INSIDE O.R.

APRIL 2014   NO 520

HOW O.R. HELPS TO STRETCH THE THIN BLUE LINE

: : INSIDE THIS MONTH : : : :

VP GOES WEST
DEVELOPMENTS IN ADVANCED ANALYTICS AND BIG DATA 2014
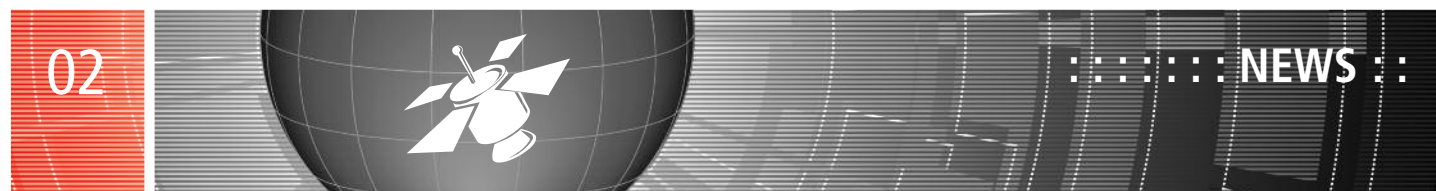A SPOONFUL OF DATA
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:: EDITORIAL :::::::

EDITORIAL

JOHN CROCKER

It is getting increasingly difficult to keep up with all the exciting things going on in the Society but Stewart Robinson's Leader – his first as President – will give you a good idea.

One of the good things about the Society is that whenever we get a new President, it is seldom accompanied by a complete re-organization as seems to be the case with many businesses. The fact that each new incumbent spends a year as 'President-Elect' so gets the chance to learn the ropes and see what is going on so there is no need to throw everyone into total confusion just to hide his or her ignorance.

Interestingly, Stewart tells me that he 'fell into simulation by accident' in much the same way as Mark Elder did. Had Stewart stayed on at Istel, he may well have become one of Mark's major rivals. In the first standalone Beale Lecture event held in February, Mark gave us a fascinating insight into his Journey of Discovery, and discussed how best consultants (or indeed, any O.R. Analyst) should approach potential projects putting particular emphasis on why O.R. is not IT. At the same meeting, Richard Wood described the work he did for the NHS which formed the basis of his PhD thesis and won him the Society's PhD prize.

Despite all the good O.R. work that has and is being done for the NHS, its budget still continues to grow at what appears to be an unsustainable rate. One wonders whether the work of Analytics (described by Nigel) using big data and cloud computing to identify developing conditions in individuals will reduce the demands on the hospitals by allowing early treatment to prevent many becoming debilitating.

Accountability is always a concern but especially when it concerns money donated for good causes. How much of this money actually ends up paying for good work? Are aid agencies and the like spending this money in the best way (see Nigel's article)? Again this seems like a job for O.R. and it is perhaps no coincidence that many of these agencies are looking at making use of the pro bono services that the OR Society is offering very ably managed by Felicity McLeister (see Felicity's article).

The design of any new product must be a compromise among a great many competing requirements. We would all like to own a car which will last for decades, require virtually no maintenance, use very little fuel and cost next to nothing but, alas the only ones that meet these requirements are those produced by Dinky, Corgi and the like. O.R. is good at evaluating alternative options with a view to making the best decisions when there are multiple stakeholders with multiple objectives under multiple criteria so it seems only nature that O.R. should be involved at the design stage. A new initiative aimed at bringing designers and O.R closer together was launched in February (see Geoff Royston's article). Before one can design a new product, someone has to come up with the idea and then someone else (usually) has to make the decision as to whether to proceed with this new idea – Hanyang University has looked at a way of making such decisions through gamification (see another of Nigel's articles).

If you like little puzzles, why not try the ones that Louise has been setting (in the Y2OR section). Although they are aimed at the young to O.R. members, there is nothing to stop you experts from having a go.

<OR>

CONFERENCE NEWS

EVENT:		DATE:		VENUE:	
EVENT:	SW14	DATE:	1 – 2 April 2014	VENUE:	The Abbey Hotel & Golf Club, Worcestershire
EVENT:	Developments in Advanced Analytics 2014	DATE:	30 April 2014	VENUE:	BMA House, London
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

:::::: IN BRIEF ::

Llongyfarchiadau!

Jo Smedley is now Head of Flexible Development and Student Success at the University of South Wales. Jo specialises in innovating and enhancing personal and organisational knowledge management in academic and corporate environments.

Jo is a member General Council, the Board of Directors and Chair of the Education and Research Committee (ERC).

Life work of O.R. Pioneer up for sale

70 boxes containing the entire mathematics library of George B. Dantzig, known in the USA as the 'Father of Operations Research', has been put up for sale on behalf of his family.

: : : : : : : IN BRIEF : :

It has been made available by 'private treaty' from PBA Galleries. http://www.pbagalleries.com/content/

Quantum Computing and O.R.

Professor Cathy McGoech Amherst College, MA continues her quest to use quantum computing to solve NP-hard problems. Her latest paper, co-authored by Cong Wang, Simon Fraser University, CA describes the use of a 439 quantum bit (qubits) computer to solve a number of NP-hard problems significantly faster than using conventional methods. Cathy also has a new book out on the topic - A Guide to Experimental Algorithmics, Cambridge University Press.

The Quantum O.R. paper referred to in this news item can be found at: http://www.cs.amherst.edu/ccm/cf14-mcgeoch.pdf

COIN-OR needs you

COIN-OR, a major force for open source resources in O.R. is looking for a complete makeover of its website. The COIN-OR foundation is a non-profit foundation that hosts 50+ open source software projects.

If you can help, please contact Dr. Ted Ralphs, Associate Professor, Lehigh University via email on: ted@lehigh.edu Or take a look at: http://www.coin-or.org/

Robots to pass Turing Test in 15 years

Ray Kurzweil, Google's director of engineering, has predicted that by 2029 computers will be more intelligent than human beings. At a conference in 1999, AI experts were asked when the Turing test would be passed. The consensus was hundreds of years or more.

The prediction comes at a time when Google has bought one of world's top robotics companies and assembled the largest artificial intelligence laboratory on the planet.

See video on this from: http://bit.ly/1g3N8lP

Citizen scientists

An Oxford University research project needs your computer to help determine whether this year's record-breaking rainfall in the UK can be attributed to global warming. The team showed in 2011 that climate change was loading the extreme weather dice as far back as 2000 but it requires a great deal of computing time.
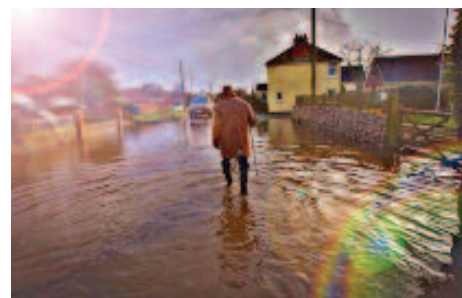
You can 'do your bit' by signing up here: http://bit.ly/ODQVv6

Prevention is better than cure

First there was reactive analytics. Next came prescriptive analysis, adding real-time evaluation to the big data model. Now, we are entering the age of predictive analytics, allowing insight to correct behaviours and avoid future problems.

Much of this predictive power comes from deep and clean analysis of consumer data, which can be used to create actionable models. 'This New Culture', according to ZDNet, 'lets big data analytics outperform competitors by up to 75% and creates corporate culture in which data analysis is inseparable from business processes and appreciation for all types of data is encouraged'. More details on: http://zd.net/1fP2shJ

Healing hearts with predictive analytics

Predictive modelling and natural language processing technology developed by IBM and Epic has been used to identify patients at risk of heart failure. In a six-week study, 350,000 patient records were analysed. This identified 8,500 patients at risk of which 3,500 would probably not have been found by normal methods. More details on: http://bit.ly/1lS2lGS

Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die by Eric Siegel

Is life what happens when we're making other plans, or is everything predictable? Eric Siegel discusses the promise and pitfalls of Big Data in his book, Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die.
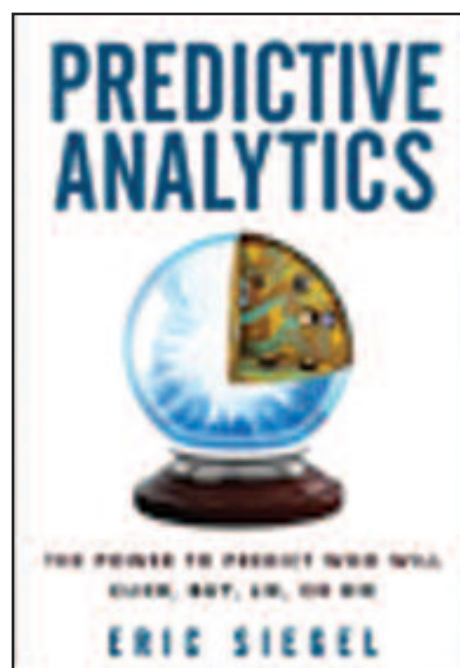
Now with more information available for analysis than ever before, human behaviour can be defined, mapped and predicted by analytics. Eric Siegel's new book tells the reader all about the 'technology that learns from experience'.

Fake Papers in Scientific Journals

Springer and IEEE have agreed to remove over 120 papers from their archives after an investigation by Cyril Labbe of Joseph Fourier University discovered that the papers contained nothing but computer-generated gibberish.

The source of these 'papers' is a computer program devised in 2005 by students from the MIT. The program, SCIgen, was written to create fake research papers as a way to test the review process for conferences. It generates random computer science research papers, including graphs, figures, and citations. It uses hand-written context-free grammar to form all elements of the papers.

News from HEFCE

The Secretary of State for Business, Innovation and Skills (BIS) and the Minister for Universities and Science have today confirmed funding allocations to the Higher Education Council for England (HEFCE) for financial year 2014-15 and sets out indicative allocations for financial year 2015-16.

Tim Melville-Ross, Chair of HEFCE's Board, said:

'At a time of considerable pressure on public finances, the funding settlement for 2014-15 and the indicative allocation for 2015-16 incorporate significant reductions. Nevertheless, the Government continues to recognise the key contribution that higher education makes to the economy and society. We will work to implement the settlement in as fair and sensible a way as possible.'

BUDGET NEWS

George Osborne's recent budget speech included an announcement that £42m was being ear-marked to found the Alan Turing Institute to ensure Britain leads the way in big data and algorithm research.

The institute is intended to bring together expertise and experience in tackling problems requiring huge computational power to help British companies to gain an advantage from big data.

The tender to house the institute will be issued later this year. It may be a brand-new facility or use existing space in a university. Its funding will come from the Department for Business, Innovation and Skills, and its chief will report to the science minister, David Willetts. No staffing numbers or chief executive have been announced.

IN BRIEF articles compiled by John Crocker and Nigel Cummings

SUBMIT YOUR IN BRIEF STORIES TO InsideOR@theorsociety.com

VP GOES WEST

JO SMEDLEY

A mid-February evening in Cardiff, what better to do than go along to the university to listen to John Hopes from Ernst and Young provide the annual 2013-2014 WORDS-SWORDS seminar, entitled 'How O.R. and Analytics skills can be mutually beneficial'.

Defining analytics as 'Extensive use of data, statistical and quantitative analysis, explanatory and predictive models, and fact-based management to drive decisions and actions' (Davenport and Harris in Competing on Analytics), his talk focused on the established link between O.R. and analytics. Case studies demonstrated how O.R. adds value to analytics but also the challenges and opportunities for O.R. through big data and data science. John's position was that the big data challenge for O.R. is 'understanding the drivers of value at a granular level' to see the wood for the trees with large data sets, new data technologies and automated decision making. With analytics and big data continuing to present big issues for business and government, he highlighted the career opportunities offered for O.R. practitioners with associated new avenues for research. As a Vice President of the OR Society, John talked about how the Society's developments are contributing to developments in analytics and the big data community through the opportunities it offers. The Analytics Network is an important part of this.

The seminar was well received by an attentive academic and practitioner O.R. audience. Penny Holborn, Research Associate at Cardiff University, commented 'Analytics is continuing to receive an increasing amount of publicity in the O.R. community, but until now I had naively not given it too much attention. However, by the second or third slide of John's talk it was clear to me that actually O.R. plays a big part in Analytics'. Angelico Fetta, a Ph.D. student at Cardiff University agreed 'The seminar was of great interest – I realized that the skills I have accumulated over my research have broad applications, across a variety of fields.' As well as being of interest to emerging academics, the seminar also engaged with experienced practitioners. Bill Dowsland, an experienced O.R. practitioner, commented 'John gave a most interesting and informative talk, illustrating well the skills that O.R. can bring to analytics but also showing that expertise from other disciplines, in particular IT, needs to be included so that the full range of data / information sources can be fully exploited.

<OR>

WATCH THIS SPACE…

A joint Special Interest Group (SIG) workshop on Developments in Scenario Planning

Hosted by the Strategy SIGs of the OR Society and the British Academy of Management

Date: **4 June 2014**

Location: **Warwick Business School, University of Warwick, Coventry, UK**

For queries please contact:
Frances O'Brien at frances.o-brien@wbs.ac.uk, (Chair of the OR Society OR&Strategy SIG)
Maureen Meadows at Maureen.meadows@open.ac.uk, (Chair of BAM Strategy SIG)

SIMULATION WORKSHOP (SW14):
1 – 2 APRIL 2014

DURK-JOUKE VAN DER ZEE – PUBLICITY CHAIR SW14 COMMITTEE

The Abbey Hotel Golf and Country Club near Redditch in Worcestershire is the venue for the Society's 7th Simulation Workshop.

For all the details about our Keynote speaker, the Programme, the Abstracts, our Sponsors and more at this excellent Workshop, go to www.theorsociety.com/SW14

If you have not already booked, the SW14 website Booking facility is still open.

<OR>

We are grateful to the following organisations for their sponsorship of SW14.

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saker solutions

SIMUL8

Tackling Transition in Mathematics, Statistics and Operational Research

Thursday 3 April 2014, Royal Statistical Society, 12 Errol Street, London EC1Y 8LX

The Higher Education Academy (HEA) is a national organisation that works to enhance the quality of the student experience in higher education. In 2013/14 we are undertaking work on the transition into university study in a range of disciplines. As part of this work we are inviting teachers, lecturers and interested stakeholders working in Mathematics, Statistics and Operational Research to join us for an evening of discussion about the transition into higher education study in specialist degree programmes in these subject areas.

This event is designed to facilitate networking and dialogue between pre-university and university educators working in Mathematics, Statistics and Operational Research. It will provide opportunities for individuals within both sectors of the education system in the UK to share expertise and experiences and to explore more effective ways of working together to tackle transition for our students.

The event will commence at 17:30 and close at 20:00. A light buffet reception will be provided. There is no charge for attending, although places are limited and advance registration is essential.

For further information and to book a place, please go to our online events page at
http://www.heacademy.ac.uk/events/detail/2014/03_April_Tackling_Transition_Maths_Stats_OR.
Delegates attending this event will need to register with the HEA. This can be done by going to our website (http://www.heacademy.ac.uk) and clicking on the 'My Academy' tab.

This event is being run by the Mathematics, Statistics and Operational Research discipline at the HEA.

The Higher Education Academy

STEM

DEVELOPMENTS IN ADVANCED ANALYTICS AND BIG DATA 2014

This third annual event will demonstrate, by way of case examples, how developments in Analytics are leading to **increased competitive advantage**.

Wednesday, 30 April 2014. 9:00am to 5:30pm.
BMA House, Tavistock Square London WC1H 9JP
BOOK NOW TO SAVE:
Fee £75 (plus VAT) **until 1 April** then £150+VAT Includes buffet lunch

Our confirmed Speakers:
Sir Mark Walport *Government Chief Scientific Adviser* The Age of Analytics: how Government can make the most of the data opportunity; **Don N. Kleinmuntz** *Principal, Kleinmuntz Associates LLC and President of INFORMS Section on Analytics* Analytics and O.R. in the US: Making the Connection; **Sayara Beg** *Consultant, The Operational Research Consultancy and Chair of The OR Society's Analytics Network* O.R. Best Practice and Governance in Analytics Consulting; **Alan Hambrook** *CEO Zoral Labs* Behavioural Data and its use in Predictive Analytics; **Russell Hodge** *Principal Consultant, Capgemini Consulting* Intelligent Asset Management – Embedding Analytics to improve Asset Maintenance and Renewal Decisions; **Dan Kellett** *Director of Decision Sciences, Capital One UK* Developments and Challenges in Credit Scoring; **Con Ariti** *Senior Trust Analyst, Nuffield Trust* Advanced Analytics in Health and Social Care; **Arne K. Strauss** *Associate Professor of Operational Research, Warwick Business School* Pricing Analytics: what can Retailers learn from Airlines?

Chairs: **Stewart Robinson** *President, The OR Society* and **John Hopes** *Vice President, The OR Society and Chair of its Analytics Working Group*

Further details of the presentations and profiles of speakers can be found at www.analytics-events.co.uk

Book now at www.analytics-events.co.uk

This event is subsidised by the OR Society to ensure excellent value

WHAT DO THOSE WHO'VE RECEIVED PRO BONO O.R. HAVE TO SAY…

FELICITY MCLEISTER

Wondering how Pro Bono O.R. is helping third sector organisations?

Felicity McLeister

Here is what a few of the organisations who've received Pro Bono support had to say:

Work for Us

There is a clearer understanding of people's roles and funding being applied for as well. This all makes for a more positive workforce with a clearer understanding of the way forward.

(Project and Communication Manager)

Springboard

The work is already supporting our planning and development for next year and allowing us to focus our thoughts and decisions on the places of most importance for our organisation. It has helped us to come up with new solutions already.

(CEO)

Crimestoppers

We've benefited hugely from your work and support in all areas of the project, and from an organisational perspective you've enabled us to take a highly professional approach to increasing the efficiency of our charity.

(Performance Manager)

Participle

I have just started to digest the work you did for us and wanted to say a huge thank you. This will be so critical to our growth and I am very grateful indeed for your time and expertise. The team have described you as 'a joy to work with'.

(Principle Partner)

The Cardinal Hume Centre

We valued the opportunity to work collaboratively and without doubt benefited from the analyst's expertise and commitment to the project.

(Operations Director)

Joseph Rowntree Foundation

JRF is an endowed foundation funding UK-wide research and development work. We have begun a major new programme to develop an anti-poverty strategy for the UK – costed, based on the best international evidence and politically-balanced. A fundamental part of this programme is to use and build simulation models of poverty to test out, refine and demonstrate the impact of our strategies. One of the main problems with previous strategies is that they do not demonstrate how policies might achieve the desired targets. Through the use of models, we aim to at least show in theory that the strategies would have an impact. We are very pleased to have gained the expertise of two external operational researchers through the Pro Bono O.R. scheme, who will be giving JRF and the research teams their independent and expert advice as we commission and use the poverty models in 2014 and 2015.

(Head of Poverty)

If you are interested in receiving Pro Bono O.R. support, becoming a volunteer or just want to find out more information, please write to felicity.mcleister@theorsociety.com

@FMcLeister

Felicity McLeister

Pro bono blog: http://probonoor.blogspot.co.uk/

Pro bono webpage:

http://www.theorsociety.com/Pages/Probono/Probono.aspx

<OR>

BEALE LECTURE

JOHN CROCKER

Evelyn Martin Lansdowne Beale (1928-1985) was an applied mathematician, statistician, pioneer of mathematical programming and the recipient of the Operational Research Society's Silver Medal (in 1980) and a Fellow of the Royal Society so it was singly appropriate that the first Beale Lecture named in his honour was held at the Royal Society, 6-9 Carlton House Terrace.

Richard Wood

Despite it being held in the afternoon, the event was a 'sell out'. There was a double bill with the first speaker, Richard Wood, who, at the start of his career was the recipient of the O.R. Society's 2011 PhD prize followed by Mark Elder, who recently retired as CEO, Simul8 and was awarded the 2012 Beale Medal.

Richard's research under Janet Williams and Jeff Griffiths at Cardiff University modelled the activities at a Neurological Rehabilitation Unit and was part of the LANCS project. His external examiner is quoted as having commented that the work was impressive and had made a major impact on a hospital unit, that the thesis was also a pleasure to read and that it solves a practical problem.

The unit has an annual demand of some 375 patients but with 21 beds and an average length of stay (LOS) of 5 months, its throughput is only 50 per annum. At its simplest, it is an M|M|21 queue. However, as we know, not all patients are the same plus there are other contributory factors such as bed-blocking (when

Mark Elder

patients are to be moved out of the unit but have to wait several days before the receiving unit is able to take them) and reneging (when patients fail to arrive at their scheduled time maybe because they are receiving other treatment elsewhere, they have been sent
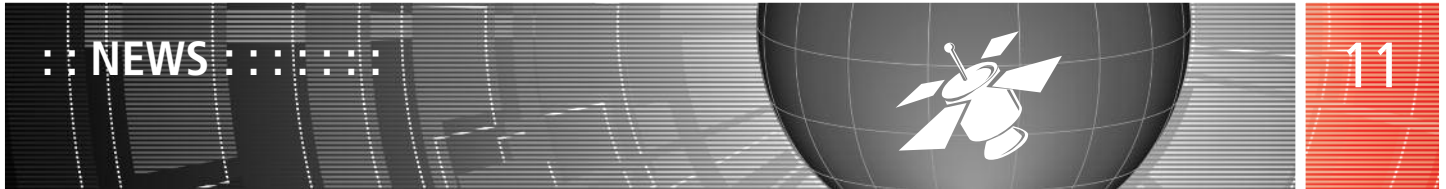
to another unit or, in extreme cases, have died waiting). Based on various factors, the initial group waiting to be treated was split into 4 sub-groups each with their own average LOS (ranging from 72 to 255 days) of which bed-blocking accounted for from 14 to 77 days. The 21 beds available were divided among these four groups with 6, 3, 3 and 9 being nominally allocated.

The model was used for a number of 'what if' studies such as increasing the number of group sessions and replacing higher paid staff with the same number of lower paid ones. (The former had a positive benefit whereas due to a lack of the necessary skills, the latter was shown not to be worthwhile.) An additional benefit of the model was that it included an automatic scheduling program which significantly reduced the time needed to do this task, provided a better solution, more time for clinical work, produced performance measures and audit data.

Richard is now working for the Lloyds Banking Group.

Mark Elder started his 'Journey of Discovery' more than 35 years ago. He joined British Leyland in 1978 as a statistician. As it turned out, another graduate was supposed to have started the same day who was going to be given a simulation modelling problem but he failed to materialise with the result that the problem was given to Mark (and the rest, as they say is history).

There are many curious phenomena that result from developing simulation models if done properly, i.e. by working closely with the client. Clients often solve their own problems even before you have had chance to develop a rudimentary model: the act of thinking about and trying to explain the problem to an outsider often leads to the solution. A particular organisation in Baltimore wanted to reduce the amount of overtime they were paying out. The doors closed at 4:30pm allowing 30 minutes for those waiting to be processed (before the end of the shift). On most nights, there was still a large number of customers waiting at 5pm but occasionally all transactions had been completed and the staff were ready to clock-off before 5pm. The client then happened to notice a very high correlation between the nights when the Baltimore Ravens were playing at home and the nights when the staff finished on time. It then dawned on him that the staff wanted the overtime pay but not so much that they were willing to miss the game.

Sometimes, rather than producing a solution, it will lead the client to realise that he or she is asking the wrong questions. Very often this is because the client only sees a small part of the business. When the consultant asks what happens up and down stream of this particular area, the client either has to go away and find out or, better still bring in those responsible for these areas. Getting everyone together around a model (even a highly simplified one)

gets people talking and seeing the bigger issue.

A very important point when dealing with clients is to make sure they accept that building a simulation model is not an IT problem. It is both an iterative and an interactive process which is best started with a very simple model that can be built upon as the client fills in more detail or as you have new ideas.

The process is very much a 'Journey of Discovery' not just for you but also for the client. Unfortunately, most businesses like firm, fixed-price contracts with a guaranteed return on investment within an agreed timescale. O.R. projects are not like that. Mark recommended that if possible you should contract for a 10-day period at the end of which if the problem has not been solved then one can negotiate a further 10 days and so on.

The 10-Day Approach

- 1, 2 or even 3 models

- At least one workshop

- Learn something valuable

- Know what to use the next 10 days for (if required)

Alternatively, one can offer a flexible contract in which one builds in a caveat to allow changes to be made to the model spec as required (by both parties) -

Flexible Clause Approach

- Full scale model spec

- Project to start with a workshop

- Mutual agreement on change requests.

Although it is possible to write simulation models in FORTRAN, the advantages that products such as Simul8 give are that you can sit down with the clients and develop a first-off simple model as you talk to them using icons and symbols that the clients can understand. As with Richard's model, you can add more sophistication later if required. The aim of these initial sessions is not so much to impress the clients with your knowledge and skills but to convince them that you understand their problems and give them the confidence that it is these problems which you will [attempt to] solve.

If you missed this event, make sure you look out for the notices announcing next year's – this is definitely one to put in your diaries. If you would like to see the whole event or re-live the experience then a video is available on the OR Society website.

<OR>

CAREERS OPEN DAY 2014

Exhibitor booking now open

The Open Day will be held at Millennium Point, Birmingham on Wednesday 19 November 2014

Early Bird booking
Reserve a stand by 30 June 2014 for £280 +VAT
(£320 + VAT thereafter).

Price includes lunch and refreshments, monthly feature in Inside O.R. up to the event and a follow up article, and a profile on our website. Confirmed exhibitors will be promoted to students prior to the event.

To reserve a stand please email your full contact details to Louise Orpin, louise.orpin@theorsociety.com

Find out more online at
www.TheORSociety.com/CareersOpenDay

<OR>

HOW O.R. HELPS TO STRETCH THE THIN BLUE LINE

SUE MERCHANT

Monday morning may not be the most obvious time to hold a Criminal Justice special interest group meeting, nonetheless seventeen people made it from as far afield as Edinburgh and Bournemouth, and our four speakers sparked off several lively discussions – no sign of Monday morning blues!

Ben Strange, from the Mayor of London's Office for Policing and Crime, gave a most interesting account of the emerging Business Crime Strategy in which he was heavily involved. He explained the difficulty of obtaining an accurate picture of business crime because of such things as complex counting rules, under-reporting and the plethora of bodies involved. To help Ben prioritise actions from the strategy the audience suggested using SSM, causal loop methods, the strategic choice approach and SODA.

HMIC's role is to examine the effectiveness and efficiency of police forces and national police agencies by annual inspections and force monitoring. Alastair Windus explained that the role of the O.R. team (he and Sian Puttock, in a group of 12 analysts) was mainly data collection and analysis though they hoped to use more complex methods in future. Analyses are used primarily to help forces make appropriate comparisons with similar forces which encourages thinking about achieving the best value for money. The team's charts are presented to police forces and the public as well as to senior officials within the Inspectorate and the Home Office. Examples include comparisons of the availability of officers with demand patterns and response times, and of spend with demand..

Alan Jackson from Hampshire Police (supported by Roy Garlick and Gary Chitan from iGrafx) explained to us how the force had improved its custody suite throughput of prisoners using process mapping and simulation with the result that the department is on track in achieving its £6m savings' target by 2015. Alan described how simulation had helped achieve a much better level of cover by identifying bottlenecks in the custody system, plus the needs to appropriately resource custody centres and find alternative case disposal methods. The data collection method used for the simulation was later used to design the size of new custody centres being planned by the Force.

Our final speaker, Jo Leigh, from Loughborough University outlined her PhD research proposals and sought practical advice on their feasibility and on the possible pitfalls she might meet.. Her aims were to try to automate predictive policing, to allocate and position police resources, to make best use of resources to minimise incident reaction time and maximise visibility. She focused on two aspects of the work – using predictive methods to identify hot spot areas for patrol where a police presence might act as a deterrent and automatic selection of the best resource to dispatch to the scene of an incident. Advice from the audience suggested the work may need to be better focused and should ensure that some of the softer reasons for dispatching a particular vehicle were included (e.g. the need to give experience to certain officers).

A big 'thank you' to our four excellent speakers, to Nick Manton for arranging the accommodation and to all involved. *Some of the speakers' slides will be posted on the CJ sig website soon.*

Next CJ sig event will be on 23 **June 1.30pm-4.30pm** in central London see website for details.

<OR>

EVENTS WORLDWIDE

To see the full listing go to:

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

ACCOUNTABILITY OF HUMANITARIAN AID AGENCIES

NIGEL CUMMINGS

Humanitarian agencies do not have the best 'track records' for measuring the effectiveness of the assistance they give. According to the Humanitarian Research Network they should develop clearer data collection methods and analyse results more systematically.

ALNAP the Active Learning Network for Accountability and Performance in Humanitarian Action says that humanitarian agencies need to 'open up their data' to outside scrutiny and treat the data collected more scientifically.

According to Paul Knox Clarke, Head of Research and Communications at ALNAP, 'evidence is something you need, to do the job. Evidence collection and analysis is a significant input for programme design, it enables agencies to assess whether humanitarian support is needed, how much may be required and what type is most effective.'

However the data must be clean and accurate to support the evidence. It needs to be collected to 'faithfully mirror conditions on the ground' to ensure that different voices from affected communities are heard and reflected in programme design. More should also be done to ensure the inclusion of those receiving aid or in crisis.

Knox Clarke also said, 'While there are many notable and noble exceptions, generally reports assessing humanitarian work do not make any formal statement of the methodology that they used to collect the information, to establish the accuracy of the information or to establish the degree to which the information is representative of the larger population.'

John Seaman, Director of Research at Evidence for Development, a UK charity that develops methods for collecting and analysing information on household income and livelihoods, recently said that the culture and business models of humanitarian agencies were too often geared towards the organisations' perpetuation rather than assessing whether or not their work was worthwhile and effective.

He also called for independent reviews of existing data so that it can be 'removed from all the pressures and biases that are intrinsic to any agency's operations'. To accomplish this he thought that agencies needed to break out of the confines of their operating environment and start collaborating on data collection and analysis.

Joanna Macrae, Humanitarian Adviser at the UK Department for International Development, agreed there was a need for more collaboration among humanitarian agencies and academics in research and analysis, to help improve the quality of evidence and allow data to be compared over time.

'Huge quantities of data', she said, 'are held by individual agencies at individual project level, but the problem is they tend to be locked in at that level. Encouraging a cultural shift towards embedding evidence-based approaches into humanitarian work should involve incentives, including making collaborations between academics and agencies a condition of funding. Data science academics would also need incentives to get involved as, historically, their rate of engagement has not been particularly high.'

One way the OR Society is helping to address these issues is through its pro bono scheme organized by Felicity McLeister. http://www.theorsociety.com/Pages/Probono/Probono.aspx

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INAUGURAL THOUGHTS: INTO 2014

STEWART ROBINSON, LOUGHBOROUGH UNIVERSITY PRESIDENT

'I look forward to a fruitful two years and would welcome ideas on how we can move the Society, and more importantly the field of O.R., forward.'

I spent New Year's Eve celebrating with friends and following what has now become the family tradition of watching the London fireworks on TV. We did go and see them live a few years ago, but decided the whole experience is much better remotely and in the warm. On this occasion, the closing of 2013 also saw the start of my two-year term as President.

Among the many things I am learning about being President is that everyone wants to know what I am going to do. I will try and answer that, at least in part, in a moment. The answer to that question, however, is made easier on two counts. First, the excellent state of the 'ship' that I am inheriting following Geoff Royston's two year term. I am very grateful to Geoff for having so ably led the Society and for his help and advice during the handover; which continues in his role as Immediate Past President. Second, I can cheat a little given that I have been on the Society's Board since 2009. As a result, I have been given a running start on some initiatives that have already started.

The Society is in great shape with many exciting on-going and new activities. Among these I count the conferences, journals, regular lectures (including the newly launched Beale Lecture that I am attending today), website developments (the newly launched Science of Better website), analytics network, corporate membership, … If I continue I am bound to be accused of missing something important, so I will simply curtail my list there.

On the other side, I think our greatest concern is a reduction in membership numbers, although Ruth Kaufman (Chair of the Publicity, Membership and Website committee) assures me these have now steadied. This is interesting because we seem to be working amongst two opposing forces. O.R. is being used more than ever, although often in the guise of analytics, so surely there would be more interest in our offerings? Meanwhile, the internet age has meant so much is available for free and has lowered expectations of the need to belong to a physical (fee charging) group. Indeed, I understand many other societies are facing similar membership challenges.

So what are some of things we can do to address the membership issue? Here are my thoughts, so far, on three possible ways forward:

1. Developing our analytics initiative seems paramount to keeping and developing strong practitioner interest in the

: : LEADER : : : : : :

Society. At a recent meeting of the Heads of O.R. Forum it was clear that many O.R. practitioners now refer to themselves as practicing analytics. Whatever out thoughts on the term 'analytics', it strikes a chord with the world outside of O.R. and is generating much interest. There are many thousands working in analytics in one form or another, and as our strapline says, O.R. is certainly at the heart of a significant proportion of analytics work.

Beyond practitioner interest, we are also starting to see much stronger academic interest in analytics, but much of the work is happening outside of the auspices of O.R. As a Society I believe we are in a position to capture some of this academic activity (e.g. through publications and conferences), since there seems to be no natural home for this work at present.

So we need to find routes to further the work on analytics already being led by Vice-President John Hopes (the Analytics Working Party) and Sayara Beg (the Analytics Network).

2. With the ending of the publication of OR Insight in 2013 there is a hole in our portfolio of publications, with no specific publication aimed at a practitioner or O.R. users audience. The Publications Committee and the Board have been working on a replacement publication and I am pleased to announce that we have agreed to go ahead with a new magazine style publication aimed at that audience. Graham Rand (Lancaster University) has agreed to edit the magazine whilst working alongside a professional editor. The plan is to launch some trial issues from next year. I am sure there will be more details provided through the pages of Inside O.R. over the next few months. One thing we need to decide is the name of the magazine. Any suggestions are welcome.

3. In this modern age of internet based networks we need to think more broadly about our membership model. One possibility is to develop a broader network of those with an interest in O.R. to whom we regularly send information. There are many visitors to our website, authors for our journals, students who study O.R. related subjects, members

of our LinkedIn Group (to name some key parts of our network), that although they are not members, would be interested in our services; and with time might be persuaded to join. Collating contact information for this 'network, and then using it to publicise O.R. and the work of the Society could be of great advantage.

Our interest in growing membership is primarily aimed at furthering interest in O.R.; one of our charitable aims. We cannot do that without a strong membership base and a broad network of contacts. Of course, the income that membership generates, both directly and indirectly, also allows the Society to further its charitable aims.

I must conclude by pointing out that this is not what I am going to do, but what the Society with its members needs to work towards. I look forward to a fruitful two years and would welcome ideas on how we can move the Society, and more importantly the field of O.R., forward.

Brief Biog ...

You could say Stewart has had a bottom-up approach having started his career working for a leading UK shoe retailer before joining AT&T Istel (now Lanner Group) as a simulation consultant. After seven years as a practitioner and consultant he decided to throw it all in and become an academic firstly with the Aston Business School, then the Warwick Business School and now with Loughborough University where he took up the position of Professor of Management Science in 2011.

His nine key areas of interest are: simulation; simulation; …; simulation! Apart from his academic and consultancy activities, he was co-founder of the OR Society Simulation Workshop, a biennial conference and co-founder of the Journal of Simulation now in its eighth year.

If all that was not enough, Stewart has also completed the 10K run in 40 min 03 sec; the half Marathon in 84 min 09 sec and; the Marathon 195 min. And, talking of from the bottom up, Stewart supports (and I use the word advisedly) AFC Wimbledon! For more info see www.stewartrobinson.co.uk

<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

WAR, PEACE, AND META-HEURISTIC ALGORITHMS

LOUISE MAYNARD-ATEM

This month the theme is books; I've been reading Stephen Budiansky's latest work entitled 'Blackett's War' which is part biography and part history lesson on how Patrick Blackett and his team used mathematical method in a warfare context, and gave rise to the discipline of Operational Research.

It really is a great read, so I thought I'd share my thoughts on it. The second thing I'll be talking about is meta-heuristic algorithms, which Sanja Petrovic mentioned briefly in her piece last month on suitable O.R. textbooks. I'll be trying to figure out what they are and how they might be used in an application context.

War & Peace

Patrick Blackett is probably far more well known to O.R. society members than he would be to the majority of the public and Blackett's War gives a bit more detail on who he was as a person, as well as his political leanings and motivations. The book rightly focusses on work of Blackett and other scientists of the time, as they applied scientific method to a warfare context particularly in reference to reducing the effectiveness of German U-boats. Budiansky's portrayal of the resistance and opposition that Blackett faced from more traditional military personnel is particularly compelling and may echo the frustrations of those who currently campaign for more evidence based policy making. What I found most fascinating about the book was how intuitive Blackett's approach felt; it's difficult to understand how a different strategy had prevailed for such a long period in time previously and also why something so seemingly obvious and blatantly beneficial was met with such suspicion. I imagine there are lots of books on a similar theme, but I'm particularly keen on this one as I feel it's a very well rounded introduction to Blackett as person and provides a rich context around the birth of O.R.

Have you read Blackett's War? I'd be interested to hear your thoughts if you have, or perhaps there are other books available that you think I should read, or would like to talk about. As always, I'm very keen to hear from you.

Meta-Heuristic Algorithms

My O.R. Society mentor, Jane Parkin, first floated the idea of an article on metheuristics a little while ago and Sanja Petrovic's mention of them in her article last month really cemented the notion. What really stood out for me was a comment Sanja made about decision makers sometimes wanted quick approximate solutions rather than exact ones that take considerable amounts of time to generate. Now, the scientist in me always balks at the thought of producing anything *inexact*, believing it ultimately leads to *incorrect*. However the increasingly more dominant pragmatist in me thinks that, when trying to solve real-world problems, you rarely have the luxury of time being on your side. So with that in mind, what actually are meta-heuristic algorithms? In a short , snappy(ish)

sentence: 'a meta-heuristic is a general algorithmic framework used to address intractable questions'. Going into slightly more detail, a metaheuristic is a high level procedure used to select a slightly lower level procedure that will provide a sufficiently appropriate solution to an optimisation problem in a relatively short period of time. Metaheuristics are particularly useful when dealing with incomplete or imperfect information and often involve assumptions being made, which makes them non-problem specific. Figure 1 gives a diagramatic summary of the different classifications of metaheuristics. A globally optimal solution may not necessarily be found using metaheuristics but by searching over a large set of feasible solutions, a good solution can often be found and with less computational effort.
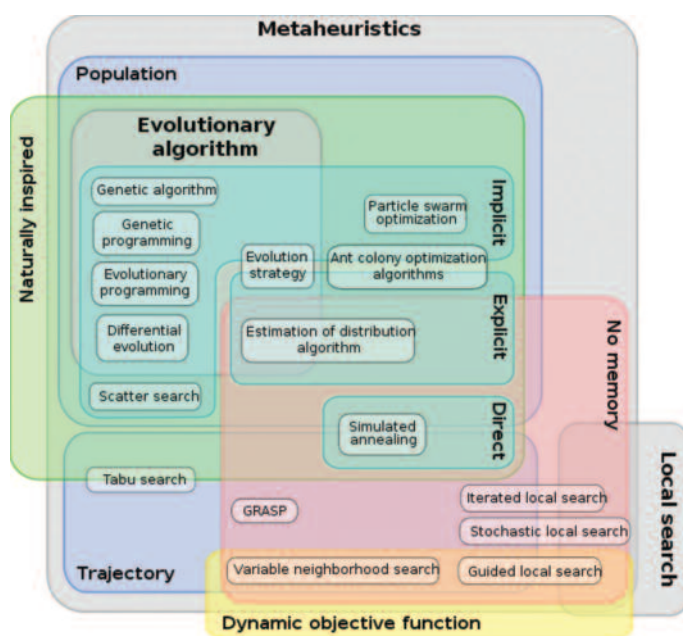
Figure 1 – The different classifications of metaheuristics.
One of the key differences between metaheuristics and heuristics is that heuristics are designed to solve a specific problem, whereas metaheuristics can be applied to multiple problems. If you're particularly interested in this area, there are a number of papers available online – I found Sze and Tiong's paper entitled 'A Comparison between Heuristic and Metaheuristic Methods for Solving the Multiple Travelling Salesman Problem' very helpful when I starting researching this area.

In terms of applications, metaheuristics are most often used in combinatorial optimisations in which a solution is sought over a discreet search space. Genetic algorithms, tabu searches and simulated annealing are all popular metaheuristics used for solving combinatorial problems.

Problem Page

Thank you to all of those who've sent in responses to last month's problem page. I definitely breathed a sigh of relief when I read that your solutions matched my own (I think I'm finally starting to get the hang of this O.R. stuff). I hope everyone will be as quick off the mark with this month's problem. As usual, answers on an e-postcard please (Louise.Maynard-Atem@dh.gsi.gov.uk) and best of luck!

Puzzle #2 – Connected and Infected

Disease can spread quickly in a globalized world where increased travel raises the opportunity for transmission. Figure A shows a modified map of the world divided into five areas. The arrows show the potential path for the spread of disease. For example, the Blue area can transmit infections directly to the Red and Violet areas but not to the Yellow or Green areas. Each area can also transmit disease to its own population, indicated by the arrows that circle back onto themselves.

The populations for each area are as follows: Blue has 0.5 billion people, Red has 0.5 billion people, Violet has 4.0 billion people, Yellow has 1.0 billion people, and Green has 0.5 billion people. Initially everyone is healthy except for 10,000 people in the Blue area who are infected with a virus.

Each month, 6.1% of the infected people transmit the virus to healthy people along each transmission route. For example, at the end of month 1, the Red and Violet areas will each have 610 infected people (10,000 infected people from the Blue area x 6.1%) and the Blue area will have 10,610 infected people (10,000 who were originally infected plus 10,000 x 6.1% from infecting its own population). Infected people stay infected and no deaths occur in this scenario.

Question: After how many months is at least half of the world's population infected?

Hint, its less than 100.

<OR>

Figure A
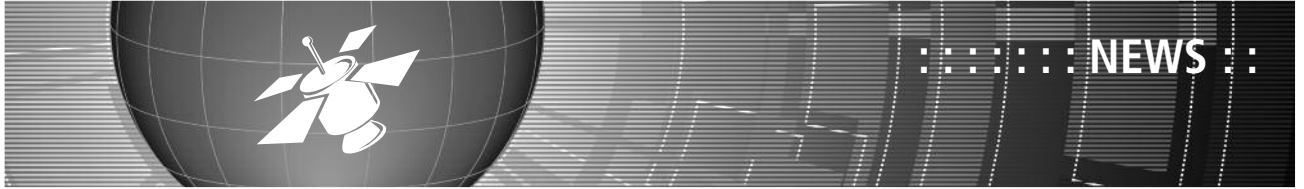
OPERATIONAL RESEARCH AND DESIGN – REPORT ON A JOINT EXPLORATORY WORKSHOP

BY GEOFF ROYSTON AND GAVIN BLACKETT

Those of you whose response to the question of age tends to be 'as old as my tongue and a little bit older than my teeth' will recall 'the Ackoff debates' of the 1970s.

Russ Ackoff, one of O.R.'s founding fathers, argued that traditional O.R. techniques of analysis were insufficient for tackling important managerial and societal problems and that we also needed the skills of synthesis, and challenged O.R. professionals to ' *to improve our methods of design and invention*' [i].

Although the UK O.R. community responded to the challenge, particularly by developing what came to be called 'soft' O.R. approaches, these typically focus on problem structuring rather than on addressing issues of design as a whole. However, although portrayals of O.R., whether 'soft' or 'hard', generally emphasise decision analysis, O.R. work often also involves the design of systems or processes. So, especially perhaps now managers are becoming more interested in how design concepts could be relevant to their work [ii], Ackoff's challenge looks like important unfinished business.

What seems particularly to have been missing is dialogue with those whose central concern is design i.e. professional designers. To that end the OR Society has been engaged recently in exploratory discussion with the UK design community. An OR Society presentation at the Engineering Design Centre at the University of Cambridge last year led to agreement to hold a workshop, hosted jointly by the OR Society and the Design Society, to explore mutual interests. So, in February, a mixed group of a dozen people drawn equally from each community (with invaluable assistance from Claudia Eckert, chair of the Design Society's special interest group on modelling and management of engineering processes), including design professionals from five UK universities, gathered for a day at the OU centre in London to explore connections, to look for synergies between the fields, and to consider how the links might be usefully developed.

The workshop kicked off with couple of introductory presentations about possible common interests, one by Geoff Royston from the OR Society, and one by Chris McMahon, a former president of the Design Society. It was noteworthy that both talks – quite independently – cited the work of the Nobel laureate Herbert Simon as providing a common foundation - both referring to Simon's 1960s book 'The Sciences of the Artificial'. This seminal book (now in its third edition [iii]) focused not on the task of explaining *how things are* (the domain of the supporting basic sciences) but on a disciplined approach to exploring *how things might be* - a *'science of design'* concerned with topics such as the representation of design problems and the search for alternatives, and included in this proposed science many of the (then new) methods of operational research.

These presentations then led to a lively discussion about what a science of design might now comprise, and how O.R. and design relate both in theory and in practice. O.R. was regarded as placing more emphasis on *analysis* of problems, particularly through *modelling*, and design as focusing more on the *creation* of solutions, particularly through *incremental* approaches. But there are clearly overlaps, and both groups for example have expertise in handling uncertainty, in working with systems and processes and in interacting with users.

The workshop then moved on to consider the two complementary issues of 'what can design bring to O.R.? ' and 'what can O.R. bring to design?'. On the former there was a view that approaches from design could bring particular strengths around ways to identify problems, in ways to search for holistic solutions, on user-focus and on impact. On the latter it was thought that O.R. approaches could bring rigour and system(at)icity, different ways of handling uncertainty, methods for facilitating collaborative design and analytical tools for assessing designs.

After lunch the workshop looked at how links between design and O.R. might be developed. It was apparent that both groups had fairly naïve assumptions about the subject matter of the other field and neither group had a clear idea of what the other is doing. So the key initial task was thought to be to building better mutual understanding. This, participants thought, could be assisted

through building a shared knowledge base of papers, methods and projects; by gathering practical case studies particularly those that would illustrate how approaches compared, and perhaps through joint work on a problem. Some questions for research were identified – e.g. how to produce an integrated approach to design; how to model human behavioural responses to design features; how to model design processes.

Training and education were seen as crucial to improve awareness, e.g. to ensure that the O.R. community understood that design is a systematic process not just a 'fluffy' art, and to clarify where collaboration would be most beneficial. Short courses could assist each community to learn about the other's concepts and tools e.g. the O.R. for non-O.R. managers course could be useful for designers. What would a design module in an O.R. course look like?

In the concluding session some possible next steps were identified including:
- sharing knowledge (online) e.g. lists of methods, projects, relevant meetings
- holding introductory training workshops for each other on each others' fields
- setting up a joint event to present case studies, e.g. on healthcare
- holding a joint workshop to study a particular problem, and to compare approaches
- running a stream on O.R. and design at future ORS conferences

- publishing case studies e.g. in a special issue of JORS on O.R. and design
- establishing a joint special interest group
- fostering joint research – e.g. joint bid to EPSRC/ESRC/TSB

The longer term hope was that progress in such areas would put both communities in a stronger position to contribute to major societal challenges such as healthcare, energy consumption, long term infrastructure or globalisation - that is surely what Ackoff would have wanted.

There is already a growing mailing list of OR Society members who want to be kept informed of developments in this area. *If you would like to join the mailing list, or even better, if you would like to help in taking forward any of the activities mentioned above, please let Geoff Royston or Gavin Blackett know.*

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i Ackoff R L (1979). The future of operational research is past. *Journal of the Operational Research Society* **30**(2): 93–104

Martin R (2009). *The Design of Business.* Harvard Business Press.

ii Simon H A (1996). *The Sciences of the Artificial.* 3rd Edition. MIT Press

<OR>

NEWS OF MEMBERS

NEW MEMBERS

The Society welcomes the following new members,
MARTIN ANDERSON, London LISA BUTLAND, West Yorkshire; RAFAEL ESCOBAR GÓMEZ, Spain; IMELDA GIARCHI, Edinburgh; FERGUS HOWELL, Leeds; ANDRE FERREIR, Northants; JEAN McLEOD, Birmingham; MUKESH KUMAR MEHLAWAT, India; HARRY WALTON, Bristol; CHRISTOPH WERNER, Glasgow;

and Reinstated members,
SATINDER RAI, West Midlands; SWARAJIT DAS, London;

and the following student members,
CHEOK FAI CHAN, Hants; JAN CHAN, London; GEORGIOS DAGKAKIS, Limerick; AMAJAD FAYOUMI, Leicestershire; GEORGIOS KONDYLAS, Southampton; SIBYLLE SEHL, Glasgow; BABAK TAKAND, London; MD SAMSAD REZA, London

Total Membership
2360

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

Admit to the category of Candidate Associate (CandORS)
Corinne JEFFS

Admit to the category of Associate (AORS)
Shahriar SAGHRI
Malcom HARLAND

Admit to the category of Associate Fellow (AFORS)
Nick COWAN

Admit to the category of Fellow (FORS)
Clint HEINZE
John JARRETT

<OR>

A SPOONFUL OF DATA

NIGEL CUMMINGS

If the NHS were a human being, it would be classified as a pensioner now, for 2014 marks its 66th year of existence; 66 years of service in which, despite many criticisms levelled at it, it is still acknowledged as one of the leading health organisations in the world.

Last year there were repeated calls for the NHS to live up to the £20bn 'Nicholson Challenge' for driving efficiency and savings i.e. to find £20 billion in 'efficiency savings' by 2015.

If this challenge is to be met, it is reasonable to assume that much of the savings will come through technology. This is because the NHS is shifting from being an institution focussed on treating chronic conditions, to one that uses data-sharing, O.R., Analytics, collaboration and digital healthcare practices to deliver healthcare services predictively.

One example of the application of this technology has been the digitisation of patient records. A move which is seen as vital for accelerating patient care, cutting waiting lists, and enabling more straightforward information sharing between departments and providing timely insight for medical practitioners.

Digitisation in addition to reducing costs also has the potential to simplify the working lives of healthcare professionals by reducing the time spent on administrative tasks and paperwork. Some NHS Trusts have shown considerable initiative by building advanced systems to support paperless working practices which have proven so successful that they will eventually be rolled out into all NHS installations. Simplification of patient records systems and easier sharing of data between NHS installations is both laudable and economic, but there is another phenomenon which is having a transformative impact across the UK – big data!

The World Economic Forum recently highlighted the fact that chronic care for high blood pressure, vascular diseases, lung diseases and diabetes could account for up to 80% of healthcare budgets by 2030. Although it did emphasises that the use of big data technologies and techniques to create platforms capable of improving efficiencies in the management of chronic health conditions such as cancer, diabetes, pulmonary conditions and cardiovascular disease would help to keep costs down if they were to be adopted universally.

The technologies most likely to have an impact in efficiencies and cost benefits are predictive analytics set across multiple datasets in real-time, the delivery of stratified medical pathways, drawing on patient, environmental, social and genetic data to anticipate treatment pathways, and the correlation, analysis and interpretation of telehealth, telemetry and genomic data to pre-emptively treat disease.

Predictive modelling is not new in the NHS but the difference now is the availability of technology that allows big data to be mined quickly and rapidly displayed to a variety of stakeholders and providers along integrated care pathways and across health and social care.

Coming to a surgery near you, doctors will be able to reliably prescribe treatment for disease that isn't due to manifest itself for 20 years or more. He or she could pre-emptively place you on a prediction driven treatment pathway that keeps you fit and healthy to maintain a high quality of life for longer. O.R. and Analytics will play a big part in this.

So, instead of spending £80bn on caring for the sick, much of this money will be needed to provide the equipment and technology to identify those at risk and provide pre-emptive treatments. There is life in the old yet!

<OR>

ALL YOU NEED IS DATA!

NIGEL CUMMINGS

'Data scientists are the new rock stars' according to the likes of Olaf Swantee, CEO EE, Ken Rudin, head of analytics at Facebook and Jeff Magnusson, manager of data science platform architecture at Netflix.

These gentlemen believe the data sciences are now so popular that if you ask children what they aspire to be as adults, data scientist will be a choice mentioned in the same breath as fireman, doctor, rock star, rapper, or even astronaut. This is because these days being a data scientist is seen as being someone involved in a glamorous industry.

Just looking at the United States alone for a moment, there are almost 190,000 positions available for up and coming data scientists. Companies looking for success in the data sciences are taking in all sorts of science graduates; Bachelors, Masters and even Doctors. Stanford, North Carolina State and Northwestern universities are already experiencing a huge influx of students clamouring for degrees in data management and analysis. A similar situation exists in Europe and applications for data science placements are 'on the up' in the UK – you only have to attend one of our careers open days to see that!

A study by the Royal Academy of Engineering shows that British industry will need 1.25 million new STEM graduates between now and 2020 just to maintain current employment numbers. Even that figure might not be enough to satisfy the British data industries' requirements though.

This is because is 'big data' is as yet unquantifiable, just how big is it? A study at the end of 2012 by IDC predicted the 'digital universe' would reach 40 zettabytes (ZB) capacity by 2020, though in reality that figure could be much higher – 40 ZB is $4*10^{22}$ bytes or approx, $40*2^{70}$ bytes)

This terrific surge of data is being created by many external forces which include: financial transactions, mobile phones and social media, the number of clicks that take place daily on the Internet to access information, and even from the updating and keeping of medical records.

According to IDC only 1% of the world's data is currently being analysed and the technology and tools for collecting and storing information has to date raced far ahead of our skills to understand it -data collection is outstripping our abilities to develop technologies to analyse it! Filling this 'big data gap' is not just a question of 'getting up to speed' with technologies though, filling the gap also means importing 'new talent' into data driven employment - these people will be in demand as much as the software developers of the dot-com boom were.

Eric Siegel, author of Predictive Analytics, summed up the value of data when he said. 'A user's data can be purchased for about half a cent, but the average user's value to the Internet advertising ecosystem is estimated at $1,200 per year.'

Data scientists Reid Hoffman and Konstantin Guericke created LinkedIn, in December 2002 to help build individuals' networks for them. The 'people you may know' feature has, through its ability to target individuals for marketing purposes, raised the 'value' of the company to approximately $7.5 billion (£4.5 billion). LinkedIn is one company that shows analytics can be a route to massive revenues!

<OR>

YOU WANT IT WHEN?

NIGEL CUMMINGS

Ocado's vans are a familiar sight on suburban streets. But how is Ocado able to compete with such giants as Tesco, Asda and Sainsbury's, to name but a few?

The answer appears to be in its software. Ocado employs some 340 software developers and other IT specialists within its technology division - more than half of the head office headcount.

According to Paul Clarke. Director of Technology, 'We are not a typical retailer - technology is woven into everything we do. We are much more like Google or Amazon than our traditional competitors.' Ocado's main selling point is the ability to designate 'one-hour delivery windows' to customers.

Tesco, currently only offers this feature in 'some' locations, and provides instead a far less convenient 'two-hour window' option everywhere else. To honour its commitment, Ocado has developed its own route optimisation software, to direct its delivery vans to customers, accounting for predicted traffic and accommodating other drop-off points, thereby saving both fuel and time.

The company needed complete control in terms of the algorithms it uses and the optimisation processes to achieve those one hour slots. In the early days of the Ocado business, standard commercial routing software was utilised, but it was not good enough, it was not capable of meeting the demands of a large scale home delivery retail commitment. So the company recruited analysts and

programmers and started to build its own routing applications.

Now, almost all of the technology that powers Ocado - from the web shop and mobile apps, middleware, the real-time control systems in its warehouses and delivery - is built internally. This has given the company complete control and ownership of the intellectual property it possesses, and this means that if there are things needed to change or fix, as a 24/7 operation, the company can usually achieve that change by 3am!

Ocado is very much a 'green' operation, this is evident to its customers too as the one hour slots are scored and colour coded to show its customers which are the optimum times for energy efficient deliveries. Less efficient delivery slots are usually flagged with a small service charge too, this helps the company offsets its carbon deficits and encourages its customers to select the 'greener' delivery options. Whilst Ocado seems to have found its solution to providing timely, greener deliveries, other retailers have yet to follow suit.

Arne Strauss, Assistant Professor of Operational Research, Warwick Business School, along with researchers from Lancaster University Management School and the University of Southampton are using a yield management approach to similarly encourage on-line shoppers to choose delivery slots. A combination of delivery prices, offers and loyalty points are used to encourage customers to pick times which will help the retailers minimise failed delivery attempts and fuel usage.

Strauss recently said: 'Traditionally online retailers would collect orders including delivery time requests until a certain cut-off time and plan their delivery schedule accordingly. Therefore, maximising profits is a problem because the final set of orders for a given delivery day are not known until shortly beforehand, yet decisions on the pricing of delivery time 'slots' have to be made in advance based on an estimate.

'Analysing the customer data to predict the impact of future expected orders produces higher profits than only using orders accepted to date in this estimation. Our model can outperform the static two-tier delivery pricing policies that are often found in practice by around 4% in profit. In an industry that operates on very small margins, this profit potential is significant.'

<OR>

YOUR OPPORTUNITY TO SPONSOR OR EXHIBIT AT OR56

HILARY WILKES

The OR Society Annual Conference, 9 - 11 September 2014
Royal Holloway University of London, Egham, Surrey, UK. TW20 0EX

The OR Society's Annual Conference – OR56 – is the flagship conference of the Society. It will successfully bring together practitioners, academics, researchers and students with a wide range of interests in all aspects of O.R. This conference provides ample space for people to share their knowledge and experiences from the latest research, discuss future directions, network with the leading researchers and practitioners in the field and, of course, enjoy some time together.

The event will feature the usual high quality programme, including academic and practitioner presentations and the highly successful 'Making an Impact' activities for practitioners.

Sponsoring and Exhibiting at the conference offers an excellent opportunity for companies to have their brand, services and software tools presented directly to an audience of over 300 people evenly split between practitioners and academics. It also promotes direct discussions with people which could lead to meeting potential business partners or employees.

Why not join our current sponsor, FICO, and take advantage of the opportunity to get involved? There is a variety of sponsorships suitable for large as well as small organisations.

For full information about prices for Sponsorship and Exhibiting, please go to our website at www.theorsociety.com/OR56 and click on the left hand heading for 'Sponsorship Information'. For more information get in touch with Hilary Wilkes on Hilary.Wilkes@theorsociety.com

Royal Holloway, University of London. The Windsor, OR56 main conference building

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FICO (NYSE: FICO) is a leading analytics software company, helping businesses in 80+ countries make better decisions that drive higher levels of growth, profitability and customer satisfaction. The company's ground-breaking use of Big Data and mathematical algorithms to predict consumer behaviour has transformed entire industries. FICO provides analytics software and tools used across multiple industries to manage risk, fight fraud, build more profitable customer relationships, optimize operations and meet strict government regulations. Many of our products reach industry-wide adoption — such as the FICO® Score, the standard measure of consumer credit risk in the United States. FICO solutions leverage open-source standards and cloud computing to maximize flexibility, speed deployment and reduce costs. The company also helps millions of people manage their personal credit health. FICO: Make every decision count™. Learn more at www.fico.com.

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

REGIONAL SOCIETIES

MIDLAND (MORS)

CONTACT: Jen East (Secretary)
EMAIL: MidlandsORSociety@live.co.uk

Optimising the Retail Network for New Zealand Post

Date/Time: Wednesday, 02 April 2014 at 18.30

Venue: Room G8, Main Building, Aston University, Aston Triangle, B4 7ET

(Entrance marked E in the campus map

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.

This is a joint meeting with the East Midlands OR Group and will be followed by a speed networking

event.

P.S. We are always looking for enthusiastic committee members. If you are interested in joining the

committee, get in touch via MidlandsORSociety@live.co.uk.

Dates for diary

A model future for the UK's nuclear legacy - Tuesday 13 May 2014 at 18.00-20.00

Title to be confirmed - Tuesday, 17 June 2014 at 18.00-19.45

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

The ooh – ahh of simulation - Tuesday, 21 October 2014 at 18.00-20.00

The use of O.R. in designing new supply chain network in Marks and Spencer - Thursday, 27 November

2014 at 18.00-20.00

SOUTHERN OR GROUP (SORG)

CONTACT: Patrick Beullens
TEL: 023 9284 6357
EMAIL: p.beullens@soton.ac.uk

SORG - Safe, Effective & Efficient – The Provision of Search and Rescue Engineering Maintenance and Cross Function Decision Support

Date/Time: Thursday, 27 March 2014 at 16.00
Venue: University of Southampton Building 58, Room 1065
Speaker: Jodie Walshe, RNLI

YORKSHIRE & HUMBERSIDE (YHORG)

CONTACT: James Crosbie
TEL: 07891244594
EMAIL: jamescrosbie@hotmail.co.uk

YHORG meeting : Performance management in the public and third sectors - avoiding the pitfalls

Date/Time: Wednesday, 02 April 2014 at 17.00-20.00 (Refreshments from 17.00)

Venue: West Yorkshire Playhouse, Leeds

Speakers: Max Moullin

Performance Management in the Public and Third Sectors- avoiding the pitfalls, Max Moullin

Visiting Fellow, Sheffield Business School

Max will begin the evening with an interactive presentation on the many pitfalls of managing and measuring performance and how to overcome them. He will also discuss, with case studies, a number of performance frameworks such as the Balanced Scorecard and the Public Sector Scorecard. He will talk about the importance of focussing on outcomes and evidence-based drivers of outcomes and of a performance management culture focussed on improvement, accountability and change, rather than a top-down blame culture. He will then facilitate a group exercise encouraging participants to apply the learning to an organisation chosen by the group.

While most of the examples given will be from the public and third sectors, the topic is just as relevant to those working in the private sector.

Max is director of the Public Sector Scorecard Research Centre and a visiting fellow at Sheffield Business School, where he was principal lecturer for over 25 years. Max's earlier career was in O.R. in the Departments of the Environment, Transport and Health before becoming senior section leader in British Coal's O.R. Executive. He is a Fellow of the Operational Research Society and the Chartered Quality Institute.

Refreshments (tea/coffee and very nice cookies) from 5pm.

Please contact James Crosbie on jamescrosbie@hotmail.co.uk to book a place.

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SPECIAL INTEREST GROUPS

ANALYTICS NETWORK
CONTACT Sayara Beg
EMAIL: ANChair@theorsociety.com

March networking event
Date/Time: Thursday, 27 March 2014 at 18.00 till 22.00
Venue: The Hub @ SAS London, 199 Bishopsgate, London, EC2M 3TY
Speakers: Joe Burridge

Calling all Data Scientists and Advance Analysts.

The Analytics Network, a special interest group of The Operational Research Society professional body, is hosting a networking event, with Joe Burridge (www.joeburridge.com) from Salt recruitment (www.welovesalt.com) and his contacts from SAS London.

There will be plenty of Beer, Wine and nibbles, so come along, network, meet fellow experts like yourself, find out what you are all doing in the world of Data Science and Advance Analytics, and swap Business Cards.

To register your attendance, please use this link: http://www.meetup.com/AnalyticsNetwork/events/159466432/

UCL/IEEE Spring School in Financial Computing and Analytics
Date/Time: Saturday, 29 March 2014 at 08.30 -17.30
Venue: Executive Suite, First Floor, Front Engineering Building, Malet Street/Malet Place, London, WC1E 6BT
Speakers: Dr Tomaso Aste, Prof Michael Dempster, Dr Guido Germano, Prof Jessica James, Prof Uzay Kaymak, Prof Alexander Lipton, Prof Dietmar Maringer, Dr Christoph Reisinger,

Registration: Students £150;   Non-students £300

The spring school is limited to 30 places, provided on first booked basis. There will be IEEE student grants to be announced in due course, for a small amount covering partially registration and travel expenses.

Contacts: Dr. Antoaneta Serguieva - tel: +44-203-108-1063; email: a.serguieva@ucl.ac.uk
        Ms Dawn Bailey - tel: +44 (0)20 7679 1315; email: dawn.bailey@ucl.ac.uk

Developments in Advanced Analytics and Big Data
Date/Time: Wednesday, 30 April 2014 at 09.00 till 17.00
Venue: BMA (http://bma.org.uk)
Speakers: Sayara Beg (A.N. Chair), Don Kleinmutz (INFORMS), Alan Hambrook (Zoral Outsourcing), Arne Strauss (Warwick University), Dan Kellett (CapitalOne)

Analytics Network - Main Conference
With the following confirmed speakers:
Sayara Beg, Chair the Analytics Network
Don Kleinmutz, President of INFORMS Analytics Section
Social Networks – Alan Hambrook Zoral Outsourcing
Research - *Arne Strauss*, Warwick University
Credit & Risk - Dan Kellett, Director of Decision Sciences–Capital One

Dates for your diary:
Big Data & Analytics Stream at SCOR 2014, Friday 02 May 2014 at 09.30 till 15.30

DEFENCE
CONTACT: Noel Corrigan
EMAIL: noel.corrigan@baesystems.com
CHAIR:
Alan Robinson
Chief Scientist, PCS Dept,
Defence Science and Technology Laboratory (Dstl)
Portsdown West, Portsdown Hill Road,
Hampshire, PO17 6AD
TEL: 02392 53 2839
EMAIL: arobinson@dstl.gov.uk

Defence Special Interest Group
Manual Wargaming – its use in decision support in MoD
Date/Time: Wednesday, 23 April 2014 14.00-16.30
Venue: Defence Capability Centre, Defence Academy HQ, Shrivenham, Wilts, SN6 8LA
Speaker: Army HQ and Dstl

Abstract: The use of manual wargaming (that is games with little or no computer support) in a military context has a long and venerable history in general staff work, and operational analysis. Arguably, with the rise of computing power, manual wargaming had become much less widely used by the military profession by the end of the last century, but has recently seen a resurgence, especially in support of Army experimentation. This session will explore the benefits of using manual wargames, note potential constraints, and describe some of its recent applications in the land domain.

The session will consist of two papers, one from Army HQ and one from Dstl, followed by demonstrations of manual and constructive Wargames.

Tea and coffee will be available from 1600.

Please arrive allowing plenty of time to book in at the main gate and find a parking space. Remember to bring some form of Photo ID with you. It is essential that you register to attend this event to ensure admittance to the site. Please contact Paula Bentley, either email her on p.bentley@cranfield.ac.uk or telephone 01793 785475 before the day

THIRD SECTOR O.R.

CONTACT: Katherine Byrne
EMAIL: katherine.byrne@voa.gsi.gov.uk
Third Sector

Unlocking the Value of Data for Charities and Other Voluntary groups
Date/Time: Wednesday, 26 March 2014 at 15.00 - 18.00
Venue: New Philanthropy Capital, 185 Park Street, London, SE1 9BL
Speakers: Mat Ilic, Colin Stewart , Tracey Gyateng and Michael Cooke

With the advent of fast computers and the internet, the total amount of world data is forecast to grow 50-fold in the next decade, yet only 1% of this data is currently used productively.

This event will explore how charities and voluntary groups can use data to improve their impact and make better decisions.

Our speakers will describe their real life experiences of using data and demonstrate the benefits that effective data analysis has brought to their organisations. The list of speakers includes:

Mat Ilic is the Policy and Research Director of Only Connect : Mat will talk about how to use data analysis to produce useful evidence in charities

Colin Stewart is a consultant Analyst at Caversham Analytics : Using maps of data and analysis to support local decision making using quantum GIS and Microsoft Excel.

Tracey Gyateng is the Project Manager for NPC's 'Data for Impact' stream of work : Tracey will talk about Increasing access to government administrative datasets to measure the impact of the voluntary and community sector.

Michael Cooke is the Head of Analytics at Marie Curie Cancer Care : Michael will talk about using data linkage to explore the impact of community nursing at the end of life, and about mapping publically available data to help the NHS make better decisions about commissioning end of life care.

To book your place please e-mail John Holt at
jholt@danielholt1992.com

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TRAINING: INTRODUCTION TO OPERATIONAL RESEARCH I

JENNIE PHELPS

A great way to develop a wider range of O.R. skills

Do you, or any of your colleagues, want to develop your skills in a wider range of O.R. techniques than the ones you use every day? The OR Society's five-day course *Introduction to Operational Research I* provides a thorough introduction to the process of O.R. and a wide range of the techniques available.

The training programme is a crash course in some fundamental O.R. techniques and, consequently, it's intensive and covers a great deal of material.

Although many delegates are relatively new to the field of O.R. the *Introduction to O.R.* course is also valuable to practitioners who specialise in a few techniques; feedback from previous years suggests that the course provides a solid introduction to new techniques that the more experienced can add to their O.R. 'tool kits' as well as a great starting point for relative newcomers to the field.

The topics covered in *Introduction to Operational Research (Part 1)* tend to be 'hard' O.R. (more numerical) such as sampling, regression, simulation, optimisation, (meta) heuristics and

forecasting. One of these subjects is covered each day, led by an expert in the field. The varied nature of the days allows attendees to gain practical experience of applying the techniques, with an expert on hand to answer any questions. On most days attendees get the chance to use recognised software for performing each technique.

The course is particularly recommended if you're relatively unfamiliar with the breadth of the O.R. field because, on completion, you'll be able to identify the suitability of a technique for a problem situation and be able to apply those techniques.

To make the educational experience personal, numbers attending are usually kept quite small so it's a good idea to book early!

The course runs from 7-11 April in Birmingham. The fees are £2,875 + VAT for OR Society members; £3,125 for non-members. Book online at www.theorsociety.com , contact Jennie Phelps on +44(0)121 234 7818 or email jennie.phelps@theorsociety.com.

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April, 1984

John Crocker

Continuing the theme of last month's article and, as it happens, last month's Leader, J.E. Beasley, Imperial College and G. Whitchurch, Rolls-Royce present the findings of a survey into O.R. education carried out among the delegates of the 1982 Young O.R. Conference (YOR2).

Although the sample size was relatively small (57 out of the 89 delegates) all were under 38 (80% between 23 and 27), most had a first (18%) or second (54%) degree in O.R. and most (87%) were in either their first or second job.

It is interesting to note that several of the 'traditional' techniques (e.g. Linear, integer and dynamic programming, queueing theory and decision analysis) had been used by less than 20% of the respondents whereas computing, simulation, forecasting, regression and statistical tests had all been used by over 70%. Not surprisingly, therefore, quite high percentages of respondents felt that there was 'too much coverage' of the former group of techniques and, if anything, too little of the latter group, although at least 51% thought the coverage of all of the topics listed was 'O.K.'.

The authors identified two major areas where O.R. education had failed students who went on to jobs in O.R.:

1. the techniques taught failed to show them how to tackle ill-defined problems;

2. there was insufficient preparation for the political and working environment of organizations.

Their conclusion was that O.R. Education was quite successful but it faced four main problems:

1. keeping courses up-to-date

2. the teaching of methodology to deal with ill-defined problems

3. preparing students for life as a practitioner

4. the fostering of desirable personal characteristics.

This would suggest that at this time, courses concentrated mainly on 'hard O.R.' with insufficient emphasis on 'soft O.R.'

There followed an addendum from Cliff Wilkinson, University of Lancaster who suggested that the MSc at Lancaster that had been running since September 1982 went a long way to address most of these issues although as he points out, the students they got were of high quality but they were not supermen. (I would like to point out that I did not do an MSc in O.R. at Lancaster so such observations did not apply in my case.)

Also in the same issue are two papers relating to 'Adaptive Filtering' as introduced in 1973 by Wheelwright and Makridakis. Both indicate that it can be effective for practical problems ('despite the fact that it has some major theoretical shortcomings' according to Christer Carlsson) but it does depend on the parameters used.

Beasley, J.E. and G. Whitchurch (1984), O.R. Education – A Survey of Young O.R. Workers, *JORS* **35.**4, pp 281-288 (jors198460a.pdf)

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Hard Line Leads Society to drop EJOR

For many years now, the Society has made subscriptions to the European Journal of Operational Research (EJOR) available to members at a special rate.

Sharply increased price

In recent years Elsevier, the publishers of EJOR (not to be confused with EJIS, which is published by Macmillan on behalf of the Society) have sharply increased the price, as the number of issues per year has increased to 24 and the number of pages per issue has also increased. To these already inflated costs, the Society has had to

add higher postage costs and the extra costs arising from the devaluation of sterling since its withdrawal from the ERM on 'black Wednesday' (Elsevier invoice the Society in Dutch guilders, so all the currency exchange risk rests with the Society). As these factors have forced up the cost of member's subscription, so the number of such subscriptions has fallen sharply.

Up to now, the Society has paid Elsevier for each issue of EJOR as it has been delivered. Elsevier have now notified us that, from 1995, they would require payment in advance for a whole year's issues. This would necessitate the Society making a substantial interest free loan to Elsevier each year, and in that sense represents a further price increase. More problematically, the money would have to be paid at the start of the year, when the Society's cash balances are

always at their lowest ebb, pending the receipt of subscription income. The currency exchange risk would also be increased, as we should lose the smoothing effect of spreading the payments over the year at different exchange rates.

Refused to shift

All of these difficulties have been put to Elsevier who, incidentally, have been trying to enforce advance payment for several years but have previously backed off in the face of the Society's protests. This time, however, they have refused to shift their ground and the Publications Committee has accordingly decided, with regret, that as from the end of the year, the Society will no longer be able to offer EJOR to members.

Apology

We apologise to the small number of members who will be affected. Whilst the society has been willing to provide this service at less than cost (we do not charge for the staff time or materials involved) so long as Elsevier were prepared to offer reasonable terms, the publishers have made clear that, in effect, they view this as a commercial matter and consider that the current arrangements are insufficiently profitable.

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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'