

THE SCIENCE OF BETTER AT THE HEART OF ANALYTICS

INSIDE O.R.

DECEMBER 2013 NO 516

INSIDE THIS ISSUE...
Your 2014
Training Guide

FREEZING PRICES AND FROZEN PIPES

:: INSIDE THIS MONTH :: :: :: ::

SIXTY YEARS OF THE OR SOCIETY

SOCIAL MEDIA DOOMED?

ACADEMIC ANALYTICS

DISASTER LOGISTICS



THE OR SOCIETY

DIAMOND JUBILEE

60 YEARS OF BETTER DECISIONS

1953  2013

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ADVANCE YOUR CAREER PROSPECTS

Accreditation: What it is and why you should apply

The OR Society's accreditation scheme enables members to enhance their career prospects by providing credible certification of their achievements in the field of Operational Research.

There are three categories of accredited membership:

Fellow (FORS) - for high achievers with at least ten years' experience

Associate Fellow (AFORS) - for those with a successful track record over at least five years

Associate (AORS) - for suitably qualified recent entrants

Candidate Associate (CandORS) - for those either completing a degree with a substantial O.R. content or starting their first employment in O.R. Candidate Associates are appointed a mentor to help guide them through the first couple of years in their O.R. career.

The substantial benefits of this recognised professional achievement include:

- an enhanced CV and post-nominal letters
- help in securing a job by demonstrating experience
- career progression through category upgrades

For full details of the Accreditation scheme, including criteria for each category and procedures, visit

www.theorsociety.com

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EDITORIAL

JOHN CROCKER

It has been decided that in order to celebrate the 60th anniversary of the founding of the Operational Research Society we will publish a number of articles over the next few months by members of the Board and the chairs of the various committees.

To start this process off, President Geoff Royston has written the first in which he recognises that operational researchers do not have crystal balls but 'O.R. will contribute more by helping create the future than by attempting to predict it'.

Vice President John Hopes also takes a quick look back over the last 60 years and forward to the next. As he says, the future of O.R. is dependent on our ability to 'evolve and innovate' and to a certain extent this is also true of the OR Society although in this case it must also continue to meet the changing needs of its members and perhaps just as importantly, its potential members.

Before any individual is going to join the OR Society, they must first be aware of its existence. Secondly, they should be actively involved in work that is loosely related to O.R. which we now acknowledge also includes Analytics. Thirdly, they are unlikely to join unless they perceive this to be beneficial to themselves at an acceptable price. John has noted that in the case of the RSS and BCS, both offer a charter qualification. Some years ago, we introduced accreditation but only a relatively few people have applied. The question is whether this is because members do not see any need/benefit or because it does not have the same authority as a charter?

It is good to see that Tesco's recognise the value of O.R. skills both for those directly involved in O.R. as well as those who are looking for a career in analytics. As they say, who would not jump at the chance of saving a company £10m a year.

In terms what skills are needed, a team from Loughborough University are investigating how best academia may meet these needs for the next generation who are likely to be employed in Analytics. They have also been joined recently by a team from Portsmouth who are looking at what O.R. courses throughout Europe are offering. Both of these activities are being funded by the OR Society as charitable projects. There are several others running at the moment and over the next few months we should be carrying reports on their progress. At the same time, you can also read about how through Felicity McLeister we are helping the third sector, those organisations that are generally 'not for profit' and who do not have the funds to employ O.R. consultants.

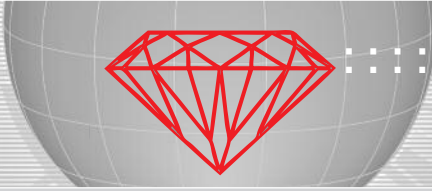
If you were not at this year's Conference (OR55) then why not? But, seriously, you did miss a number of very good talks. You are probably all aware that the government is concerned about how to get its message across and to get people involved well Michael Sanders who heads a Behaviour Insights Team explained not only how but also emphasised the importance of making sure that what they are doing is backed up by scientific evidence.

May I on behalf of the whole team wish you all a very merry Christmas.

<OR>

CONFERENCE NEWS

| | | | | | |
|---------------|------------------------|--------------|------------------------------------|---------------|---|
| EVENT: | Beale Lecture 2014 | DATE: | 27 February 2014 | VENUE: | Royal Society, London |
| EVENT: | SW14 | DATE: | 1 – 2 April 2014 | VENUE: | The Abbey Hotel & Golf Club, Worcestershire |
| EVENT: | OR56 Annual Conference | DATE: | 9 – 11 September 2014 | VENUE: | Royal Holloway University of London, Egham. |
| EVENT: | EURO2015 | DATE: | 12 (welcome), 13 – 15 July 2015 | VENUE: | University of Strathclyde, Glasgow |



SIXTY YEARS OF THE OR SOCIETY

GEOFF ROYSTON

1953 was an eventful year for Britain - the coronation of Queen Elizabeth II, the ascent of Everest, the discovery of the structure of DNA – and not forgetting the publication of the first James Bond novel. But in Operational Research (O.R.) we have another reason to remember the date.

Sixty years ago, in an extraordinarily mild November, an exceptional group of people decided it was time for an important change. They were all members of a small club promoting the application of science beyond its more usual technical role; deploying it at an *operational* level to inform tactical and strategic decisions. This application – moving scientists out of the laboratory and into the ‘real world’ - had already proved its worth in tackling vital problems during the war; making better decisions about the use of military equipment and improving the design of defence systems on land, at sea and in the air. Now in peacetime O.R. was spreading to other areas in industry and commerce. The growth of interest in this new endeavour would be recognised by reconstituting the closed club of O.R. enthusiasts, formed just five years previously, into an open society, with no limit on numbers. Thus on 10th November 1953 The OR Society was born, and its first officers took up their positions in the following January.

Since then the Society, with its objects of advancing knowledge, interest and education in operational research, has grown from 100 or so founding members to its current membership of well over 2000. And its reach - the number of people benefiting from its conferences, training, publications and other activities – is many times greater than that.

The ‘application of science at the operational level’ now pervades and indeed underpins many of the systems that support everyday life – scheduling trains and planes; routing traffic – whether vehicles along roads or data along cables; and sizing and locating facilities from factories to health clinics. Operational research, by analysing problems, identifying and assessing options for their solution, and monitoring and evaluating implementation, is contributing to success in many areas of enterprise at both tactical and strategic levels. From cutting waits at hospitals and airports to curbing crime and waste, O.R., as the science of systems *improvement* – a disciplined and evidence-based approach to designing better systems, making better executive decisions, and learning about what works best - in short the ‘science of better’ - is making a real difference in today’s complex world.

To support this endeavour, operational researchers (whether called by that name or by alternatives such as management scientist) now employ – and have done much to develop - a wide range of quantitative and qualitative tools and techniques. Data visualisation, problem structuring, computer simulation, forecasting, optimisation, and more; they all enable modelling and

analysis to support more efficient, equitable and effective decisions from the front line to the boardroom.

In all of this the Society, with a mission to be ‘vibrant, visible and valued’, has supported O.R. professionals and the O.R. profession, in academia, in commerce, in industry, in government and in the 3rd sector, and continues to do so, through its publications, websites, conferences, training, accreditation, awards, regional societies, special interest groups, social media, outreach to schools, development of pro bono work and other activities.

What of the next 60 years? We have no crystal ball for this; O.R. will contribute more by helping create the future than by attempting to predict it. There are some clear potential growth points – the rise of analytics and ‘big data’, a greater ability to model not only ‘hard’ tangible entities like machines or money but also ‘softer’ intangible things such as human thought and behaviour, and an ever increasing capacity for analysis that captures more of the key features of the real, complex, ever-changing world. The Society will, as ever, seek to foster such developments and support its members in pursuit of its stated vision: ‘a world improved by rigorous analysis and better, evidence-based, decision-making’.

‘Operational research, by analysing problems, identifying and assessing options for their solution, and monitoring and evaluating implementation, is contributing to success in many areas of enterprise at both tactical and strategic levels.’



A DATE FOR YOUR NEW 2014 DIARY – OR56

9-11 SEPTEMBER, ROYAL HOLLOWAY UNIVERSITY OF LONDON

Planning is already underway for the 2014 annual conference. We're returning to the Royal Holloway University, which is located just 19 miles from central London

As well as booking the date, please consider offering to help make OR56 another highly successful OR Society conference:

Organise a Stream:

OR56 is being Co-Chaired by Andy Verity-Harrison of FICO, AndyVerityHarrison@fico.com and Giles Hindle of the University of Hull, giles.hindle@hull.ac.uk

Call to Special Interest Groups (SIGs) – we would be very pleased to hear from any SIG organisers who would like to run a stream at OR56 next year.

We would also be very pleased to hear from anyone else who would like to organise a stream. If you'd like some inspiration, the OR55 streams can be viewed at www.theorsociety.com/Pages/Conferences/OR55/OR55Streams.aspx.

If you would like to discuss the opportunity to organise a stream, please email Hilary Wilkes in the first instance on Hilary.wilkes@theorsociety.com

We look forward to welcoming you to OR56 at Royal Holloway in September 2014. In the run-up to the conference we will, of course, be keeping you up to date with progress in developing the various components of the programme.

President's Medal

The President's Medal is awarded for the best practical application of O.R. submitted to the competition (a wide definition of O.R. is used). Entries are welcomed from both industry based O.R. workers and consultants as well as from academics. One of the main qualifications for entry is that the work has been implemented before submission.

If you're thinking of giving a case study based paper at our OR56, why not consider aiming a bit higher and going for the President's Medal?

<OR>



Royal Holloway University of London

EVENTS WORLDWIDE

To see the full listing go to:

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

FREEZING PRICES AND FROZEN PIPES

NIGEL CUMMINGS

Monica Giuliatti, Associate Professor of Global Energy, Warwick University says Labour Leader, Ed Miliband's plan to cap energy prices for 20 months is likely to 'challenge the energy companies' ability to supply'.



Monica Giuliatti

Dr Giuliatti has been studying UK energy prices for 20 years and believes such a plan raises concerns about future investment in the sector and might even push prices up before the freeze is set. A better way of improving competition in the energy industry in the UK, Dr Giuliatti argues, is to tackle the opaque nature of the wholesale market.

Such a policy would amount to an extreme case of regulatory intervention. For this to work, it has to achieve a very careful balance between price fairness for the consumer and commercial viability for the supplier. The main driver of electricity prices are fuel prices which are outside the control of the energy companies. A small rise in these could easily bankrupt an energy supplier. To guard against this they will need to build up a large contingency fund which will almost certainly mean cancelling any long-term investment projects such as replacing the aging nuclear power plants.

Given that the profits made on selling to domestic consumers accounts for only a very small percentage of the price charged (figures of around 2-3% have been quoted) it would not take a very large rise in basic fuel prices to make it unprofitable to generate electricity for the domestic market thus leading to large-scale outages (or power-cuts).



Ed Miliband

In their paper 'Price transmission in the UK electricity market: was NETA beneficial?' published in *Energy Economics*, Dr Giuliatti, Professor Michael Waterson, of the University of Warwick's economics department, and Luigi Grossi, of the University of Verona, found that the system set up by the last Labour Government to give consumers more choice and competitive prices has not been successful.

'One of the main reasons for the 'market failure' in the UK energy market, which Mr Miliband refers to, was probably the expectation that competition could be brought about by consumers actively looking for the most attractive deals and making informed choices about the cheapest deals available, said Dr Giuliatti.

'Several investigations into the market, such as Ofgen's energy supply market probe, have shown that this has not happened to a sufficient level to promote active competition in the market. However, research undertaken at Warwick Business School shows that the key to a fairer deal for energy consumers lies instead in a more transparent and well-functioning wholesale market.'

SCHOOL RESOURCES AVAILABLE AT THE NATIONAL STEM CENTRE



LOUISE ORPIN, EDUCATION OFFICER

The National STEM Centre houses the UK's largest collection of STEM (Science, Technology, Engineering & Maths) teaching and learning resources, in order to provide teachers of STEM subjects with the ability to access a wide range of high-quality support materials.

Based in York, the Centre works with business, industry, charitable organisations, professional bodies and others with an interest in STEM education to facilitate closer collaboration and more effective support for schools and colleges, and promotion of STEM careers awareness.

The OR Society has become a partner organisation with the Centre and the Decision Maths resources from the LearnAboutOR website and our collection of videos from the 'What is O.R?' DVD have been made available on the Centre's eLibrary, <http://www.nationalstemcentre.org.uk/elibrary/collection/1761/operational-research>.



Partner organisations use the eLibrary as a route to disseminate resource materials to teachers across the UK. The Centre's eLibrary team provide feedback on teachers' use of these materials through regular reporting. As a Partners we will also have the opportunity to work with their Teacher Associates to develop and trial new materials.

This is a great opportunity to expose our resources to a wider audience and the statistics are looking good, so far in September 545 people viewed our resources and 219 files were downloaded. In October there were 403 unique page views and a total of 134 files were downloaded. We will receive an update every 3 months.

We are also able to develop our collection in the eLibrary and the resources from the recent O.R. Ambassadors in Schools project will be included in the next month.

The National STEM Centre also provides facilities for STEM education partners to support their work with schools and colleges, including meeting rooms and event support. There may be an opportunity for us to run workshops for schools to find out more about O.R., watch this space...

<OR>

MAKE SURE YOUR CONTACT DETAILS ARE UP-TO-DATE

Contact Carol Smith

carol.smith@theorsociety.com

or go online to www.theorsociety.com

log on and click 'My Contact Details'

PRACTICE OR RESEARCH?

BRIAN DANGERFIELD

Training to practice or training to research? – An assessment of teaching tools and methodologies for postgraduate and executive O.R. education in Europe

A team of four under the leadership of Dr Jana Ries from the University of Portsmouth have engaged in a project funded through the OR Society to look at what is available within Europe to promote the future generations of Operational Researchers.

Developing an MSc in the multi-disciplinary area of Operational Research imposes a range of challenges which are first and foremost driven by the question 'What makes an excellent Operational Researcher?' Throughout the UK and in Europe, a range of O.R. related postgraduate courses are on offer, including a dominating set of standard taught programmes, followed by international programmes in cooperation with European partner universities and industrial programmes.

The project will allow us to gain insights into postgraduate O.R. education and its impact on employability and the needs of industries by taking a European perspective. We will investigate curricula in postgraduate O.R. education, identifying similarities and differences within course structures, content and teaching philosophies in the UK, Spain, France, Germany and Italy. More specifically, when looking at O.R. curricula, we are interested in the current impact on employability in research and practice. Therefore, we will look at industrial requirements in the field of O.R. and possibly differing researcher's core abilities. This will allow the identification of current foci in O.R. curricula and any potential weaknesses with respect to different O.R. careers.

We will collect information through online descriptions provided by institutions and by observing the current dynamics on job platforms,

completed by means of a survey that will be conducted in Higher Education institutions and with O.R. practitioners. It is intended to gain an understanding of the core O.R. skills that are expected from an employer perspective in contrast to the training provided by Higher Education.

The project will provide an understanding about current trends in O.R. education and its impact on the professional landscape in O.R. by giving an overview of the current situation with respect to curricula in postgraduate and executive teaching. Recommendations will be provided on potential core units in the field and trends with respect to additional course features such as industrial placements and international experience.

The project will introduce best practices in the UK and other European countries which will allow us to gain an understanding of potential strengths, weakness, opportunities and threats (SWOT) of O.R. education in HE with specific attention being given to setting a clear focus on employability for postgraduate students. Based on this SWOT analysis that incorporates views from practitioners, O.R. academics in HE will be able to adapt and reflect on current approaches, best practices and potential benefits. This will provide an impact to hopefully enhance HE practice in the field of Operational Research. The OR society will be able to use the outcomes of this project to obtain an understanding of differences and similarities in current activities and potential trends in postgraduate O.R. education in the UK and Europe.

<OR>

NOTICEBOARD

WHERE ARE THEY NOW?

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

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

Gowtham Bharatwaj Srinivasan

Canterbury

Melissa Goodman

Cardiff

Michael Cowham

Bournemouth

Elena Pershina

Edinburgh

Ekin Kolbas

Kent

Eleftherios Ioannou

Kent/Greece

<OR>

THE WINNER IS MICHEL BALINSKI

NIGEL CUMMINGS

Michel Balinski of C.N.R.S. and the École Polytechnique/Paris Tech in France has been named as the 2013 recipient of the INFORMS von Neumann Theory Prize.



Michael Balinski

He received his award at a ceremony at the Minneapolis Convention Centre on Sunday, 6 October during the INFORMS 2013 Annual Meeting.

The award citation read, in part, that Michel Balinski's contributions in linear and nonlinear optimization include an algorithm for finding

all optimal solutions to linear programs, a primal/dual simplex method that incorporates a natural proof of termination and leads to a self-contained, elementary but rigorous, constructive account of the theory and the basic computational tool of linear programming; the use and economic interpretation of dual prices; and a proof that prices in von Neumann's model of an expanding economy are marginal values.

Michel Balinski is a Williams graduate; who studied at MIT and Princeton. He has taught at Princeton, Penn, CUNY Graduate Centre, Yale and SUNY, Stony Brook. Since 1982 he has been Directeur de Recherche de classe exceptionnelle, CNRS and Ecole Polytechnique, Paris, and Director of the Laboratoire d'Econométrie (1989-1999). He was awarded the Lanchester Prize in 1965, and an honorary degree in mathematics from the University of Augsburg in 2004.

He is the founding editor of *Mathematical Programming* and a past President of the Mathematical Programming Society but his principal current interest is the theory and applications of ranking and the design of electoral systems, one of which is currently in use in Zürich, Switzerland. Together with H. P. Young, their book *Fair Representation: Meeting the Ideal of One Man, One Vote* was awarded the 2008 George H. Hallett Award of the American Political Science. His most recent book with Rida Laraki, *Majority Judgment: Measuring, Ranking, and Electing* proves that majority judgment is the only method that satisfies the important traditional criteria of social choice.

<OR>

SPECIAL INTEREST GROUPS

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

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

SOCIAL MEDIA DOOMED?

NIGEL CUMMINGS

Could we be moving toward the final stages of the social networking fad?



Social media, a delight to many and a scourge to the few, may have peaked. A recent survey in which 300 of the U.K.'s leading experts were asked for their opinions and predictions on the future of Google and Facebook, among other things, has revealed some quite remarkable trends.

Only half of the respondents to the survey were confident that Facebook would survive the next ten years as a dominant social media platform, and only 14% said that they would definitely use social media wearable technology such as Google Glass.

The respondents to the survey were said to be amongst a 'who's who' in marketing and their responses were largely culled from marketers who registered to attend the first Digital Marketing Show which was held in November 2013.

The organisers of the event believe that those who attended the show were likely to be influential in the future development of our digital world and how businesses derive revenue from it. So the fact that so few of them bought into the idea of wearable technology and thought that Facebook might soon lose its dominance, should perhaps, be taken seriously.

It is also interesting that many of the respondents thought that search engine optimisation's days were limited too. This could be due to the understanding that Google want to ensure that people get the best possible result for any search, therefore they are persuading some businesses to think 'quality and content' rather than SEO.

Returning to social networks for a moment and the like of Facebook in particular. There appeared to be doubt over whether or not such online resources could prove to be useful revenue streams in future. This doubt was made all the worse by fears that social networking was insecure. IT people for example appear to be exhibiting 'Facebook fatigue', because they have doubts about putting personal information on the site, especially after Facebook's privacy controversy, over facial-recognition technology. With fears about security, it is likely we could see large numbers of users moving on to whatever is the next big thing in social media.

As long ago as November 2009, the Guardian newspaper published an article which asked the question, 'After social networks, what next?' In that article Peter Thiel, who co-founded PayPal and made early investments in Facebook and LinkedIn reminded us to evaluate first what stage we are at with social networks. 'With digital technology there is a tendency to underestimate when things are getting mature, but to understand the financial and technological situation is really important.' Well six years have passed since then, social networking is certainly mature now, could it have peaked? Only time will tell!

<OR>

REGIONAL SOCIETIES

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

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

EURO SUMMER INSTITUTES – A TRIP TO THE SUN FOR 2014?

GAVIN BLACKETT, SECRETARY & GENERAL MANAGER

As you will have seen in last month's *Leader*, EURO, the Association of European Operational Research Societies, is scheduled to hold the next two in its series of Summer / Winter Institutes in the Summer of 2014.

O.R. applied to Health in a Modern World will take place in June in Italy, and *O.R. in Agriculture and the Agrifood Industry* will follow in July in Spain. If you, as an early stage researcher, would like to participate in either of these, you need to get your applications in now.

The *Heath in a Modern World* Institute will take place in the spectacular location of Bard, in northwestern Italy. The tiny village lies at the centre of a deep, narrow gorge at the head of the Aosta valley. O.R. modelling for healthcare has developed with the complexities of the modern world. Health Care Systems (HCS) are often awash with data but managers are unable to benefit while concerned only with trouble-shooting. Furthermore, HCS should reflect a patient centred and societal perspective focusing on outcomes rather than only on output. The institute will bring together those issues proposing new modelling and solution techniques to aid decision makers in the fields of health and disease management, patient flow and all aspects of optimal use of scarce resources.

If health isn't your field, then perhaps you can be tempted by the *Agriculture and the Agrifood Industry* Institute, taking place in Lleida, Spain? Lleida is the oldest town in Catalonia with a rather magnificent looking cathedral set in one of the most prominent positions. Expect it to be hot and sunny with very little chance of rain.

Details of both institutes can be found at www.euro-online.org/web/pages/458/euro-summerwinter-institutes-eswi

EURO, together with the hosting Society, provide funding for the institutes. Scholarships for travel to (and from) the institutes are available from the OR Society. Applications must also be made through the OR Society. The deadline for applications is Friday 28 February 2014. Please send applications to the OR Society's Secretary & General Manager at gavin.blackett@theorsociety.com

<OR>

SYSTEM DYNAMICS - ANOTHER APPROACH TO POLICY ANALYSIS

IAN MITCHELL FORS, OPERATIONAL RESEARCH UNIT, BIS

Professor David Lane of Henley Business School addressed Economists, Statisticians, Social Researchers, Scientists Engineers and Operational Researchers from the Department of Business Innovation and Skills (BIS).

The BIS Analysts Seminars offer a valuable forum for members of these analytical professions to discuss issues of common interest.

'Structure influences behaviour' was an underpinning theme as the presentation explored two recent cases for Professor Lane. First was child protection work conducted as part of the Munro Review for the Department for Education (DfE); diagrams revealed the unintended consequences of 'prescription addiction' in child protection. The second project reported to the National Audit Office (NAO) appraising policy options for the management of C. difficile in health care facilities.

Systems approaches encourage the synthesis of different and often siloed views. These provide more comprehensive frameworks that are apparent in the structures of reports even if the diagrams themselves do not feature.

The presentation concluded with a list of 14 applications of Systems Dynamics leading to a lively Question and Answer discussion. Watching this I was struck by how often O.R. policy clients need a basis for discussion as well as a basis for decision. System Dynamics seems well equipped to provide both.

<OR>



SINK OR SWIM IN VIRTUAL POOLS

NIGEL CUMMINGS

Liam Hastie, a consultant with the SIMUL8 Corporation spoke about the use of Discrete Event Simulation (DES) applied to Virtual Agent Pools in Contact Centres at this year's OR55 conference.



Liam Hastie, SIMUL8 Corporation, at OR55

There are some things to which you just hope no one will be tempted to apply O.R. techniques. Improving the efficiency of call centres is great if they are there to answer your questions but perhaps not if it means they can make more cold calls more cheaply!

Contact centres are part of a huge industry and recent figures suggested that they are going to account for a significant part of a 337 billion-dollar global industry by the year 2018. This obviously means that there is big competition within the industry and that means that even where you can make small changes in efficiencies, the effects could be very large.

That can be good or bad, if you make a small change in the wrong direction you can make a big loss, competition is tight and the margins are important. It is a difficult environment sometimes for experimentation.

In this particular case, the client - one of the top five US telecom providers - was aware of this but they recognised that a lean six sigma team could achieve efficiencies but they were not sure how. Even testing out their theories on a small scale would have its risks and what might work at this scale might not be so effective when scaled up.

The obvious answer was to see if the scenario could be modelled using simulation. This would allow them to experiment in a totally safe environment to try out new ideas and explore alternate possibilities.

The current system receives an incoming call from a customer. An interactive voice system attempts to determine why the customer has called. This would be used to determine to which automatic call distributor the call should be passed. This then considers the geographical location of the centre to which it will be sent. Once it has arrived there, it is then allocated to the next available person.

This is all fairly straightforward but it has been recognised that as far as the communication system is concerned, the geographical location is irrelevant. By treating all agents as being in the same virtual location this removes the need for the second action plus, it will on average reduce waiting times.

Making experimental changes such as this in the field could be costly, time consuming and lead to loss of revenue and increased levels of customer dissatisfaction with how their calls were handled. This is where Liam Hastie said SIMUL8 Corp and its Discrete Event Simulation applications could prove effective by providing virtual call centres, agents, clients and levels of client demand based on real world call centre information.

Once this virtual call centre world had been created, it was then possible to simulate how a change to a virtual pool system would operate and predict performance routing levels for call centres when operating a virtual agent pool system. So yet another satisfied customer who has benefitted from O.R. in general and simulation modelling in particular.

HOW TO WIN FRIENDS AND INFLUENCE THEM (OR NOT)

NIGEL CUMMINGS

OR55's closing plenary was given by Michael Sanders, an economist working in the Government's Behavioural Insights Team.



Michael Sanders

The goal of this team, when first introduced by the government, was viewed as a voguish, wacky thing for a government team to be doing, or even a distraction from the proper business of government - since its institution three years ago however, opinions have changed.

When presented with three 'facts' a high percentage of the audience accepted them as true even though they were made up (but, of course, the audience did not know this). The point this illustrated was that people are more inclined to believe things when they trust the source or believe it to be an authoritative body.

We have seen how a little negative publicity, such as in the case of the MMR vaccine, can have serious repercussions. Once such an idea has been instilled into the minds of people, it can be very difficult to dislodge it. Many years after the MMR scare was totally discredited there were still people did not believe it, say such things as 'They would say that, wouldn't they.'

The government has three main tools to impart information:

regulation, incentives and information. What the government wanted to know was which of these alone or in combination might prove the most successful and whether it might depend on the type of message that they wished to get across. To do this, a team of behaviour scientists had been set up under Michael's leadership with the primary purpose of adding behavioural insights.

If you want someone to do something you stand a much better chance if you make it easy, attractive, social and timely. The other core part of the team's work is involved in is testing, learning, and adapting. In order to do this, extensive use is made of randomised controlled trials in an interactive way to improve the quality of their work and to assess whether or not the things they are doing are actually having any kind of effect at all.

Although traditionally evidence was used as a basis for delivering policy, this group tried to do things in a slightly different way. It looked at control groups and randomised groups and used the results obtained from studies within those groups to gain further insights into how effective policies were, and how effective policies could be with just a little change.

His team's commitment to using, wherever possible, randomised controlled trials to evaluate different initiatives had shown how, and where, the application of behavioural Insight methods could help make policy effective, by building its own evidence base.

By way of an example, the audience were asked to consider the case of charitable giving in a company. The CEO hoped that everyone would donate one day's salary to a certain charity. It was not entirely clear whether the staff were divided into six mutually exclusive randomised groups or whether they were split into two and then offered additional incentives if they did not respond positively. Either way, one section received an open letter simply asking them to make such a donation while the other got a personalised email. The further incentives were getting in celebrities to publicise the event and sending out small packets of sweets. The results were for the first group: 5%, a further 2% and a further 5% so 12% in total. And, for the second group 12% responded to the personalised email and a further 5% responded to the sweets bribe resulting in a total of 17%.

Mr Sanders gave several more examples which showed how effective Behaviour Insight had proved across a wide range of applications and certainly justified the existence of his team.



AN ARMY MARCHES ON ITS STOMACH BUT...

NIGEL CUMMINGS

At OR55 Richard Pasco spoke about logistics in defence and how much of a struggle it was to get it a fair hearing in Defence Reviews.



Richard Pasco at OR55

Logistics is often regarded, not just by the logisticians, as the Cinderella of the armed forces and yet there have probably been more battles won and lost by as a result of good and bad logistics than for any other reason.

However from an operational point of view, most logisticians would argue that the science of logistics enables the battle rather than hinders, but it can be difficult to prove this empirically in the timelines of the military planning cycle. Calculating how much maintenance and support will be required is heavily dependent not just on the numbers of equipments deployed but on the length of the conflict, the terrain and the type of fighting involved. Supporting a peace-keeping role in Northern Ireland is a very different matter, logistically, to fighting a mini-war in the Falklands. Equipment not specifically designed for desert warfare has a very

nasty habit of being far less reliable than when it is deployed primarily as a deterrent on the northern plains of Europe.

It is always going to be difficult to anticipate all of the suggested applications during a strategic defence and security review (SDSR), not least because other players in such a review will be fighting their corner as hard as they can to secure the maximum funds available (albeit at the expense of the other sections).

There are many very complex models used to estimate the demand of the hundreds of thousands of different items required to support the multitude of different forces in all of their different roles. These take a lot of man-power to set up, run, interpret and report the results and, unfortunately, time is something that is always in extremely short supply during these skirmishes, sorry, reviews. Coming to the table fully prepared would obviously be the ideal situation but getting knowledge of what politicians are thinking, in advance, might be considered as a bridge too far.

Unfortunately, much of Richard's talk is sub-judiciary. Had you been at the Conference you would have heard a great deal more about the decisions that had to be made and the work that went into making them but alas, we are not allowed to publish them.

<OR>

'Calculating how much maintenance and support will be required is heavily dependent not just on the numbers of equipments deployed but on the length of the conflict, the terrain and the type of fighting involved.'

DON'T PANIC

NIGEL CUMMINGS

Physicists at the University of Bonn, Germany have devised a new experiment to test if the universe is a computer running a simulation; they are not alone in testing this hypothesis.



the meaning of 'Life, the Universe and Everything' which produced the answer 42 as an answer to 6x9 causing Arthur Dent to comment, 'I've always said there was something fundamentally wrong with the universe.' (Actually, the sum is only 'wrong' because we naturally assume it is in base 10 but if it was in base 13...)

Of course it is one thing to suggest that the universe is a simulation, it is quite a different matter to prove this. The theory of Simulism probably arose around ten years ago with the publication of a paper by a philosophy professor at the University of Oxford. In his paper, he argued that at least one of three possibilities is true:

- The human species is likely to go extinct before reaching a post-human stage.
- Any post-human civilization is very unlikely to run a significant number of simulations of its evolutionary history.
- We are almost certainly living in a computer simulation.

His paper considered that the argument goes beyond scepticism, claiming that '...we have interesting empirical reasons to believe that a certain disjunctive claim about the world is true, one of the disjunctive propositions being that we are almost certainly living in a simulation!'

The theory basically states that any civilisation, which could evolve to a 'post-human' stage, would almost certainly learn to run simulations on the scale of a universe. And that given the size of reality – quite literally billions of worlds, orbiting around billions of suns – it is highly likely that if this is possible, it has already happened. And if it has? Well, then the statistical likelihood is that we are, that is to say, human kind, planet Earth, etcetera, etcetera... are located somewhere in that chain of simulations within simulations.

If, as some conjecture, there are an infinite number of universes running in parallel might these be 'future histories' generated by a simulation model? Douglas Adams suggested that Earth was just a large computer running a program to find

Professor Martin Savage at the University of Washington says while our own computer simulations can only model a universe on the scale of an atom's nucleus, there are already 'signatures of resource constraints', which could tell us if larger models are possible.

Savage says that computers used to build simulations perform 'lattice quantum chromodynamics calculations'. They divide space into a four-dimensional grid. Doing so allows researchers to examine the force, which binds subatomic particles together into neutrons and protons, but it also allows things to happen in the simulation, including the development of complex physical 'signatures', that researchers don't programme directly into the computer. In looking for these signatures, such as limitations on the energy held by cosmic rays, they hope to find similarities within our own universe.

Professor Savage says that, currently, supercomputers utilising lattice quantum chromodynamics programming, start from the fundamental physical laws that govern the universe and they can only simulate a very small portion of the universe, on the scale of 1×10^{-14} metre - a little larger than the nucleus of an atom. It could therefore be a little while before sufficiently powerful computers exist which can simulate the Earth (some 21 orders of magnitude larger more complex

Eventually, more powerful simulations will be able to model on the scale of a molecule, then a cell and even a human being. But it will take many generations of growth in computing power to be able to simulate a large enough amount of the universe to understand the constraints on physical processes that would indicate we are living in a computer model.

However, Professor Savage has also said, 'If you make the simulations big enough, something like our universe should emerge. Then it would be a matter of looking for a 'signature' in our universe that has an analogue in the current small-scale simulations such as a limitation in the energy of cosmic rays.

If we are one of an infinite number of 'future histories', then it is likely that there is an infinite number that are worse than ours and, of course, an infinite number which are better. Or, could it be that this infinite number of future histories is running consecutively rather than concurrently? Perhaps a more important question is that if we are part of a long-running [simulation] program, are we pre-programmed or do we possess free-will?

PERSPECTIVES OF POLICY

JOHN FRIEND

The word 'policy' is a short one, and to many of us a powerful one, suggesting a high level of influence over decisions.

Unlike that other strong word 'strategy', its origins are civil rather than military, originating in the ancient Greek *polis* for a city state. Therein, I have found, lie some particular challenges to which we in O.R. are increasingly able to offer distinctive forms of response.

An early research project on policy making in city government, in the formative years of the Institute for O.R. which was formed through an initiative of our Society's Council in the 1960's, soon exposed me to the subtle dynamics of interaction among different sources of policy influence, from local political parties to Ministries of the crown with oversight over different public services. Then a later project saw us working with county planning teams to analyse policy options within a new land use planning system where the focus was intended to shift from the design of physical plans to the design of written policy statements. Some of the most sensitive choices, we learnt, concerned choices of specificity in the wording of such generic statements, as much as choices of policy direction. These choices were often underpinned by subtle differences in frameworks for *classifying* future situations, reflecting different underlying models of equity. As we soon learned through involvement in public inquiries and other forums of debate, there were insistent pressures to challenge the internal and external consistency of important policies, leading to persistent symptoms of

policy stress and tending gradually to erode the influence of the policy-makers through time.

Such insights came to guide many further projects, in the UK and then increasingly overseas, in other fields of social and environmental policy. They influenced the combinatorial methods that we and our associates in policy roles developed to address the challenges of policy design; the processes we jointly designed for engaging stakeholders in policy debate; and the group methods we introduced, and often facilitated, for managing core areas of technical, political and structural uncertainty while moving steadily towards commitment.

The increasing global adoption of such interactive methods indicates an important scope for O.R. in the UK to claim a leading role in the further advancement of an operational design for what might be called an 'Open Science of Policy'. To move further in this direction is likely to call for continued investment in awareness, training, decision and communication technology and research.

Our coming event in London on December 12th offers our members a first opportunity to start participating in this important debate.

<OR>

NOTICEBOARD ::

NEWS OF MEMBERS

The Society welcomes the following new members,

ALESSANDRO ARBIB, London; ZOE BRASS, London; REBECCA FOX, Hants; ROBERT JOWETT, Staffordshire; NABAA KHANDWALA, Hertfordshire; ALFONSAS MISEVICIUS, Lithuania; MIRJANA PEJIC-BACH, Croatia; HIMANISH PRAHARAJ, London; MICHAEL OLIVER, Hants.; KATHRYN PIMBLETT, Hants; SAYYED QALSAR, Southampton; JAMES SAYE, Cardiff;

and Reinstated members,

FABIOLA FERNANDEZ-GUTIERREZ, Dundee; THOMAS MONKS, Hants; MICHAEL YOUNG, Kent; RUPERT WEARE, Newcastle Upon Tyne;

and the following student members,

SARAH BAILEY, Cardiff; SARAH BRILL, Sheffield; MARY DILLON, Cardiff; NICOLA DRAKE, Hants; CHRISTOPHER EYMERY, Bristol; RHYS JONES, Cardiff; ROMANA KAROLIA, West Yorkshire; RAYMOND LAM, Kent; MHAIRI MASSON, Glasgow; DEEPA PRASAD,

Lancs; AMANDA SIBBALD, Glasgow; GRACE SOLSBY, Bristol; DILRAJ SUR, Leeds; SHENGNAN ZHANG, London; ZHONG ZHAO YU, Lancs;

Total Membership
2300

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)

Angeliki MICHAILEDIOU
Dirish NOONARAM

Admit to the category of FELLOW (FORS)

John MEDHURST

<OR>

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

LSE'S ROSEBERY HALL, 90 ROSEBERY AVENUE. LONDON. EC1R 4TY

12 DECEMBER 2013, 16.00 to 18.00

John Friend, Rob Angell, Chris Yewlett, Leroy White

Chair: Frances Abraham, Tavistock Institute

Registration and refreshments from 15.30



If you are keen to see an expansion of the role of O.R. in developing public policies, you are encouraged to apply for a place at this free event. It is the first of two planned within John Friend's new charitable project on the Future Policy Influence of O.R.

Evidence has now been accumulating over several years of the distinctive contributions of O.R. to the design and facilitation of public policy processes, as well as to the provision of analytical support. One of the most significant sources of innovation has been the work of the Institute for O.R., which was launched as an initiative of our Society's Council fifty years ago this year. IOR's pioneering work on collaborative processes of policy planning, ranging from the local to the transnational, has now had significant impacts on the development of environmental, social and other policies in Europe and beyond.

Increasingly, this momentum of innovation has now passed from O.R. practitioners to public policy professionals in other countries. So the question now arises of how far new generations of the UK's O.R. community can continue making pioneering contributions to the design of policy processes to address the uncertainties, complexities and political intricacies of our 21st century world. The answer will depend on a capacity to extend our interfaces with the various public policy professions and to mobilise appropriate investments in training, communication technology and research.

The primary purpose of this first event is to begin engaging members of our Society – especially those at a formative stage of their careers – in a movement to build on the record of achievement of O.R.'s policy pioneers. As a first step, it is proposed to launch an informal network of OR Society members who are interested in developing our future capacities in this field.

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

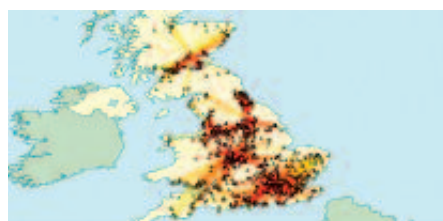
WHAT MAKES PRACTITIONERS HAPPY?

JAMES CROSBIE, DEPARTMENT OF HEALTH

The Yorkshire and Humberside group met at Sheffield Hallam University for the third of this year's events with three speakers lined up.

First to kick off was Stuart Johns filling in for our very own and slightly delayed Louise Orpin. Stuart and Louise talked to a full room of students about the joys of a career in O.R. and the benefits of OR Society membership. Louise said that O.R. is used all around us and gave examples from supermarkets, NATS, airlines, sport, banks and government. She emphasised that O.R. is a profession where initiative, creativity and enthusiasm are every bit as important as technical ability.

Luckily (or maybe it was the cake) some of the students left, so that the room could fill again with our non-student members attending the consultant themed presentations and discussions from Jane Parkin and Andrew Eaves



Jane's talk 'Just messing around with models' was a reflection on her long career in academia, government and consultative O.R. roles.

Jane first described her work as an academic in logistics trying to improve efficiency across an engineering company supplying engineers and parts to meet service requirements from a number of locations.

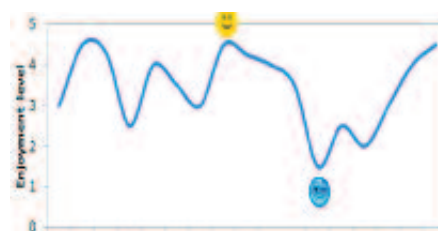
She then went on to describe some of the roles she had in government (fortunately not when I was working for her) and the use of the assignment problem for placing analysts to posts in the DWP's recent restructuring exercise. Staying within DWP, she described how she used Gompertz curves to inform the take up of online government services.

Jane concluded her presentation with her successful implementation of a staff rostering system to improve efficiency at Crimestoppers, who were expecting a 60% increase in business due to taking on responsibility for more areas but with no increase in resources. To tackle this problem, simulation was used leading ultimately to 4% increase in service levels with a corresponding reduction in abandoned calls and time to answer but no increase in staffing costs.

Andrew Eaves, of Andalus Solutions, was next to talk on 'Client collaboration –

what is too much and what is too little?' which included his experiences as an O.R. consultant. Andrew started his career at the MoD, before moving to a rail consultancy and then establishing his own successful business. Andrew has a wealth of experience gained through working in a number of areas from retail, public sector, telecommunications, financial services, etc.

Throughout Andrew reflected on his time as a consultant, highlighting the pros and cons of being independent; and of the types of clients encountered, before giving strategies for dealing with those who are either overbearing or disinterested.



During his talk, Andrew presented his 'happiness chart' of a project lifecycle: starting with the initial consultation phases, moving to its zenith of model development and its

nadir during testing and QA. Many of those present empathised with this.

He then went on to describe one of his projects incorporating weather forecasting information into customer demand forecasts: sourcing data, running statistical analyses, building a model and quantifying unrealised demand.

He finished with the challenges and opportunities for working as an independent consultant and gave some helpful tips on how to develop a career as an independent.



A lively question and answer session ensued from all talks before we moved on to have a drink and continue our discussions at a local Sheffield establishment.

The next event will be on 29th January 2014, details at the back of this issue. Please get in touch with me if you are interested in attending.





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HAPPY BIRTHDAY TO US!

JOHN HOPES



'60 may be just a number, but the anniversary does perhaps appropriately coincide with a review of what membership of the Society offers and what it could and should offer going forward.'

In November 1953 a small group gathered in London to witness a significant change in the status of an alliance of like-minded people.

Yes, 60 years ago my parents were married; so like the vast majority of current OR Society members I have no personal recollection of the founding of the OR Society in the same month. (I am reliably informed that 20% of our current members were alive at the time, but most of these were far too young to remember the big event.)

While 60 years feels like a long time, in the context of Professional and Learned Societies the OR Society is still relatively youthful. For example, the Royal Statistical Society (RSS) and the Institute of Chartered Accountants of England and Wales (ICAEW) (to which I am affiliated) are both twice as old. The age of the OR Society reflects the positioning of O.R. among that wave of technologies flowing out of World War II, including the jet engine and rocket propulsion, electronics, antibiotics and nuclear power, all of which (like O.R.) still have plenty of life left in them 60 years later.

What has changed in the years since the founding of the Society are some of the issues driving the need for O.R. solutions. For example, globalisation and technology-driven change have become very important drivers of demand for O.R., particularly in the context of an almost continuous push to improve performance. In addition the Society's membership has expanded to cover a broad range of segments with differing needs. These include the growing student group, the academics, the retired members (O.R. hadn't been around long enough to have retired members in 1953) and the practitioners, with the latter sub-dividing still further into independent consultants, those in large groups and those in large consultancy firms, as well as by sector.

In response to these changes our services to members and to the wider world have expanded significantly over the years across our conferences, journals, training courses, special interest groups and local societies. But the way in which members interact with the Society has also changed, with the website now being our main shop window. This is also the case for the Society's promotion of O.R. to the wider world, where our recently revamped Science of Better website is our primary communication channel.

60 may be just a number, but the anniversary does perhaps appropriately coincide with a review of what membership of the Society offers and what it could and should offer going forward. While there is a working party that has already put a great deal of effort into this, this is a debate that should engage as many of our members (and ideally potential members) as possible.

In a world of social media the fashion for belonging to things is changing (with the decline in political party membership being an extreme example). It is notable, for instance, that the Society's LinkedIn group is now larger than its membership. And with our

special interest groups, such as the recently launched analytics network, we deliberately extend the Society's reach beyond its membership. But it is nonetheless important for the Society to have at its heart an active and engaged membership.

As with any such Society two of the key factors driving growth in membership are publicity and benefits. In terms of publicity, simply identifying groups of potential members and finding the best way to approach them can expand membership. We know that our penetration of the segments of students, academics and practitioners could be higher, and simply having the correct approach would help. For example, there are O.R. groups where promotion of membership by the group leader has had a positive impact.

But publicity alone is not going to address the membership challenge. We also need to look again at the benefits we provide, by membership segment, to ensure that the Society is indeed providing valuable support. When considering the OR Society alongside the RSS or the ICAEW, as mentioned above, or indeed

against that other Society that is as youthful as the OR Society, the British Computer Society (BCS), there is a key difference in that all of them offer a chartered qualification that potentially acts as a barrier to entry to the profession. I know that many of us have been unconvinced of the value of chartered status for O.R. professionals, but there are some who feel very strongly in favour, and I think that voice is growing louder across both academics and practitioners. What is more, our recent membership of the Science Council provides a potential route for satisfying this need, although more work needs to be done in evaluating both costs and benefits here.

Success over the next 60 years depends on O.R. itself continuing to evolve and innovate to address new challenges and stay relevant. But the Society also needs to remain attuned to the changing needs of its membership. Just as I was not around for the birth of the Society I (very probably) will not be around for the 120th anniversary, but I am sure that there will be plenty of new issues for O.R. and the OR Society to tackle over the next 60 years.

<OR>



BEALE LECTURE 2014

Make a note in your diary for the afternoon of **Thursday 27 February 2014.**

The winners of two OR Society Awards will be giving lectures at
The Royal Society, 6-9 Carlton House Terrace, London SW1Y 5AG

PhD Award

for the Most Distinguished Body of Research leading to the Award of a Doctorate in the field of O.R.
2011 winner, **Richard Wood** from Cardiff University

Beale Medal

recognising a sustained contribution over many years to the theory, practice, or philosophy of O.R. in the UK
2012 winner, **Mark Elder** recently retired from SIMUL8 Corporation

More details of these talks and how to reserve a place will appear in future issues of *Inside O.R.*

<OR>

TIPS FOR PRO BONO O.R. PROJECTS

IAN SEATH

The Third Sector Special Interest Group met in October to hear about the experiences of a pro bono O.R. project from both the volunteer providing analytical support and the social enterprise he worked with. Ian Seath of Improvement Skills consulting and Amanda Briden of Participle both offered lessons learned from their pro bono O.R. project, providing some useful tips for those offering and receiving pro bono O.R. support.

Three top tips from Ian were:

- **Give the same commitment to pro bono projects as you would to your day job.** Ian says: 'I believe it's important not to treat these projects as 'free consulting' and something to be fitted into a busy schedule if there's time. These are 'proper' assignments and need to be managed in the same way you would any other client engagement. Sticking to deadlines agreed with the client are particularly important, otherwise you might send the signal that you are just 'fitting it in' around other projects.'
- **Don't overload the pro bono work with excessive project management.** Ian says: 'In my experience, some of the organisations I've worked with have been relatively 'immature' in their management thinking and therefore a light touch approach to project management is called for. More informal approaches and regular communication about progress tend to work better than the use of project templates and formality.'
- **Be clear about the nature of the volunteering role.** Ian says: 'It's really important to have a discussion early on about the type of role the client expects you to play. Do they want you as a 'pair of hands', an 'expert', or do they want to work collaboratively and work out joint solutions? That discussion can help avoid any misunderstandings or mis-matched expectations.'

Ian also reflected that pro bono O.R. brought benefits to the analyst providing support as well as to the organisation being supported: 'I really enjoy working with people who both need and want help, and who are very appreciative of the sort of support they wouldn't normally be able, or prepared, to pay for. The diversity of the Third Sector also makes it fascinating and offers an incredibly broad range of opportunities to work with interesting people on worthwhile projects.'

Ian's presentation is now available on the Third Sector SIG pages of the OR Society website.

Three top tips from Amanda were:

- **Work with the *right* volunteer.** Amanda asks herself: 'Will this person be flexible? Can they handle changes to the scope of the work and moving deadlines? Are they willing to travel to meet you? Do they want to participate in your service to better

understand the work that they are helping move forward? Are they motivated to produce a final product and document the key decisions that were made to reach it?'

- **Provide the right *incentives*.** Before they start, Amanda likes to ask volunteers: 'What do you want to get out of the experience?' She makes an effort to deliver on this in order to ensure that the experience is not only valuable to the organisation, but also to those offering pro bono support.
- **Build in *lead time*.** Amanda says that in the future, she'll coordinate earlier and more consistently with internal and external stakeholders so that their inputs and feedback can be captured in a timely fashion. She would like to minimise the amount of time volunteers are put 'on hold' waiting for key decisions to be made.

<OR>

'Participle is a social enterprise based in London which works with and for the public to create new types of public services that make a real difference in everyday lives - designing, developing and taking to scale innovative solutions to social challenges.'

Improvement Skills is a consulting firm which encourages its employees to offer one day a month as pro bono support to third sector organisations.'

PRO BONO O.R. UPDATE

FELICITY MCLEISTER

I have now been in post for almost two months so I thought it would be good to give you an update on how things are going.

I am pleased to say, so far the project is thriving. We already have one project underway with the RSPCA, another one about to commence with Harrogate & Ripon Centres for Voluntary Service and several other enquiries at various stages.

A big thank you to all the volunteers who have signed up to the volunteers' database. We currently have 60 volunteers across the UK who are currently available to work on projects. This puts us in a great position to offer Pro Bono O.R. across the UK.

The biggest challenge now is continuing to increase the awareness of O.R. to the Third Sector and promoting the Pro Bono O.R. project.

Since getting started I have discovered the power of social media. Having never tweeted, blogged or been on LinkedIn I wasn't aware what a useful tool social media in the work place was. As I started my journey of discovery I realised the potential that social media could tap in to. I have already had six potential enquiries via LinkedIn, have been retweeted and followed by various organisations and have had a blog published on Reach's website (skilled volunteering charity). I have become a big fan and would

recommend it as a great networking/promotional tool.

If you are interested in receiving pro bono support, becoming a volunteer or just want to find out more information, please write to felicity.mcleister@theorsociety.com quoting 'OR in the Third Sector'.

 @FMcleister

 Felicity McLeister

Blog: <http://probonoor.blogspot.co.uk/>

You may also be interested in our Third Sector Special Interest Group (ORiTS)

<http://www.theorsociety.com/Pages/SpecialInterest/ORThirdSector.aspx>

Thank you for taking the time to read this and I look forward to hearing from you.

<OR>

A-LEVEL CONTENT ADVISORY BOARD (ALCAB)

LOUISE ORPIN, EDUCATION OFFICER

The Russell Group is establishing the A-Level Content Advisory Board (ALCAB) which will give leading universities more control in the development of A-levels.

ALCAB will advise on the core content requirements considered desirable in key A-level subjects for progression to degree study. This Russell Group led body will draw on skills and knowledge within Russell Group universities, and will collaborate with a broad constituency of stakeholders across the wider academic spectrum.

As an independent advisory body, ALCAB will collate views from a broad spectrum of stakeholders, which should include professional and learned societies, on A-level core content. ALCAB will take responsibility for establishing subject panels chaired by leading academics in the respective fields and produce recommendations for Ofqual. The review and recommendation process will be rolled out for up to eight key subjects as part of ALCAB's contribution to the development of A-levels and Ofqual's post-examination review processes.

ALCAB, chaired by Professor Nigel Thrift, will focus initially on the content of new A-levels in mathematics and modern languages for first teaching in England in September 2016.

ALCAB is still in the process of being set up and the role of Executive Director is currently being advertised. I urge all those working at universities and especially those at Russell Group institutions to please be aware that this is happening. When the subject panels are established it would be a missed opportunity if we could not have some O.R. representation, especially for the mathematics one.

<OR>



BIG DATA

LOUISE MAYNARD-ATEM

What's the Big (data) Deal?

In my introductory article I mentioned that I would be writing bite-sized tutorials on various essential techniques within the O.R. toolkit that would prove particularly useful to those of us at the start or in the early stages of our careers. Initially I thought I might kick-off with multi-criteria decision analysis (MCDA), explaining the basics of the technique and giving examples of how it is used by operational researchers in their working lives; however, since attending the recent annual Government OR conference, I have decided instead to talk about big data/predictive analytics – what are they, what do they mean to the O.R. community and how should we, as early operational researchers, try and incorporate them into our toolkit of skills?

So what actually is big data...?

It is perhaps a little self-explanatory but big data is just that – an informal definition is datasets so large in size that they cannot be easily captured or processed using regular software in a reasonable amount of time. The formal definition, first proposed by Doug Laney in 2001, described exponential data growth as being three-dimensional i.e. increasing volume (amounts of data), velocity (speed of data flow) and variety (taking into account the range of types and sources of data). In 2012, the definition was updated (by Gartner Inc.) as follows:

'Big data is high volume, high velocity, and/or high variety information assets that require new forms of processing to enable enhanced decision making, insight discovery and process optimisation.'

This definition is now widely used and commonly referred to as the 3V's, with some organisations adding a fourth V – representing veracity (how trustworthy is the data).

Predictive analytics follows on almost automatically from any conversation on big data and can be formally defined as an area of data mining that deals with extracting information from data and using it to identify trends in activity and behaviour. It is hoped that by applying predictive analytics to big data, we will be able to get an insight into events that have yet to take place or behaviours that have yet to manifest.

It stands to reason that the more data collected, the more accurate the analyses and the more evidence-based decision made, thus it is vital to ensure that our capacity to collect data doesn't outrun our capability to analyse what we have collected.

It is almost impossible to think of a business area or industry that could not benefit from proper and appropriate analysis of big data and a number of industries have already been able to use the concept of big data to their benefit for example, scientific research including the human genome project and the Large Hadron Collider

(LHC) experiments. Multinational private sector companies are investing in improving their capacity to generate, handle and meaningfully analyse big data, with the public sector very keen to follow suit.

What does big data/predictive analytics mean to the O.R. community?

I believe that the increasing focus on big data is a huge potential opportunity for O.R. practitioners to have a considerable impact on analysis that informs the decision-making process, rather than a threat to the profession. The breadth of the O.R. toolkit, and the synergies that exist between the area and predictive analytics, puts us as O.R. students and practitioners at the forefront of the big data debate, as well as making us one of the most likely groups to produce meaningful analyses from such large and dynamic datasets. Combining skills such as problem structuring, modelling and stakeholder engagement with analytics can add meaningful value in terms of utilising big data.

The notion that data scientists will be the people to best get to grips with analytics and big data has become increasingly popular, with the definition of a data scientist's skillset described as follows:



Taken from an Ernst & Young presentation 'How O.R. and Analytics Skills can be mutually beneficial.'

It is easy to see from the skills mentioned above that O.R. analysts use the majority, if not all of these skills in their day-to-day work.

How does big data affect those studying O.R. or early O.R. careers, if at all?

Big data will undoubtedly play a part in the role of an operational researcher in the not so distant future; therefore it is important to always be aware of the landscape in which our roles currently exist. It is vital that we understand what big data is and how the

techniques in our toolkit can be modified to best accommodate it. It is also important that we are willing to be creative and flexible in our thinking, to ensure that we are solution driven rather than technique driven. There are some techniques that will be obviously applicable to big data and predictive analytics, as well as some which would not normally fall with the O.R. remit.

According to IBM, the global IT market will require 20 per cent more skilled big data analytics roles than it currently has within the next five years, hence they have spent a total of \$20bn in the past year on acquisitions to allow them to 'move into a world of decision-making excellence with big data'. The number of possible avenues where big data could apply are almost infinite. A characteristic of operational researchers is that we have the ability

to learn and use new techniques very quickly and so I think it would be wise for those of us just starting out in O.R. to ensure that we try to develop at least basic skills in predictive analytics and working with big data— it is also very likely to further enhance our employability prospects in the future.

It would be great to hear your thoughts on how you think big data and predictive analytics will change the O.R. landscape, and if you are already combining your O.R. skills with work in the area then drop me an email as I would be very interested in your viewpoint.

My email address is Louise.Maynard-Atem@dh.gsi.gov.uk. I look forward to hearing from you.

<OR>

YOUR 2014 TRAINING GUIDE

With this issue of Inside O.R.

Your 2014 Training Guide detailing 31 OR Society approved training courses.

The OR Society is committed to supporting you and ensuring that you have the tools you need to develop your career in line with changing industry needs.

You can also go online at

<http://www.theorsociety.com/Pages/Training/TrainingCourses.aspx>

to download your Training Guide or if you'd like more hard copies contact Jennie Phelps on

+44(0)121 234 7818 or by email at jennie.phelps@theorsociety.com

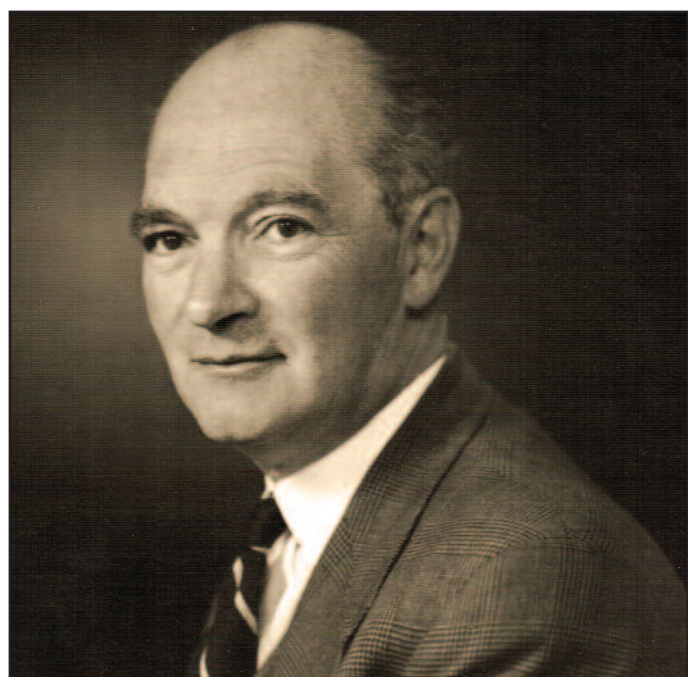


<OR>

LORD HALSBURY

NIGEL CUMMINGS

If you study the list of past presidents, either in the annual report, or on the board in the OR Society offices, you will come across the name Lord Halsbury who was President from 1960 to 1961. Possibly not one of the best known of the early pioneers but an interesting character nonetheless.



Lord Halsbury

How many of us have an inkling for example of the contributions made by P.M Morse, E.C. Williams, Roger T. Eddison, G.A. Barnard, Sir William K. Slater or John Giffard, Earl of Halsbury? All of these men were past presidents of the society, yet they so seldom gain a mention when reviewing our history.

To mark their contribution, we shall publish an occasional series of feature articles which will present some biographical information about these individuals and notes about their involvement with O.R. The first of these features will focus on John Giffard, Earl of Halsbury, a past president of the society, mathematician, chemist, and analyst and business process management specialist.

John Anthony Hardinge Giffard, 3rd Earl of Halsbury (1908-2000), was a British peer and scientist. Giffard first acquired his interest in scientific learning from chemistry sets and steam engines as a boy. Then at his private school, Ludgrove, the senior classics master there encouraged him to follow his interest in astronomy. At a very early stage whilst at Eton he purchased a book called 'An introduction to the calculus'. The book opened new mathematical horizons for him and he found himself enthralled, although it seemed to be too advanced for sixth-form scholars, so much so that a master once accused him of cribbing and so Giffard explained on the blackboard the basis and principles of differential and integral calculus expertly

– this caused considerable embarrassment for the master who regretted accusing Giffard of cribbing!

After Eton, he developed an interest in quantum theory and relativity theory, and this caused him to live something of a double life, as for a career he became committed to studying accountancy in the City, but his real interests lay in matrix algebra and tensor calculus.

Having completed three years' accountancy training at Deloitte's, he left accountancy and accepted an offer as a market clerk in a firm of chemical merchants that operated internationally and had a use for people who could speak foreign languages. In 1932 he registered as an 'external' chemistry student at London University.

At this time, a friend of his father's, E.R. Bolton, who practised as a consultant granted him access to his laboratories to allow him to practise analysis. Giffard practised organic 'spotting' and synthesis and physical chemistry, though mainly electrochemistry. His studies allowed him to graduate with first-class honours in chemistry and mathematics.

In 1935 he took a job with Lever Brothers at Port Sunlight. His first duties were analytical: they concerned the 'efficient' extraction of vitamin A from whale livers, and standardisation of Lever's vitamin A concentrate in capsular form. He also contributed to work on the production of fatty alcohol from sperm whale oil after he assumed a managerial post at Prices (Bromborough) Ltd in 1937.

This was very useful work as, until World War II, Britain's supply of fatty alcohol had come entirely from Germany. Giffard constructed a machine from scrap materials at a cost of £250 that produced the country's entire supply independent of any connection with Germany. By the time he left Prices in 1942, the company had trebled its profit.

1942-1947 was spent in the employ of Brown-Firth Research Laboratories where he assumed the role of metallurgist in charge of creep-resisting steels for service in jet engines.

On the death of his father in 1943 he assumed the title of 3rd Earl of Halsbury though he continued his work at Brown-Firth. In 1947 he began working for Decca Records in the research department there. From assuming the role of metallurgist, he now tuned his scientific brain to improving audio quality and developing stereo recording and playback techniques. He left Decca in 1949 to become the first Managing Director of the National Research Development Corporation (NRDC) 1949-1959.

The NRDC was set up with the object of the commercial exploitation of inventions resulting from the research of government departments. During his time there, he encouraged the growth of

Britain's computer industry arguing that automation would not result in higher unemployment. As Managing Director of the NRDC he virtually created the British computer industry. To use his own words, he saw this as having 'kicked today into tomorrow'. The position that computers had reached by the late 1950s owed an enormous amount to his advocacy of them.

He was President of the Institution of Production Engineers (1957–59); he served as President of the Operational Research Society during the period 1960–1961. Subsequently he served on many other public bodies, including chairing the Committee on Decimal Currency (1961–1963). He assumed the role as a Governor of the BBC from 1960 to 1962. In 1967 he became Brunel University's first Chancellor, a post he held until 1997 and in 1969 he was elected a Fellow of the Royal Society. He was President of the British Computer Society during 1969–70.

He served as a member of the Medical Research Council from October 1973 to July 1977. In 1986, he tabled a Private Member's Bill in the House of Lords entitled 'An act to refrain local authorities from promoting homosexuality'; it failed, but led to the enactment of the similar Section 28.

A prolific science article author, in 1956 he most notably wrote 'Automation - verbal fiction, psychological reality', in 1957 he wrote 'Management, group conflict and the sciences', and in 1960 he wrote 'Fads and observations of the Western world', all of which were published in the *Impact of Science on Society Journal*.

Outside of his work and extensive list of presidencies, he was also a friend of J. R. R. Tolkien and one of the few people to read *The Silmarillion* in Tolkien's lifetime in 1957. His grandmother was the Edwardian couturiere Lady Duff-Gordon, otherwise known by her professional name Lucile, and who was a survivor of the RMS Titanic disaster.

Working well into his nineties, as the Earl of Halsbury he made his last speech in the House of Lords, on 30 June 1999 on behalf of the Convenor of the Crossbench Peers. Prophetically he said at that time. 'I may well be bidding your Lordships farewell for good, or not: I do not know'. In September 1999 he suffered a severe stroke and died on 14 January 2000, aged 91.

John Anthony Hardinge Giffard, 3rd Earl of Halsbury FRS, ORS President, analyst, inventor and polymath b.4 June 1908 d. 14 January 2000.

<OR>

WIN £1000 FOR THE BEST INDUSTRY-BASED STUDENT PROJECTS IN O.R.

The OR Society funds its annual awards for student projects from a generous bequest from the estate of Mrs May Hicks, wife of Donald Hicks, OBE, a major contributor to Operational Research and the first treasurer of The OR Society. For 2012, the prizes for the postgraduate competition will be: 1st prize £1000 plus up to two runners up of £250 each.

The entry deadline for this award has been moved back to the **end of February 2014**.

The rules for entry are as follows.

1. Entries are invited from any eligible courses. Masters courses in O.R., Management Sciences and Business Analytics are automatically eligible. Other courses should, before contemplating entry, seek confirmation of their eligibility from the Society.
2. Entries should be made by the Course Director or a faculty member acting on his/her behalf (and not by students direct). One entry per 15 students on the course, or part thereof, is allowed.
3. Projects entered should be O.R. or analytics projects carried out for a client organisation (and not, for example, desk research carried out within the university). Joint projects are allowed.
4. The initial entry should consist of the following:
 - a. a summary of not more than two pages of the project and its effects;

- b. endorsement of the project's effectiveness by the organisation which hosted the project; and

- c. an endorsement by an independent academic (e.g. the external examiner) of the project's quality.

Anonymised (as to the clients) entries will be accepted. In such cases, the endorsement at (b) should be submitted as a private communication to the chair of the awards committee.

5. The judging panel will shortlist the entries. Project reports may be requested for shortlisted entries, so a final decision can be reached on the winners. The panel may, at their discretion, make site visits or invite students to present their work.

6. Winners will be encouraged to present their work at an OR Society conference and to publish the work in one of the Society's publications. The OR Society may also publicise the winning entries through its publications and the website.

7. Entries should be submitted electronically to gavin.blackett@theorsociety.com to arrive **no later than 28 February 2014**.

<OR>



ACADEMIC ANALYTICS

STEWART ROBINSON



Is Operational Research in UK Universities Fit-for-Purpose for the Developing Field of Analytics?

Michael Mortenson, Neil Doherty and Stewart Robinson from the School of Business and Economics, Loughborough University are running a charitable project funded by the OR Society called ORATER (Operational Research & Analytics Training, Education and Research). Its primary aim is to determine the role of O.R. education and research in the field of analytics.

We started by extracting over 7000 relevant job adverts from LinkedIn Jobs API (<http://developer.linkedin.com/apis>) so there was plenty of material to analyse to find out what skills employers are looking for and what they consider falls into the category of 'Analytics'. To do this we used a *correlated topic model*, conceptually related to factor analysis or, more specifically, principal component analysis as they seek to identify latent variables (factors, components, or in this case 'topics') that explain the variance in the dataset.

From this analysis, we have identified what skills, academic backgrounds and experience analytics employers are looking for. The findings of this analysis will be combined with those from a series of interviews we are conducting with employers, agencies and consultancies and used to determine what is required in analytics-type roles; information which can then be used to help identify the appropriate content for analytics-type degree courses and training. The analysis also identified five key topics: **strategic decisions** (the main topic in 41% of job adverts), **computing** (20% of adverts), **consultancy** (17%), **digital & web analytics** (8%) and **technical** (7%).

These results show that there are several different 'branches' of analytics jobs, ranging from customer-facing consultancy-type roles, to highly technical roles, computing based analytics, and also the more specific branch of digital analytics. In each of these cases it is clear that specific skill-sets and backgrounds may be required, including soft-skills, finance, OR/MS, web development and computer science. However, by far the most common topic was strategic decisions, an indication of how many companies are seeking to use analytics methods in their higher-level decision making. Whilst no obvious single discipline can be thought to serve all requirements in this area, we would argue that OR/MS can be a very relevant part of this area as well as its importance in many technical jobs.

The next major stage of the research is to supplement the data collected from job adverts with interviews with a variety of people working in analytics in industry. The purpose of the interviews is to capture some of the requirements of new employees (including 'hard' and 'soft' skills), recent experiences of hiring new employees (whether at graduate level or those with more experience), and perspectives on how analytics may develop in the near future. Anyone interested in taking part should email contact@whatisanalytics.co.uk or visit (www.whatisanalytics.co.uk).

<OR>

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

TESCO'S DUNCAN APTHORP THINKS THE TERM DATA SCIENTIST IS ABHORRENT – HERE'S WHY

NIGEL CUMMINGS

Tesco is a British multinational grocery and general merchandise retailer with its headquarters in Cheshunt, Hertfordshire, UK. It is the second-largest retailer in the world measured by profits (after Wal-Mart).



TESCO always attracts significant interest at our Careers days

Recently its press department have informed us that there is no struggle to find skilled IT personnel for Tesco, even though many organisations in the UK and wider world are currently finding it hard to fill vacancies due to an international shortage of skilled technicians and analysts.

Tesco believes that a combination of highly competitive career paths and its strong links with UK universities has provided it with the ability to find all the IT talent it needs now and for the future. Tesco often exhibit at our conference events and in particular, our career days. They support the OR Society because they know the right students attend our events.

Tesco's supply chain programme manager, Duncan Apthorp, recently explained why his firm's hiring schemes seem so effective. At the Teradata Partners conference in Texas he said, 'There's the term 'data scientist': we hate it with a vengeance. We look to hire smart, numeric people. They may be mathematicians, scientists, engineers - we even have one who did geography. We typically hire them

straight out of university - we work closely with all the university career teams and so far we've not had a problem'.

Apthorp did admit though that economic conditions could influence Tesco's hiring patterns if many more businesses suddenly start having a need for big-data analysts - a trend which according to many reports will arrive within the next four years. This, coupled with Gartner's predictions of a 75% worldwide shortfall in big-data analysts, means the employment market is likely to become highly competitive. When you tell smart people that they could save the business £10m per year it is hardly surprising that they are keen to be a part of this.

Tesco currently employs 530,000 people across the globe and has annual revenue of £72.4bn. Its big data analytics extends to ultra-specific studies that monitor such things as how different weather patterns influence buying habits in different stores.



ROBO-ANALYST!

NIGEL CUMMINGS

Has the '10 years' finally ended for machine learning? As with artificial intelligence and nuclear fusion, machine learning has been just '10 years' away for the best part of 50 years now it looks as though it could actually happen quite soon.



Early adopters of Machine Learning as a service (MLaaS) are likely to integrate predictive Application Programming Interfaces (APIs) with the customer transaction data they possess in order to gain a competitive edge by using an API driven approach to improve their 'adaptive intelligence',

MLaaS has been waiting for big data to happen and now that distributed data systems like Hadoop are the norm in many businesses, along with open source and proprietary machine learning algorithms, new big data software services are being seen as the 'next best thing' for providing instant analysis for massive amounts of data on customer sales transactions and for returning accurate personalised predictions of shopper needs.

One of the biggest problems with reading data is that there are so many different ways of saying the same thing plus there can be many subtle nuances in the way things are said that can cause a sentence to mean the exact opposite of itself depending on where the stress is placed. This is a problem for data that has been correctly entered, trying to work out what the author meant when they have missed out words, misspelt them or used the wrong word altogether or used a voice recognition system can fox even the cleverest of humans, let alone machines.

Machine learning has been a long time coming but there could not be a better time for it what with the expected rise in the demand for skilled analysts and the predicted shortfall in the number coming along.

Already companies like Swift IQ are developing machine learning applications to help fill the gap left by the skills shortage of data scientists. Jason Lobel, CEO of Swift IQ says that his company's machine learning products are able to trial different algorithms and various types of data and sample sizes and then to apply the most efficient algorithms to process the data. 'We want to see good response features in the models so we will iterate with the variables first and then ask our client for a massive data dump once the predictions are proving accurate. That discovery process is part of our value add. We deliver all of this via an API so it can be delivered on demand for any application.'

Lobel also believes that e-commerce businesses should pay particular attention to the application of machine learning applications because these are the businesses that have the most to gain. They can deliver a better experience with Machine Learning as a Service.'

In making a business's data machine readable, it is essential to focus on integrating data via APIs from four main sources: JavaScript tags from a business' website; product data from affiliate feeds or a business' own product catalogue; CRM data on shoppers and customers or; segmentation data from external sources.

It is a relatively simple process to allocate the correct type of algorithm to be used in machine learning to make predictions, the most common algorithms are: recommendation engines; frequent pattern mining; classification and; clustering.

Recommendation Engines are often used by companies such as Amazon, they allow for a more personalised online shopping experience that helps retailers present the types of products in which the individual shopper is most likely to be interested.

Frequent Pattern Mining has proven useful in supermarket chains who want to organise shelving patterns to link products to make it easier for customers to remember what they want and get all they need.

Classification algorithms can be used to better organise keyword search results to better suggest ranking of search terms based on their likelihood to be relevant to the searcher. Classification algorithms could also be used in conjunction with knowledge about a customer's previous buying habits.

Clustering algorithms are used to help identify and better target their most valuable clients.

ANOMALYTICS

NIGEL CUMMINGS

Does the name Hossein Eslambolchi sound familiar to you?



Hossein Eslambolchi

It might not, but did you know Mr Eslambolchi is a prolific inventor who once brought us the technology that allows people to make charitable donations via text message? Just one of more than 1,000 patents he holds. Did you also know he is the inventor of Anomalytics?

With a background of over twenty years as Chief Technology Officer and Investment Officer for AT&T, he once managed \$14 billion in capital spending and a \$20 billion annual operating budget. Nowadays this Iranian innovator, engineer, inventor and author has turned his attention to analytics – he has invented a whole new branch of analytics as result!

Anomalytics is his answer to the problems all too commonly encountered when trying to spot anomalies in corporate information technology networks that might be data-stealing cyber-attacks. Eslambolchi believes his company CyberFlow Analytics, a recent start up, can usher in the next evolution in data security using analytics and mathematical formulas to stop sophisticated attacks and cyber espionage.

CyberFlow is still in its early stages as a start up, it has raised more than \$2 million in funding from Toshiba and Angel Investors. But already it has demonstrated an alpha version of its Anomalytics software-as-a-service product, which will target large corporations. A beta version is expected in early 2014 followed by an official product launch in the middle of next year.

Anomalytics was developed in an effort to get out of the 'box' mentality of solving cyber security, which means companies buy a vendor box with an intrusion-detection system, with a firewall, all kinds of virus-detection software. All this is pretty much hardware-driven for the enterprise customer base. Anomalytics on the other hand offers a much more sophisticated approach to the problems associated with cyber terrorism like 'denial of service' organised and guided cyber-attacks.

This new branch of analytics looks for anomalies and strange behaviour. It identifies those anomalies, watches those anomalies and then determines which are threats. Then Anomalytics provides that information to its corporate enterprise customer so they can remedy those attacks.

According to Eslambolchi it takes seven to ten days to baseline a customer network. Once that baseline is set, any anomaly off that baseline can be tracked to see if they start behaving in a way that is indicative of an Advance Persistent Threat. That is where a virus comes in, like a bot-net. It stays dormant for three or six months. Then the command and control structure somewhere tells it to go and attack some server, find a port and take the data out.

Eslambolchi says there is nothing wrong with having firewalls and anti-virus software in place to protect a company's cyber assets, but there can be occasions when such protection is simply not enough, so Anomalytics can add an extra layer of protection, which it is believed, will thwart the best or worst efforts of the most determined cyber terrorists.

Cyber-attacks are no longer simply malicious, they may also be used to steal company data and use such data to gain competitive advantage. With increasingly sophisticated attacks occurring, it makes sense to employ mathematics based analytics to detect anomalous network behaviour – products using Anomalytics may well turn out to be the best investment a company can make if it wants to keep its data safe! More information on this new approach to protecting networks, can be found at:

<http://www.cyberflowanalytics.com/>



HOUSES FOR SALE OR RENT...

NIGEL CUMMINGS

Traditional and predictive analytics can be used to increase profitabilities in real estate markets and eliminate bad sales leads.



Predictive analytics could provide the real estate industry with better means of evaluating and interpreting data to predict future outcomes and trends. Already the application of analytics has led to property managers and estate agents gaining better understanding of transaction and market data, which in turn allows them to use it to benefit the industry, agents and consumers.

Predictive Analytics has been used to examine and analyse member and customer trends from a variety of data sets to assist in the development of services and resources that provide value to property markets and provide insights into ways property agents can better meet the needs of their clients.

Disparate data sources can be collected and used together to build analytical models that will solve complex problems in the housing industry and to develop tools to help property sellers, housing

agents and local associations and others make better [data driven] decisions.

It is not just about predictive analytics though, traditional analytics can also be used to collect propriety big picture data and analyse it to give retrospective insight into what happened; customer relationship management tools can look at the little picture and analyse proprietary data that supports current activities. Whilst 'big data' can look at both the little and big picture and analyse public and proprietary data to determine patterns that can predict the future.

Effective use of predictive analytics, can allow companies to not only identify their best customers, they can also identify which of them are most likely to behave profitably – those most likely to go ahead and conclude property purchase. By building predictive models in line with property marketing strategies and overall business strategy, it is now possible to 'score' customers and identify those customers most likely to be profitable, thus allowing property marketers to increase the profitability of marketing campaigns.

To maximise marketing though, companies need to define a strategy, then segment the customer base, identify the properties of each segment, set objectives for each segment, define the activities for each segment, and continually measure outcomes and refine campaigns.

Predictive modelling provides a rational basis for making decisions and helps ensure the success of marketing activities.

<OR>

EARLY CAREER ADVISORY GROUP – YOUR SOCIETY NEEDS YOU

GAVIN BLACKETT, SECRETARY & GENERAL MANAGER

Not surprisingly, the Society has long recognised that its members in the early stages of their careers are vitally important to its future health and well-being.

It has supported the 'young to O.R.' through its YOR conferences, its training programme and other networking events.

It has now agreed to include more formally the Early Career members in the Society's mechanisms for shaping and actioning policy, direction and activities. Its first step on this path is to create an Early Career Advisory Group as a means for gathering, understanding and acting on the views of the profession's newer additions.

It is envisaged that the Group will hold a couple of face-to-face meetings per year at the Society's offices in Birmingham with other business conducted by email or video calls. If you fall into this group and would like to contribute ideas and actions to Society business, please email or telephone me to discuss this further (gavin.blackett@theorsociety.com, or 0212 233 9300).

<OR>



DISASTER LOGISTICS

NIGEL CUMMINGS

According to Management Sciences Professor Ann Campbell at the University of Iowa, mathematics and logistics can improve relief efforts like those under way after Typhoon Haiyan left much of the Philippines devastated.



Professor Campbell, an expert on transportation logistics is researching more efficient methods for governments, agencies and businesses to transport relief supplies to disaster areas where roads, ports and airports are all but destroyed.

Her specialty is vehicle routing and she is using mathematical and computer modelling to develop quicker, more efficient ways to move supplies and personnel from one place to another. Of course the Philippines disaster has been made worse by the fact that so many roads have been blocked by debris or even obliterated entirely by the destructive effects of the typhoon, which saw wind speeds of up to 200 mph during its peak followed by very high seas.

Professor Campbell's research is normally aimed at improving business supply chains and commercial activities, but she recently said, the same research tools were useful in meeting the challenges of disaster logistics. 'Commercial supply chains are focused on

quality and profitability. Humanitarian supply chains are focused on minimising loss of life and suffering, and distribution is focused on equity and fairness much more than in commercial applications.'

Campbell's most recent research has been focused on helping drivers in the Philippines learn what roads are still usable and which have become impassable as a result of the disaster, so that emergency workers will be better equipped, before setting out, to know which paths are least likely to be damaged.

Of her work for the Philippines disaster relief, she said. 'We want to give drivers a recommended path and some back-up options in case they encounter road failures. In a disaster, it is important to recognise that information on road conditions is slow to come in. Also, cell phones usually don't work so it is important to give drivers as much information as possible before they leave the depot with supplies.'

She also said that, typhoon Haiyan created a whole new set of circumstances, not the least of which was that much of the damage was caused in remote areas that were difficult to access even before the storm.

Applying mathematics to the problems associated with disaster management is nothing new though. In 2010 for instance, a team of mathematicians from the Complutense University of Madrid (UCM) developed a computer application that estimated the magnitude of natural disasters and helped non-governmental organizations (NGOs) in the decision making process. The researchers there also presented an on-site humanitarian aid distribution model. Both could have been applied in the case of the recent Philippines disaster.

The researchers' application starts by taking information about the type of disaster (earthquake, flood, hurricane, tsunami, fire, etc.), quantifiable units (Richter scale for earthquakes, wind speed for hurricanes, etc.) and a vulnerability measurement of the area. This measurement is based on the Human Development Index provided by the UN per country modified according to the situation of the affected region. With this data, estimates can be made of the magnitude of the consequences of the catastrophe 'in terms of fatalities, injuries, homeless people, others affected and cost,' which is very useful information for NGOs. Truly a demonstration that the application of mathematical analysis can lead to saving lives!

REGIONAL SOCIETIES

EAST MIDLANDS (EMORG)

CONTACT: Chris Smith

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EMAIL: chrissmith677@gmail.com

EMORG - Fuzzy Logic in Decision Support Applications

Date/Time: Tuesday, 21 January 2014 at 18.00

Venue: Room BE0.40 in the Business School, Loughborough University

Speaker: Prof. Robert John, Head of the Automated Scheduling, Optimisation and Planning (ASAP) Group, University of Nottingham

In this talk Bob will firstly give an overview of type-1 and type-2 fuzzy logic and the role of fuzzy logic in modelling uncertainty. The rest of the talk will cover some of the applications that he and others have worked on using fuzzy logic highlighting the advantages and disadvantages of the approach in real applications.

Speaker: Prof. Robert John, Head of the Automated Scheduling, Optimisation and Planning (ASAP) Group, University of Nottingham. Bob worked in industry for 10 years as a mathematician and knowledge engineer developing knowledge based systems for British Gas and the financial services industry. Bob spent 24 years at De Montfort University in various roles including Head of Department, Head of School and Deputy Dean. He led the Centre for Computational Intelligence research group from 2001 until 2012. Bob joined Nottingham this year where he leads on the LANCs initiative and Heads up the research group ASAP in the School of Computer Science.

EMORG - Annual General Meeting

Date/Time: Tuesday, 21 January 2014

Venue: Bar area at Burleigh Court, Loughborough University

Speaker: Chris Smith Secretary EMORG

The EMORG Annual General Meeting will follow the talk on 'Fuzzy Logic in Decision Support Applications' We will move from the Business School to the bar area at Burleigh Court at the University for the AGM where we can have a drink in more comfortable surroundings.

As well as electing a new committee, receiving the accounts etc, the majority of the meeting will be devoted to discussing the programme for next year. What events would you like to see? What are the new subject areas or visits that would attract you to meetings? Come along and share your ideas and suggestions (or if you can't make it, let me know your thoughts by e-mail chrissmith677@gmail.com)

MIDLAND (MORS)

CONTACT: Jen East (Secretary)

EMAIL: MidlandsORSociety@live.co.uk

PhD research showcase

Date/Time: Tuesday, 28 January 2014 at 18.00

Venue: Warwick Business School

Speakers: Mahdi Noorizadegan and Chenlan Wang

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

On vehicle routing problems with uncertain demands by Mahdi Noorizadegan, Warwick Business School

Abstract

tba

Inefficiency of selfish routing under stochastic demand by Chenlan Wang, Warwick Business School

Abstract

tba

Disaster preparedness and response plan for floods (tbc) by Oscar Rodriguez Espindola, Aston Business School

Abstract

tba

Modelling and measuring demand and performance in HMRC call centres

Date/Time: Wednesday, 26 February 2014 at 18.30

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

Speakers: Steve O'Donnell, HMRC

Abstract

The management of call centre performance relies heavily on queuing theory work first carried out by Erlang in the early 20th century and much elaborated since. But this approach requires copious and detailed forecasting of future demand and resources and while it is excellent for short term performance management HMRC has found it less suitable for medium to long term performance planning of their call centres. Part of the problem, which any call centre under pressure faces, is it is difficult to establish how much demand the call centre has to handle. The work described here outlines a novel way of measuring the real demand faced by a call centre. This measure turns out to be intimately related to the performance of a call centre and allows the building of extremely accurate models of medium to long term call centre

NOTICEBOARD

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performance. HMRC adopted this model for managing call centre performance from April 2011 and, with the assistance of the improved understanding of demand and performance the model brings, went from handling 48% of calls in 2010-11 to handling 74% of call in 2011-12. This performance has been sustained in 2012-13 with performance in the later part of the year regularly achieving 90% + calls handled. The model was the primary tool supporting the recent decision to reprioritize £34m of HMRC funding into contact centre investment at a time of austerity in Government financing.

Optimising the Retail Network for New Zealand Post

Date/Time: Wednesday, 02 April 2014 at 18.30

Venue: TBA

Speakers: Tony Lewins, Ernst & Young

Abstract

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

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

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

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

A model future for the UK's nuclear legacy

Date/Time: Tuesday 13 May 2014 at 18.00-20.00

Venue: TBA

Speakers: Panos Frangos and Simon Hughes

Details to follow

Title to be confirmed

Date/Time: Tuesday, 17 June 2014 at 18.00-19.45

Venue: TBA

Speakers: Sayara Beg

Details to follow

Air traffic control, business regulation and CO2 emissions (tbc)

Date/Time: TBC

Venue: TBA

Speakers: Steve Hammond, NATS

Details to follow

The ooh – ahh of simulation

Date/Time: Tuesday, 21 October 2014 at 18.00-20.00

Venue: TBA

Speakers: Frances Sneddon, CTO Simul8

Details to follow

The use of O.R. in designing new supply chain network in Marks and Spencer (tbc)

Date/Time: Thursday, 27 November 2014 at 18.00-20.00

Venue: TBA

Speakers: Victoria Forman, Marks and Spencers

Details to follow

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

Winner of the 2013 President's Medal

SOUTH WALES (SWORDS)

CONTACT: Dr Jonathan Thompson.

TEL: 029 2087 5524 Fax: 029 2087 4199

EMAIL: ThompsonJMI@cardiff.ac.uk

SWORDS Event

Packing up for Christmas – How OR contributes to a Greener, Cheaper Christmas.

Date/Time: Tuesday 3rd December 2013. The talks will commence at 6.15pm in room M/0.34 (ground floor). This will be followed by a quiz and food in room M/1.02 starting at 6.45pm.

Venue: Mathematics Institute, Cardiff University. Tea and coffee will be available from 6pm in the Internet Café which is just inside the main entrance to the Mathematics Institute.

Speakers: Dr William Dowsland, Gower Optimal Algorithms Limited (GOAL)

Abstract

For over 30 years GOAL has provided companies worldwide with software solutions to optimise space utilisation – on pallets, in shipping containers or on the supermarket shelf. This reduces their costs, saves you money and is better for the planet as the resources needed for packaging, storage and distribution are minimised.

Current clients include Arden Foods, Meyer Prestige, Taylors of Harrogate, Diageo, Heineken, Hallmark Cards, Disney, Estee Lauder, Fergusons, Panasonic, and Unilever, to help you eat, drink and be merry and deal with the inevitable washing up.

This presentation examines some of the O.R. techniques used to optimise product and packaging design and illustrates the impact of these in providing an efficient, cost effective and greener supply chain.

There is a charge for the social of £5 for OR Society members and £10 for others (partners are welcome). We need to know in advance who is coming so please let me know asap if you wish to attend. Also let me know if you would like the vegetarian option.

Please contact Jonathan Thompson, tel: 029-20875524

E-Mail: ThompsonJM1@cardiff.ac.uk

Dates for your Diary

- Wednesday 12th February – John Hopes, Ernst and Young.
- Tuesday 18th March – Rhodri Brown (Welsh Rugby Union) and Matthew Parry (Swansea University)
- Wednesday 7th May 2.00pm – Trip to Sony (Pencoed) for tour of Raspberry Pi production

YORKSHIRE & HUMBERSIDE (YHORG)

CONTACT: James Crosbie

TEL: 07891244594

EMAIL: jamescrosbie@hotmail.co.uk

YHORG meeting :

How do you solve a problem like Analytics?

Date/Time: Wednesday, 29 January 2014 at 17.00

Venue: West Yorkshire Playhouse, Leeds

Speakers: Stewart Robinson, Sarah Fores

Followed by Sarah Fores, Are there opportunities for Yorkshire and Humberside OR to gain from more European involvement?

<OR>

SPECIAL INTEREST GROUPS

ANALYTICS NETWORK

CONTACT Sayara Beg

EMAIL: ANChair@theorsociety.com

Analytics Network Committee Meeting & Dinner

Date/Time: Thursday, 28 November 2013 at 18.00 till 22.00

Venue: National Portrait Gallery Restaurant

Speakers: Chair

Committee meeting will be held over dinner.

By invitation only.

Analytics Network Sponsored Christmas Meetup

Date/Time: Thursday, 05 December 2013 at 18:00 - 21:00

Venue: Dirty Dicks Pub, 202 Bishopsgate

Speakers: Chair & James Proctor of CNX Search

An opportunity to meet likeminded professionals, working in the field of Data Science, exchange contact details and establish long term professional networking relationships for business development opportunities.

There will be nibbles and a drink available, as well as stimulating conversations with an exciting exchange of ideas. Register to attend here: <http://www.meetup.com/AnalyticsNetwork/>

This event has been sponsored by CNX Search, a Data and Analytics Recruitment firm www.cnxsearch.com

CNX search provides world-class staffing solutions for customers who have invested in analytics software and want to ensure they get the most from their chosen solutions. By focusing on Business Intelligence, Data Warehousing, Predictive Analytics and Data Science, CNX positions itself firmly in the most innovative and commercially important area of Information Technology, aligning ourselves as partners to organisations who want to ensure that whether you are in business looking for a specialist, or a professional searching for your next career move, you have a partner that you can rely on to facilitate these changes quickly, professionally and accurately.

Analytics Network Xmas Party 2013

Date/Time: Sunday, 08 December 2013 at 18.00 till 22.00

Venue: Google Virtual Hub

Speakers: Chair

Registration details will be available soon

<OR>



Training for 2014

Approved courses in O.R. and Analytics

THE SCIENCE OF DATA VISUALISATION

4 March, Birmingham
£600 + VAT for OR Society members
Hands on course

NEW FOR 2014

Course provider: Flying Binary

These days, we can all create charts with one click. It's easy - so why do they sometimes look so wrong? It turns out that we must respect ten thousand years of evolution, learn a new language, get to grips with core components and apply a structured process! During the day we will mix presentation, video, real published examples and workshop exercises to equip you for the exciting adventure that is modern data visualisation.

You will learn how visuals are hardwired into our biology; why some charts elucidate and some obfuscate; the six simple steps in the visualisation cycle; how to transform your interaction with decision makers; why action must flow from every successful visualisation

SUPPORTING STRATEGY

5-6 March, Birmingham
£1,150 + VAT for OR Society members
Hands on course

Course providers:
Frances O'Brien, John Morecroft

A practical course aimed at developing expertise in deploying frameworks, methods and models to support strategy development. The course looks at the use of manual and computerised techniques for conducting various strategy development activities such as setting direction, creating strategic initiatives, making sense of internal and external environments.

Roles for O.R. supporting strategy: Current practice; Frameworks for setting direction and measuring performance; Frameworks for creating strategic initiatives and rehearsing strategy; Get an introduction to system dynamics; Learn about formulation and simulation; Undertake modelling for strategic development

IMPROVING QUALITY AND PERFORMANCE

11 March, Birmingham
£470 + VAT for OR Society members
Hands on course

Course provider: Max Moullin

Gain a greater understanding of the topics of quality, excellence and performance measurement and an appreciation of the need for performance measurement to be based on stakeholder needs, the organisation's strategy and process; appreciate the debate on targets in the public sector and the eight essentials of measurement.

Find out about the latest developments in performance measurement; Ensure that performance measures are aligned with service user and stakeholder needs, with the organisation's strategy, and the processes used to achieve it; Keep up-to-date with developments in quality management and be able to advise on developing quality user-focussed public services; Learn how to use the balanced scorecard and strategy mapping

BUSINESS INTELLIGENCE WORKSHOP

12 March, Birmingham
£555 + VAT for OR Society members

Course provider:
Dweomer Consultants Limited

Understand the basic capabilities and limitations of OLAP tools, how they differ from other reporting and analysis tools, and the change management issues raised when they are introduced; how and why the design of a data warehouse needs to be different from other data processing systems; learn how to use dimensional modelling techniques and understand the key challenges and trade-offs faced in managing a successful business intelligence / data warehousing initiative.

Learn how to participate in the design of data marts and OLAP based applications; Understand the technical, political and change management issues that need to be addressed to benefit from investing in business intelligence and data warehousing; Get an opportunity to discuss the issues facing your organisation and exchange ideas with other delegates and the course tutor

ALSO IN MARCH:

13 March Facilitation Skills

25-27 March Simulation

**For details of all courses and to book online, visit www.theorsociety.com
or call Jennie Phelps on 0121 234 7818**

OR-30

John Crocker

Most of the December issue for 1983 was devoted to the 25th Conference (OR25) which was held in Warwick that year. There was, however, a paper which related to both this conference and the previous one held in Bristol and was written by Robert Bittlestone from Metapraxix.

Today some of us are very familiar with social media software such as Facebook, LinkedIn and the like. In 1983, the World Wide Web and the ability to communicate with individuals electronically was still some years away. However, a foretaste of things to come was available at these two conferences in the form of what was called a 'meta-conference'. Such an idea had first been proposed by Stafford Beer but previous attempts to run one had not proved very successful due to the inadequacies of the computers available at the time.

Robert had programmed a MicroAPL Spectrum which had four terminals plus a 24' relay screen. This allowed up to four people to be logged on at any one time. Once logged on, they could send messages but more importantly, they could vote on various statements and create their own statements for the other delegates to vote on. The idea was that this would generate interaction between delegates at a level that did not normally happen at OR (or any other) conferences.

The software behind the scheme ran a number of analyses on the votes cast. This showed whether the delegates were in favour or against, but also drew out similarities and differences between individuals, e.g. delegates A and B tended to vote in much the same way on the majority of issues whereas A and C tended to disagree with each other.

It was a fascinating exercise which I remember participating in at the time (in Bristol but not in Warwick). Unfortunately, it suffered from a number of problems. Firstly it was alas too popular for its own good – the computers available at that time were of very limited capacity in both memory and processing power plus there were always long queues for each of the four terminals even though only about half the delegates took part. The second was that it became a bit silly – too many of us were making silly comments or asking silly questions (trying to be funny and/or clever).

On a totally different note, you will recall that last month I wrote about a paper that looked at the work of the boundaries commission. The authors had identified a number of possible partitionings of the 22 wards into three constituencies (in Wandsworth). At the time they used a sampling method as it would have taken too long to go through all 2×3^{21} possible solutions. I decided using a reasonably modern laptop to see whether it would be feasible to generate all possible cases and whether this would identify any new ones. After a fair amount of effort, I managed to write a program which did this and worked for each case whether each of the three constituencies satisfied the two main criteria: the number of electors within each of the three were within a certain percentage of the average (I chose 10%) and that one could draw a line through all the wards in any given constituency without passing outside the constituency. The result was that the program produced 97 possible solutions.

Bittlestone, R.G.A., 1983, The 1982/83 Operational Research Society Metaconferences, *JORS* 34.12, Pp1151-1169 ([jors1983255a.pdf](#))

<OR>

OR-20

Exciting developments in systems thinking

There was a strong Systems stream at OR35, maintaining a longstanding tradition. To the systems thinker, of course, Operational Research is just one methodology among many that tackle the problems that arise in management science or applied social science. We quite understand, however from the point of view of the O.R. community the 'systems approach' is just one technique among many, perhaps particularly suited to problem structuring. Nevertheless the breadth of vision of systems thinkers makes them charitable to multiple paradigms, for example hard, soft, emancipatory and critical systems thinking.

Aware of challenge

Moreover systems thinkers are aware of the challenge of postmodernism and its particular way of resolving paradigm

incommensurability. For that reason we were pleased to welcome the first paper in the stream 'An agenda for postmodernism and poststructuralism 1n O.R.' by Ann Taket and Leroy White. This paper came with all the stamp of the authority of a refereed paper accepted by JORS, and had been given an extended time-slot in the conference programme to allow for discussion. We had all had time to read the paper in advance and first class contributions to the debate were made by Charles Ritchie and Jim Bryant (official 'discussants') who really engaged with the material. Somehow the apparatus of this official approval is at odds with the wicked spirit of postmodernism, and there were, perhaps, rumblings of discomfort from the very polite audience. I sensed agreement, however to the thesis that we now live in a postmodern world that has abandoned rational planning and is driven by whim. Fashion and ideology.

Poverty of planning

This depressing conclusion was borne out for me, by the final paper in the stream by Eric Wolstenholme – 'A case study in community care using systems thinking'. This again was a refereed paper given advance circulation in JORS, and this contributed to the high standard of debate, ably complemented by contributions from David Lane and Geoff Royston. Professor Wolstenholme is propounding a philosophy of 'modelling as learning' using the models of systems dynamics to create learning environments or 'microworlds'. This is an exciting development in systems thinking and worthy of all our close attention. The depressing part was the state of affairs in community care revealed by the systems modelling. Given a hard/soft dichotomy in systems thinking and a debate about whether systems are in the world or in our minds, I felt that this paper exemplified real-world modelling that yielded real insight into the poverty of planning for community care.

Valuable papers

Sandwiched between the refereed papers were some valuable papers that indicate how research is proceeding in the systems fields. All the five papers were in the area of information systems and this field clearly absorbs the interests and energies of many system practitioners. Roger Stuart's paper 'Communication analysis of command and control teams' involved study of real-world human activity and real communication between human beings, operating sometimes in tense and stressful circumstances. For me this was another good example of systems 'in the world' amenable to study by objective methods (sociometry in this case). Alan Eardley's

paper, however, reported research in the literature of information systems – specifically eight classic case studies of strategic information systems in North America. What interested me was the need for interpretive judgement in this type of research and the way in which the maturity and previous experience of the researcher enhances the analysis. The need to blend the objective and the subjective is what makes the systems field so fascinating.

Influence of tension

Each of the remaining three papers had been influenced in varying ways by this tension. Frank Gregory's research has now reached a conclusion, and his paper 'Soft systems methodology for knowledge elicitation and representation' demonstrated how SSM conceptual models can be 'hardened' to allow for the implementation of an information system. Finally, the paper by Heather Watson and Trevor Wood-Harper also concerned itself with the augmentation of SSM, in this case by prototyping. The written version of this paper ends with a conclusion, not perhaps to be expected from the title of the paper, headed 'Reflecting on commitments to the practice of critique in information systems'. This conclusion refers to the Multiview methodology and describes it as a 'synthesis of existing approaches functioning together through our own interpretive activities'. This strikes me as a way forward that provides an alternative to postmodernism.

Gilbert Mansell

<OR>

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This global management consultancy has significant growth plans for their Analytics practice in the UK, prompting recruitment at Consultant, Manager and Senior Manager levels. Providing particular expertise in predictive modelling and associated analytics, they seek candidates offering a sound blend of technical ability (ideally including regression analysis, SAS, R), genuine business awareness and excellent communication skills, underpinned by impressive academic credentials.

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Central London based

FINANCIAL MODELLING CONSULTANTS
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Business Modelling is an established competency within this respected professional services firm, with financial modelling being a key offering, in addition to operational and strategic modelling. Client demand has now created the need to recruit additional professionals at Consultant/Senior Consultant level with a good degree, affinity for the consultancy environment, who are ambitious, effective self-starters with a goal orientated approach.

London & Bristol

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This rapidly expanding Marketing Analysis Consultancy are seeking high calibre Customer/ Marketing Analysts with proven experience of conducting and delivering data analysis (reporting, profiling, segmentation) using SAS. The successful candidates 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

DATA SCIENTIST
£30,000 - £50,000

Joining this new and exciting software development company you will be responsible for analysing large sets of data, implementing sophisticated algorithms and analytical routines to make a real-time impact on their products and working offline to extract insights from the data to drive the company forward. You need to have at least an MSc in Operational Research or Statistics and ideally a relevant PhD to support this. With experience of analysing large data sets you will have used either R, VBA, SQL, SAS, SPSS or Matlab and ideally have basic experience with computer programming (C++ , Python or Java).

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North West

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Northants/Bucks or London

PRICING STRATEGY & ANALYSIS
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Our client is a pioneer and global leader in its field. Now embarking on the next phase of their impressive growth plans, they seek an accomplished analytical professional to join their established Pricing Strategy team in a new, key role with a wide-ranging brief. Offering impressive academic credentials with proven experience of analysis driven problem solving, key attributes should include innovation, creativity, commercial acumen and strong influencing skills.

Berkshire/M4 Corridor

'GRADUATE' ANALYST - SUPPLY CHAIN
£Competitive Package

Our client is looking for exceptionally able candidates to help deliver major improvement projects to their supply chain by applying a scientific approach to retail problems, delivering solutions to improve the customer's experience. Applicants will need a good (2.1 or above) numerical or operational degree (Mathematics, Engineering or similar sciences based degree) from a top tier university and a minimum A grade in A-level Maths. Relevant MSc and PhD applications also welcomed.

Hertfordshire (commutable from London Liverpool Street)

SENIOR LOCATION PLANNING ANALYST
To £50,000 DOE + Benefits

Excellent new opportunity to work for a prestigious retail organisation as they expand their Location Analysis expertise. The successful applicant will have a good relevant numerate degree and proven commercial capability in statistical analysis and model building i.e. predictive modelling, regression, clustering etc. Additional experience within the location planning and spatial analysis field, whilst beneficial, is not essential. In-depth knowledge of analytics software i.e. SAS, SPSS and/or R required.

Midlands

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South Wales

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

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