as new areas such as sustainability in O.R., O.R. in the third sector, and so on. Application-oriented presentations and case studies in areas such as health and defence are also welcome. For more information about the streams available, please refer to the stream definitions at www.theorsociety.com/yor18. If your talk does not fall into one of the streams listed please contact the Conference Chair (Antuela Tako), or the Programme Schedulers and Stream Co-ordinators (Tom O'Dell, Miles Weaver and Vicky Forman)

At the first instance please contact one of the stream leaders to discuss your paper and to register your interest, preferably by 1 November 2012. The submission system is now open and presenters are invited to submit their title and abstract via the YoungOR18 website (www.theorsociety.com/yor18), as soon as possible. However, we are open to submissions until 28 February 2013.

Titles and abstracts should be phrased in an interesting way to attract people to the presentation. These will appear in the conference handbook given to all delegates, so long as at least one of the speakers has registered and paid the relevant conference fee. Abstracts should not contain mathematical symbols, graphs, tables, or references. It should state if the paper is theoretical, practical, or a mix of the two as well as indicate important methodological information and major results. Further instructions for presenters can be found at:
http://www.theorsociety.com/Pages/Conferences/YOR18/YOR18Information.aspx.

We hope you will present a paper at the Young OR 18 or recommend it to someone you know.

IMPORTANT DATES

01 October 2012	Title/abstract submission open (300 words max)
01 November 2012	Early bird booking opens
31 January 2013	Deadline for early bird bookings
01 February 2013	Standard booking opens
28 February 2013	Deadline for title and abstract submission
08 March 2013	Receive notification of acceptance by stream leaders
09 - 11 April 2013	Attend Conference

THE FIFTH EUROPEAN CONFERENCE ON INTELLIGENT MANAGEMENT SYSTEMS IN OPERATIONS – IMSIO 5 (2013)

3-4 JULY 2013, UNIVERSITY OF SALFORD, U.K.

Call for Papers

Operations management poses a number of problems of significant complexity where a solution would lead to more effective operations and bring significant economic benefits. Solving such a problem, however, may require novel approaches that are based on techniques and principles from both Operational Research and Artificial Intelligence.

As with the previous four conferences held since 1997, this conference aims to bring together researchers and practitioners working on the challenging problems in operations management that are at the O.R.-AI interface. The conference will be held at Media City, Salford Quays.

Media City, Salford Quays

Researchers and practitioners from industry and academia are invited to submit papers in all areas related to aspects of design, development, testing and implementation of intelligent management systems in manufacturing and service operations covering but not restricted to:

- Media Operations
- HealthCare
- Knowledge Management in Operations
- E-Business and E-Manufacturing
- Finance and Credit Scoring
- Logistics
- Maintenance and Fault Diagnosis
- Scheduling and Capacity Planning
- Supply Chains and Inventory Management
- Process Design, Quality Management & Control
- Operations and Control of Intelligent Buildings

Papers describing case studies utilising or evaluating AI techniques such as Neural Networks, Data Mining, Knowledge Discovery, Semantic Ontologies, Knowledge Based Systems, Case Based Reasoning, Fuzzy Logic, Bayesian Networks, Agent Technology as well as Hybrid Intelligent techniques are particularly encouraged.

Key Dates & Deadlines

* Indication of intention to present a paper as soon as possible
* Extended abstract of around 500 words to be submitted by 30 November 2012.
* Accepted papers to be notified by 21 December 2012.
* Full papers to be submitted by 29 March 2013.

Organising committee

Khairy A. H. Kobbacy, University of Salford (Chair)
Sunil Vadera, University of Salford (Co-Chair)
Hilary Wilkes, Conference Organiser, The OR Society

Submission Procedure

Send intent to attend/submit a paper or abstract to:
Khairy Kobbacy or Sunil Vadera,
The University of Salford,
Salford, M5 4WT UK.
EMail: k.a.h.kobbacy@salford.ac.uk; s.vadera@salford.ac.uk

ONE IN THE EYE FOR GLAUCOMA

NIGEL CUMMINGS

Mathematical modelling techniques are being tested by researchers at the School of Science at Indiana University-Purdue University Indianapolis (IUPUI) and the IU School of Medicine to study glaucoma.

America's National Science Foundation recently recognised the work led by Giovanna Guidoboni, Associate Professor of Mathematics and Alon Harris, Professor of Ophthalmology and Director of Clinical Research at the Eugene and Marilyn Glick Eye Institute, for work done on a new approach to understanding what actually causes debilitating diseases like glaucoma. Their research techniques could also lead to more efficient treatments of diseases like diabetes and hypertension.

Glaucoma is the world's second-leading cause of blindness, yet the primary form of treatment is to reduce pressure in the patient's eye. However, as many as one-third of glaucoma patients have no elevated eye pressure, an ability to better understand what risk factors lead to the disease could be useful.

Mathematical modelling can be utilised to create abstract models to describe the behaviour of the system. These could allow doctors to better measure things like blood flow and oxygen levels in fine detail in the eye. Models also can be used to estimate what cannot be measured directly, such as the pressure in the ocular vessels.

Through simulations, mathematical models can help doctors determine the cause and effect of reduced blood flow, cell death and ocular pressure and how such risk factors affect one another in the presence of glaucoma. A better understanding of these factors - and the ability to accurately measure their interaction - could improve doctors' ability to treat the root causes of disease.

According to Professor Harris, 'This is a unique, fresh approach to research and treatment, we're talking about the ability to identify tailor-made treatments for individual patients for diseases that are multi-factorial and where it's difficult to isolate the path and physicality of the disease.'

Harris and Guidoboni have worked together for the past 18 months on the project, and Dr. Julia Arciero, Assistant Professor of Mathematical Sciences at IUPUI, is a principle investigator on the project as well with expertise in mathematical modelling of blood flow.

The team's preliminary findings have been published in the British Journal of Ophthalmology and the research currently is under review in the Journal of Mathematical Biosciences and Engineering and the European Journal of Ophthalmology.

The pair also presented their findings at the 2012 annual meeting of the Association for Research in Vision and Ophthalmology (ARVO). Harris suggested that, out of the 12,000 ARVO participants, their group might have been the only research group to include mathematicians.

According to Doctor Guidoboni. 'We approached this as a pure math question, where you try to solve a certain problem with the data you have.' Guidoboni has expertise in applied mathematics and a background in engineering, which she says, helps her to approach medical research from a tactical standpoint where the data and feedback determine the modelling approach.

This recent work amply demonstrates how the application of mathematics, and in particular, mathematical modelling can providing routes to better understanding of medical conditions.

PROMOTING O.R. AT SCHOOL, COLLEGE AND UNIVERSITY

NIGEL CUMMINGS

Naomi Crouch told delegates about British Airways' outreach programme at the recent OR54 Conference in Edinburgh.

Naomi Crouch

Naomi Crouch began her presentation in OR54's Education stream by stating that she had been with British Airways (BA) for five years. She had started there by supporting BA's fleet planning department in strategy decisions. Then she had moved around and done different types of O.R. for the airline in a number of departments and gained a considerable amount of O.R. experience. What she mainly did now, though, was support any decisions that Heathrow operations have to make, and for the last year it had also been her responsibility to coordinate any activities that BA does in terms of O.R. Outreach.

She then said she'd like to take '…just a moment now and try to remember where were you when you first heard about O.R., where in your age, path, career you first heard about what O.R. was?' The question elicited a number of responses from Naomi's audience, ranging from; 'I was choosing my degree, I read a prospectus which mentioned it', another replied 'I first got introduced to Linear Programming when it was part of O-level maths way back in the seventies, but then more recently I ended up doing a course in O.R. at the Open University'.

Naomi said she remembered where she had first encountered O.R. as a maths student. It was at the University of Edinburgh's Careers Service after returning from a summer of the 'most awful work experience, it had so far been so disappointing, I'd come all the way from school and Uni, went on work experience in my second year at Uni and hated it, and I came back thinking, what am I going to do? This is what I was planning to do, but I don't want to go there anymore.'

She continued, 'So I was sitting in the Careers Service with careers guides in front of me, and I read about a career in O.R. and I just could not believe all these things that a career in O.R. could offer. Opportunities to get to management, a decent salary, the fact that you could work on various projects and so I went to class the next day and tried to convince my fellow students about this brilliant career. We should all become O.R. consultants I said, but it was too late because, by this point they were all applying for accountancy graduate programs and teacher training and nobody else from my intake, as far as I am aware, went into O.R. I had almost 'missed the bus' for O.R. I was looking in the wrong direction.'

This experience had highlighted a problem with career opportunities in O.R. 'This is the reason why I go into schools. I don't mind if people choose other careers, we need accountants, but I want them to pick that over O.R, because they'd rather do that, not because they have never heard about O.R.' This was, she said, her motivation – to raise awareness of O.R. as a career choice.

Regarding BA, she then said that BA too, were interested in promoting O.R. because although the company has a 'strong and healthy' O.R. department, it was often targeted by the national company and people were 'picked off' to work in other parts of the company. So there was need to access a healthy supply of O.R. graduates to fill the gap. 'If people don't know about O.R. they won't study it and we won't be able to recruit them. So at BA we tend to focus on two areas. We go and talk to final year undergraduates and we talk to Masters O.R. students.'

This, she said, enabled BA to provide working examples so that students could apply their learning in the workplace and also gain some recruitment opportunities. BA also focussed attention on students who were just finishing their GCSEs and just finishing their A-Levels – people who were at decision points about where they wanted to go in maths. These points of contact at crucial times in the student's career selection served to highlight awareness of O.R. in general.

Naomi also said that a small amount of O.R. Outreach had been applied at primary and junior school level to try and promote maths in general, at such times it was not an objective to promote only O.R. at that level. She then talked about some examples of exercises done with students. With GCSE students, for example, Outreach contact served to stimulate interest and illustrate fairly simple descriptions of the O.R. processes that take place on a day to day basis in companies like BA.

Naomi also said that when making contact with students it was useful to use information that was interesting to them, this would engage them and stimulate their interest – she spoke about an exercise in data extraction that had proved popular in this respect. Students were provided with fake newspaper articles, some fake manufacturer product specifications, and some fake bar charts. They were then encouraged to make decisions rather than derive answers from the information provided for the exercise. 'Because a lot of maths at school is about. You do a problem, you get an answer, so we could have gone in and said to them. If we buy a big aircraft, how much money will we make? Then they'd answer it and that's it, over with. But by saying, what shall we do, we've got a problem, help us make a decision? They seem to engage with that, it's not just about solving a problem anymore, it's looking at the wider picture!'

Naomi then spoke about an exercise that had proved useful when introducing O.R. to university students. In this instance the focus was on 'hard' and 'soft' O.R. skills which could be used to make students think about wider issues, construct diagrams and provide them with opportunities to exercise potential business skills by team work. Stimulating interest in O.R. she said, at graduate level had proved to be an effective 'springboard for recruitment'.

Finally she spoke about an exercise often undertaken with university level students. It was different to the previous illustration insomuch as it actually demonstrated a specific O.R. technique, that of 'simple' revenue management. In this exercise, students were organised into teams and each team would be allocated one aircraft with ten seats. In addition to encouraging team working skills, this exercise was also competitive, as teams were required to develop strategies and use computer applications to complete their tasks - in this case an Excel tool that could be used by the teams to input the results of their decisions in order to evaluate the consequences of their decisions – the key point of this type of exercise was to illustrate how it was possible to do a proper O.R. case study in a student environment so long as the outreach tutor/facilitator provided some tools to assist team work, interaction with the problem set and completion of the tasks set.

Naomi's presentation showed how the promotion of O.R. in schools, colleges and universities could be an important factor in ensuring a healthy supply of future O.R. professionals. British Airways she said, recognised the importance of making contact with schools and universities, and was committed to raising awareness of O.R. and its applications amongst students, teachers and careers advisors.

<OR>

MATHEMATICS SOLVES MUSICAL MYSTERY?

NIGEL CUMMINGS

The opening chord at the start of the 1964 Beatles hit 'A Hard Day's Night' is one of the most recognisable chords in Rock and Roll music, yet it remains one of the most difficult chords for any musician to emulate as every attempt to reproduce it seems to sound wrong.

A British mathematician however, is now claiming he has got closer than anyone else to solving the decades old musical mystery of the Hard Day's Night opening chord. Dr Kevin Houston, from the University of Leeds, has utilised sophisticated computer software to split up the sound on the original record into its component frequencies.

When presented on a computer screen, a clear sound pattern offers some insight into which notes are most prominent. Dr Houston's results suggest a much simpler solution than one proposed four years ago by Professor Jason Brown, Dalhousie University, Canada. Professor Brown's research seemed to indicate that missing guitar notes in the chord were replaced by Beatles producer George Martin playing a piano.

Buried deep in the background behind the guitars, the piano is very hard to hear. According to Professor Brown though, the faint sound of the piano provides 'the vital musical spark' that makes the chord so distinctive. Dr Houston does not dispute that the piano is there, but challenges its importance. His belief is that George Harrison was playing a straightforward 'F add9' chord on his 12-string electric Rickenbacker guitar, rather than the unusual fingering indicated by Prof Brown.

At the same time, Harrison appears to have had his thumb curled round the neck of the guitar, pressing down the bottom E string at the first fret - this apparently is a common technique amongst self-taught pop and rock guitarists. Dr Houston's research also seems to have established that John Lennon was playing the same chord on an acoustic guitar. On the stereo track, Harrison and Lennon are heard on different speakers.

'The opening chord to A Hard Day's Night is a mystery, it turns out that nobody really knows what it is. People who do know are a bit cagey about it. George Martin probably knows quite well but I think he's quite happy not to tell people. I wouldn't like to say that we've definitely got it right, but I think we've put the record straighter. It makes mathematical and musical sense.'

Both Dr Houston and Professor Brown used the same mathematical process, a Fourier transform, to dissect the Beatles chord. Professor Brown however was faced with a set of numbers, but Dr Houston's

software was able to display the result in a visual form. As a result of his visual observations Dr Houston believes Professor Brown got it 'all wrong'. He came up with 29,000 frequencies and assumed the most important frequencies were the loudest, and therein laid his mistake.

Brown's solution suggested that Harrison was playing the notes A, D, G and C on just the four middle strings of his guitar. It also indicated that John Lennon's only contribution was a single C note played high on the fret board on the first string. A question mark still hangs over the role of Paul McCartney's bass guitar though, as the mathematician is not sure whether McCartney was playing a full note, or a harmonic, or both.

The song that merits all this analysis, A Hard Day's Night, was recorded at Abbey Road studios in London, it topped the charts in both the UK and the US, and was also the title track on the Beatles' first feature film.

BUMBLEBEES CAUSE QUITE A BUZZ!

JOHN CROCKER

Tucked away in the bottom corner of page 17 of The Times (Wednesday 19th September 2012) was a short article on how bumblebees find the shortest route to the nectar (or sucrose in this case).

Apparently out of 120 (sic) possible routes the bees reduced their total journey time by around 80% to find the almost optimum route in just 20 trials.

The researchers from Queen Mary, University of London placed five artificial flowers with a dollop of sucrose in the centre of each in a freshly mown pasture. Each 'flower' had its own webcam which was triggered by a bee landing on the flower. Each of a number of bees was also fitted with a transponder so the flights of these could be accurately monitored.

The five artificial flowers were arranged in a regular hexagon (side 50 m) such that the line joining the two nearest to the nest formed the base of an isosceles triangle with the nest at the apex. Each flower was primed for each bee with just sufficient sucrose to fill one fifth of the bee's crop so that it would have to visit all five flowers to fill its crop before returning to its nest. There were no other flowers or sources of nectar to act as detractors. A bee's eyesight is not particularly good so it is unlikely that they would be able to see any of the flowers from the nest or from anyone of the flowers. This is borne out by the fact that they set off in foraging mode (at a relatively slow speed and no particular direction) to look for the first flower and similar for the second after having found the first and so on.

Once a bee had established where the nearest flower was relative to the nest or to another flower, it would generally head along a line close to the straight line joining them – this apparently is known as a trapline. After the bees had established traplines around the five flowers, the researchers removed the one furthest from the nest (flower F3) and placed it at a position F6 such that it formed an equilateral triangle with flowers at F4 and F5 to the outside of the pentagon.

From the repeated routes taken by each individual bee, the researchers were able to establish that they did not use a nearest neighbour heuristic since they were observed moving between non-nearest neighbour flowers in 52% of the bouts in which all five flowers were visited (n = 42 bouts) although to start with, before all five flowers had been located 77% (n = 50 bouts) of all transitions between flowers were between nearest neighbours.

If they were not using a 'nearest neighbour' heuristic then maybe they were using a 'discovery order' heuristic in which the bees visit the flowers in the order they first discovered them but apparently none of the bees used the discovery order as their trapline sequence. Bees that discovered F1 first were just as likely to end up starting with F5 when they had found their optimal route (and vice versa) – there was also no preference for circulating clockwise (F1-F5) or anticlockwise (F5-F1).

Maybe the bees used randomized optimisation. So having found three flowers (F1, F2 and F3, say) they would pick sequences out of the 6 possible ones (abc, acb, bac, bca, cab, cba) at random and repeat this when they found new flowers. The researchers calculated that to do this, each bee would take something approaching 100 trials to find the optimum around the 5 flowers but of the 7 bees that found the optimum sequence, the average number was just under 18 with the standard error about the mean of under 2 (17.57, 1.79).

What they decided in the end was that the bees use trial and error by combining exploration, learning and sequential optimisation. A simple iterative improvement heuristic gave a very good fit to the observed data. It suggests that bees are able to remember the length of the shortest route (so far) and compare this against the latest. If the latest is found to be shorter then the bee is more likely to repeat these flight vectors thus reinforcing them in its memory and gradually forgetting the longer options using what is essentially a positive feedback loop. This is similar to ant colonies only without the pheromones to mark the trail.

With grateful thanks to Professor Lars Chittka, for making the original paper available to me.

ACADEMICS AND PRACTITIONERS: FINDING OUR 'TECHNOLOGY STRATEGY BOARD'

STEWART ROBINSON (VICE PRESIDENT), LOUGHBOROUGH UNIVERSITY

'Academics and practitioners mingle freely at the Society's events and conference, often in roughly equal numbers.'

John Crocker's article reporting on OR54 in last month's issue of Inside O.R. gave a nice summary of the panel discussion that took place at the conference on practitioner-academic collaboration.

This was part of the Making an Impact activities at the conference. From my perspective this was a repeat performance of a similar panel we held at the Simulation Workshop (SW12) in April. I was, however, the only surviving member from the earlier panel – not ignoring Sally Brailsford's excellent efforts in putting both panels together and so ably leading them. Despite the change in membership, the panel at OR54 did cover much of the same ground, which suggests some level of uniformity in thinking. I will not repeat John's summary of the discussion here.

Two weeks later I found myself at another conference, on this occasion based around EPSRC funding for manufacturing research. Naturally this had quite a different flavour to our own conference, not least because of the subject matter which focused primarily on the design of machines in manufacturing processes. Given that I have previously received funding through this channel I was hoping to find evidence of a renewed interest in process design and operations management. Unfortunately there was little evidence that the engineering wing of EPSRC is likely to move in this direction in the near future.

Putting this aside there were a couple of more subtle differences to OR54 that brought me back to the discussion on the academic-practitioner interface. First, the conference was dominated much more by academics both in the proportion of attendees and in the flavour of the presentations. This is not to say that there was no representation from the 'user' community. Second, and maybe surprisingly given the domination by academics, there was a much stronger sense of the need to link academic research with practice.

A key theme that kept emerging was that of Technology Readiness Level (TRL) which describes where a particular technology is on the path from a research idea to implementation. Having looked into the concept further I think it provides some insight into the link between academic research and practice, and also into the reasons why there is sometimes a divide. For a summary of the concept of TRL see
www.acq.osd.mil/chieftechnologist/publications/docs/TRA2011.pdf

It seems that TRL emerged from NASA in the 1980s and since then it has gained wide acceptance in other US government agencies such as the Department of Defense. Judging on my experience at the EPSRC conference it is widely used in manufacturing circles as well. Nine technology readiness levels are identified, starting from basic principles observed and reported (level 1) through to actual system proven through successful mission operations (level 9). Translated into more familiar language we might see this as the following progression: basic technology research, research to prove feasibility, technology development, technology demonstrations,

system development and system test and launch. Note how the language subtly moves from research to technology to systems.

At the EPSRC conference, research was very much seen as the domain of the academics and systems (in operation) were seen as the domain of the user community. The link is technology, which it seemed neither academics nor users specifically owned, although both had strayed into that territory. As such, there is divide between research and practice much as we often observe in the world of O.R. In the case of manufacturing the Department for Business, Innovation and Skills' solution has been to set-up the Technology Strategy Board that is specifically tasked with funding work that turns research into practice. Significant amounts of money are going into this activity on the grounds of creating 'impact' from research. I note that some of this money can be directed to O.R. through activities such as Knowledge Transfer Partnerships (www.ktponline.org.uk).

So what does this mean for O.R? First, I think we should celebrate the excellent research that is carried out by the academic community. We should also celebrate the excellent O.R. interventions carried out by the practitioner community. But we need to recognise that excellent research rarely progresses much beyond TRL 3 and neither should it – it is research. Similarly, practitioners will rarely be interested in an idea until it has reach at least TRL 7 and neither should they – they want to intervene in real problems. My question then is: what is the equivalent of the Technology Strategy Board for O.R? Unfortunately at this point in time I do not have an answer.

This bridge between research and practice may not require large investments in the same way as the manufacturing field requires. After all, our equipment is often little more than pen, paper and a computer. We also have a significant head start on many fields. Many of our academics have, and continue to have, real world experience. Academics and practitioners mingle freely at the Society's events and conference, often in roughly equal numbers. O.R. by nature is a practice oriented discipline and so research that is close to the coal face is not uncommon.

The recent discussions highlight a desire to work more closely together, but they also demonstrate some level of frustration that we do not do so as much as we would like. We need to find our own 'Technology Strategy Board' to bridge the gap from TRL 3 to TRL 7.

<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.

Stewart Robinson, Loughborough University, has been elected to the Board and General Council as President-Elect. He'll serve one year in this role from 1 January 2013, followed by two years as President in 2014 and 2015, and wind down during 2016 as Past-President. Sanja Petrovic, Nottingham University, has been nominated to replace Stewart as Vice-President, and Roger Forder will take over as Honorary Treasurer in both cases for three years on the Board and General Council, beginning in January.

The following members have been elected to General Council, to serve for three years from 1 January 2013:

Pavel Albores, *Aston University,* Regional Member - Midlands
Alistair Clark, *UWE,* Regional Member - West
James Crosbie, *Dept. of Health*
Bill Dowsland *, *Gower Optimal Algorithms Ltd*
Gillian Groom, *University of Southampton,* Regional Member – East Midlands
Jeff Griffiths *, *Cardiff University*
Martin Kunc *, *University of Warwick*
Frances Sneddon, *Simul8*
Miles Weaver, *Edinburgh Napier University*

* 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.

At its meeting on 8 October, the Board made the following appointments to fill casual vacancies, not filled during the election process:

Sayara Beg, *Independent Consultant*
Noel Corrigan, *CORDA,* Special Interest Group Representative
Mike Wright, *Lancaster University,* Regional Member – North West

These temporary appointments are for a period of one year, running from 1 January 2013.

One vacancy remains unfilled, and if you are interested in getting involved in helping to run the Society, please get in touch. It need only be for one year, at the end of which time you are free to stand down or seek nomination for a full three year term.

I would also like to thank, on behalf of the Society, Thierry Chaussalet, John Crocker, Richard Eglese, Kevin Glazebrook, Stuart Johns, Martin Keys, Ian Mitchell, John Ryan, Chris Smith, Stein Wallace and Sandra Weddell for their time served on Board and/or General Council.

<OR>

A DELEGATE'S POINT OF VIEW

JENNIE PHELPS, OR SOCIETY

Please forgive me if this article is not written in an O.R. Professional manner, but hey I don't need to apologise, I am just a mere non - O.R. person that works alongside these strange mysterious creatures.

I attended Mike Moir's course, 'An Introduction to O.R. for Non-O.R. Professionals', on 4 October. I thought that as I manage the training courses this would be a great opportunity to have an insight into the world of my delegates, if only for seven hours to see the world through their eyes.

The group was made up mainly by delegates from Dstl along with representatives from RNLI, DOH and Carol Smith from our Membership Team.

On entering the training suite with the soft voice of Nina Simone playing in the background I was somewhat nervous to see ropes placed on each chair and wondered if O.R. really had this effect on people. As the room filled and we all took to our seats, I looked around to see the faces of the other delegates who were tentatively playing with their ropes.

Mike Moir seemed to enjoy our uncertainty and we were soon paired up and given our first task. This really broke the ice with the group and within minutes we were all twisting our bodies in what can only be described as a game of twister whilst tied up!

The exercise was designed to teach us that a problem can be solved by a simple maths solution, and this is in part what O.R. is about, at last we were learning.

After a brief history of how O.R. came about during the 1940's we were all hungry for more.

Mike touched on six branches from the O.R. tree and using interactive methods we learnt about, Queuing, Measures, Simulation, Forecasting, Decision Making and Game theory. Mike had a number of O.R. stories that gave perfect examples to illustrate these branches from European post office queues to a simple problem at an airport which caused mayhem worldwide.

After a splendid lunch, we played a couple of games. Firstly we played *Deal or No Deal* – where I was Noel Edmunds and a mighty fine Noel I was too. The group held up their numbered envelopes with pride and we all played along not realising that Mike (The Banker) was demonstrating the importance of Decision Making and how this game is not just a TV Quiz, but a complex decision making process. (For those interested, Simon from Dstl dealt at the Bankers offer of £12,250 – to later find out he had £50,000 in his envelope. If only he was really on the show.)

We then had a quick game of *Golden Balls* where James and Maria had to deal with the dilemma of Steal or Share for the prize money – 'The Prisoners Dilemma', a classic game theory problem. Poor Maria, the kind soul, made the decision to share the £5200 prize money, whereas James stole and walked away with the prize money. He later admitted that the money would be donated to saving puppies!

The final game was 'The Beer Game' (Reference -Peter Senge - from 'The Fifth Discipline'), I must admit I found this really enjoyable and my favourite part of the course. In this Mike demonstrated that a small effect can have major negative consequences in the 'Real World' and that this is why O.R. is so important in everything we do.

I found the course a great way to learn about 'O.R. People' and I gained a greater appreciation for what they do.

One delegate at the start said that he thought the course would be 'death by PowerPoint', but I am happy to say there was not a laptop in sight and Mike Moir should be congratulated on his delivery of this well presented course.

THE OR SOCIETY

Blackett Memorial Lecture

The Society is pleased to announce that the 2012 Blackett Memorial Lecture will be given by

Prof. David MacKay FRS

Professor of Natural Philosophy in the Department of Physics at the University of Cambridge and Chief Scientific Adviser to the UK Department of Energy and Climate Change (DECC)

The title of the lecture is:

2050 Pathways

- How easy is it to get off our fossil fuel habit?
- How does our current energy consumption compare with our sustainable energy options?
- How can we make energy plans that add up?

This talk will offer a straight-talking assessment of the numbers, and will present the DECC 2050 Pathways Calculator [http://tinyurl.com/2050decc].

David MacKay is a Professor in the Department of Physics at the University of Cambridge. His best-selling book, *Sustainable Energy - without the hot air* (www.withouthotair.com), has been described as 'a tour de force' *(The Economist)*, 'a must-read analysis' *(Science Magazine)*, and 'this year's must-read book' *(The Guardian)*. In 2009, he was appointed the Chief Scientific Advisor to the UK Department of Energy and Climate Change.

Thursday 29 November 2012

The Royal Society, 6-9 Carlton House Terrace, London SW1Y 5AG

Lecture at 4.30 pm

(Tea and biscuits at 4.00 pm; Drinks reception after the lecture)

There is no charge for attendance at this event. To register and receive joining instructions please go online to www.theorsociety.com/Pages/Conferences/Blackett.aspx and fill in the online reservation form.

If you have any queries contact **hilary.wilkes@theorsociety.com**

MAKING AN IMPACT IN EDINBURGH

RUTH KAUFMAN, KATE SWATRIDGE

Around 10% of you were at OR54 in Edinburgh this September. For those unable to make it – the rumours are all true. In just a few hours, Wednesday's Making an Impact day delivered all a practitioner could wish for with the opportunity to: make new business contacts; participate in your chosen workshops; learn from ground-breaking case studies and then share views and experiences with others during early evening drinks. Jealous? Here's what you missed.

The Meat in the Sandwich

On the middle day of the OR Society's annual three-day conference, *Making an Impact* was organised *by* practitioners *for* practitioners who can often only spare one day away from their desks yet still want to experience all the conference has to offer. The day included plenary sessions, which this year saw enlightening presentations from Jason Field and those competing for the President's Medal.

Putting names to faces was first up at a sprightly 8.30am, and what better way to digest breakfast than over a few rapid-fire rounds of speed-networking? This was the brain-child of energetic (and stopwatch-holding) Sophie Carr, of Bays Consulting. Sophie employed her whistle to keep us all moving; one minute was just long enough for a basic introduction – pairs who wanted more time quickly arranged coffee meetings for later.

O.R. people talking to complete strangers at speed-networking

Technique Tasters & Workshops

The high energy and participative atmosphere carried forward into the rest of the day with a range of Technique Taster and Workshop sessions. These were organised by Kate Swatridge of decisionLab and were designed to give insights into practical O.R. approaches. Technique Tasters introduced or refreshed the memories of fellow practitioners, by taking them on a whistle-stop tour of a technique: a) What it is; b) When to use it; and, c) How to find out more. Guido Diepen (Paragon Decision Technology) presented on Constraint Programming, Giles Hindle (University of Hull) lead us through Rich Pictures and Systems Modelling, and Sophie Carr dealt with Bayesian Networks.

Working on the Holmes problem in the Bayesian Networks Technique Taster

The day turned into a veritable flood of useful information for the – happily – very receptive folk present. The ethos was one of hands-on, replicable O.R. Check the website's Document Repository for detailed notes from many of the well-received sessions, including:

- 'Build your own pub': an agent-based simulation game from Dave Buxton of decisionLab. Who ran the most profitable pub in the village?

- 'Wow an audience with effective Data Visualisation', a lively and crowd-pleasing session from Ian and Jacquie Taylor of FlyingBinary.
- Simul8's sensitively delivered 'Networking for Introverts'
- Ruth Kaufman's practical 'Personal and Professional Development'.

Teams at work building a pub using Agent-Based simulation

The final session (before the much-anticipated Simul8 sponsored drinks reception) attempted to narrow the gap between academics and practitioners. For a detailed breakdown of this session and its outcomes, please see John Crocker's piece on p16 of last month's newsletter.

Nightcaps and Next Year…

The day ended as sociably as it started. The get-up-and-go liveliness seen throughout the day continued right the way through the drinks reception, the conference banquet...and the ceilidh. Clearly, many have been hiding their dancing talent for quite some time.

Plans are already underway for next year's conference in Exeter so if you are an O.R. practitioner and want to get involved or to make suggestions, we're all ears.

<OR>

ANALYTICS PROVIDES O.R. WITH FASHION INDUSTRY FOOTHOLD

NIGEL CUMMINGS

The fashion industry generates billions and brightens the lives of many by maintaining cutting-edge designs, and continually re-inventing itself.

Every season, fashion companies from Paris to Bombay and beyond, launch new styles, fabrics and colours into a hungry marketplace – it is one of the few industries unaffected by the economics of austerity. The fashion market's reaction decides which new fashions to produce for the new season and which ones will become the next 'must have' items for trend-setters the world over.

Determining which designs to mass-produce is only one element out of many that defines success for fashion companies though. Some fashion companies use forecasting technologies to predict likely sales for every variation of a potential 'hit' item. Prediction is a useful anti-waste tool, since unsold products at the end of season are either sold at huge discounts, or destroyed in an attempt to protect the exclusivity of brand name.

Surprisingly, on average, fashion companies are behind similar industries when it comes to their use of business analytics tools. According to information obtained from a recent SAP Performance Benchmarking analysis, fashion companies on average are able to track fewer strategic Key Performance Indicators and less able to use analytics than their peers in the retail and consumer products industries.

Fashion companies traditionally have a hard time getting an accurate and highly detailed read on supply and demand in their world, as trends and tastes tend to be fickle. Most fashion companies have procurement lead times of 6 to 8 weeks, and this makes it hard to anticipate and respond strategically to lower or higher than expected demand for certain Stock Keeping Units (SKUs) or styles.

Some fashion and clothing-design companies are however utilising analytics to improve their forecasting and potential profitability. *Under Armour*, for instance, is able to plan in detail for the next 3-4 seasons by collecting critical market forecasts and inputs in quick and accurate manner. Another fashion house trading mainly on the web, *Bluefly*, is using business intelligence tools to help its marketing team monitor the performance levels of multiple marketing channels, in near real-time. These tools allow the company to identify best- and worst-performing partners and affiliates. *Zara*, the fashion chain owned by Inditex, is apparently able to take information from the shop floor on changing demand and get new designs to stores in a week.

According to SAP, and based on leading examples from fashion and other industries, five key characteristics consistently stand out in

companies that have taken analytics on board:

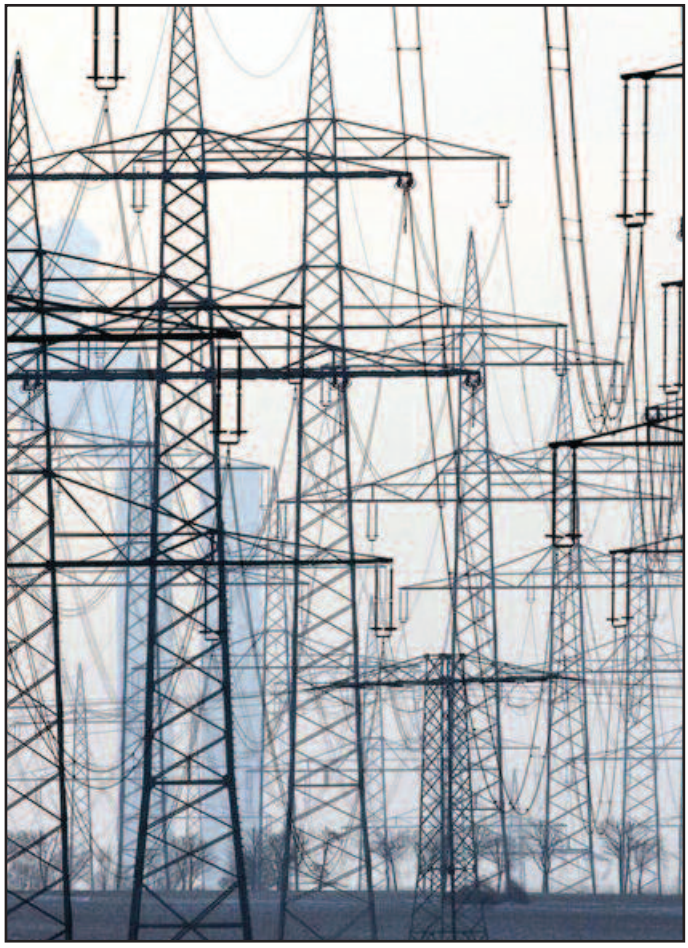
- Their business analytics systems provide visibility into multiple parameters, such as colour, size, style, season, theme, and so on;
- Analytics technologies allow them to optimise markdowns to improve profitability and reduce inventory;
- Their systems have the ability to predict performance of new products (even with no sales history) by leveraging attributes like colour, collar size, etc. from other products;
- These companies utilise user-friendly tools to collect information from key people in their organisation; and
- Their analytics systems can handle large amounts of data, including information from social websites such as Facebook and Twitter, to provide a richer sense of what people are saying about fashion trends, products, strategies and brands.

The impact of using analytics in fashion has been dramatic. SAP Performance Benchmarking shows that companies with the greatest use of business intelligence have on average 54% higher operating margins than companies with low adoption. With those levels of value, Business Intelligence may be the next hot trend for the fashion industry.

KEEPING COOL, THE SMART WAY

NIGEL CUMMINGS

Switzerland's largest retailer is working with IBM's business analytics to turn its refrigerated warehouses into part of a future, smart, electricity grid.



Migros, Switzerland's largest retailing company, owner of the largest supermarket chain and one of the largest employers in Switzerland has teamed up with IBM in a project involving electricity utility BKW and national grid operator Swissgrid. The aim of this cooperative venture is to use Migros warehouses as a buffer to cope with the unpredictability of renewable energy sources.

Unlike conventional fossil fuels, generating electricity from wind or solar power is unpredictable and varies according to the weather. For energy providers, this means they need to have the flexibility to balance supply and demand in new ways.

Migros is a huge consumer of electricity using more energy than the entire Swiss city of Bern. Most of this power is used to hold its three enormous warehouses, covering some 20 hectares, at the correct temperatures. Good insulation obviously helps but most of the heat gains occur during the movement of stocks due to the doors being opened allowing cold air to escape and because the incoming stock may be warmer than that being held.

'Unlike conventional fossil fuels, generating electricity from wind or solar power is unpredictable and varies according to the weather '

Small fluctuations in temperature within the warehouses are not a problem so when power is available it can be used to lower temperatures to the bottom of the acceptable range. When power is not available, the movement of stock can be reduced and doors can be kept shut thus reducing the amount needed. The clever bit is matching the balancing between the peaks and troughs in power generation against those in demand from outside Migros with the movement of stock in and out of the warehouses.

Acting as a power buffer would help reduce Migros's energy costs, as its provider would pay to gain the flexibility it needed. Thus the consortium, which is called Flexlast, is working on developing analytical models that predict the energy needs of Migros warehousing, and allowing the electricity provider to divert resources elsewhere at times of lower consumption.

In simple terms, when the wind blows and the sun shines, there will be abundant energy that Migros can use. When the weather changes, the utility firm can direct resources elsewhere.

The project aims to have a fully live version of the system running early in 2013. IBM is also looking into how other electrical consumers can be used to buffer the irregular production of renewable energy, and has already demonstrated how electric vehicles, appliances and homes can contribute to a future smart grid. IBM's energy analytics takes into account real-time conditions and increases the use of renewable energy, to balance grid load, reduce failures, and accommodate consumer preferences and their desire to reduce energy consumption.

HOW MUCH HOME INSURANCE SHOULD YOU BE PAYING?

NIGEL CUMMINGS

Predictive Analytics is allowing insurers fighting for a share of an increasingly competitive marketplace to increase profitability without sacrificing insurance cover to its customers.

Insurers see predictive analytics as a means of gaining a better understanding how closely their premiums match their risks. They are constantly looking for better ways to predict future losses so they can identify their best risks and price all the risks in their book of business more accurately. So it no surprise that predictive analytics is currently their de facto choice in wringing the best profits from insurance sales whilst minimising risk and providing value for the insured.

Home insurance is a highly complex business. On the one side are the risks: fire, theft, flood, accidental damage, and so on. On the other side are the customers: how likely are they to claim; how likely are they to take their business elsewhere ; by how much can we increase their premiums before we lose their custom and hence do we really want this person on our books. What additional benefits can we offer this person knowing there is an extremely low probability they will claim against them.

Advanced analytics has proven an effective means to increase predictability and develop new underwriting and rating approaches for insurance, and in particular for the homeowners' insurance market. Some insurance companies are using advanced analytics on homeowners to develop rating plans that rate separately for the individual risks covered by the homeowners' policy, as opposed to the traditional approach of rating all risks as a package.

The relative importance of risks can vary for a number of reasons. For example, risks from flooding can now be determined from studying 3-D maps which identify, at a glance, local minima (i.e. places in which flood water can accumulate and to what depth). Fire damage is likely to be more serious in properties of a certain type but also in more remote areas where fire appliances are likely to take longer to reach the scene. Again there are maps which show the number of burglaries by street; houses in *cul de sacs* are particularly vulnerable particularly if there is footpath access to closed-off end. 'Crimewatch' areas are, however, less prone but are areas on the periphery more prone as a result?

Needless to say there are software packages available that can produce risk ratings for any of a whole load of factors. One such 'off-the-shelf' analytics solution is 'ISO Risk Analyzer Homeowners produced by a U.S. company based in New Jersey. It features an environmental module which can be easily modified to encompass risk factors associated with UK and European home owners' insurance needs. The environmental module supplied with ISO's 'Analyzer', once configured, can analyse and predict potential loss costs for nine separate risks at the level of census block group by public protection classifications for base policies. There are also modules which can deal with other types of risk including car insurance both for private and commercial owners.

Perhaps every self-respecting burglar should carry an ISO Analyzer as well as a gemmy and a 'swag' bag!

More information about the ISO range of predictive analytics applications can be found at: http://www.iso.com/

SOCIAL ANALYTICS IN EXTREMIS?

NIGEL CUMMINGS

British Physicist Stephen Wolfram once described as 'The Man Who Cracked the Code to Everything', and the genius behind Wolfram Alpha, Mathematica and the Computational knowledge engine, has now taken a step in the direction of social media enthusiasts. Is it a step in the right direction?

His company, Wolfram Alpha, has released 'Facebook friends mapped' (FFM), an application which uses the company's analytics platform to utilise information already online to show Facebook users their account activity in the form of pie charts, graphs and maps.

By the time you read this news and discussion article, close to half a million people will have used FFM to analyse the information they have put on Facebook. The new application seems to have taken Wolfram Alpha's intelligent search facilities away from the world of science and inserted them into the eager hands of a voyeuristic public.

FFM can generate pie charts which reveal the ratio of their friends' relationship statuses and maps that plot their locations by global city. Wolfram Alpha's FFM app works directly from data freely given and already online to provide a definitive answer to a question rather than providing links to other websites like a traditional search engine.

The platform also reveals a user's most popular posts and generates a word cloud in which the most frequently used words are displayed are the largest. Users can choose to clip and share their graphs on various social networks including both Facebook and Twitter. Reports can be generated by typing 'Facebook report' into a 'Wolfram Alpha search box'.

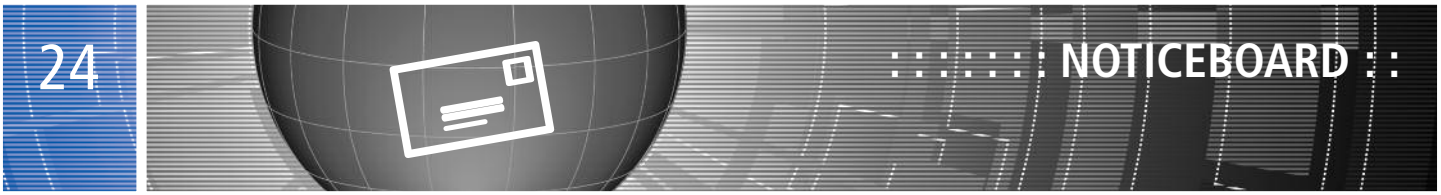
Whilst this information may be fascinating or even interesting, the downside is that in the wrong hands it could stop you from getting a job, getting security clearance or getting credit. By knowing your contacts and movements it could decide you are terrorist sympathiser when in reality you are a foreign correspondent. You might be in contact with drug addicts because you spend your spare time working for a charity aimed at helping such people kick the habit. You could spend a lot of time looking at maps where burglaries are most likely to occur to decide where the best pickings are to be found or because you are a consultant trying to determine where best to promote 'Crimewatch' schemes or employ extra police on the streets.

Social networking websites such as Facebook, Twitter, and LinkedIn have transitioned from fad to mainstream to global phenomena over the past few years. Only two years ago, in 2010, analysts revealed that the popular social networking site Facebook had surpassed Google for the most page visits, confirming a definite shift in how people are spending their time online.

Some highly informative slides pertaining to the research provided by InSites for our use in this publication, can be located at: http://www.slideshare.net/InSitesConsulting/social-media-around-the-world-2012-by-insites-consulting

If there is a moral to any of this though, it may be to 'Enjoy social networking at your peril, do not abuse it and hopefully it will not abuse you. Do not let it rule your life, be extremely careful what you say and to whom and where, because once information is posted out there in cyberspace it is instantly and openly available for analysis. The information that you innocently give out to the world may one day come back and take some of your world away from you!'

<OR>



JOURNALS & SPECIAL ISSUE CALL FOR PAPERS

CALL FOR ENTRIES

2013 Franz Edelman Award

Further information: www.informs.org/Recognize-Excellence/Franz-Edelman-Award/Application-Process

Abstract: The purpose of the Edelman competition is to bring forward, recognize, and reward outstanding examples of operations research, management science, and advanced analytics in practice. The prize is awarded for implemented work, not for a submitted paper or for the presentation describing the work. The client organization that uses the winning work receives a prize citation and is inducted into the Edelman Academy. The authors of the winning work receive a cash award and are designated as Edelman Laureates. All finalists receive the opportunity to publish their papers in INFORMS' prestigious journal, *Interfaces*.

IMPORTANT DATES

Summary of Achievement submission due date: 17 October 17 2012
Finalist announcement: 17 December 2012
Full paper submission: 15 February 2013
Finalist presentation rehearsal: INFORMS Conference on Business Analytics & O.R., San Antonio, TX: 7 April 2013
Presentations and award: INFORMS Conference on Business Analytics & O.R., San Antonio, TX: 8 April 2013
First prize author keynote address: 2013 INFORMS Annual Meeting: 3-9 October 2013

SPECIAL ISSUE

Knowledge Management Research & Practice (KMRP)
Sustainable Quality: Knowledge and Information Management

Further information:
www.theorsociety.com/Pages/Conferences/KIM2013/KIM2013.aspx

Abstract: This Special Issue, in conjunction with KIM2013 (the OR Society's inaugural Knowledge and Information Management conference) is dedicated to the theme of Sustainable Quality. This wide-ranging topic is relevant to organisations and individuals working in any sector of the economy. Knowledge Management has become a key process in understanding organisations and their use of resources and, ultimately, quality is a major differentiating factor when considering goods and services. Sustaining quality requires taking a strategic view that may present short to medium term challenges and knowledge management should be able to help address such challenges. For large organisations, knowledge management may be seen as an intra-organisation activity, but sustaining quality for small to medium enterprises may require inter-organisational cooperation. Papers that relate to the theme and to knowledge and information management will be welcome. Areas of particular interest include (but are not restricted to) the management, practical application, limitations, implications, lessons learned and challenges related to KM and sustainable quality in the areas of services, education, health and manufacturing.

IMPORTANT DATES (in conjunction with key dates for KIM2013)

KIM2013 conference paper titles and abstracts submitted:
7 December 2012
Full conference papers submitted: 11 January 2013
Notification of outcomes of reviews of conference papers: 1 March 2013
Final manuscripts submitted (for conference): 10 April 2013
Conference: 4-5 June 2013
Final manuscripts submitted for KMRP: 1 July 2013
Electronic publication expected in KMRP: 1 September 2013

CALL FOR PAPERS

SIMULATION MODELLING PRACTICE AND THEORY SPECIAL ISSUE ON 'Energy efficiency in Grids and Clouds'

Further information: http://ees.elsevier.com/simpat.

Abstract: Computational and data grids and clouds are large scale distributed systems used for serving very large and complex applications. Grids and Clouds performance became more important due to the tremendous increase of users and applications. However, the usage of energy has become a major concern for grid and cloud computing since the price of electricity has increased dramatically.

IMPORTANT DATES

Manuscript submission deadline: November 30 2012
Manuscript reviews to authors: February 28 2013
Manuscript revision due: May 30 2013
Final notification of acceptance: July 31 2013
Final manuscript submission deadline: August 31 2013
Expected publication of the special issue: December 2013

CALL FOR PAPERS

EURO JOURNAL ON DECISION PROCESSES
Special Issue on Problem Structuring Research and Practice

Further information at: https://www.editorialmanager.com/ejdp/

Abstract: Problem structuring has long been acknowledged as a core modeling activity in the practice of operational research. What is modeled and how influences the way the problem is understood, therefore guiding the actions of individual, groups and organizations. Although there is a significant literature on problem structuring support, much more work is needed in this growing area of operational research and management science. This Special Issue will present important advances on problem structuring research and practice at individual, group and organizational levels.

IMPORTANT DATES

Deadline for the submission of extended abstracts: November 15 2012
Deadline for the submission of full papers: March 15 2013
Final decision notification: April 30 2014
Publication of the Special Issue: 2nd quarter of 2014

CALL FOR PAPERS

CCPE Special Issue on 'The Internet-of-Things: Shaping the new Internet Space'

Further information at:
http://www.cc-pe.net/journalinfo/issues/2013.html#IOT2013

Abstract: The new version of the Internet Protocol - IPv6 - has astronomically increased the IP address space from around 4.3 billion IPv4 addresses to roughly 340 trillion trillion trillion new IPv6 identifiers. This humongous pool of addresses ensure the continued expansion of the Internet for many decades to come and it realises the vision of everyday objects that are uniquely identifiable and are connected to the Internet – this is commonly known as the 'Internet-of-Things' (IoT).

IMPORTANT DATES

Paper submission deadline: January 15 2013.
The authors will receive initial decision and reviewer comments: April 15 2013.
Final papers: June 15 2013.
Final decisions: July 15 2013.
Accepted papers are expected to appear online for early view within 4 months of final decision.

EWG-MCDA, WELCOME BACK TO UK

ALESSIO ISHIZAKA

The 76th meeting of the European Working Group 'Multiple Criteria Decision Aiding' (EWG-MCDA) was held on 13th-15th September 2012 in Portsmouth.

We were especially glad to bring back to United Kingdom the EWG-MCDA after 34 years (the 7th EWG-MCDA was organised in 1978 in York). The organisation of the meeting in Portsmouth Business School was not a coincidence as MCDA is one of the core research areas of the University. This event has been supported by the Portsmouth Business School, EURO and the OR Society.

Scientific Programme

The 76th meeting was attended by 46 participants from 12 countries. There were 15 papers, three discussion papers spread over five streams (Outranking methods, Clustering, AHP, Transports and MCDA Applications) and six posters which were presented by young MCDA researchers.

A round table on the theme '*Fairness in Group Decisions*' was held by Sébastien Damart (Université de Rouen), Gilberto Montibeller (LSE) and Dylan Jones (University of Portmsouth). The passionate debate involved a large and active participation.

Full papers and abstracts were printed in the proceedings (http://mcda76.port.ac.uk). A special issue in the International Journal of Multi-criteria Decision Making will gather the best papers after a peer-review process (http://www.inderscience.com/info/ingeneral/cfp.php?id=1986).

Social Programme

The gala dinner was held in the Southsea castle, where a Scottish piper welcomed the delegates. The networking excursion led us in the historic dockyard and a tour of the harbour ending up with a trip up the Spinnaker Tower from which there were excellent views of Portsmouth and the Isle of Wight. Finally an Indian lunch closed the meeting with an exotic touch. Special thanks to all who helped create a truly memorable occasion.

<OR>

TECHNOLOGY READINESS LEVELS

JOHN CROCKER

In Stewart Robinson's leader this month, he draws attention to the phenomenon of the Technology Readiness Level (TRL) of which there are nine (TRL1 to TRL9).

These date back to the 1980s and the NASA Space Shuttle programme but have started to gain a much wider recognition in more recent times. In fact, in some areas they have become 'buzz' words, another to add to the 'word bingo' that many attendees of boring meetings partake in order to try to stay awake.

The following is a very personal interpretation of TRL from an Operational Research practitioner point of view.

TRL 1 Basic principles observed: this would also be when a problem first presents: what does the client want to know; what are the bounds; what data is or could be made available. It could also happen the other way around: we have this armoury of methods and techniques, where could we best apply them; which parts of the business could most benefit.

TRL 2 Formulation: we think we know what the problem is so now we have to decide how to solve it: have we solved anything like this before; what method(s) should we use; do we have the right data; does it need cleaning. The output should be a conceptual model which may, or may not, have a physical manifestation which would form the basis of discussions with the sponsor.

TRL 3 Experimentation: we have decided to try using a certain method: do we have a generic model available; can we adapt one we used earlier; is there a Commercial Off The Shelf (COTS) product and is there any chance of being able to buy it; is there anyone to whom we could talk to understand the method; is there anything on the web that might help. The output would probably be a fairly basic program or possibly a spreadsheet model. By now we should have decided whether this is likely to be a one-off use or part of a service.

TRL 4 Development: we have a simple program which produces results for a simple case possibly using simulated data. We may have decided to use a genetic algorithm to solve a certain type of problem but we now need to determine what form the fitness function should take, how the genome should be constructed, what crossover and mutation rates should be used, how many cohorts there should be in each generation and how many should be carried over from the previous one.

TRL 5 Model validation: this is a difficult problem. If we have used simulation then it is almost certainly because we do not know how to solve the problem mathematically. We may be able to derive some very simple cases where we can produce exact answers or good approximations. We may be able to test it against known functions to see if it finds the global optimum and/or local optima. We may apply a grid search in the area in which the 'optimum' has been found to check there are no better solutions in the immediate area. Ultimately it comes down to one of trust and whether the results look 'reasonable'. We may also want to explore its sensitivity – if one changes a parameter by a small amount does it suddenly zoom off to infinity or home in on the same minimum. If we use a different random number start seed, are the results significantly different or well within statistical error.

TRL 6 Demonstration: The model works and produces results in standalone mode. We have a working prototype. There is likely to be next to no documentation. It may still be in a state such that only the developer knows how to run it. It may produce next to no meaningful diagnostic messages. If the original problem was a one-off – how many soaking pits, what is the best layout for the road network – then this is likely to be the end of the project. Typically, this would be the 'quick and dirty' solution.

TRL 7 – 9 Productionisation: This would normally be where we (as O.R. people) would most likely hand it over to a team of professionals to productionise, to add the bells and whistles to make it easy to use probably by non-O.R. people. It might include: adding a 'user-friendly' user interface; writing user manuals; web-enabling it; adding sensible diagnostics; checking it doesn't corrupt the system; providing user-training and support.

At TRL9, there is likely to be a product that has been fully tested, documented and integrated into the system. It maybe 'shrink-wrapped' ready to be sold as a COTS product or form the basis of a service to paying customers. At this stage it should satisfy ISO9000 or equivalent.

As always, please send in your comments. I have I got it completely wrong? What is the equivalent for academics?

<OR>

Career development opportunities for you this autumn

Approved courses in O.R. and Analytics

FUNDAMENTALS OF PRICING STRATEGY & REVENUE MANAGEMENT

1 November, Birmingham
£595 + VAT for OR Society members

Course provider:
Lancaster University Management School

This course will teach you how to analyse customer needs and assess alternative pricing methodologies. You'll also be able to determine when it makes sense to compete on price and when it does not.

Change customers' price perceptions to capture more value; Become familiar with the more technically challenging aspects of pricing; Optimise pricing strategy by determining the value of your product or service; Understand the concepts and implementation of various pricing strategies.

PRACTICAL PROCESS IMPROVEMENT USING LEAN AND 6-SIGMA

5 November, Birmingham
£450 + VAT for OR Society members

Course provider:
Improving Skills Consulting Limited

This course provides take-away practical tools that will help you to improve your organisation's processes. You'll practice improving a 'real' process in a case study environment to identify the success and failure factors.

Learn how Lean and 6-Sigma differ, yet are complementary approaches to process improvement; How to set up and define a process improvement project How to use appropriate tools to map, measure and analyse business processes and how to design a Lean value-adding process

THE STRATEGIC CHOICE APPROACH TO PLANNING UNDER PRESSURE

7-8 November, Birmingham
£1,250 + VAT for OR Society members
Hands-on course

Course provider: University of Bristol and University of Hull

Gain confidence in introducing visual interactive O.R. methods into your consulting repertoire with a decision-centred philosophy of planning that works in non-hierarchical settings. You'll hear about the experiences of the O.R. scientists who introduced the SCA toolkit into some very different fields of management.

Understand the decision-centred philosophy of SCA; Learn to handle multiple sources of technical, political and structural uncertainty under real-time pressures for commitment to early actions; Gain skills in facilitating decision-making groups through the flexible introduction of a kit of visual O.R. tools which are interlinked within a coherent logical framework

RISK AND SIMULATION MODELLING IN EXCEL

20-21 November, Birmingham
£1,340 + VAT for OR Society members
Hands-on course

Course provider: Systematic Finance

Excel modelling is, nowadays, a core finance and management skill and sensitivity analysis is required in many types of business models. You'll learn a number of risk and sensitivity techniques, how to apply them efficiently avoiding some of the common errors and add confidence to decision making.

The techniques for mapping and modelling risk; Evaluation of risk and uncertainty and how to quantify risk; Multiple methods for risk analysis; How to build effective simulation models

FINANCIAL BUSINESS CASE MODELLING

22-23 November, Birmingham
£1,340 + VAT for OR Society members
Hands-on course

Course provider: Systematic Finance

Excel modelling is an essential finance and management skill which managers are expected to have. But most managers have received no formal training in Excel and how to use it to make better decisions. This course will help you to understand how to incorporate various techniques to build more powerful models, maintain them and develop further robust models.

Gain hands-on experience of building financial models; Learn how to use the Excel features and the rules and techniques for model layout and design; See how to find and eradicate errors and how to build-in flexibility and future development

USING SOFT SYSTEMS METHODOLOGY

30 November, Birmingham
£540 + VAT for OR Society members
Hands-on course

Course provider: Attivation

This practical course is aimed at developing expertise in applying Soft Systems Methodology (SSM). We look at the application of SSM for problem structuring within complex projects, and how to use SSM for planning the project process.

The practical skills of applying SSM; Using SSM for thinking about and planning projects; The importance of process and process facilitation; Using SSM models to improve dialogue and decision making; Direct application of SSM in the delegate's workplace

AGENT-BASED MODELLING: WHAT, WHEN AND WHERE

3-4 December, Birmingham
£1,120 + VAT for OR Society members
Hands-on course

Course provider: DSE Consulting Limited

A practical 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. Understand how to exploit the huge volumes of new data available.

Learn when and why to use each of the three main modelling paradigms (DES, SD and ABMS); General principles and techniques used in modelling and simulation; Design methodology for ABMS and the AnyLogic simulation tool

To book online, visit www.theorsociety.com
or call Jennie Phelps on 0121 234 7818

OR - NOW

As many of you will know, *Inside O.R.* has been running two regular features entitled 'O.R. – 20' and 'O.R. – 30' for several years. At this year's Conference (OR54) the idea of 'O.R. – 0' was raised as a means of helping to better disseminate current developments in O.R. to a wider audience.

It has been recognised that not everyone in the OR Society reads every paper in our excellent Journals. In addition, there was some concern that much of the good work that goes on in O.R. goes unreported and hence unrecognised in the wider world. 'OR-NOW' is intended to try to bring to your attention a small selection of papers published within the last few months. Dr John Lamb has agreed to provide some three or four articles a year. If there is anyone who would like to help him identify appropriate papers or better still, fill some of the gaps during the other eight or nine issues every year then please get in contact with me or the team at the OR Society. (Editor)

Simulation: bespoke, generic or reuse?

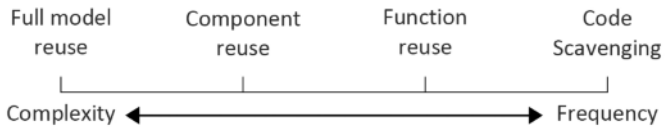
Dr John Lamb

Anyone who has built a few simulation models knows the dilemma. Should you build a bespoke model from scratch? Or is it better to recycle an old one? A recent paper in *JORS* by Gillian Mould and colleagues at Stirling University and NHS Fife casts some light on the matter.

The paper considers three discrete event simulation (DES) approaches to modelling hospitals, a context in which simulation ought to be more successful than it often has been. The authors built a bespoke model for an A&E department and reused components of the model for an outpatient clinic. They also compare generic A&E models, designed to work for any NHS A&E department.

The bespoke model was a great tool for engaging with the client—the soft side of simulation—and helped them identify issues and make changes. But there were drawbacks. The simulation got so much enthusiasm that it gradually morphed into something much bigger and took longer than originally planned. And the clients were so confident with the model they implemented changes before the analysis was complete.

The strengths and weaknesses of the generic A&E models were the other way round. The hard O.R. analysis was completed on time. But client engagement, while useful, was not much more than data collection. And it was harder to convince clients to accept the model results and make changes.



The reuse model is an example of what Mike Pidd calls component reuse (see figure) in a paper (Robinson et al, 2012). Some components of the A&E model are reused for an outpatient clinic, also for NHS Fife. Other components such as scheduled patient arrivals are modelled from scratch. The reuse model and analysis was completed on time and the results were readily accepted.

So, what do we learn from these models? First, there is substantial opportunity for reducing the complexity of simulation modelling by reusing existing components. Second, a good reuse model gives both hard-O.R. and soft-O.R. benefits. Modellers can analyse it confidently and get results in a reasonable time, while clients are more likely to engage with it and accept and use the results. Finally, if you are going to reuse a model, it helps to have one that you've already developed with your client.

Bowers, J., Ghattas, M. and Mould, G. 2012, Exploring alternative routes to realising the benefits of simulation in healthcare, *JORS* 63.10, 1457–1466.
Robinson, S., Nance, R. E., Paul, R. J., Pidd, M. and Taylor, S.J.E. Simulation model reuse: definitions, benefits and obstacles, *Simulation Modelling Practice and Theory* 12 479–494.

KIM2013 REMINDER OF DEADLINES

Knowledge and Information Management Conference, 4-5 June 2013

Forest of Arden Hotel & Country Club

The OR Society's inaugural Knowledge and Information Management conference, KIM2013, will take place on 4-5 June and will be dedicated to the theme of Sustainable Quality. This wide-ranging topic is relevant to organisations and individuals working in any sector of the economy. A Special Issue (SI) of *KMRP*, will publish expanded versions of selected papers from the conference.

SUBMISSION for KIM

If you wish to present a Paper or Poster at KIM2013, please record your intent to do so by adding the title of your Paper or Poster and an abstract of no more than 150 words to the KIM2013 page of our website no later than 7 December 2012 on www.theorsociety.com/KIM2013. Click on the left hand heading 'Title and Abstract – submission/status/edit'

KMRP Special Issue

A Special Issue of *Knowledge Management Research and Practice* (KMRP) will publish selected papers from the conference. Authors should notify the SI editors of their intention to submit to KMRP at the time of submitting conference papers. The call for the KMRP SI is available here:
http://www.palgrave-journals.com/kmrp/index.html

KMRP instructions for authors can be found here:
http://www.palgrave-journals.com/kmrp/author_instructions.html

<OR>

IMPORTANT DATES

7 December 2012	Deadline for submission of KIM2013 conference paper titles and abstracts
11 January 2013	Deadline for submission of full conference papers Deadline for authors to notify SI editors of intention to submit expanded versions for KMRP
1 March 2013	Final date for notification of outcomes of reviews of conference papers Final date for KMRP SI editors to notify authors of outcome of review
12 April 2013	Deadline for submission of final conference manuscripts
4-5 June 2013	Conference
1 July 2013	Deadline for submission of final KMRP manuscripts
Link to full Key Dates	www.theorsociety.com/Pages/Conferences/KIM2013/KIM2013KeyDates.aspx

SIR HENRY TIZARD
PART 5 – WAR IS LOOMING

JOHN CROCKER

How to stop the bombers getting through was a major concern for the future safety of United Kingdom.

The 'Tizard' Committee, as it became known, was tasked with solving this problem. Although they received many suggestions from many sources, Tizard himself believed the most practical, indeed, the only option likely to have any chance of success was a system based around the use of RDF (later radar).

A trial had been set up to assess the chances of fighters successfully intercepting incoming bombers. The findings of this trial were reported to the Swinton Committee by the Tizard Committee towards the end of 1936. This concluded that fighter aircraft could be directed to intercept in-coming aircraft with an accuracy of 85% and this was enough to allow the trials to continue. At the same time Dowding, C-in-C, Fighter Command arranged for all sectors to practice the new methods. Initially this was done with Hawker Hinds as the target aircraft but Tizard suggested it would be more realistic to use civilian aircraft making for Croydon from the Continent. This proved to be a good move as it highlighted some peculiarities under certain conditions.

The importance of these trials was summed up by Tizard in July 1937 when he concluded, 'that the trials have shown that RDF gives very important information which could not be obtained by any other means and which is essential to the successful operation of fighters'.

It is interesting to note that these trials without which the Battle of Britain would not have been won were instigated by Tizard with next to no official support. Indeed, in a communication between Air Vice-Marshall Freeman, Air Member for R&D and the Deputy Chief of Air Staff, the former felt it was wrong that the trials had been instigated by a scientist and not the Air Staff. The DCAS replied, '… so far as the Air Staff was concerned, the experiments had never, in fact, been official.'

The trials continued but there were complaints that the scientific experiments were interfering with training. On hearing this, Tizard suggested that the Station Commander should offer to test one against the other, at short notice. This proved to be the solution to the problem of flying standing patrols for which there were neither enough pilots nor aircraft. At last there was a theoretical chance, at least, of protecting Britain from the threat of daylight raids by enemy bombers.

RDF only worked if the fighter pilots could see the bombers. There still remained the problem of how to combat night raids. A number of suggestions had been made. A balloon barrage was one such but Neville Chamberlain, the then Chancellor of the Exchequer, was alarmed at the cost of the London defences and put a stop on any further deployment. Lindermann had been a keen supporter of aerial mines. One idea considered was to tie bombs or mines at intervals along a 1000 ft length of wire with a parachute at one end which would be dropped in the path of approaching bombers. Airborne infra-red detection was another possibility but at that time its effective range would need to be increased significantly. Airborne radar was the only method that really held out very much hope, although Lindermann, who by now was Churchill's scientific advisor, was still far from convinced.

Most of the work on airborne radar was carried out by E.G. Bowen although Watson-Watt was also involved. Trials with an Anson fitted with radar started in 1937 and proved that it could be used to detect surface vessels, a feature which would prove invaluable in the Battle of the Atlantic.

In November 1936, Wimperis asked Tizard to chair yet another committee, this time the Committee for the Scientific Survey of Offence, which was aimed at the problem of ensuring bombers not only got through but also that they found their targets. Unfortunately this committee too was only advisory with no executive powers and no money or resources available. Bomber Command entered the war un-equipped with adequate methods of reaching their targets, or of destroying them if they were lucky enough to reach them. Tizard later wrote, 'Nothing had been done by experiment to discover what the difficulties really were and it took over two years of war and the loss of the most valuable lives and aircraft to discover this'.

It should be remembered that at this time, Tizard was still full time Rector of Imperial College. In addition he was co-editor of the massive *Science of Petroleum.* He was a Trustee of the British Museum, and a Development Commissioner. In March 1939, he gave the Rutherford Memorial Lecture to the Chemical Society. Whilst attending a conference of the British Association, in Calcutta, he visited the Tata Iron and Steel Works in Jamshedpur to give the first Perin Memorial Lecture speaking on industrial research. He was actively involved with the Association of University Teachers and, one should not forget, he also had a family.

Throughout the period leading up to the war, he was constantly bombarded with suggestions on air defence from all quarters. No matter how crazy the idea, they all ended up on his desk 'as being the one man who could deal with them'. Every one had to be investigated and recorded with an explanation as to why it had been dismissed. He was also acutely aware that if people like himself and Blackett showed undue interest in a suggestion that this could be construed as an endorsement and hence be used to gain funding. An example of this was that he had been told about a man in Holland who claimed he could use some sort of magnetic field to put people to sleep. He decided the chances of this being true were very low and if the man was, indeed, a charlatan then Tizard's visit would only add credence which he would no doubt use to his advantage.

Tizard recognised that after the outbreak of war, there would be a demand for a large number of physicists to support the network of radar stations around the coast. These would largely have to come from the universities but radar was top secret so how could students and lecturers be trained in the principles and techniques of the new 'science' without giving the game away. Tizard started in the spring of 1938 by bringing in Professor Cockcroft at the Cavendish (Cambridge) not far from Bawdsey where much of the development work was taking place. Cockcroft had served in WWI so was an ideal candidate. Eventually, small groups of nine or ten taken from the more prominent universities were sworn to secrecy and then told as much as they needed to know about this new science. On the 1st September 1939 the men from these groups were sent to the various stations to spend a month of on-the-job training. War was declared two days later so that 'month' probably ended up being six years for a good many of them.

His unique position and knowledge meant that he was able to discuss the best size of bombers with Barnes Wallis of Vickers and with Handley Page, how the aeronautical industries could get the right men from the universities. He advised the Secretary of State that there should a Corps of Aircraft Constructors similar to the Corps of Naval Constructors. He was also instrumental in ensuring that research was done on such matters as grain storage in some cases by using Imperial College funds to keep such research going.

In December 1938, Otto Hahn split the uranium atom using a method that got labelled 'nuclear fission'. Following work by Lise Meitner and her cousin Otto Frisch, it was discovered that the method Hahn had used might generate more energy than was needed to split the atom. Shortly after this Professor Joliot-Curie showed that by using heavy water the process could be self-sustaining which meant that it might be possible to produce a nuclear weapon. The CID[1] actioned Tizard with investigating this possibility with utmost secrecy.

Following an apparently casual remark to Edgar Sengier, one of the Belgium Directors of the Uranium Mines in the [Belgium] Congo, the primary source of uranium ore, arranged to have two ship loads of the ore shipped to Britain. This was to prove enough to enable experiments to be carried out and ultimately to provide the fissile material used in the first atomic bomb that was detonated over Hiroshima. Note: the second bomb, on Nagasaki, was a 'hydrogen bomb' so did not use uranium.

He got Professor G.P. Thomas (son of JJ) to put together a draft report with enough [bogus] detail to persuade the Germans that the UK had already developed an atomic bomb in the hope that this might dissuade Hitler from considering war. This deception, however, was never deployed so we will never know what effect it would have had.

In June 1939, Tizard managed to arrange for Churchill to visit Martlesham Heath to observe at first hand the many developments that were taking place in the hope that he might be able to persuade him to apply his influence in the 'right' directions. Following the visit, the order came to produce 30 'smeller' sets (of air-to-air radar) and have them installed by 1st September.

The next month Tizard started a tour with Wing Commander Ragg of the air bases under Bomber Command: Great Driffield, Waddington, Mildenhall and Wattisham. At each he talked to the assembled aircrews after a short introduction from Ragg. Prior to these visits few had heard of Tizard other than the fact that he was a scientist and Rector of Imperial College. The fact that he had won the AFC in WWI helped break the ice but as soon as he started talking his knowledge and understanding of their problems soon got their full attention. His opening sentence was, 'Generally considered, with proper training, it would be possible to be pretty certain of being within one's objective by a distance of ten to fifteen miles even if one could not see the ground…' (At this time, Germany already had a system operating on Lorentz beams known as *Knickebein* which directed bombers to an accuracy of 500 yards.)

On September 1st Tizard was relaxing with one of his assistants, Squadron Leader Helmore (another pilot from WWI), fishing on the River Wylye (just outside Salisbury) when the news came in that Germany had invaded Poland. By this time, he had been appointed Scientific Advisor to the Chief of Air Staff and given two assistants, the other being Squadron Leader Haslam. After spending the rest of the day on the river and landing several good trout, the two returned to London by which time, the silver barrage balloons were already floating aloft.

Clark, Ronald W., (1965), *Tizard*, Methuen & Co Ltd

[1] CID - Committee of Imperial Defence.

October – December 2012

ICORD Workshop on Problem Structuring Methods
12-13 October 2013, Tunisia www.informs.org/content/.../file/ICORDWorkshop%20poster.pdf

2012 International Annual Conference of the American Society for Engineering Management
17-20 October 2012 Virginia, USA, www.odu.edu/asem2012

IEEE Global Humanitarian Technology Conference
21-24 October 2012, Seattle, Washington USA, http://www.ieeeghtc.org/

ESM'2012 26th Annual European Simulation and Modelling Conference FOM
22-24 October 2012 Essen, Germany http://www.eurosis.org/cms/index.php?q=node/2112

SCCG 2012 1st International Workshop on Soft Computing Techniques in Cluster and Grid Computing Systems
12- 14 November 2012 Victoria, Canada http://www.fing.edu.uy/cluster/sccg

3PGCIC Seventh International Conference on P2P, Parallel, Grid, Cloud and Internet Computing
12- 14 November 2012 Victoria, Canada http://www.lsi.upc.edu/~net4all/3PGCIC-2012/

GAMEON'2012 The 13th annual Simulation and AI in Games Conference
14-16 November 2012, Malaga, http://www.eurosis.org/cms/?q=taxonomy/term/325

MESM'2012 The 13th Annual International Middle Eastern Simulation and Modelling Conference
10-12 December 2012, Muscat – Oman http://www.eurosis.org

GAMEON-ARABIA'2012 The 3rd annual Pan-Arabic Simulation and AI in Computer Games Conference
10-12 December 2012, Muscat, Oman www.eurosis.org

IEEE 2012 International Conference on Industrial Engineering and Engineering Management
10-13 December 2012 Hong Kong www.IEEM.org

January – March 2013

ORO2013 Second international conference on Operations Research and Optimization
19-22 January 2013, Tehran, Iran. http://math.ipm.ac.ir/conferences/2013/ORO2013/

GAMEON-ASIA'2013 5th annual Asian GAME-ON Conference
7-9 March 2013, Shanghai, China www.eurosis.org

EMO 2013 - the 7th International Conference on Evolutionary Multi-Criterion Optimization
19-22 March, 2013, Sheffield, UK, www.shef.ac.uk/emo2013

IMCIC2013 - 4th International Multi-Conference on Complexity, Informatics and Cybernetics
19-22 March 2013 Orlando, Florida, USA http://www.2013iiisconferences.org/imcic,

7TH IMA Quantitative Modelling in the management of health and Social Care Conference
25-27 March 2013, London, UK http://www.ima.org.uk/conferences/health2013.cfm

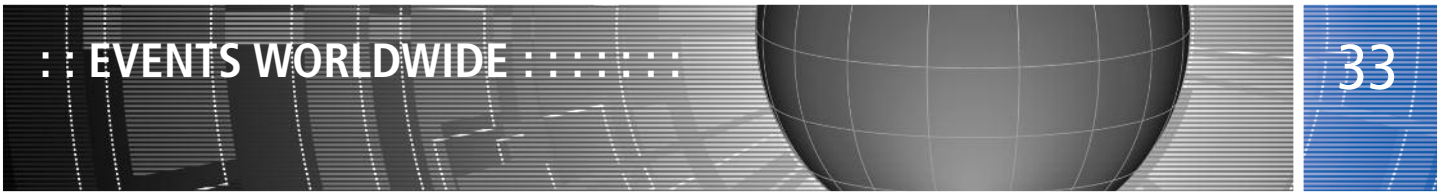
April – June 2013

EVO2013, 16th European Conference EuroGP, EvoCOP, EvoBIO, EvoMUSART and EvoApplications
3-5 April 2013, Vienna, Austria www.evostar.org

YOR18, Young OR18 Bi-annual Conference for O.R careers of less than 10 years
9-11 April 2013, University of Exeter, UK http://www.theorsociety.com/Pages/Conferences/YOR18/YOR18.aspx

FUBUTEC'2013 9th Annual Future Business Technology Conference 2013
15– 17 April 2013, LIncoln, , UK http://www.eurosis.org/cms/?q=node/2281

ICMSAO'13 5th International Conference on Modeling, Simulation and Applied Optimization
28-30 April 2013, Hammamet, Tunisia www.icmsao.org



ISC'2013 11th Annual Industrial Simulation Conference 2013
22-24 May 2013, Ghent, Belgium http://www.eurosis.org/cms/?q=taxonomy/term/334

CIAC 2013 8th International Conference on Algorithms and Complexity
22-24 May 2013 Barcelona, Spain http://albcom.lsi.upc.edu/ciac2013

KIM2013 Knowledge and Information Management conference
4-5 June 2013 Meriden, UK www.theorsociety.com//KIM2013/aspx

ICAPS'13 The 23rd International Conference on Automated Planning and Scheduling
10-14 June 2013 Rome, Italy http://icaps-conference.org

July – September 2013

IMSI0 5 2013 The 5th European Conference on intelligent Management Systems in Operations
3 – 4 July 2013, University of Salford, UK email s.vadera@salford.ac.uk

MISTA 2013 Special Track on EDUCATIONAL TIMETABLING
27-30 August 2013, Gent, Belgium http://www.schedulingconference.org/

OR55 Operational Research Annual Conference
3-5 September 2012 Exeter, Uk http://www.theorsociety.com/pages/conferences/conferences.aspx

International Conference on Operations Research
3-6 September 2013, Rotterdam, The Netherlands, www.or2013.org

CONFERENCE NEWS

EVENT:	Careers Open Day	**DATE:**	21 November 2012	**VENUE:**	Nottingham Conference Centre
EVENT:	Blackett Lecture	**DATE:**	29 November 2012	**VENUE:**	The Royal Society, London
EVENT:	YOR18 Conference	**DATE:**	9 – 11 April 2013	**VENUE:**	University of Exeter
EVENT:	KIM2013 Conference	**DATE:**	4 – 5 June 2013	**VENUE:**	Forest of Arden Hotel, nr Coventry
EVENT:	IMS105 2013	**DATE:**	3 - 4 July 2013	**VENUE:**	University of Salford
EVENT:	OR55 Annual Conference	**DATE:**	3 – 5 September 2013	**VENUE:**	University of Exeter

REGIONAL SOCIETIES

EAST MIDLANDS (EMORG)

CONTACT: Chris Smith
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EMAIL: chrissmith677@gmail.com

EMORG - Simple Models for a Complex World
Date/Time: Wednesday 14th November, 2012 at 5pm
Venue: Lecture Theatre SMB.0.14 (Stewart Mason Building), Loughborough University
Speakers: Professor Stewart Robinson
Booking: http://www.lboro.ac.uk/service/publicity/inaugural/2012/inaugural_stewart-robinson.html

Abstract: Computer models provide simplified representations of the real world which are useful for understanding and predicting the future; but how simple should they be?

Models are widely used in, for example, forecasting weather, predicting climate change and projecting economic trends. In developing such models there is a tension between obtaining approximate results quickly from a simple model and making extended efforts to generate models with a high level of fidelity.

In this lecture we discuss why simple models are generally better. In doing so we shall demonstrate some simulation models that have been applied by business and the public sector, showing how they were used and the benefits that were obtained.

Although set in a business context, the lessons have much wider applicability for the use of models in other fields.

EMORG - Sports Analytics
Date/Time: Tuesday 12th March 2013 at 6pm
Venue: Room BE1.42, Business School, Loughborough University
Speakers: Andy Shelton, Head of Sports Science at Leicester Tigers

Abstract: 'There is tremendous value to be gained by retaining experienced players within the squad and we are confident that, by adopting predictive analytics, our team will be able to leverage data about the physical condition of players for the first time and considerably enhance our performance.'

LONDON & SOUTH EAST (LASE OR S)

Programme 2012
Location (unless otherwise specified): In the upstairs bar of Ye Olde Watling, on the Corner of Bow Lane and Watling Street nearest stations are Mansion House (Bow Lane exit) and Bank (exit 8) for tube, or Cannon Street and City Thameslink for rail. The event is open to all and with a free buffet of sandwiches available afterwards.
FOR FURTHER DETAILS CONTACT:
Sandra Weddell
TEL: 020 7918 4591,
EMAIL: Sandra.Weddell@tube.tfl.gov.uk
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MIDLAND (MORS)

CONTACT: Jen East (Secretary)
EMAIL: MidlandsORSociety@live.co.uk
Operational Research techniques applied to Crowd Safety

Date/Time: Wednesday, 21 November 2012 Time - TBC
Speaker: Prof. Dr. G. Keith Still FIMA, G4S Professor of Crowd Sciences, Bucks New University
Venue: TBA

Abstract: My background is in operational research, so when I was stuck in a crowd, in 1992, Gate C, Wembley Stadium, for four hours, it struck me that there should be ways to optimise the complexity of crowd flow. Basically, I wanted to figure out a way to get in more efficiently.

Perhaps if I'd known more about the subject back then I'd have given the idea up as being too complex!

I asked some questions of the local fire officer. *How do they determine the optimal means of ingress/egress for crowd flow? What queueing theory do they apply to these kind of systems? What are the cost functions in these kind of systems? Operating costs? Arrival and Service times on queues? How do they determine minimum and maximum throughputs for turnstiles? How does Wembley work (10,000 people are Gate C) but Hillsborough fail (5,000 people at the Lepping's Lane entrance)?*

The more research I conducted the more I realised that there was no real science of crowds.

20 years later I'm now considered the worlds' expert. Crowd science is an amalgam of both hard science (optimisation, space utilisation, pressures, flow rates, fill times) and, so-called, soft science (human factor, behaviour, influences on the crowd from the design, the information and the management styles). It's a combination of elements of operational research and psychology. It's not theoretical work, I've worked on some of the world's largest, most dangerous and most complex crowded spaces. For the last 12 years I've been teaching at the UK Cabinet Office Emergency Planning College and run lectures/workshops around the world.

The talk (1 hour) outlines some of the modelling tools I use in planning and optimising crowded space. I'll outline a meta-model (the phases and influences of crowd behaviour) and how we've developed a better understanding and application of crowd science over the last 20 years.

This will be a joint talk with the West Midlands branch of the IMA.

Please email MidlandsORSociety@live.co.uk if you would like to attend or require any further information.

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SOUTH WALES (SWORDS)

CONTACT: Dr Jonathan Thompson.
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EMAIL: ThompsonJMI@cardiff.ac.uk
SWORDS - The talk 'O.R. – a virtual reality?'
Date/Time: Tuesday 13th November 2012
Venue: School of Mathematics, Cardiff University
Speakers: Geoff Royston (OR Society President)

The talk 'O.R. – a virtual reality?' will be aimed at stimulating discussion by considering some of the realities of operational research - what its practitioners and academics do and how they can effectively relate, how O.R. is seen and used - or not seen and not used – by managers, and the role of the OR Society in giving – or not giving - its members useful support.

Dates for your Diary
Wednesday 12th December 2012 5.30pm, Cardiff University – Professor Jeff Griffiths. The Heathrow Queuing Problem

Tuesday 5th March 2013 5.30pm, Cardiff University – Steve Black and Jon Cook (PA Consulting). Applications of O.R. within health and the pharmaceutical sector.

WESTERN (WORDS)

CONTACT: Dr Jo Smedley
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WORDS/SWORDS - The talk 'O.R. – a virtual reality?'
Date/Time: Tuesday 13th November
Venue: School of Mathematics, Cardiff University
Speakers: Geoff Royston (OR Society President)
The talk 'O.R. – a virtual reality?' will be aimed at stimulating discussion by considering some of the realities of operational research - what its practitioners and academics do and how they can effectively relate, how O.R. is seen and used - or not seen and not used – by managers, and the role of the OR Society in giving – or not giving - its members useful support.
The WORDS/IMA - Is 42 the real answer?
Date/Time: Wednesday January 23rd 2013
Venue: University of the West of England (Frenchay Campus), Bristol.
Speakers: Dr John Crocker
Abstract: Simulation, whether Monte Carlo (MCS), discrete-event (DES) or agent-based (ABS), can be a very powerful and often useful tool but it is not reality. This is especially true when used in conjunction with optimization methods. We shall look at some of the ways the results of a simulation model can lull you into a false sense of security, so to speak.

YORKSHIRE & HUMBERSIDE (YHORG)

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SPECIAL INTEREST GROUPS

COMMUNITY OR NETWORK

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COMPLEX SYSTEMS DISCUSSION GROUP

CONTACT: Kevin Gilligan
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Group meetings to be held at 12 Noon
Last Friday of the month
The Adelaide, Park Road, Teddington
Title : The Management of Uncertainty

CRIMINAL JUSTICE

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CJSIG NEXT MEETING:
Date/Time: Monday 26th November 2012, 2.00pm-4.30pm
Venue: MoJ in central London
Speakers will include:

- Munira Dossaji and Chola Mukanga, MOJ, on the international benchmarking of justice indicators;
- Jane Parkin, independent consultant, on her simulation work for Crimestoppers;
- Rebecca Endean, MoJ, on existing and new applications of O.R. in MoJ;
- Chris M Smith, Warwick University, on his work for Warwicks Police

Please notify Sue Merchant as soon as possible if you would like to attend as space is likely to be limited. suemerchant@hotmail.com

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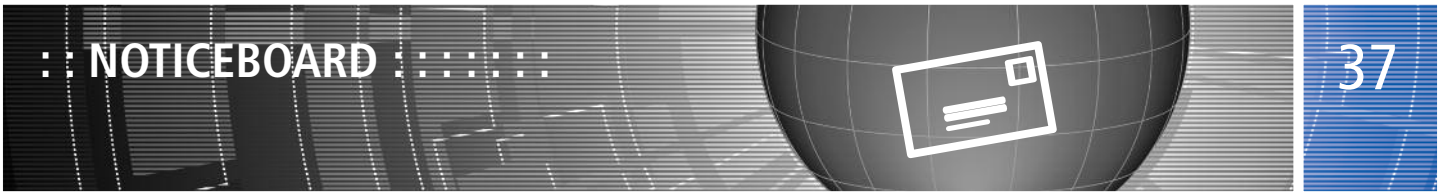

O.R. AND STRATEGY

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EMAIL: Frances.O'Brien@wbs.ac.uk

O.R. FOR DEVELOPING COUNTRIES

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O.R. IN THE THIRD SECTOR

CONTACT: Katherine Byrne
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OR in the 3rd Sector: Improving RNLI Response

Date/Time: Wednesday, 12 December 2012 – 14.00

Speaker: Andy Verity-Harrison (FICO), Stuart Nicholas (Atkins), Kevin Sheehy (Lanner), Cath Reynolds (RNLI)

Venue: RNLI, London Support Team, 124-126 Webber Street, London, SE1 0QL

Abstract: The OR in the Third Sector (ORiTS) special interest group aims to help O.R. analysts working or planning to work in third sector organisations (charities, social enterprises, voluntary and not for profit groups and non-government organisations). In this talk, we will present a case study of an ORiTS project with the Royal National Lifeboat Institution (RNLI, http://rnli.org): how an project starts, how it progresses and what is involved. The RNLI is an independent charity, wholly funded by voluntary donations, which provides, on call, a 24-hour lifeboat search and rescue service crewed by volunteers, a seasonal lifeguard service and safety advice. The aim of the RNLI is to save lives at sea.

The ethos of the RNLI is one of volunteering – over 95% of it's staff are volunteers and each volunteer is valued not only for the time they give, but for the diversity and skills they can bring to the organisation. It was therefore natural for the RNLI to get involved with ORiTS, which encouraged O.R. volunteers to engage with third sector organisations. One of the first projects that presented itself was to better understand the impact on cover when a lifeboat goes off service, and therefore what metrics might be used to maintain cover whilst reducing relief fleet and maintenance costs wherever possible.

One of the first projects the ORiTS volunteers have been asked to investigate is the application of condition based maintenance to the lifeboat fleet. Specifically the impact on risk calculator metrics of classifying station assets according to the amount of time they can spend off-service.

This sort of problem lends itself to a simulation, but before we could start we had to get a better understanding of RNLI operations.

We used a systems dynamics model to represent the flows of resources (lifeboat assets) and the flow of incidents (rescues) over time. This gave us some useful insights into the way the RNLI worked and some initial results showing us how robust the overall system was to changes in incident types and rates as well as changes in the way the lifeboat fleet was being managed.

Simulation was also used, to investigate the dynamic between the availability of lifeboats, the utilisation of lifeboats and the response times to incidents when modelling the deployment of life boats to incidents around the coast of Wales, England and Ireland.

Please email Katherine.byrne@voa.gsi.gov.uk if you would like to attend.

PROBLEM STRUCTURING METHODS

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OR-30

November 1982
(John Crocker)

In June 1982, Pat Rivett raised a case for allowing the value of pi to float (*Inside O.R.,* Nov. 2012). Heiner Müller-Merbach wrote back begging Pat to keep pi constant as he points out its importance in calculating the true cost of a project when one only knows the budget price. He cites three examples: the Munich Olympic Games of 1972 (plan 600 million marks, actual 1.9 billion marks); an education centre (plan 7 million marks, actual 22 million marks) and; a nuclear power plant (plan 1.4 billion actual 5.4 billion marks including 1 billion for inflation). He fears that if the value of pi is allowed to float then public money spenders would no longer be constrained.

Meanwhile back to the real world of simulation. The personal computer with its own visual display unit (VDU) had only be around for 2-3 years by this time but already we are seeing the development of visual interactive simulation models. In a paper by Stephen Withers and Robert Hurrion (of Warwick University) they discuss the potential benefits of being able to develop such models interactively. They argue that it could take several weeks for an analyst to develop a prototype model with its displays and interactions. This would then be taken to the sponsor to act as a catalyst to facilitate discussions on how it can be improved by allowing the sponsor to gain 'some understanding of the modeling process and the assumptions behind the model itself'. The analyst would then take away these suggested modifications and spend quite some time making the changes before returning to talk to the sponsor again. For a particularly complicated scenario, there could several such iterations.

The question they asked was, 'If we can develop a visual, interactive model why can't we develop a visual, interactive development of such models'. They decided on two lines of attack: a facility for the interactive design of displays and; the creation of libraries of entities and associated logic that could be used as building blocks. It would be another 3-4 years before CACI produced SimFactory (using SimScript dating back to Markowitz in 1962) and ISTEL created Witness which was probably the first general purpose visual interactive modeling tool which had its roots in British Leyland's SEE WHY and British Steel's FORSSIGHT which had its roots in GSP, the first general purpose simulation language written by K.D. Tocher in 1958.

Interactive modeling was also developing in other directions. Jim Bryant Sheffield City Polytechnic (now Sheffield Hallam University) and Lewis Corner (University of Sussex) described their management game which was developed 'to help newly-appointed service managers to achieve an appreciation of the financial implications of their decisions'. The platform chosen was an Apple II with 48K (sic) RAM, a 5¼ in floppy disc and a 9 in (22.5 cm) black and white monitor.

Müller-Merbach, H., 1982, On Rivett's Free Market Geometry, or: PI as a Financial Constant, *JORS* 33.11, Pp 1047 (jors1982218a.pdf)
Withers, S.J. and R.D. Hurrion, 1982, The Interactive Development of Visual Simulation Models, *JORS*, **33**.11, Pp 973-975 (jors1982207a.pdf)
Hollocks, B.W. 2006, Forty years of discrete-event simulation – a personal reflection, *JORS* **57**.12, Pp 1383-1399 (2602128a.pdf)
Bryant, J. and L. Corner, 1982, Training Service Managers Using a Microcomputer, *JORS*, **33**.11, Pp 977-982 (jors1982208a.pdf)

<OR>

OR-20 Extracted from OR Newsletter November 1992

Spinning it out? Perish the thought!
Report on September Council

My turn to write the report of Council came round at my fourth meeting – by this time I think I have the 'look and feel' of discussions. The general format is that we review minutes of Council and the various other committees of the Society and consider reports of the committees and other members and officers. What is not apparent is which of the items on the agenda will occupy the time available – the pace of movement through the agenda is distinctly erratic.

On this occasion the minutes of the last Council meeting were rapidly approved and the matters arising were very brief. Bob Miles, General Manager of the Society, reported positively about the success of the appointment of a part time member of staff. The meeting at the Annual Conference designed to inform members about the work of the Society was not judged to be successful – the format for next year will be changed in any effort to improve communication.

The General Purpose Committee (GPC) minutes showed that the Society has a mail franking machine that is now too big for our needs and we would like to sell the remaining lease. This has arisen following the adoption of pre-sorted mail which has attracted a useful discount from the GPO. Another item from GPC which sparked discussion concerned the European Journal of Information Systems (EJIS). From the start of next year members will have to

'Many of the problems facing Council over the conference or any other matter concern the overheads and how they should be allocated.'

pay to receive this journal albeit at a much reduced subscription from the library rate. It is uncertain what proportion of members will be happy to pay for what, until now, has been available free. The new policy will clearly test the commercial feasibility of EJIS. The Council flirted with the proposition that all journals would be 'unbundled' but discussion was deferred to a later date.

Attention then transferred to what was to be the principle topic of the day – a report from the National Events Committee on Annual Conference policy. Last month's Newsletter saw the publication of a survey of members' attitudes to the conference. A wide variety of worries, grumbles and contrasting opinions emerged in the Council's discussion such as-

- Paper-givers had to pay the full daily rate even though they took no other part.
- The conference dinner should/should not be in the price
- No discount/50% discounts should be given to organisers of streams.
- What fees should be charged to non-members, spouses, students, academics etc.

Many of the problems facing Council over the conference or any other matter concern the overheads and how they should be allocated. (How often have we pointed out to our clients that whether a branch, depot or product is profitable depends on what keys are used for allocation?)

The Vice-Presidents then had their turn. Vince Hopkinson gained approval for his suggestion that committee members should serve one term of three years. Tony Christer appealed for Information concerning the fate of commercial O.R. groups in the current recession.

The final piece of business called for a formal vote into indemnify the Royal Bank of Scotland against the Society's error when it introduces direct debit for subscriptions next year. The meeting ended just in time for the AGM at 4pm. Any suggestion that the business of the day had been spun out to ensure that enough Council members stayed behind to provide a quorum for the AGM this quorum is a slander.

By John Pugh

<OR>

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IMPORTANT: Contributors please note. All contributions must be in four parts as follows (1) headline (approx 6 words); (2) mini-abstract (max 25 words); (3) main body of contribution (max 500 words); (4) keywords. At the editor's discretion, contributions exceeding 500 words will be shortened, serialised or published with the warning Long article. X words. Whenever possible contributions should be submitted electronically as Word files and emailed to insideor@theorsociety.com. Illustrations should be attached as JPG, GIF, TIF or files of other common formats. Contributions submitted in hard copy must be posted to The OR Society at the address above, or sent to the Society's fax number, and be clearly marked Inside O.R. All contributions must bear the author's name and address (not necessarily for publication). All contributions accepted by the editor will be published in the print version subject to availability of space. The editor's decision on all contributions is final and no correspondence will be entered into.

PROSPECT RECRUITMENT

Established in 1975

SCHEDULING & STRATEGIC PLANNING
£30,000 - £50,000 + Bonus

Recognised as a leader in the application of simulation/optimisation expertise to logistics, scheduling and strategic planning, our consultancy client seeks a calibre professional to contribute to their continuing growth. With sound modelling experience to date, including proven programming capabilities, the person appointed will need a 1st or 2i degree in a numerate subject, together with well developed communication and client interaction skills. **Surrey/Hants**

SUPPLY CHAIN MODELLING
To £50,000 plus Benefits

Using their flagship supply chain software product, this optimisation consultancy enables its' clients to simulate business operations, thus delivering major improvements in cost, service, sustainability and risk mitigation. Their fast growing European operation seeks additional high calibre professionals able to demonstrate strong analytical/modelling experience, including discrete event simulation and mixed integer linear programming, ideally gained in a supply chain or related field. **London or Bucks**

BUSINESS ANALYST
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This small, boutique consultancy works with major corporations, generating business and strategic solutions to improve profit performance by leveraging complex data situations. Consistent growth is driving their need for additional professionals offering proven modelling experience, complimented by drive and an affinity for a dynamic environment. Experience from within a relevant blue chip commercial analytical/modelling environment, expert knowledge of SQL and Excel and a minimum 2:1 degree in a quantitative subject from a well regarded university are also essential pre-requisites. **London**

BUSINESS ANALYTICS CONSULTANCY
Packages £40,000 - £95,000

Enviable opportunities, ranging from Consultant to Managing Consultant level, with two leading consulting firms seeking motivated professionals for project activities such as: simulation, optimisation, yield management, customer insight, pricing strategy, marketing analysis and forecasting. Candidates will need demonstrably relevant experience, underpinned by academic excellence, genuine business awareness and a goal oriented approach.

Central London based

BUSINESS MODELLING CONSULTANCY
£35,000 - £60,000 + Benefits

This premier business modelling consultancy seeks additional consultants offering genuine self confidence and drive, underpinned by a minimum 2i Hons academic track record. With engagements embracing a wide range of activities including strategy, business performance, finance, pricing, customer and supply chain issues, those appointed can expect significant variety, commitment to training and career development potential geared entirely to individual achievement. **Central London based**

WEB ANALYTICS
To £40,000 + Car + Benefits

This well known online car rental & travel industry company has an exciting decision support opportunity, focusing on web and associated customer experience analytics. With a brief ranging from detailed data analysis to input at a strategic level, commercial skill will be as critical as technical competence, with strong Excel and SQL being a pre-requisite, plus exposure to a web analytics package being highly advantageous.

Bracknell

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- Revenue/Yield Management
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SENIOR BI ANALYST
To c£35,000

This global organisation is seeking to recruit an experienced Business Intelligence Analyst to collate and provide accurate, essential and consistent information through the manipulation and interpretation of date that adds value and aids commercial decision making. The successful candidate needs to be a logical thinker with excellent analytical skills, and an IT skill set encompassing Excel, Cognos and Access. First rate communication and planning skills and the ability to build complex data models are also essential. **Bedford**

PRICING ANALYSTS/MANAGERS
£Negotiable DOE

Leading organisation seeks to strengthen its Central Pricing Function, working at the heart of their commercial business providing pricing and financial expertise to support the success of their products and services. Openings at a variety of levels for applicants with relevant modelling experience, preferably with some exposure to pricing or finance analysis. Strong skills in MS Office including Excel and Access required. Excellent communication skills and ability to capture insights from across the business to inform pricing policy required. **Central London**

MULTICHANNEL SPECIALISTS
£Competitive

One of the UK's leading retailers seeks to recruit two high calibre Multichannel Customer Insight Specialists to play a key role in their continuing success; undertaking analysis to provide the Multichannel Team with a robust understanding of their customer base, how they shop and how initiatives and campaigns change customer behaviour across a number of devices and/or platforms. Experience of using Hitwise, Omniture or other web analytics tools required. Relevant experience in the Retail market preferred but not essential.

Central London

SAS MODEL BUILDING
£40,000 - £65,000 + Benefits

A leading high street insurance broker client is looking to augment their dynamic model building capability. With an increasing focus on customer insight analytics, they seek to recruit one or more high calibre individuals with strong SAS, statistical analysis and model building capabilities (logistic regression, predictive, clustering etc). The confidence to innovate and challenge existing approaches is key to these high profile positions. **Manchester**

JUNIOR MARKETING ANALYST
£25,000 - £35,000

On behalf of this rapidly expanding Marketing Analysis Consultancy we are seeking a high calibre Customer/Marketing Analyst with proven experience of conducting and delivering data analysis (reporting, profiling, segmentation) using SAS. The successful candidate should have a numerate degree, strong SAS and SQL skills and have the ability to add value from day one. Excellent client facing skills are an essential pre-requisite, as is a real passion for gaining insight from data.

London

DECISION SUPPORT CONSULTANTS
£Negotiable DOE

Our client provides analytical and management consultancy to help government and businesses make better-informed decisions. Due to demanding growth targets, they seek to recruit high energy, exceptional people to work as Decision Support Consultants. You will work across a range of areas covering services based on modelling and operational research techniques such as simulation, and providing more general decision support and business consulting. Experience from a Defence or Government background of particular interest but is definitely not essential. **Hampshire**

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.

Telephone: 01892 510892 **Email: or@prospect-rec.co.uk** **Web: www.prospect-rec.co.uk**