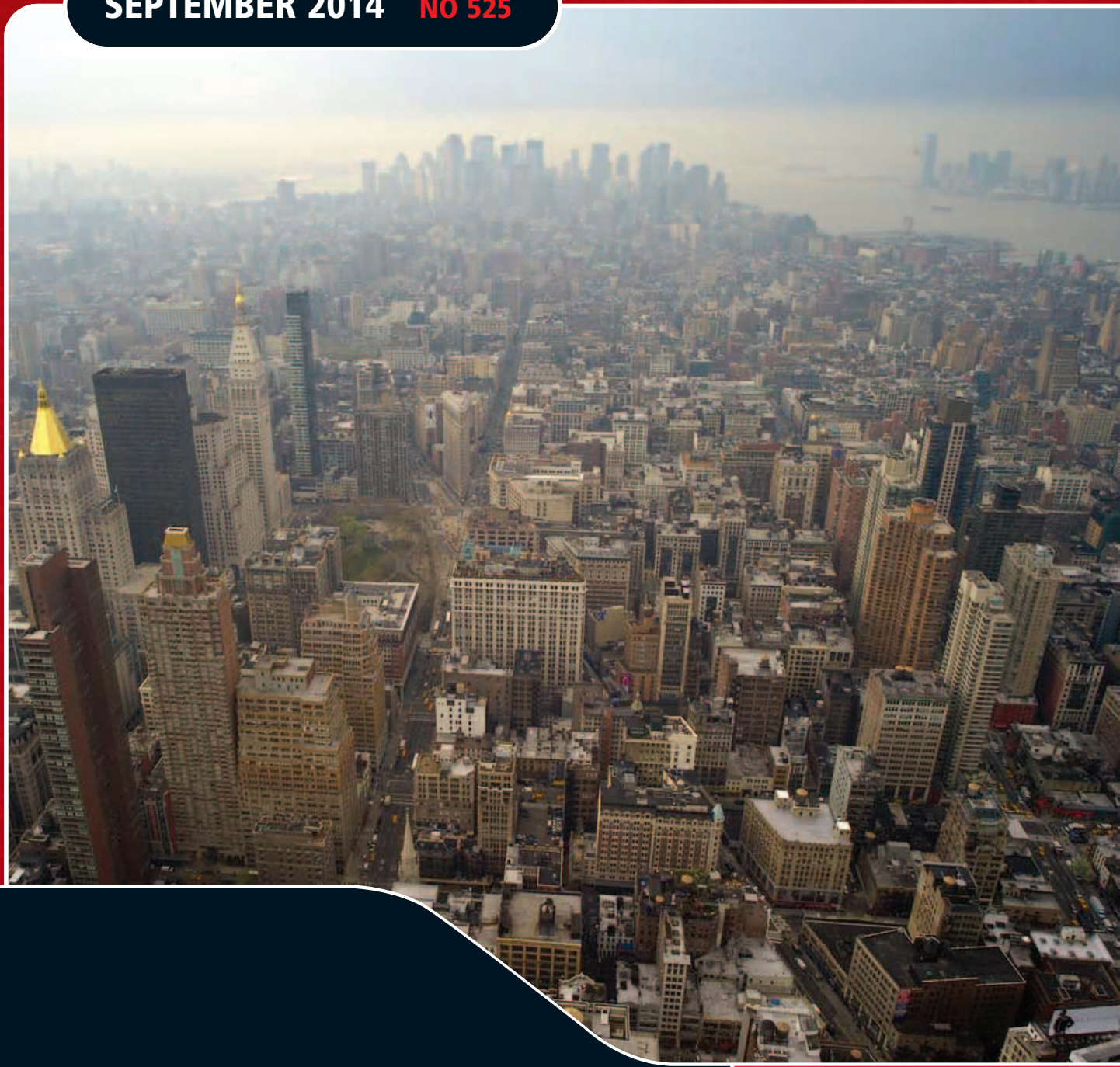
THE SCIENCE OF BETTER AT THE HEART OF ANALYTICS

INSIDE O.R.

SEPTEMBER 2014 NO 525



FOG IS ON THE HORIZON

: : INSIDE THIS MONTH : : : : :

THE AMAZING PROFESSOR QUETELET
WHICH PLANET IS YOUR SALAD FROM?
BRAND WARS
BIG DATA PROTECTION LAW

THE OR SOCIETY
DIAMOND JUBILEE
60 YEARS OF BETTER DECISIONS
1953 2013
www.theorsociety.com

EDITORIAL

JOHN CROCKER

Every month I am amazed at the variety of topics covered although upon reflection, I am not sure why I should be after all, there are few areas of human endeavour that would not benefit from a more scientific approach. Even after 60 years, we appear to be no nearer to defining what is and is not O.R. Sanja Petrovic and Bart MacCarthy, in their joint Leader, provide us with an interesting discussion about the differences and similarities between O.R. and O.M. where, in this case O.M. is Operations Management. In my day, O.M. or, more commonly O & M, stood for 'organisation and methods' so needless to say, our department was invariably referred to as O & R (partly out of ignorance and partly to annoy us, no doubt). (Incidentally, there was a third section which was known as 'Work Study'.)

In this issue, we have reports from three recent events: Advanced Analytics and Big Data; ICORD - the International Conference on O.R. for Development and; the inaugural meeting of the new Public Policy special interest group. ICORD is a conference organized by IFORS. I am indebted to Sue Merchant, who has been assigned the Developing Countries Committee portfolio for IFORS, for soliciting the two articles that appear in this issue.

What also amazes me is how much O.R. was carried out long before the advent of electronic computers and not just in times of crisis. For example, Nigel has identified a certain Professor Quetelet who was, among other things, interested in crime rates in 19th Century Belgium – work which has been brought up to date by John Poppelaars. Incidentally, I recently bought 'Engineers of Victory' by Paul Kennedy (published by Penguin, ISBN 978-0-141-03609-0) which, among other things, tries to put some of the O.R. work done during WWII into context – hopefully I will have read it by next month and will be able to include a full review but certainly based on the first 60 pages, it is proving to be most interesting.

On the Analytics front, apparently the latest satnav addition is an app that will direct you on the 'prettiest' route between A and B – a feature particularly useful for anyone visiting a city for the first time with a few hours to kill, provided, of course, it is not too foggy or between 6pm and midnight on a Friday night.

Last month you will no doubt have read of the sad losses of Cliff Wilkinson and Alan Mercer; we include more detailed obituaries of both esteemed gentlemen. Sadly, just to prove the saying that bad things come in threes, we also announce the sad loss of Philippe van Asbroeck.

On a more up-beat note, Louise Orpin is not only getting married but has been promoted within the OR Society!

<OR>

: : NEWS : : : : : : :

EDITORIAL - 02
O.R. IN POLICY MAKING - 03
IN BRIEF - 04
THE AMAZING PROFESSOR QUETELET - - - - - - - - - - - - - 07
A2B BEAUTIFULLY - 08
BLACKETT MEMORIAL LECTURE - - - - - - - - - - - - - - - - 09
OR56 NOT BOOKED YET? THERE'S STILL TIME! - - - - - - 10
MAKING AN IMPACT: IN PRACTICE - - - - - - - - - - - - - - 11
HAVE WE BEEN OPTIMISING THE WRONG THINGS?;
OPTIMISING EFFICIENCY OR EFFECTIVENESS IS BAD! - 12
HAT-TRICK FOR STRATHCLYDE:
2013 MAY HICKS PRIZE WINNERS - - - - - - - - - - - - - - - 13
JOS - CALL FOR NEW EDITOR - - - - - - - - - - - - - - - - - - 13
EXPERIENCES OF THE INTERNATIONAL CONFERENCE ON
O.R. FOR DEVELOPMENT, JULY 2014 - - - - - - - - - - - - - - 14
ICORD-2014 'DEVELOPING MODELS IN CHANGING
SCENARIOS OF DEVELOPING COUNTRIES' - - - - - - - - - 15
WOULD YOU LIKE TO GET INVOLVED IN
RUNNING THE SOCIETY? - 16
NEW ROLE, NEW NAME FOR LOUISE - - - - - - - - - - - - - 17
CAREERS OPEN DAY 2014 - 18
ALAN MERCER (1931-2014) - 20
WHICH PLANET IS YOUR SALAD FROM? - - - - - - - - - - - 24
BRAND WARS - 25
CLIFF WILKINSON (1936-2014) - - - - - - - - - - - - - - - - - 28
PROBLEM SOLVED - Y2OR - 30

: : LEADER : : : : : : :

OPERATIONAL RESEARCH VERSUS OPERATIONS
MANAGEMENT - 26

: : ANALYTICS : : : : : : :

DEVELOPMENTS IN ADVANCED ANALYTICS - - - - - - - - - 32
BIG DATA PROTECTION LAW - - - - - - - - - - - - - - - - - - - 33
FOG IS ON THE HORIZON - 34
CENTRE FOR ADVANCED BUSINESS ANALYTICS - - - - - - 35

: : REGULARS : : : : : : :

CONFERENCE NEWS - 03
WHERE ARE THEY NOW? - 16
TRAINING - 22
NEWS OF MEMBERS - 27
BACK ISSUES AVAILABLE - 33
REGIONAL SOCIETIES - 36
SPECIAL INTEREST GROUPS - - - - - - - - - - - - - - - - - - 37
LAST WORDS - 38

O.R. IN POLICY MAKING

NIGEL CUMMINGS

Chaired by OR Society President Professor Stewart Robinson, our special interest policy event on 26 June 2014 in Roseberry Hall, LSE consisted of several elements, all of which were designed to illustrate and inform attendees about the important role of O.R. in policy making.

Rob Solly, Dstl, explored the areas where O.R. had proven its worth in providing policy support. He emphasised that 'problem structuring' was one of the unique qualities of O.R. that made it such a perfect fit with government policy creation objectives using the recently held 'Shaping Choice in Public Policy – a problem Structuring Approach' event to illustrate this.

John Friend delivered a presentation detailing his long involvement with O.R. (over 50 years) and his recent involvement in an OR Society charitable project concerning, 'The Future Policy Influence of O.R.' In Europe and on other continents O.R has already been shown to have a useful function in the development of the processes behind public policy development.

Following John's presentation, attendees were treated to short presentations suggesting starting points for proposed thematic workshops. These workshops took place after a refreshment break, and they were supported by Mike Cushman, Cathy Hobbs, Brendan Hickling, Ian Mitchell, Rob Solly and other members of the new O.R. Special Interest Group on Public Policy.

This period of interactive problem structuring in facilitated groups had participants engaging in: exploration of alternatives for future investment in key areas of skills for shaping public policies; research in public policy processes and; technologies to support the development of public policies. The workshops resulted in a series of informed poster presentations which stimulated further debate. The event was brought to a close by OR Society President, Professor Stewart Robinson.

Please visit the OR Society website for downloadable videos of the various presentations.

<OR>

'The workshops resulted in a series of informed poster presentations which stimulated further debate.'

CONFERENCE NEWS

EVENT:	OR56 Annual Conference	**DATE:**	9 – 11 September 2014	**VENUE:**	Royal Holloway University of London, Egham.
EVENT:	Blackett Memorial Lecture	**DATE:**	26 November 2014	**VENUE:**	Grocers' Hall, London
EVENT:	EURO2015	**DATE:**	12 (welcome), 13 – 15 July 2015	**VENUE:**	University of Strathclyde, Glasgow

Sad EURO News

We are sorry to announce the very sad loss of Ir. Philippe van Asbroeck who was the EURO Permanent Secretary between 1993 and 2012. Many of you will have known Philippe and valued his support over this period, as he was vital to the efficient running of the Association. His dedication and 'institutional memory' benefited national societies as well as individual members. Alongside of all previous EURO presidents, his service was recognised through an award which was handed out at the EURO XXV Euro-k Conference in Vilnius on July 10th 2012.

Those who have worked with him appreciated his kindness, competence and collaborative attitude. He has been a great friend and supporter. It has been a privilege to know and work with him. We will miss him.

Gerhard Wäscher, President of EURO

Food, glorious food

Researchers from Johns Hopkins University, Purdue University, German Federal Institute for Risk and IBM have successfully developed a cloud-based predictive analytics platform and tool to help investigate food-borne outbreaks of disease.

By using newly designed algorithms, visualisation, and statistical techniques the tool can use information on the date and location of billions of supermarket food items sold each week to quickly identify, with a high degree of certainty, potentially harmful products after as few as 10 reported cases of food poisoning.

More information on this: http://bit.ly/1mZpKV3

RS Vision

The Royal Society has launched a report proposing major reforms of science and mathematics education to give students the breadth needed to face the challenges of the 21st century.

The recommendations are published in a report, 'Vision for Science and Mathematics Education' covering the STEM arena. One of these is that A-levels should be replaced by baccalaureate-style frameworks that encompass vocational and academic learning across a broad range of subjects to age 18.

More details on: http://bit.ly/1lfHVVS

O.R. on top of the food chain

In matters concerning Operational Research and Analytics it seems great minds in O.R. concur. ORTEC recently published a YouTube video (it's only 1minute 24 seconds) in which former INFORMS President Anne Robinson talked about O.R. and Analytics and stated that she thought O.R. played a 'really critical role in analytics'. 'Analytics', she says, 'is all about the end to end process around data discovery and problem formulation, but O.R. is the 'toolbox' that can be applied to problem solving. In the descriptive, predictive, and prescriptive framework - O.R. is part of prescriptive analytics. '

YouTube is fast becoming a platform for O.R. and Analytics professionals to speak out to the rest of the world – a search for O.R. or Analytics there will yield hundreds of short to medium length videos on both subjects. The OR Society has already established a strong video presence there and Anne Robinson's praise for O.R can be found at: http://bit.ly/1lUedqV

Old School Analytics

'Industry Trends in Human Resources Technology and Service Delivery Survey',

: : IN BRIEF: : : : : : :

conducted by the Information Services Group (ISG) predict that investment in HR Technology applications will improve user and candidate experience and speed up access to innovation and best practices to support business. Candidates will, no doubt, be subject to analytic evaluation, just as banks do credit scoring, long before they reach the interview stage. But will they be able to tell whether you are human or a robot?

For more information about the ISG study, take a look at: http://bit.ly/Y4lI9t

Even Scientists are Human

Scientists in the middle of the status hierarchy are likely to be the first to work with easy-to-use commercial products. The study indicates that people of low status don't expect to improve their situation much by their actions whereas those of high status don't see the need to do so. Those in the middle trying to get to the top will do almost anything!

'Nonmonotonic Status Effects in New Product Adoption' is by Yansong Hu of the University of Warwick and Christophe Van den Bulte of the University of Pennsylvania's Wharton School. It can also be accessed from the Warwick University website at: http://bit.ly/1l2IbhC

It's in the genes

According to a group of scientists who conducted research of a data pool called the Twins Early Development Study, which enrolled 12-year-olds from nearly 2,800

British families, there is a genetic link between numeracy and literacy. The team compared twins and unrelated children to see how they performed in tests for maths, reading comprehension and fluency and then matched the children's genomes.

More information on this can be found at: http://bit.ly/1kB8qv8

Blue Skies

Microsoft has made a preview version of its Azure Machine Learning (Azure ML) cloud service public. Azure ML allows users to build services, using Microsoft's tools that use 'machine learning' to make predictive analyses.

Azure ML apparently combines Microsoft's analytics tools and the powerful algorithms it developed for Microsoft products like Xbox and Bing and years of machine learning experience into one easy-to-use cloud service. Microsoft believe (hope!) that the combination of rapidly increasing volumes of data and a decreasing number of data scientists there is a need for services like Azure ML.

Microsoft does not yet have a date for general release - it will depend on feedback from users of this preview version. More information can be found at: http://bit.ly/1vz3mc0

Wolfram Cloud

Wolfram Research has launched Mathematica 10, the first iteration of the company's signature program to tap into both the company's Wolfram programming language and the power of the cloud.

Mathematica 10 has added concepts like computational geometry, geographic computation and device connectivity to its core functions. More information on: http://bit.ly/1oJ8xzP

Déjà vu

Product team support is what gave the founders the idea for FullStory in the first place. While working on a new project they realised that none of the available web analytic tools gave them the level of insights into customers' behaviour they needed, this deficiency in the analytical tools application market caused them to rethink what would be most useful to potential buyers of a new analytics tool, and FullStory was the result.

FullStory replays a person's interactions with a website or web app by recreating that session's document object model (DOM) and its mutations, meaning that it reproduces how the browser and website were behaving at the time (warts and all).

It would be interesting to see what happens if the user decided to use FullStory – Gerald Hoffman and French Horns come to mind!

More information on this can be located at: http://bit.ly/UdJTA7 and https://www.fullstory.com/

06 :::::::: IN BRIEF : :

Skimming

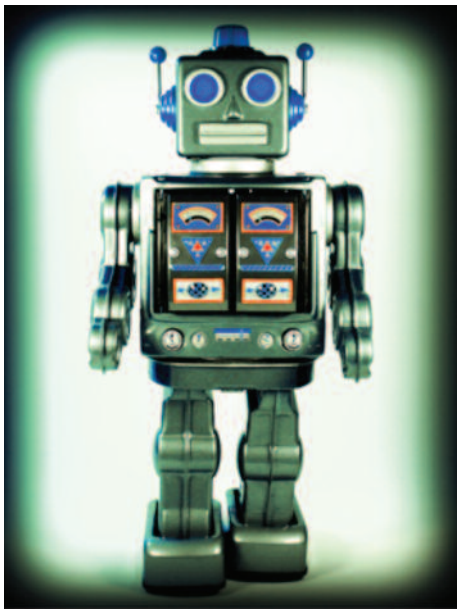
Self-service terminals, such as petrol pumps, are like ATMs when it comes to being vulnerable to fraud via 'skimming', i.e. the illegal copying of information from the magnetic strip of a credit or debit card. Visa Transaction Advisor (VTA) enables merchants to use real-time authorisation risk scores to identify transactions that could involve lost, stolen or counterfeit cards. A pilot test of the new service showed a 23% reduction in the rate of fraudulent transactions without costly infrastructure upgrades or disruption of the customer experience.

VTA has not been approved for use in Europe yet, although it can only be a matter of time. Until its implantation though, we must all be vigilant. If you think your debit or credit card has been affected by skimming or phishing crime, the following link will provide some useful advice on what to do.

http://bit.ly/1AdydNK

I Robot, You retired!

A research study paper from Pew Research Centre in the US predicts that professional roles such as doctors, lawyers and accountants could be replaced by artificial intelligence by the year 2025 – i.e. 11 years from now. This is interesting as I seem to recall something similar being announced back in the 1970s along with free electricity from nuclear fusion , although, in those days it was always just 10 years away! Futurologist Ray Hammond thinks it will be more like 2035 but believes white collar jobs could start to be replaced by 2025. He



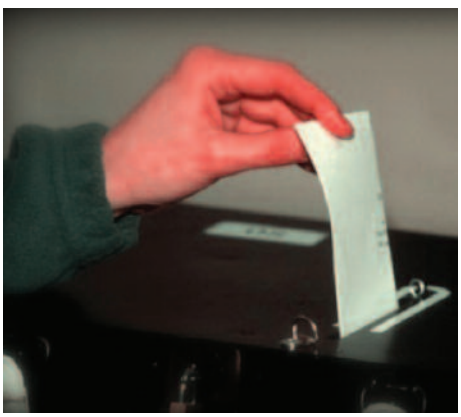
added, 'Funnily enough, blue collar jobs are safer, they are very flexible. A carpenter won't do the same job twice. It's the admin jobs which are more at risk.'

http://bit.ly/1pE4atL

The Analytics General Election, 2015

NationBuilder, developed by Jim Gilliam, has been selected by whatever the Liberal Party is calling itself, this time around. This proved highly successful with the SNP in 2011. In eight months' time we will know whether it worked for the Libs as well.

Labour has enlisted the services of David Axelrod as a senior strategist for next year's election – Axelrod was the behind the scenes analytics presence for President Obama's 2008 victory.



Meanwhile Conservatives will continue with Michael Ashcroft's 'Key Seat Operation' which channels the resources of demographic and consumer data to forecast which marginal seats are easiest to 'flip' at election time.

At the time of writing, robots were still disenfranchised.

More info on: http://bit.ly/1lUePNc

OR56 Has Gone Mobile!

The OR Society's Annual Conference, OR56, has gone mobile using Guidebook!

We strongly encourage you to download our mobile guide to enhance your experience at OR56. You'll be able to plan your day with a personalised schedule and browse exhibitors, maps and general conference info.

The app is compatible with iPhones, iPads, iPod Touches and Android devices. Windows Phone 7 and Blackberry users can access the same information via our mobile site at m.guidebook.com.

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To download this guide, in the search box type in OR56

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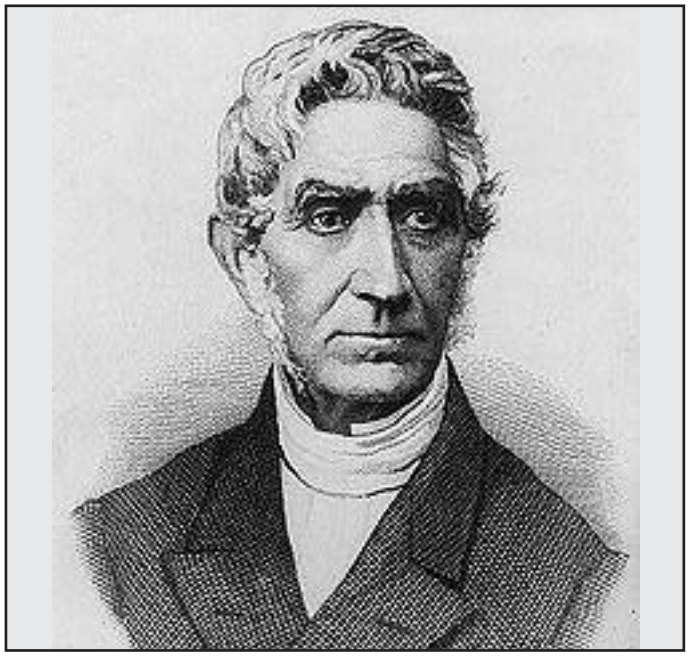
THE AMAZING PROFESSOR QUETELET

NIGEL CUMMINGS

O.R. work Quetelet started in the 19th century has recently been brought up to date by John Poppelaars.



Lambert Adolphe Quetelet (22 February 1796 – 17 February 1874) was a Belgian astronomer, mathematician, statistician and sociologist. He is the man behind the infamous BMI (Body Mass Index), but he also worked on detecting patterns in crime rates. He found that, 'the seasons in their course exercised a very marked influence on the incidence of crime'. He found for example that, during summer the greatest number of crimes against persons were committed, and during the winter months such crimes showed a sharp decline. Besides a seasonal pattern, street robberies also show a distinct pattern over the days of the week and during the time of day.

John Poppelaars, ORTEC , in a study concerning crime statistics from the Netherlands, has shown that the majority of street robberies happen after 12:00 with the highest number of incidents between 18:00 and 23:59 and the highest number of these occur on Fridays.

John Poppelaars' recent work concerned the incidence of crime in Rotterdam. In analysing the distribution of high impact crimes over the weekdays for both 2011 and 2012 a he found a shift towards more offences during weekends in 2012.

Taking the analysis further, the number of street robberies decreased with age – youths between 12 and 17 being the most vulnerable victims. For men the highest incidence rates occurred between 6pm Friday and 6am Saturday and again before 6am on Sunday mornings whereas for women it was up to mid-night on a Friday evening. Not surprisingly, certain locations were also more favoured than others. All of which information has greatly helped the police catch more perpetrators and, at the same time, reduce the number of incidents.

The three most popular items taken were mobile phones, bags and wallets. Apparently theft of mobile phones was not common in 19th Century Belgium, failing even to get a mention in Quetelet's papers.

Quetelet was something of a polymath but his main interests were in astronomy (he founded the Royal Observatory of Belgium), and statistics. He founded or co-founded several national and international statistical societies and scientific journals, and presided over the first series of the International Statistical Congresses.

John Poppelaars

Quetelet was among the first who attempted to apply statistical analysis it to social science, what he called a 'social physics'. He was keenly aware of the astounding complexity of social phenomena, and the many variables that needed measurement. His goal was to understand the statistical laws underlying such phenomena as crime rates, marriage rates or suicide rates. He wanted to explain the values of these variables by other social factors. These ideas were controversial at that time – as it was argued they contradicted the concept of freedom of choice. How times have changed!

A2B BEAUTIFULLY

NIGEL CUMMINGS

We are all familiar with satnavs and the fact that they will give us the shortest or quickest route from A to B (via C) even if we do not use them. Now Daniele Quercia and his team at Yahoo Labs in Barcelona, Spain have devised an algorithm that will give you the 'prettiest' route from A to B.

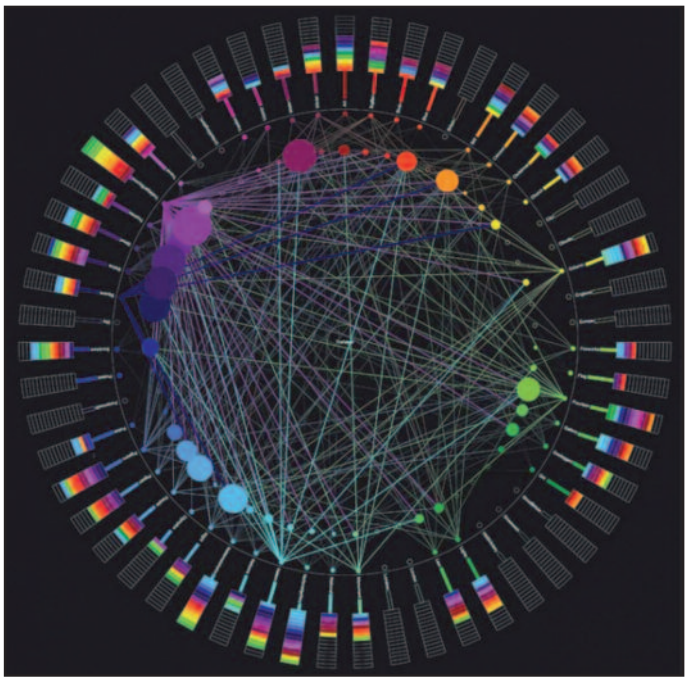
Daniele Quercia

They have worked out how to measure the 'beauty' of specific locations within cities and then designed an algorithm that automatically chooses a route between two locations in a way that maximises the 'beauty' along it. The goal of this work they say is to, 'automatically suggest routes that are not only short but also emotionally pleasant'.

Quercia and his team began their work on 'beautiful routes' by creating a database of images of various parts of the centre of London taken from Google Street View and Geograph. They then 'crowdsourced' opinions about the beauty of each location using a website called UrbanGems.org.

Each visitor to UrbanGems was allowed to see two photographs and then to choose the one which showed the more beautiful location. That gave the team a crowdsourced opinion about the beauty of each location. They then plotted each of these locations and their beauty score on a map which they used to provide directions. They did the same for Boston, MA and then checked that the routes determined by their algorithm were 'more beautiful' than the shortest routes using a group of 30 people in London and 54 in Boston.

Crowdsourcing opinion for every possible location in every city is clearly a time-consuming and potentially expensive business. So Quercia and co have automated this process using photos from Flickr and the data and tags attached to them. This approach allows them to mine the data associated with them to see what parameters correlate with beauty.



The work is ongoing, and a mobile app which uses the 'beauty' algorithm is under development, but will no doubt be available soon.

A paper concerning this research can be accessed from the Cornell University website at: http://arxiv.org/abs/1407.1031

More information about Danielle Quercia, his work and that of his colleagues can be found at: https://www.facebook.com/YahooLabs

<OR>

'The goal of this work they say is to, 'automatically suggest routes that are not only short but also emotionally pleasant'.'

THE OR SOCIETY

Blackett Memorial Lecture

The Society is pleased to announce that the 2014 Blackett Memorial Lecture will be given by

Professor Sir Bruce Keogh

National Medical Director, NHS England

Sir Bruce Edward Keogh, KBE, FRCS, FRCP, (born 24 November 1954) has been Medical Director of the National Health Service in England since 2007 and National Medical Director of the NHS Commissioning Board (NHS England) since 2013.

on

Wednesday 26 November 2014

at

Grocers' Hall, Princes Street, London, EC2R 8AD

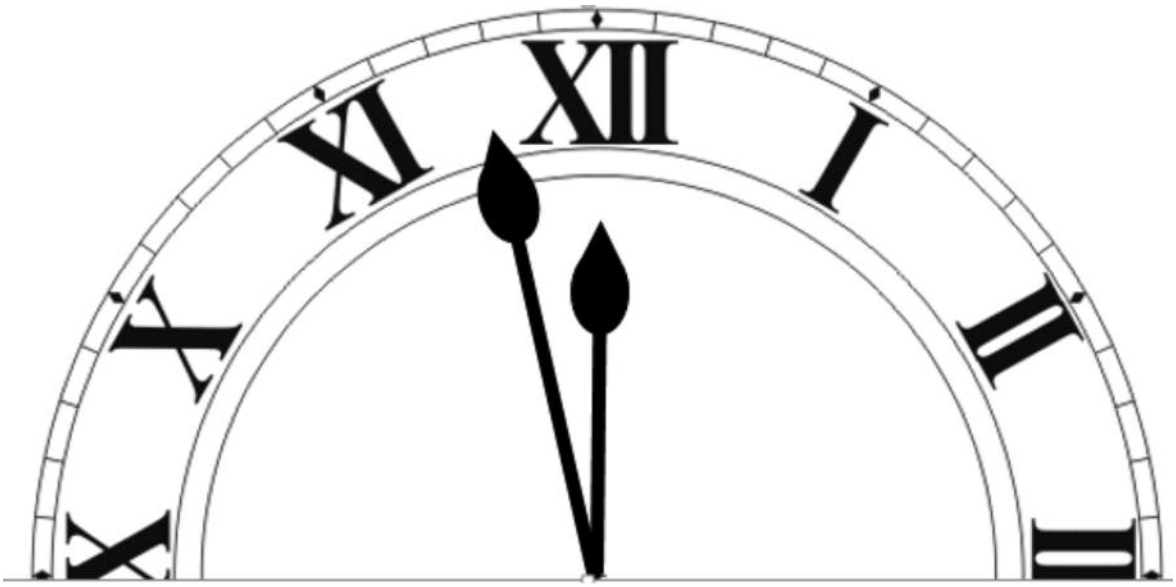
Grocers' Hall is situated in the heart of the City of London in a private courtyard opposite the Bank of England. A one minute walk from Bank Station (exit 1), which is served by the Central, Circle, District and Northern Underground lines as well as the Docklands Light Railway and Waterloo and City line. Moorgate, Liverpool Street and Cannon Street British Rail stations are all just a five minute walk away.

(Title and abstract to be advised.)

Lecture at 4.30 pm

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

There is no charge for attendance at this event. To register and receive joining instructions, please go online to www.theorsociety.com/blackettlecture and fill in the online reservation form or contact Hilary Wilkes on hilary.wilkes@theorsociety.com



OR56 NOT BOOKED YET? THERE'S STILL TIME!

9 - 11 September 2014. Royal Holloway, University of London

Thanks to the hard work of the organising committee, everything is now in place for another excellent Annual Conference. At the time of writing we've received bookings from about 250 delegates of whom more than one-third are practitioners.

The annual conference is the perfect place to learn about what's new in O.R. and Analytics. We have **24 EXCELLENT STREAMS** to choose from – a list is available at The OR Society's website which has dedicated conference pages at **www.theorsociety.com/OR56** . This is where you can find, titles and abstracts, schedule of papers and information on:

- **Our Plenary speakers** – **Stewart Robinson** (President of the OR Society: *The 'Analytics' Society?*); **Ursula Brennan** (Permanent Secretary at the Ministry of Justice: *The need for analytical thinking in policy development*) and **Andrew Jennings** (Senior Vice president at FICO: *The analytics behind a day in the life of a credit card*)

- **The Debate Session** on Thursday – Chaired by Sanja Petrovic with Prof Jacek Gondzio and Konstantinos Katsikopoulos leading the debate on *Optimising versus Satisfying approaches to optimising problems that are at the core of O.R.*

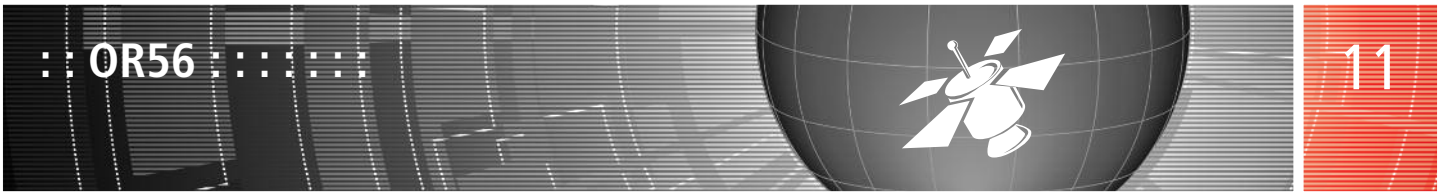
- **The Plenary Panel** session discussion Behavioural Operational Research, chaired by Dr Gilberto Montibeller LSE. The Panel comprises: Prof L. Alberto Franco, Loughborough University; Phil Jones, Dstl; Prof David C. Lane, Henley Business School; Judith Rawle, Head of O.R., CORDA; and Dr Geoff Royston, Immediate Past President, The OR Society

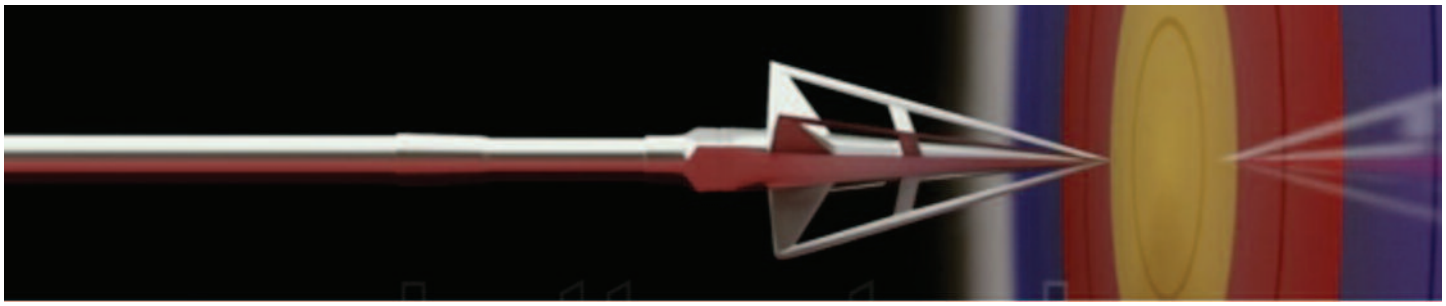
TIME TO NETWORK AND BE SOCIABLE

As well as fitting in the many papers and presentations, the organisers want to make sure there's plenty of time in the schedule to meet old friends and make new ones. For those who arrive on the Monday evening, there's a horse racing event (not real horses though, apparently) and the famous Bar Quiz on Tuesday evening.

For those who would like a change of scene on Wednesday afternoon, there's a choice of outings: close to home you could take a tour of the University's Founders Building; slightly further away, there's Kew Gardens or a walking tour of Windsor. And you'll be pleased to know that we *have* managed to organise something in a brewery. Wednesday evening is the traditional time for the Conference Gala Dinner and dance.

If you haven't booked for OR56, there's still time: you can join us for just one day or all three. Here's the link: bit.ly/ORS56 (case sensitive). We look forward to welcoming you to OR56.





Wednesday 10 September 2014, Royal Holloway, University of London

MAKING AN IMPACT: IN PRACTICE

Focused Sessions for

CONSULTANTS, ANALYSTS and DECISION MAKERS

– and anyone with a passion for making the world work more effectively

Is it your day-job to help make organisations more effective – through O.R., analytics, decision support, business analysis, management science, or plain problem-solving common sense? If so, whatever your job title, whether you are an external consultant or an employee, 'Making an Impact' is for you.

'Making an Impact' is a session within the OR Society Annual Conference, OR56.

At 'Making an Impact' you can

- See case studies showcasing important applications
- Exchange ideas and expertise with people in similar fields
- Explore issues of immediate relevance to practice
- Try out new techniques – are they any good for you?
- Meet leading academics and discover what they can do for you – and what you can do for them
- Build your network amongst likeminded professionals

If you haven't booked for 'Making an Impact', there's still time: you can join us for just the one day or all three of OR56. Here's the link: bit.ly/MAIOR (case sensitive). We look forward to welcoming you to 'Making an Impact'.

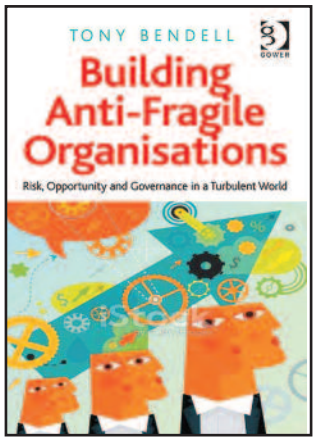
USING SOCIAL MEDIA

This year, we'd like to make better use of social networks to tell the world about the conference and what we're learning. **If you're giving a paper**, please Tweet about it including the hashtag #OR56 and including the address @theorsociety (so that we will receive it and retweet it to our followers).

If you've booked to come, please tell your followers that you're planning to attend (again include @theorsociety in your message). Once you're at the conference, feel free to Tweet away!

HAVE WE BEEN OPTIMISING THE WRONG THINGS?; OPTIMISING EFFICIENCY OR EFFECTIVENESS IS BAD!

Professor Tony Bendell, author of the recent book *`Building Anti-Fragile Organisations; Risk, Opportunity and Governance in a Turbulent World`* *(Gower, July 2014)* is running a course on behalf of the OR Society on Tuesday 23 September in Birmingham discussing the implications of the seminal Anti-Fragility concept of Nassim Taleb on Operational Research theory and practice.



Professor Tony Bendell

The course analyses how **Fragility hurts organisations**, and how it can and should be avoided, managed and reduced. It discusses the risks of organisational and process fragility, and how **Optimisation of Efficiency** impacts these, as well as **Black Swan events**, and why conventional **Risk Analysis is itself fragile**. It explains **how to create and manage Anti-Fragile organisations**, and **Anti-Fragility in process management**, as well as the **conflicts and synergies with more conventional approaches.** It also discusses how and where to start with **Anti-Fragile Optimisation,** and a new unified approach to Risk Management. Finally, it considers the **impact on traditional Financial Planning and Management**, and **what needs to change** to develop **optimisation approaches incorporating Anti- Fragility.**

What exactly is Anti-Fragility, and does it matter? Organisations and systems may be Fragile, Robust or Anti-Fragile.

- Fragile refers to systems and organisations that can be easily damaged by changes or shocks in the external or internal environment.
- Robust refers to systems and organisations that are able to withstand such adverse conditions.
- Anti-Fragile refers to systems and organisations that, like biological systems, are more than just robust and within limits actually improve their resilience through being stressed.

Thus, the fragile cannot withstand stress. The robust can, but only up to its inbuilt limit of strength that may decline over time. Thus, like the Thames Barrier the robust is always waiting for a wave that is bigger than it, that will destroy it. The anti-fragile gets stronger by being stressed, just as I get stronger by exercising. Its strengths grows, and with it, its ability to survive and flourish. Anti-fragility is an important attribute for any organisation or system.

This is both a controversial and an inspirational subject, and through interactive plenary presentations, group discussions, individual and group exercises, delegates attending the course will be exposed to **current research thinking** and its potential for **practical application**. They will learn about the Anti-Fragility concept developed by **Nassim Taleb**, and the consequential **shortfalls in current O.R. optimisation approaches**. Discussion will focus on **how Fragility, Robustness and Anti-Fragility is built in to organisational structures and systems**, the **implications for Model Building and risk**, **how to take stock of Fragility, Robustness and Anti-Fragility in an Organisational System**, and **how and where to start**. Thus by attending the course, delegates should be able to **explore the shortfalls and risks in current models and modelling approaches, take stock of Fragility in relation to their own organisations and systems, construct Action Plans to develop Anti-Fragility within these, and. Optimise Organisational Anti-Fragility, as well as Efficiency.**

Further information about the unique concept of Anti-Fragility and its impact can be found at; http://www.theanti-fragilityacademy.com/

or email Tony Bendell at;

tony@theanti-fragilityacademy.co.uk

To book on the course please contact jennie.phelps@theorscoiety.com or go to http://www.theorsociety.com/Pages/Training/Courses/2014/313.aspx

HAT-TRICK FOR STRATHCLYDE: 2013 MAY HICKS PRIZE WINNERS

GAVIN BLACKETT, SECRETARY & GENERAL MANAGER

The OR Society is delighted to announce the winners of the 2013 May Hicks prize for best student project, and for the third year in a row the winner is from Strathclyde University.

The winner is Christoph Werner, who is £1000 better off as a result of his award. His client was the Health Analytical Service Division (ASD) within the Scottish Government. The Scottish Government regards integration of health and social care as one of its core policies, and has set up a Joint Improvement Team with representatives of the many bodies involved such as NHS Scotland and local authorities. ASD's role is to provide advice about evidence-based policy based on both quantitative and qualitative analyses.

Christoph's dissertation addressed both these aspects of using the large data sets resulting from integrating data from health and social care sources. The main deliverables were two integrated tools constructed in Excel, as well as 'proof of concept' systems dynamics model (also in Excel) to allow the investigation of policy options, to show how the work might be further developed.

His external examiner concluded his remarks, 'Christoph's personal reflections in his dissertation are also very deep - indeed they would serve as a worthy article on 'how to successfully complete an MSc dissertation. Overall I found this a delight to read, and worthy of the exceptionally high mark awarded.'

This year's entries were of very high quality, and the judges agreed to reward *three* runners-up. In alphabetical order they are: Adam Booker (University of Southampton), Charlotte Ekau (Lancaster University) and Gail Mawdsley (Lancaster University). They each receive a cheque for £200.

Thanks to everyone who contributed. The 2014 competition will be announced later this year, with a deadline of 31 January 2015 for entries.

Congratulations to all winners.

<OR>

JOS - CALL FOR NEW EDITOR

GAVIN BLACKETT, SECRETARY & GENERAL MANAGER

Founding editor, Dr Simon Taylor, has decided against continuing his position for a further spell. As a result, a vacancy in the editorial team of the Society's Journal of Simulation (JOS) has arisen, and the Society is inviting members interested in becoming part of the this editorial team to submit their CVs for consideration.

Launched in 2006, JOS is now into its 8th volume and is building a strong reputation in its field. The Society seeks a new editor to join the editorial team to continue the journal's development and growth.

If you would like an opportunity to discuss the role, please contact Professor Jeff Griffiths, Chair of the Society's Publications committee (griffiths@cardiff.ac.uk).

Please send a covering letter and CV to Gavin Blackett, Secretary & General Manager at gavin.blackett@theorsociety.com. The deadline for expressions of interest is **30 September 2014**.

<OR>

EXPERIENCES OF THE INTERNATIONAL CONFERENCE ON O.R. FOR DEVELOPMENT, JULY 2014

BY ERKIN GULER (BS STUDENT, DEPARTMENT OF INDUSTRIAL ENGINEERING), DR TANER ERSOZ (ASSISTANT PROFESSOR, DEPARTMENT OF ACTUARIAL AND RISK MANAGEMENT) AND DR FILIZ ERSOZ (ASSOCIATE PROFESSOR, DEPARTMENT OF INDUSTRIAL ENGINEERING) KARABUK UNIVERSITY, TURKEY

We would like to thank the OR Society for its support for us (Filiz and Erkin) so we could play an active part in the recent International Conference on O.R. for Development (ICORD) in Lleida, Spain.

Erkin Guler, Elise del Rosario and Filiz Ersoz

Group discussions in the ICORD workshop

It was a pleasurable Conference and an absolutely memorable event, thanks to the organizers, especially Elise del Rosario and Lluís Miquel Plà-Aragonès. The ICORD conference is an event organized by IFORS that brings people together for mutual support, education and inspiration. We really appreciated the fact that assigned 'reactors' (i.e. critics) shared their knowledge and insight about our scientific paper. We found the conference informative and worthwhile and the ambience was very impressive.

We are based in the Department of Industrial Engineering at Karabuk University which is in the Western Black Sea Region in Turkey. Karabuk city is about 3 hours from the capital of city Ankara. Karabuk University was established in 2007 and has 14 Faculties, 4 Institutes, 4 Schools and 7 Vocational Schools with 36,000 students including both graduates and undergraduates and about 15 academic people studying O.R.

Our paper is about applying data mining techniques to sales forecasting in the agricultural machinery sector. The purpose of this study was to determine how the sales of a company operating in the sector of agricultural machinery depend on different variables. The data used in the forecasting model was taken from Cansa Agricultural Machinery Company for the years 2011-2013. The methodology mainly consisted of decision trees in classical Data Mining, Chaid Algorithms. In this study, the amount of sales was determined as the dependent variable and independent variables included: monthly rainfall, research & development (R&D), promotion, price, competitive price, advertising, temperature and monthly inflation. According to the analysis results, we found that there is a statistically significant relationship between R&D spending and agricultural machinery sales. Data mining in agriculture is a relatively novel research field. It is our opinion that efficient techniques can be developed and tailored for solving complex agricultural machinery problems and sales forecasts using data mining but obstacles such as the difficulty of obtaining reliable data are frequently experienced.

In the future, the authors hope to continue studies that could lead to further research and, at the end, strengthen sustainable growth and improved living conditions in Turkey and other emerging and developing countries.

We wish to highlight the following points about the conference:

- It was opened by the Organizing Chair, *Elise del Rosario who* talked about some of ICORD's objectives i.e. to: promote the development of Operational Research worldwide and to form a link between the member societies and regional groups.
- Participants were enthusiastic about the conference and gave highly positive feedback afterwards.
- Participants were introduced to methods that help deal with problems arising from the nature of under-development and of the development process. The limitations of more traditional O.R. methods in this context were be discussed.

For more information:
http://ifors.org/icord2014/pre-post-conference.html

ICORD-2014 'DEVELOPING MODELS IN CHANGING SCENARIOS OF DEVELOPING COUNTRIES'

DR. SADIA SAMAR ALI, FORTUNE INSTITUTE OF INTERNATIONAL BUSINESS, NEW DELHI, INDIA

The ICORD (International Conference on O.R. for Development, organized by IFORS) generally focuses on the problems of developing countries who have their own challenges in terms of infrastructure, industrialization, resource allocation, environment, health and hygiene.

Lluis Miquel, Sadia Samar Ali and Elise del Rosario

These factors enable a nation with a rich economy to compete in the global market to attract Foreign Direct Investments and to conform to global standards and contributions to society. A good development strategy focuses on ensuring that development aid is spent most effectively and efficiently to improve a developing country's technical abilities and increase its operational efficiencies in these areas. Researchers at ICORD shared several innovative solutions that can act as a catalyst in multi-dimensional developments. A few of these are reported on below. I was most grateful for the support of the OR Society in enabling me to attend ICORD and hear such a variety of talks.

With the paradigm shift in the lifestyles of people, concerns related to health, hygiene and nutrition have gained importance. Bringing a balance through nutrient substitutes has become a necessity with changing food habits. Lorena Pradenas Rojas from Chile discussed some health related research emphasizing Nutritional Menus Planning Problem (NMPP) as a decision making tool for assigning meals for different types of users. In their study they proposed a multi-objective mathematical model for the problem of planning traditional menus for several days with the principal objectives of nutrition adequacy at minimum cost. They also shared the results of testing the model with an actual case that contained 73 meals. The only problem is that their current model tends to create menus with small portions.

Faisal Wahid from the University of Auckland, presented joint work with Ula Alward , Sullivan and Cameron on the important concept of Renewable Energy Management Systems (REMS), an optimization tool for developing plans for both investment in renewable energy infrastructure and electricity generation in the Islands of the Pacific which are currently heavily dependent on fossil fuels. They also illustrated the trade off in marginal cost of running renewable generation with respect to grid supply and diesel generation.

The study I spoke about at ICORD was conducted for a LPG cylinder manufacturing company based at Bhubaneshwar, Orissa, and emphasized the importance of sustainable production and its advantage to developing countries. I suggested that the green initiatives adopted by organizations around the globe are playing a pivotal role in reversing climatic changes and in reducing greenhouse gas emissions and I described the role of LPG as an exceptional green fuel which is gaining popularity due to its wide range of applications. The environmental friendliness, wide variety of uses and arbitrage available in its pricing has diverted this domestic product into industrial usage. My talk focused on those resources that become bottlenecked in profit maximization through optimum utilization while meeting customer demands and I attempted to find a solution to the increasing demands through outsourcing used for resource allocations of raw materials, time and cost. A model using 'theory of constraints' proved to be analytically robust. It allows decisions to be made on which products to outsource. The results were shared with the organization which has helped them to make a strategic decision with respect to outsourcing.

All the research papers presented displayed a strong connection with the requirements of a developing country and covered the major areas of development. The findings and methods of all these studies can contribute significantly in providing solutions to the major needs of a nation in realizing its development strategy.

WOULD YOU LIKE TO GET INVOLVED IN RUNNING THE SOCIETY?

GAVIN BLACKETT, SECRETARY & GENERAL COUNCIL

The Society's General Council (GC) and various underlying committees help set the strategic direction and convert its plans into actions.

GC is made up of 36 Society members, serving as representatives of the Regional Societies, a representative of the Special Interest Groups and National members. The five officers of the Society serve on GC, and together with up to six other members of GC act as trustees on its Board. Members of GC can serve up to two terms of three years.

As a result of this, GC benefits from a regular turnover in membership. The formal election notice, together with details on how to get nominated, has been posted on the website. If you'd like to get involved, the vacancies are listed below. Go online to find the documentation.

The commitment includes attending 3-4 meetings a year, and working on follow-up actions. Please get in touch with me if you'd like discuss this further.

Call for nominations

Officers of the Society to serve on the Board of Directors and on the General Council

Nominations are invited from fully paid up members of the Society for the following vacancy

President Elect	Twelve sponsors

Members of the General Council

Nominations are invited from fully paid up members of the Society for the following vacancies

Up to 7 national members †	Six sponsors each
Regional member, London & South East *	Six sponsors
Regional member, North West *	Six sponsors
Regional member, Scotland †*	Six sponsors
Regional member, South Wales †*	Six sponsors
Regional member, Yorkshire & Humberside †*	Six sponsors

* Regional members must be nominated from among their own number by members within the region.
† Some incumbent members are eligible to stand for a second term.

Nominations must be received by the Secretary and General Manager on or before **30th September 2014.**

LATE NOMINATIONS WILL NOT BE ACCEPTED.

<OR>

WHERE ARE THEY NOW?

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

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

Zhaoyu Zhong Yu	Lancaster	Elliott Parsons	Bristol
Dimitrios Valsamidis	London	Christopher Eymery	Lancaster

<OR>

NEW ROLE, NEW NAME FOR LOUISE

GAVIN BLACKETT, SECRETARY & GENERAL MANAGER

Louise Orpin, our Education Officer, is about to go through quite a period of change in both her personal and professional lives. By the time you read this she'll be recently married, but more importantly from the Society's point of view, about to start a new job.

The good news is that this is a new job for the Society, and that we'll continue to benefit from Louise's energy and enthusiasm. The newly created role is that of Strategic Projects Manager, and yes, you guessed it, she'll be looking after our strategic projects! Initially this will cover a wide variety of projects on member retention, member benefits and driving our analytics initiative forward. The beauty of this role is the variety of work it offers as strategic projects could cover anything that the Society is or might be involved in. Essentially, this gives the permanent staff a little more resource to get stuff done! No doubt, as soon as Louise gets up and running with this, she'll be calling on us all for input, and keeping us updated with progress via *Inside O.R.* and our social media feeds.

This does mean that we also have a vacancy to fill, and elsewhere in this issue you'll find an advert for an Education Officer. This is a fantastic opportunity for someone to really capitalise on the foundations Louise has put in place. If this is something that interests you, get in touch! Louise's new email address is louise.allison@theorsociety.com

Congratulations Mrs. Allison!

<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

CAREERS OPEN DAY 2014

LOUISE ORPIN, EDUCATION OFFICER

Once again, this year's exhibitors prove the variety that one can expect from a career in O.R. and Analytics. What would you like to know more about before embarking upon a career in O.R. and Analytics? Meeting employers and postgraduate providers face to face is the best way to understand what it will be like working in O.R. and Analytics.

Find out about O.R. and Analytics in…

CONSULTANCY

ACTICA consulting

Capgemini CONSULTING.TECHNOLOGY.OUTSOURCING

dunnhumby

EY Building a better working world

IBM

SIMUL8 CORPORATION

steer davies gleave

DEFENCE

CORDA Delivering Successful Futures

[dstl]

QinetiQ

EDUCATION

sparx

ENERGY

British Gas

FINANCE

Nationwide On your side

GOVERNMENT

GORS Government Operational Research Service

TRAVEL

BRITISH AIRWAYS

Expedia

TUI Travel PLC

SPEAK TO SPECIALIST RECRUITMENT CONSULTANTS

datatech analytics

PROSPECT RECRUITMENT

DISCUSS POSTGRADUATE OPPORTUNITIES WITH UNIVERSITIES

Loughborough University

Aston Business School

CARDIFF UNIVERSITY
PRIFYSGOL CAERDYDD

Lancaster University Management School

University of Southampton

wbs Warwick Business School

Millennium Point, Birmingham
Wednesday 19th November 2014
10am to 4pm

Book your FREE place online www.theorsociety.com/CareersOpenDay

<OR>

ALAN MERCER (1931-2014)

GRAHAM RAND

Alan Mercer, Emeritus Professor at Lancaster University and Companion of Operational Research, died on 9 July, following a stroke.

He was born on 22 August, 1931 in Stocksbridge, Yorkshire. He won an open scholarship from Penistone Grammar School to study mathematics at Sidney Sussex, Cambridge, where he started in 1950. Alan went to the University Appointments Board in his first year in Cambridge and asked what a mathematician could do for a living. No answer was provided and he was told to return the next year, when he was asked what class of degree he had been awarded in Part1. Although that was a First, the only suggestions were Banking or Insurance. Disillusioned, but knowing what two Sidney Sussex students in the year ahead of him had done, he decided to stay on to take the Diploma in Mathematical Statistics. His supervisor was David Cox, who at the time was a young Assistant Lecturer. The first research Alan undertook was a statistical analysis of the counts on bull semen. The lengthy report contained a huge number of calculations performed with a hand-held Brunsviga calculator.

Alan's wife, Iris, also attended Penistone Grammar School, but they hadn't spoken until January 1950, when Iris congratulated him on winning his Cambridge Scholarship. The relationship flowered and they married in 1954. The same year, he joined the Field Investigation Group of the National Coal Board (NCB), and thus began his operational research career. As a result of his NCB experience, he published his first paper, in *Operational Research Quarterly*: 'Estimation of the Number of Holes and Charge per Round in Tunnel Drivage'.

In 1956, he had come to the conclusion that the NCB was wrong to undertake O.R. studies lasting several years. Iris's health was suffering from living in London, so he moved to the Atomic Weapons Research Establishment at Aldermaston. Based in the Theoretical Physics Division, he had two roles. One was to control a team developing Monte Carlo methods for weapon design, and thus he was one of a small team directly responsible for Britain's first hydrogen bomb. He did early pioneering work on the generation of pseudo-random numbers for high speed computers but the work was classified and he did not receive recognition for it. The other role was as operational research/statistical consultant to the whole Establishment. In this capacity he continued the stochastic processes work upon which Fuchs, the atom spy, had been working at the time of his arrest, and he was responsible for the statistical work on the detection of underground nuclear explosions. During his Aldermaston period, he wrote his Ph.D. thesis 'Some Stochastic Processes Analysed by the Method of Supplementary Variable' in his own time; his supervisor was again David Cox, then at Birkbeck College, University of London.

In 1962, he joined Armour & Co. Ltd as the senior manager responsible for operational research, statistics and data processing. Within eight months of joining the company, he had determined the company's data processing needs, ordered the computer and taken delivery of it, had a computer room built, recruited and trained systems analysts and programmers who in turn had programmed and implemented an ordering, inventory control and accounts receivable system.

In 1964, given the chance to start the Operational Research Department at Lancaster University with Pat Rivett and Mike Simpson, he could not resist the challenge of bridging the gap between industry and academia. As students needed to be taught about the application of O.R. to marketing and distribution problems he decided to work in these areas and by 1970 had been awarded three Social Science Research Council (SSRC) grants to support research assistants and pay expenses. Soon after arriving in Lancaster, he carried out his first private consultancy, when Allied Breweries asked him to install state-of -the-art quality control in its Burton-on-Trent brewery. After completing the work, he persuaded the company to start its own O.R. group with Lancaster's first PhD as its head.

In 1965 he began a long term relationship with Tilcon, the premix concrete supplier, visiting its Planning Director each month to discuss the company's problems and performing calculations between visits. He showed that large agitator trucks were not cost-effective, so that none were introduced to the UK. Another long term relationship started in 1976 with Burton's Biscuits, which only ended, after 23 years, with his retirement. Other companies with

which Alan was involved included Imperial Chemical Industries (ICI), Gallaher, Wilkinson Sword, Unilever, Mars, Anheuser-Busch, Serck Services, Edmundsen Electrical and International Computers (ICL).

For several years in the early 70s, he advised the Turkish government on the introduction of O.R. to that country. A Unit had been set up on the Middle East Technical University campus in Ankara, staffed by extremely bright young graduates. Alan made regular visits of a week or two, during which he worked on industrial projects, including days spent in companies. Several of the graduates subsequently studied in Lancaster.

After Mike Simpson died suddenly in July 1983, Alan was appointed as his successor, a role he undertook until 1992. In February 1984, the Science and Engineering Research Council (SERC) O.R. Panel expressed concern about the lack of research being undertaken in the Department. Whilst the research needed improving dramatically, the Department required rebuilding after the Thatcher cuts. At this time, the Department had 18 teaching staff, but few were publishing regularly in good, refereed journals. The deep cuts imposed by the government required Alan to reduce the number to 12. By 1992 everyone was publishing and 8 staff were receiving support from either SERC or ESRC, compared with none in 1983.

In 1982, Alan started a three-year term as Chairman of School of Management and Organisational Sciences and set about moving the School, against much opposition, from a grouping of self-centred, largely autonomous departments to the integrated Lancaster University Management School (LUMS). He became Associate Dean, responsible for research, in 1990, and was required to prepare for the 1992 Research Assessment Exercise (RAE). By convincing the School departments to present a single submission LUMS received a top rating of 5 which established its reputation, brought money to the School and greatly helped Lancaster's elevation into the top ten research rated UK universities.

Ever since joining the Development Committee in 1980, Alan had been a member of the University's Academic Planning Committee, and other key committees, and so had been at the heart of university decision making for fifteen, often difficult, years. He attended to several crises around the university. His biggest challenge, which he relished, came when he was asked in July 1995 to act as Head of the Department of Law, which was in some chaos. Two months later, he had resolved the immediate problems and laid strong foundations for the future.

After retirement in 1998, he went to the University every week until all his doctoral students had obtained their degrees, lectured to the MSc course for a decade and chaired almost all the PhD vivas until his wife became ill in 2010.

Alan joined the OR Society in 1954, and became a Council Member in 1969. They were turbulent times, with Stafford Beer's abortive attempt to create a professionally qualified society. Alan, Chairman of the Education and Research Committee, favoured one open to all and promoting the highest standards. In 1975, Alan became the editor of the *European Journal of Operational Research (EJOR),* jointly with Bernhard Tilanus and Hans Zimmermann, a post he held for over 20 years. In 1998 he chaired the Annual Conference which was held in Lancaster. The Society appointed him as a Companion of Operational Research in November, 2010.

Outside the University and O.R., Alan had many significant appointments. These included membership of the Social Science Research Council's Management and Industrial Relations Committee for four years from 1972, and again from 1980-82, when it became the Industry and Employment Committee of the ESRC, of which Alan was Vice Chairman, 1982-4, and then Chairman until 1987, and membership of the O.R. Panel of SERC from 1989 to 1994. In 1997, he was appointed to the government's Retail Logistics Task Force, which consisted almost entirely of senior distribution executives and was concerned with introducing new ideas.

He was appointed in 1971 to the Board of the Central Lancashire Development Corporation (CLDC), newly created under the New Towns Act, and remained a member until its end in 1985, when he became a member of the Warrington & Runcorn Development Corporation (WRDC) before being appointed its Chairman a year later by Margaret Thatcher. At the first CLDC Board meeting, he was appointed to be its representative on the Whitley Council for New Towns Staff, which negotiated pay and conditions of service. He became the vice-chairman, before being elected chairman in 1979 until the WRDC was dissolved in 1989. New Towns staff had better redundancy terms than any other public servants as a result of Alan's negotiations with Michael Heseltine.

He was a member of the North West Economic Planning Council from 1973 to its dissolution in 1979. From 1977 to 1980, he was the deputy chairman of Radio Fylde Limited, a consortium which made a failed bid for the local radio franchise. Other members included Tom Finney and Les Dawson.

Alan's last visit to the Department was in September 2013, to take part in a day of celebration of 50 years since Pat Rivett's appointment. He gave a typical, lengthy, speech, full of forthright opinions, which several alumni regarded as spellbinding. On Christmas Day I received an email from Alan. He had delayed opening his copy of *Inside O.R.* until then, and found a report of the celebrations. Alan wrote: 'Page 10 includes a photo of me, which is significant for two reasons. First, it includes the words Lancaster University, to which I devoted most of my life. Second, it is likely to be the last photo of me.'

Alan was highly innovative, with a wide range of interests. He had an abrasive style that many will remember. Nevertheless, he made a huge contribution to O.R. in the UK, through his development of the Lancaster O.R. Department, and in Europe, through his editorship of EJOR. He leaves a widow, Iris, two sons, Nicholas and Jonathan, and three grandchildren.

<OR>

Career development training

Approved courses in O.R. and Analytics

INTRODUCTION TO CREDIT SCORING

9 September, Birmingham
£675 + VAT for OR Society members
Hands on course

Course providers:
Jonathan Crook and Galina Andreeva

This course provides an introduction to credit scoring: what credit scoring is; how it developed and how it fits into the credit industry; the business problems it addresses. Gain the information needed to develop scoring; legal limitations; ideas of generic scoring and segmentation. Learn statistical techniques used in scorecard development: linear and logistic regression; choosing characteristics and attributes; splitting continuous variables.

Understand other approaches to credit scoring: how to assess if a scorecard is good, monitoring scorecards and the necessity to segment. Statistical and alternative methods of constructing scoring rules; How to process data prior to model building; How to assess and monitor scorecard with a review of current developments; Current developments and new applications of credit scoring techniques

THE COLLABORATIVE APPROACH TO SIMULATION MODEL BUILDING

10-11 September, Birmingham
£1,190 + VAT for OR Society members
Hands on course

Course providers:
Kathy Kotiadis and Antuela Tako

Anyone who is developing and using discrete event simulation models will benefit. You'll learn the collaborative modelling process and the tools that support this process. Know how to get stakeholders to discuss implementation and engage in searching for the solution.

Develop models to include active engagement with a group of stakeholders; Learn a structured approach to collaborative modelling supported by non-technical paper-based tools; See how to engage stakeholders in the modelling process as this can lead to learning and improved implementation of study findings; Improve rigour and transparency in the collaborative modelling process

INTRODUCTION TO O.R. II

15-19 September, Birmingham
£2,875 + VAT for OR Society members
Hands on course

Course provider:
Frances O'Brien

Understand the role of Operational Research in management; understand the requirements for successful Operational Research interventions; have knowledge of a range of Operational Research techniques; be able to identify the suitability of a technique for a problem situation; be able to apply those techniques.

- Problem Structuring Methods
- System Dynamics
- Statistical Methods in O.R.: multivariate models
- Data Envelopment Analysis
- O.R. in Strategy

PROCESS OPTIMISATION AND ANTI-FRAGILITY – FRIENDS OR ENEMIES

23 September, Birmingham
£405 + VAT for OR Society members

Course provider:
Tony Bendell, Services Limited

NEW FOR 2014

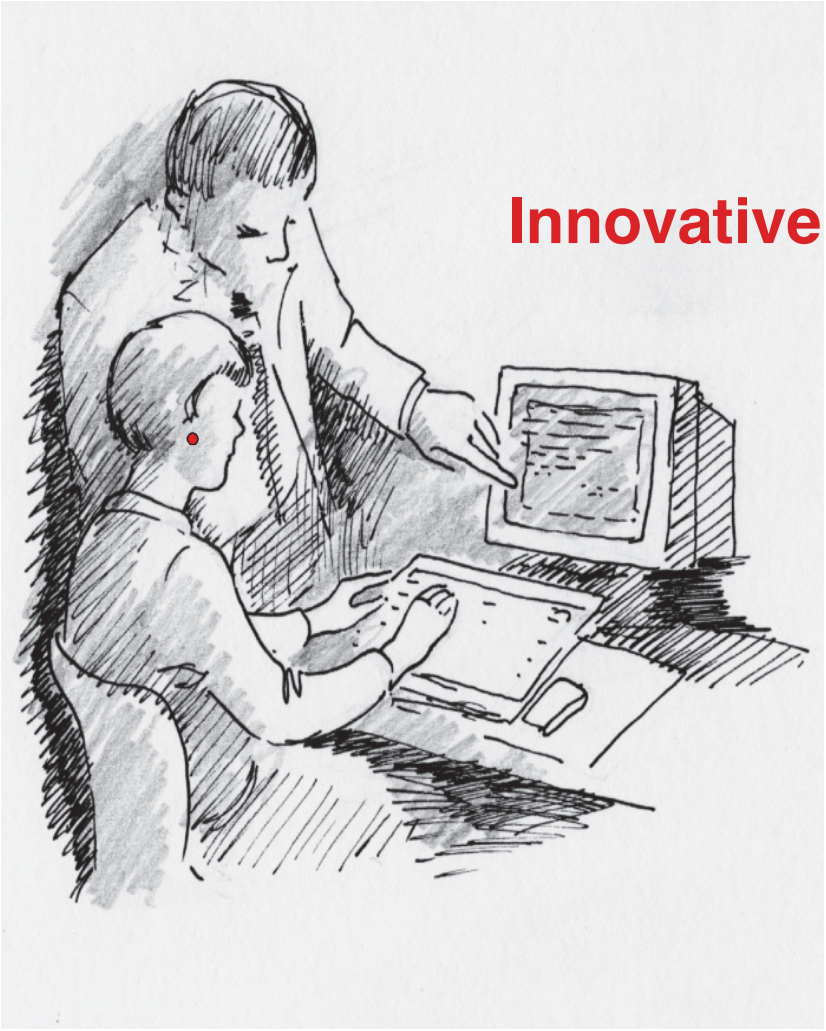
The course will provide an examination of the need to improve on current optimisation practices and offer consideration of system and organisational fragility as well as process efficiency. You'll learn about the Anti-Fragility concept developed by Nassim Taleb and the common shortfalls in current O.R. optimisation approaches. Familiarise yourself with current research thinking and discover:

How fragility, robustness and anti-fragility is built in to organisational structures and systems; How to explore shortfalls and risk in current modelling approaches; How to take stock of fragility in relation to your own organisation and systems and construct an action plan to develop anti-fragility within them

COMING SOON:

1 October	Introduction to O.R. for non-O.R. professionals
2 October	Fundamentals of Pricing Strategy and revenue Management
7 October	Practical Process Improvement using Lean and 6-Sigma
8 October	Introducing social media for researchers and consultants
14 October	Analytics in Defence and Realpolitik

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



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- **Decision Explorer®** - an ideas mapping tool used to organise and structure an individual's or a group's ideas about a problem or issue. This is a piece of software with many uses, in areas such as strategic management, risk assessment, project planning/ definition and general problem structuring. Single user licenses start from £99 + VAT.

- **Frontier Analyst® Professional** - a performance measurement tool, using Data Envelopment Analysis (DEA), to give a relative assessment of the performance of a group of business units. Used in organisations that have a network of branches/ depots or in situations where a group of similar "units" can be identified (for example, hospital wards, banks, shops, teams within a company and so on). Single user (75-unit analysis capability) licenses start from £195 + VAT.

- **Impact Explorer™** - a voting, ranking and matrix assessment tool. Groups use radio based handsets coupled with the Impact Explorer software to register their opinions or cast votes on the subject being discussed. The system supports up to 250 participants. Cost depends on the handsets being used. Prices start from as low as 31 GBP + VAT per handset. Handsets can be purchased in any quantity. Accompanying software license starts from £395 + VAT. System requires both hardware and software.

- **Interwrite™ Response** - a classroom response system. Using radio frequency or infra-red handsets, students respond to questions presented in PowerPoint, the internal question editor, or to impromptu questions asked verbally. The system can support thousands of students. Cost depends on the handsets being used. Prices start from as low as 31 GBP + VAT per handset. Accompanying software is included with the receiver kit, cost depends on the system being used. Discounts available for volume purchases of handsets.

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WHICH PLANET IS YOUR SALAD FROM?

PROF. DAVID C LANE HENLEY BUSINESS SCHOOL

Have I been mistreating my lettuce?

I bought a salad spinner; stainless steel bowl, plastic mesh basket which inverted looks like the dome of the Reichstag, and a clip-on top fitting over the bowl and transmitting to the basket the rotational moment that results from pulling on a draw-string cord. Pulling the cord makes the spindle in the top rotate, hence the basket rotates and water is gently removed from my salad leaves.

But is the water 'gently removed'? To what 'g forces' am I exposing my salad leaves? Am I crushing and bruising the delicate leaves of my lettuce?

As a child I had a large chart on my bedroom wall with the planets of the solar system. (To all you youngsters, in my day we had Pluto - so there.) In each case it showed: distance from the Sun, diameter and surface gravity. Mercury's 0.38g, Neptune's 1.12g and there was also the Moon, not a 'wanderer' but Objective One for the space missions so dear to children in the 60s. So when Neil and Buzz finally got there in '69 we all watched, on surprisingly grainy video footage, what 16% gravity looked like. On Apollo 15 David Scott simultaneously dropped a hammer and a feather and showed to us gawping wonderers that, although they took muuuuuch longer to fall, they fell in lockstep. 'Galileo was right' concluded Commander Scott and we whooped for joy. Of course we already knew he was right, because we watched Blue Peter.

Back to salad. Which celestial body was I transporting my lettuce to as I spun up my salad? OK, 'A Level' in Applied Mathematics time.

The cord is L long, where L = 47 cm. I pull it out to that length in time T ~ 1½ seconds, so the end of the cord is travelling at V=L/T = 0.313 = ms^{-1}. That pull is translated into the angular velocity of the spindle inside the clip-on top. That velocity V is causing a spindle of radius R_1 to rotate at ϖ according to $V=R_1*\varpi$. I am after ϖ. I can make a reasonable guess that R_1 is somewhere between 2 and 3 cm. Let us take as the first value; we can do sensitivity analysis later. Then with V=0.313, we get $\varpi = V/R_1 = 0.313/0.02$ @ $15^2/_3$.

The salad is in the plastic basket: 20 cm. across, remember to halve and get the right units, and we have R_2= 0.1 m. Now we get to greet an old friend: ladies and gentlemen, please welcome back Ω^2R, the rotational acceleration effect experienced by the lettuce. We have a value for ϖ and the relevant radius is R_2 (a little less in reality since lettuce is not crushed to zero width but we are after a first order result here). Using ϖ^2*R_2 we get $(15^2/_3)^2*0.1$ = 24.5 ms^{-2}

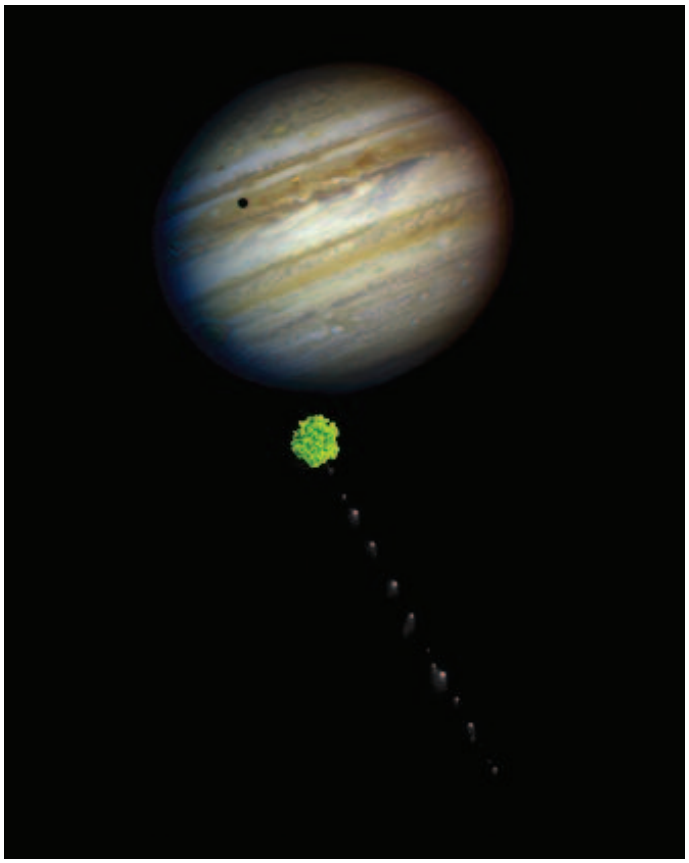
Our lettuce is being exposed to two effects:-

Horizontally: $\varpi^2 * R_2$ = 24.5 ms^{-2}

Vertically: g = 9.81 ms^{-2}.

These are two orthogonal vectors so we 'square, add and root' to get the magnitude of the resultant: the salad is experiencing 26.4 ms^{-2} or 2.7 times the effect of Earth's gravity - without a pressure suit.

Back to the wall chart: apparently I am eating lettuce which, at least in gravitational terms, has had a brief visit to the surface of Jupiter. I find it a nice thought, because it is more than I will ever do, and it adds a certain unworldly note to summer dining, by Jove.



The original imagery was created by: NASA, ESA, H. Weaver and E. Smith (STScI) and J. Trauger and R. Evans (NASA's Jet Propulsion Laboratory). It is a composite, formed of photographs of Jupiter and of the Shoemaker-Levy 9 comet, taken by the NASA/ESA Hubble Space Telescope in 1994 and shows the comet approaching Jupiter.

BRAND WARS

NIGEL CUMMINGS

According to a recently published INFORMS study, the use of game-theory models can provide companies with useful indicators as to when their brands should choose to advertise next to rival brands and when not to, but using competitors' brand names as keywords on search engines like Hotbot, Yahoo Search, Google and Bing can backfire.

The study which is titled 'The Company that You Keep: When to Buy a Competitor's Keyword' is by Preyas S. Desai and Richard Staelin, professors at the Fuqua School of Business, Duke University and Woochoel Shin, Professor at the Warrington College of Business Administration, University of Florida and is published in INFORMS' *Marketing Science*.

The way this works is that if someone searches for a given product by name or 'keyword', they will automatically get links to any other company that has bought that keyword. The theory is that the lesser known product will benefit from the kudos of being seen in the company of the better known product. The research, however, suggests this may not actually be the case. If your product is perceived as being significantly inferior then people are even more likely to go for the [perceived] better one. They have looked at yours but have been reminded that actually there is a much better option available. The authors believe this to be a psychological phenomenon known as assimilation and contrast.

However, the converse may be true if the two brands were similar in quality. Thus, according to the research undertaken so far, the choice to advertise a target brand in searches for a rival brand is not obvious but depends on the [perceived] quality difference between the two brands.

Using a game-theory model, the researchers were able to illustrate when to advertise a brand next to a rival brand and when not to. The authors believe that the lesser-known brands who want a 'free-ride on their competitor's fame' should not advertise on the rival's brand name if they are significantly inferior to the rival.

If your product is the market leader but is only marginally 'better' than the rival products then it may pay you to buy your own brand name to stop competitors jumping on your bandwagon but if you do so then you could be losing out on some free publicity.

This research has been made public in conjunction with the INFORMS Society for Marketing Science (ISMS). ISMS is a group focused on describing, explaining, and predicting market phenomena at the interface of firms and consumers.

An abstract for it and details of where it is located, can be found at: http://pubsonline.informs.org/doi/abs/10.1287/mksc.2013.0834

<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

OPERATIONAL RESEARCH VERSUS OPERATIONS MANAGEMENT

SANJA PETROVIC AND BART MACCARTHY
NOTTINGHAM UNIVERSITY BUSINESS SCHOOL

'Many of the classical problems in O.R. (e.g. the job shop scheduling problem, the travelling salesman problem, queuing and inventory models) are directly relevant to the design and management of operational systems.'

One of us (Sanja Petrovic) recently joined a Division of Operations Management and Information Systems in a Business School as Professor of Operational Research whilst the other (Bart MacCarthy) has been a Professor of Operations Management in the same Division for over a decade.

To many of our colleagues in the Business School we occupy the same territory. We do indeed have some strong areas of overlap in our research interests but quite a number of differences in emphasis and approach also. A natural question emerges – what is the relationship between Operational Research (O.R.) and Operations Management (OM)?

Many in the O.R. community would say they are more or less the same. However, the reverse is not true. Many in the OM community do not perceive themselves as O.R. researchers or practitioners. It seems that in both the scientific literature and business communities there are no definitive answers on the scope of, and differences between O.R. and OM.

This is not a new question of course. The histories of the disciplines are intertwined. Many of the classical problems in O.R. (e.g. the job shop scheduling problem, the travelling salesman problem, queuing and inventory models) are directly relevant to the design and management of operational systems. Many researchers across the O.R. and OM disciplines publish in the same academic journals but then again there are O.R. journals that some OM academics would not consider at all relevant and vice versa. There are quite eminent scientists who earnestly believe that O.R. and OM are synonymous. Others, equally eminent, resolutely maintain that O.R. is focussed on mathematical modelling, optimisation problems and simulation, while OM is a discipline addressing more general problems about processes and systems and involving a broader range of issues including information systems, organizational and human behaviour, ethics and other softer management disciplines. Valid observations may be that there is no clear and crisp distinction between the disciplines and there is considerable overlap.

In text books and encyclopaedias O.R. is typically referred to as *a discipline that deals with the application of advanced analytical methods to help make better decisions,* whilst OM addresses the *activities, decisions and responsibilities of managing the design, production and delivery of goods and services.* There is general agreement that O.R. concerns the application of quantitative models and methods to understand and 'solve' many types of

problems, including those that have a strong operational focus. This means O.R. involves the application of existing methods and the development of new ones in many mathematically defined operations areas. In O.R. manuscripts one can find key words like optimisation, dynamic control, Markov chains, stochastic analysis, games, risk analysis, etc - but of course one can see some of these terms in some papers in OM journals also. However, there is also more and more recognition of *Soft O.R.* approaches, applying predominantly qualitative techniques with the aim to define and explore a given problem from various perspectives.

Similarly, there is agreement that OM is concerned with the creation, design, production and delivery of products and/or services. However OM places strong emphasis on understanding 'effectiveness' in systems design and management, which may not be evident purely from mathematical modelling. Effective deployment and effective management and practice necessarily bring in broader human, organisational and systems issues. In OM manuscripts key words could include performance measurement, project management, supply chain management, manufacturing and production, energy/ transportation, service systems etc – but, as above, many of these terms appear in papers in O.R. journals also. Additionally, there is increasing recognition in OM that appropriate mathematical modelling can lead to valuable insights into the design and management of robust operational systems, particularly in large complex systems.

Some would argue that O.R. journals have prioritised manuscripts that describe methods and algorithms for solving usually well-defined theoretical problems but somewhat divorced from real-world applications. The developed models are usually a simplified representation of a real-world problem. The focus is then on rigorous evaluation of a method or algorithm and on performance comparisons with other methods and algorithms reported in the literature. The OM literature publishes both qualitative and quantitative research, perhaps with a greater emphasis on the former. The argument is that the OM literature has placed greater emphasis on real-world problems, including contemporary concepts such as lean thinking, sustainability, and globalisation.

An interesting illustration is the domain of forecasting. The O.R. literature has tended to emphasise the development of algorithms and techniques for the generation of 'accurate' forecasts from historical data sets. The OM literature has been more concerned with forecasting as a process within organisations and its incorporation into effective planning and management regimes. Of course, one cannot live without the other. In large scale retail organisations for instance we rely on timely and accurate model-based forecasts for perhaps many hundreds of product lines across retail stores. But equally we rely on strong operational processes for the translation of such forecasts into appropriate ordering and replenishment decisions and the effective management of logistics and distribution processes to ensure on-shelf availability.

We agree that this brief article raises more questions than answers. It has not sought to be exhaustive in discussing the foci and boundaries of the O.R. and OM disciplines. There is a little surprise that some have labelled O.R. as the more theoretical and OM the more applied discipline. Is it true? Probably not! Many counter-examples could be given but there are perhaps elements of truth in these observations.

We conclude by noting that irrespective of the borders between the two disciplines, they should each seek to address the many challenges that arise in modern complex decision making environments and work collaboratively where appropriate. Let's not argue too much about fuzzy discipline boundaries but instead place the emphasis on relevance and rigour in addressing real world problems.

<OR>

NEWS OF MEMBERS

NEW MEMBERS (September 2014)

The Society welcomes the following new members,
DAVID BONFIELD, Orpington; KATHARINE ETHERIDGE, Hants; EVA GARNACHO, Lowestoft; GRAHAM JACKSON, London; WALTER MALUNGA, Zimbabwe; SRINIVAS POLURU, USA; ANDREW REEVES, London;

and Reinstated members,
YALIN BI, Southampton; KIRSTY GRAHAM, Hants; SHAMAILA ISHAQ, Coventry ; IAN REYNOLDS, Gloucester;

and the following student members,
ANDREW HALE, Bristol; ANDREA HILL, Alvechurch; PATRICK TULLY, Bristol;

Total Membership
2269

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: -

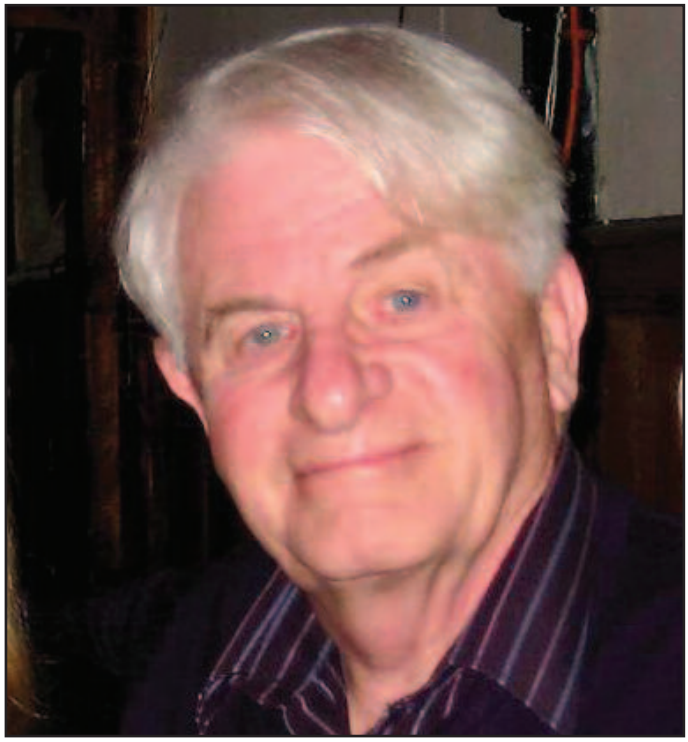
Admit to the category of CandORS (CANDORS)
Jun NEOH
Laura RICHARDS

<OR>

CLIFF WILKINSON (1936-2014)

GRAHAM RAND

James Clifford (Cliff) Wilkinson died on 3 July, following a long battle with cancer.



He was born in Preston, in December 1936, where he attended Preston Catholic College. His undergraduate degree was in Mathematics (with Statistics) at Manchester, 1955-58. Following that he worked for a year as an assistant engineer in the aircraft industry, undertaking data processing and statistical analysis, before becoming a mathematics master at a grammar school.

In 1961 he began the Birmingham MSc OR, where he remembers being taught by Brian Haley, Steven Vajda and Frank Benson, amongst others. On graduating, he was awarded a National Transport Research Fellowship at Liverpool University. In addition to some O.R. teaching duties, he spent three years concerned with computer scheduling of buses and their crews, before becoming lecturer in O.R. in the sub-department of numerical analysis within the department of Applied Mathematics, in 1964. In this role he taught O.R. techniques to final year maths students, as well as supervising O.R. projects, which he described as 'minor'.

A year later he came to Lancaster University, to what was then the Department of Operational Research, as lecturer, on 1 October, 1965, a year after the University, and the Department, had started. He was promoted to Senior Lecturer on 1 Aug 1971.

Cliff went to the US to visit Russ Ackoff's group at the University of Pennsylvania for a full year in 1967-8. One outcome of this was a collaboration with Shiv Gupta, which led to a paper presented at the 5th IFORS conference held in Venice in 1969, entitled 'Allocating promotional effort to competing activities: a dynamic programming approach'.

Later his interest focussed on the operation of water supply systems, and he helped develop a multi-criteria control policy for the River Dee in north Wales. It was rumoured that the university insurers had to pay an increased premium to cover English staff and students working on a Welsh river system! Several papers were published in specialist journals such as *Water Resources Research* and the *Journal of Hydrology*, and he co-edited a book, *The mathematics of hydrology and water resources*, published by Academic Press.

He co-authored papers on water resources with David Smith who writes 'I had the honour and delight of being supervised by Cliff for both my Masters' project and my PhD - being Cliff's first doctoral student. Cliff was completely at home in the worlds of engineers, geographers and mathematicians with whom he worked; a model of interdisciplinary work. There was a sense of humour too - part of the controls on the River Dee had been given the acronym DISPRIN, so one day he suggested that the sequel should be known as PARACETAMOL, and devised an appropriate piece of jargon to fit. Such antics with words linked to his delight in crosswords, one of his hobbies in retirement.'

Following his retirement in 1990 he continued to be involved with teaching in the Department for another decade. Cliff made a huge contribution to the early decades of the department of Operational Research at Lancaster, and will be remembered fondly by former colleagues and many students, particularly those he supervised on Masters projects.

He leaves a widow, Pauline, children Jonathan, Christopher and Elizabeth, and grandchildren Patrick and Samuel.

<OR>

'Cliff was completely at home in the worlds of engineers, geographers and mathematicians with whom he worked; a model of interdisciplinary work'

THE OR SOCIETY EDUCATION OFFICER

THE OR SOCIETY

The OR Society - Education Officer

The Operational Research Society is seeking an Education Officer to undertake a range of duties in support of the Society's aims and objectives.

Duties will focus mainly on the Society's education outreach programme, OR.in Schools, by: promoting Operational Research in schools, at open days, and conferences; resourcing and developing educational materials; arranging visits to schools for volunteers; providing training and support to volunteers; developing other projects in support of OR.in Schools; representing the Society at a variety of meetings where education issues are under discussion; and keeping the Society up to date on education news and developments.

The role will be based at the Society's office in Birmingham and the applicant must be willing to travel within the UK.

Salary will be in the range £25,000 - £35,000 depending on experience.

Applications should consist of a CV **not exceeding two pages**, together with a covering letter of **not more than one page**, which should explain the reason for your interest and the qualities you feel make you an ideal candidate. They should be submitted **by email only**, to gavin.blackett@theorsociety.com.

The closing date is **Friday 19 September 2014**.

Additional information about the role is available from the Society's website, www.theorsociety.com

www.LearnAboutOR.com
www.TheORSociety.com

The OR Society is an equal opportunities employer and welcome applications regardless of race, gender, disability, age, religion or sexual orientation

PROBLEM SOLVED

LOUISE MAYNARD-ATEM

This month, as promised, here are the solutions to the five puzzles that have formed part of the 'Problem Page' series.

I've been overwhelmed with the level of response I've received from all of you, and I'm hoping to turn this into a regular feature within the magazine, rather than just as a section of Y2OR.

The great thing about O.R. is that there's always more than one way to solve a problem, and this was proved by the many and varied responses I received to each of the problems. The answers that are published below are by no means definitive and are a selection from the submissions that were sent in. Thank you to everyone that has taken part and if you have any feedback on this feature, the answers below, or just want to get in touch about future Y2OR articles then I encourage you to get in touch with me on LMaynardAtem@live.co.uk.

Puzzle #1 – Survivor

The 'Survivor' problem asked you to calculate the maximum number of points you could achieve from the limited resources you have available to you when trying to survive hiking through the wilderness. The constraints were that you must take one item from each of the four categories (Food, Water, Shelter, Defence) and that your rucksack could not exceed its 25kg capacity.

As many of you commented, this puzzle was quite straight forward – but this was intentional as I didn't want to scare anyone off right at the start.

The correct answer, as all of you stated, was a maximum of **74 points** and below (Figure 1) you can see the workings of **Dr Paul G. Ellis,** who was the first to submit a response to this puzzle and used simplex linear programming to arrive at this solution.

Figure 1

Microsoft Excel 14.0 Answer Report
Worksheet: [Book1]Sheet1 (2)
Report Created: 01/03/2014 11:09:39
Result: Solver found a solution. All Constraints and optimality conditions are satisfied.
Solver Engine
Engine: Simplex LP
Solution Time: 0.046 Seconds.
Iterations: 2 Subproblems: 6
Solver Options
Max Time Unlimited, Iterations Unlimited, Precision 0.000001
Max Subproblems Unlimited, Max Integer Sols Unlimited, Integer Tolerance 0%, Assume NonNegative

Objective Cell (Max)

Cell	Name	Original Value	Final Value
$E$30	Total Survival Points Survival points	0	74

Variable Cells

Cell	Name	Original Value	Final Value	Integer
$C$10	Food1 Item Select	0	0	Binary
$C$11	Food2 Item Select	0	1	Binary
$C$12	Food3 Item Select	0	0	Binary
$C$13	Water1 Item Select	0	0	Binary
$C$14	Water2 Item Select	0	1	Binary
$C$15	Water3 Item Select	0	0	Binary
$C$16	Shelter1 Item Select	0	0	Binary
$C$17	Shelter2 Item Select	0	1	Binary
$C$18	Shelter3 Item Select	0	0	Binary
$C$19	Defense1 Item Select	0	0	Binary
$C$20	Defense2 Item Select	0	0	Binary
$C$21	Defense3 Item Select	0	1	Binary

Constraints

Cell	Name	Cell Value	Formula	Status	Slack
$B$23	Total weight Wt	24	$B$23<=25	Not Binding	1
$D$25	# Food items	1	$D$25>=1	Binding	0
$D$26	# Water amount	1	$D$26>=1	Binding	0
$D$27	# Shelter items	1	$D$27>=1	Binding	0
$D$28	# Defence items	1	$D$28>=1	Binding	0
$C$10:$C$21=Binary					

Puzzle #2 – Connected & Infected

The 'Connected & Infected' problem was based on the spread of disease and asked you to calculate how long it would take for at least half of the global population to be infected with a virus. The puzzle gave you the rate at which infection spread, the population of each area and the routes that the virus could take. There were also assumptions to be considered; no deaths would occur and infection would remain constant (i.e. assuming there was no cure).

This puzzle was slightly more complicated than its predecessor, as some of you noted, but was still quite manageable. The correct answer was a **minimum of 81months**, and this answer was arrived at using a simple spreadsheet model to give the correct solution. **Alexander Finlayson** arrived at the same answer using a spreadsheet model and presented his results in the form of the graph shown in Figure 2.

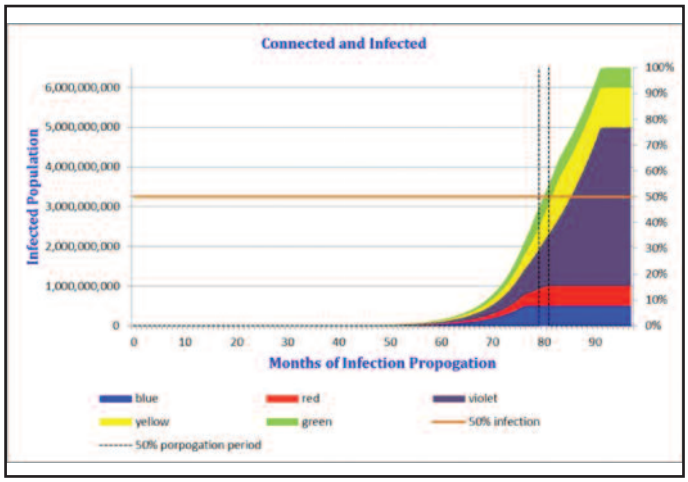


Figure 2

Puzzle #3 – Choose Your Crew

The 'Choose Your Crew' puzzle tasked you with finding the optimum mixture of skills required to navigate a sea voyage, all the while spending the minimum amount on total salary. Three skill categories were presented and the constraint in this instance was that there needed to be a minimum of 15 points in each category, however there was no limit on the number of crew members that could be aboard the voyage.

The minimum amount spent was $5,200, utilising Amy, Carl, Dan, Fred and Ida. Once again, all the solutions I received gave the correct answer with the majority identifying this as a linear programming problem and choosing to use Excel's Solver tool.

Puzzle #4 – Relief Mission

The 'Relief Mission' puzzle describes the situation of coordinating relief efforts after a major national catastrophe and the logistic complexities that go along with such an event. The puzzle sought to discover the optimum landing positions of the two available relief packages, in order to minimise the total distance that villagers from the 20 surrounding villagers must walk in order to obtain supplies. Once again, the assumption was made that there would be an infinite amount of relief supplies within the two packages.

Personally, I felt that this was the most challenging of all five puzzles that were set and it seems that you all agreed, as I received the fewest solutions for this one. I arrived at the answer of **C3 and H7 as the optimal drop points** and used my old favourite, Excel solver. Thank you to Mark Montanana, who sent in the most detailed response to this puzzle, explaining how he used an algorithm with 2500 different iterations (corresponding to every combination of possible locations between drops 1 and 2) to arrive at, thankfully, the same answer as me.

Puzzle #5 – Travelling Spaceman Problem

The 'Travelling Spaceman Problem' is a classic O.R. problem whereby you must decide on the most appropriate order in which to visit various locations in order to minimise the total distance travelled. The constraints in this instance are that you must visit every location and that you cannot visit any location more than once (other than your starting location). The slight twist on this problem is that you are visiting galaxies rather than map points, and these have (x,y,z) coordinates rather than just (x,y) coordinates.

I felt it would be quite fitting to end this series of puzzles on a travelling salesman type problem, as it's a very popular O.R. concept and I don't doubt we've all come across it at some point, be it academically, professionally or both. Interesting enough, this was the problem that drew a number of different solutions, some of which have been presented in the table below (Table 1). I was particularly impressed with the solution provided by Barry Daniels, who used Prim's Algorithm to arrive at his solution and visualised it beautifully, as shown in Figure 3.

I think that this puzzle nicely illustrates the one of the most basic principles of O.R.; there's always more than one way to solve a problem.

Table 1

Name	Solution
Richard Allison & Barry Daniels	2 → 1 → L3 → Z8 → 7 → 9 → N5
William Waller	7 → 9 → N5 → 2 → 1 → L3 → Z8

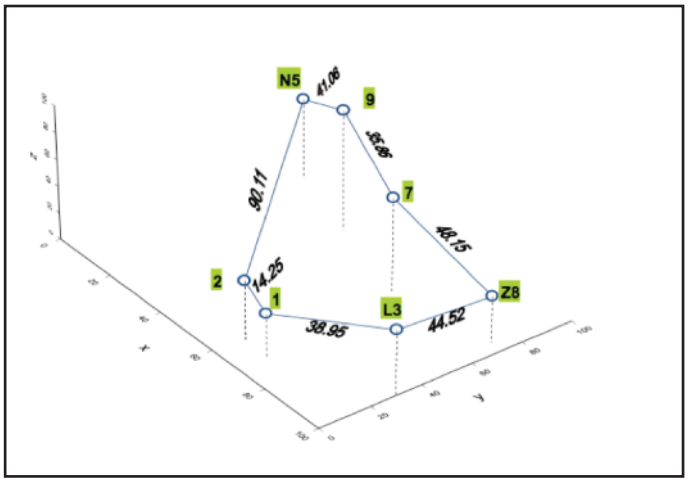


Figure 3

<OR>

DEVELOPMENTS IN ADVANCED ANALYTICS

NIGEL CUMMINGS

Alan Hambrook, CEO of Zoral Labs, a company which specialises in behavioural modelling and delivering solutions based on unstructured data gave a presentation entitled 'Behavioural Data and its use in Predictive Analytics' at this year's Developments in Advanced Analytics and Big Data event.

Alan Hambrook, CEO of Zoral Labs

Unstructured data is information harvested from the web, from sources like Facebook, digital fingerprints, the devices people use, the way they use their keyboards, the way they interact with applications etc.

Zoral Labs he said worked in predictive analytics primarily for the finance sector. 'Our clients are mostly financial institutions who supply products to consumers and small businesses – they are lending money or selling insurance policies or something like that'. Zoral Labs he said, also worked in a very specific world which had its own peculiar demands that required 'straight-through' processing online, i.e. fill in, send off and expect a reply within a few minutes.

Working in real time in this way where decisions had to be made quickly to satisfy both the client and the companies deciding to provide financial coverage required a great deal of computing and analytics power, and a very high level of automation. The decision components of the platforms used had to rely on the artificial intelligence imbued within them by Zoral Labs.

These companies had specific criteria for customer acceptance; they needed to know which client leads were worth accepting and taking risks on. Were clients supplied as referrals from other channels, and if so were the channels trustworthy, were they any good? They also needed to know what products to offer their clients based on evaluation of responses to their online systems.

This was where behavioural data was valuable. Someone who goes to the trouble of typing in their details rather than cutting and pasting is, apparently less likely to default. Other indicators of veracity of clients could also be obtained from social media systems such as Facebook – a difference between actual and stated age might be a sign of dishonesty. Examining their 'likes' frequency, from social media, was also a useful indicator.

Zoral Labs had found that the application of behavioural data when making decisions about clients had maintained and improved acceptance rates in many cases by over 50%, more than doubled client retention/renewal rates and reduced default levels by more than 20%. In making the decision, over 4000 data items would be analysed. Only 8% of the data examined (in real time) related to conventional data sources, 40% related to online behaviour, 10% related to social media, 12% related to unstructured data from documents and 30% related to the actual applications and in-house data available to the financial service providers.

The technologies involved in providing or denying service to clients were many and varied – from artificial neural networks with feed-forward capabilities to radial basis function neural networks and self-organised mapping. Multinomial regression was also used, so were generative models, convex programming, expert systems, decision theory and NLP.

Finally, Alan Hambrook explained, 'Predictive modelling was used because, by capturing, understanding and using behavioural data and applying it to predictive modelling, it was possible to lower the cost and improve trading metrics and gain additional insight into clients' behaviour and predictability.'

BIG DATA PROTECTION LAW

NIGEL CUMMINGS

The era of 'Big Data' has provided a massive opportunity to those looking to gather information/intelligence, but the UK's data watchdog has issued a warning to all those who choose to use it.

The UK's Information Commissioners Office (ICO) is concerned that providing access to an all-encompassing collection of large and complex data sets is risky because big data is a large and difficult area to monitor with regard to the use of personal information. They have issued a fifty page report on big data which sets out how Big Data can, and must, operate within the data protection law and is available at:
http://ico.org.uk/news/latest_news/2014/~/media/documents/library/Data_Protection/Practical_application/big-data-and-data-protection.pdf

The report is essential reading if you want 'stay on... the right side of the law and still innovate'.

The Data Protection Act's second data protection principle is known as 'purpose limitation' and it creates a two-part test for data controllers. The first part revolves around the reason and purpose for which data is collected. The second part concerns what happens if the data is further processed for any other purpose, and asks the question, is it incompatible with the original purpose?

The report says: 'It has been suggested that big data challenges the principle of purpose limitation, and that the principle is a barrier to the development of big data analytics.' It suggests that 'a more accurate description of 'purpose limitation' is 'non-incompatibility'. The ICO also adds to this by stating that The Data Protection Act, 'does not say that processing for a new purpose is not permissible, nor does it say that the new purpose must be the same as the original purpose, nor even that it must be compatible with the original purpose: it says that it must not be incompatible with it'. It couldn't be clearer!

To try and counter any possible future action with regard to data privacy, the ICO's Head of Policy Delivery, Steve Wood, recently said. 'What we're saying in this report is that many of the challenges of compliance can be overcome by being open about what you're doing. Organisations need to think of innovative ways to tell customers what they want to do and what they're hoping to achieve.'

Mr Wood also said there were 'benefits' associated with being seen as a responsible custodian of data and… 'Big Data can work within the established data protection principles. The basic data protection principles already established in the UK and EU law are flexible enough to cover Big Data. Applying those principles involves asking all the questions that anyone undertaking Big Data ought to be asking'. He added. 'Big Data is not a game that is played by different rules.'

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ORQ/JORS, 1970 - 89
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<OR>

FOG IS ON THE HORIZON

NIGEL CUMMINGS

Apparently, according to Cisco, clouds are too nebulous, too far away and too difficult to access. The answer, again according to Cisco, is a 'fog' or, if you like, a localized cloud.

It would appear that the cloud itself has become the bottleneck because often there simply is not enough available bandwidth to keep performance levels as high as their many and varied customer bases require. The cloud unfortunately has been a victim of its own success, more and more business and non-business users want to utilize its functionality, but bandwidth restrictions simply has not been able to keep up with demand. Fog computing on the other hand might solve some of the problems posed by an ever increasing number and type of devices being used in network situations online – even though it seems as though we are turning back the clock, as far as technology is concerned.

Rather than simply generating and dumping data onto a cloud for subsequent access, fog computing is about adding intelligence at the front by analysing the data at source. The data still gets dumped on the cloud for remote access but the important decisions are taken before it floats off into the ether.

Equipment health monitoring (EHM) is an obvious example. Rather than having probes sending data to a cloud to be processed and analysed remotely, much of this could be done at source. The local system would need access to past data but this could probably be held locally as well. It would, of course, be necessary to determine whether this would be cost-effective or more efficient.

Fog computers could make a name for themselves because of their capabilities in utilising smarter routers which feature application level functionality too. Cisco has published a paper which they have called, '*Fog Computing, Ecosystem, Architecture and Applications*'. It provides considerable information about the use of and potential application space for fog computing.

To find out more about fog computing and how it may be applied to big data and analytics, please take a look at:
http://www.cisco.com/web/about/ac50/ac207/crc_new/university/RFP/rfp13078.html

CENTRE FOR ADVANCED BUSINESS ANALYTICS

NIGEL CUMMINGS

KPMG is investing more than £20 million in a collaboration project with Imperial College London (IC) which will create the 'KPMG Centre for Advanced Business Analytics'.

Researchers at Imperial College Business School (ICBS) will lead the centre as part of the college's Data Science Institute, which is developing data science methods and technologies and supporting data-driven research.

KPMG and IC said the collaboration would also see the creation of a 'Global Data Observatory' to bring data visualisation software to bear on large amounts of data and complex data, it will allow researchers to spot patterns and get real insights into complex business issues.

Professor G 'Anand' Anandalingam, Dean of ICBS, said: 'Processing huge swathes of data is a major challenge for leading businesses. Today's datasets are so big and complex to process that they require new ideas, tools and infrastructures.'

While Alwin Magimay, KPMG UK head of digital and analytics, said: 'Our new Global Data Observatory will act as the Hubble of business data. We are still at the silent movie era with respect to evolution of big data. Together with Imperial, we will break new ground with a simple objective of generating new insights to create new business value for our clients.'

The project will focus on five key areas - analysis of business capital, growth opportunities, people, operations and resilience. Each area has been selected to help UK businesses gain a competitive edge by launching products and services ahead of international competitors. The new KPMG Centre will also develop innovative approaches, analytical methods and tools for using big data, giving UK businesses the opportunity to solve complex issues, such as enabling banks to predict fraud or helping retailers better understand consumer behaviour.

The eight year project will see a joint team working together, with the ambition of completing 15-20 projects per year.

More information on this new centre can be found at: http://www.imperial.ac.uk/business-school/research/kpmg-centre-for-advanced-business-analytics/

<OR>

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

The ooh – ahh of simulation
Date/Time: Tuesday, 21 October 2014 at 18.00 - 20.00
Venue: TBA
Speakers: Frances Sneddon, CTO Simul8

How do you solve a problem like Analytics?
Date/Time: Wednesday, 12 November 2014 at 18.00 - 19.00
Venue: TBA
Speakers: Prof. Stewart Robinson, President of the Operational Research Society

Abstract: 'Analytics' seems to be everywhere, job adverts abound, companies talk of their analytics capabilities, and the press regularly report on activities in analytics. Meanwhile, in the OR world, our US counterpart, INFORMS, have thrown huge resources at analytics. So how should we, as UK based OR practitioners and academics, respond? In this talk I shall reflect upon my own analytics journey which started in around 2006. We shall ask what is analytics? Is it just another fad or something that will stay? And we shall finish by thinking about what this means for us. Come ready to discuss your own ideas on how we 'solve a problem like analytics.'

STEWART ROBINSON is Professor of Management Science and Associate Dean Research at Loughborough University, School of Business and Economics. Previously employed in simulation consultancy, he supported the use of simulation in companies throughout Europe and the rest of the world. He is author/co-author of five books on simulation. His research focuses on the practice of simulation model development and use. Key areas of interest are conceptual modelling, model validation, output analysis and alternative simulation methods (discrete-event, system dynamics and agent based). Professor Robinson is co-founder of the Journal of Simulation and President of the Operational Research Society. He is helping to lead an OR Society Charitable Project on Analytics Education. Home page: www.stewartrobinson.co.uk.
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

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

The use of OR in designing new supply chain network in Marks and Spencer - Thursday, 27 November
2014 at 18.00-20.00

SOUTH WALES (SWORDS)

CONTACT: Dr Jonathan Thompson.
TEL: 029 2087 5524 Fax: 029 2087 4199
EMAIL: ThompsonJMI@cardiff.ac.uk

Postgraduate Presentations and Social Event
Date/Time: Tuesday 7 October 2014 at 17:30
Speaker: Various Postgraduate Students
Venue: School of Maths, Cardiff University

Following on from a similar event last year, a number of PhD students will give brief overviews of their research in Operational Research areas. These will cover a range of topics including health, scheduling and routing problems and are based on their ongoing postgraduate research. There will also be an opportunity to meet new students on the MSc in Applied Statistics and Operational Research run by the Cardiff Mathematics Department.

The meeting will be held at the Mathematics Institute, Cardiff University. Tea and coffee will be available from 5.30pm in the Internet Café which is just inside the main entrance to the Mathematics Institute. The talks will commence at 5.45pm in room M/0.40 (ground floor).

The talks will last approximately one hour after which we will go to a nearby hostelry (venue to be decided) — for networking and free refreshments (meal and drink).

As we need to book the food beforehand, please let me know by the 1st of October if you plan to attend. Also please let me know if you are a vegetarian or have other dietary requirements.

Dr Jonathan Thompson, Thompsonjm1@cardiff.ac.uk
SWORDS Title To be Confirmed
Date/Time: Wednesday, 12 November 2014 @17.45 - 19.00
Speaker: Naomi Rowlands (BA)
Venue: School of Maths, Cardiff University

Naomi Rowlands from British Airways will be speaking to SWORDS on the 12th of November. Further details will be provided later.

SWORDS Seminar and Quiz
Date/Time: Wednesday, 10 December 2014 @ 18.00
Speaker: Professor Steve Disney
Venue: School of Maths, Cardiff University

Professor Steve Disney will be giving a presentation to SWORDS on the 19th of December and this will be followed by a quiz and food. More details will follow later.

SPECIAL INTEREST GROUPS

Simulation modelling in health and social care

Fostering links between simulation research, practice and the NHS. November 17th Warwick Business School

The OR Society Simulation Special Interest Group and Warwick Business School are pleased to announce a one day seminar and workshop aiming to improve and foster links between simulation research, practice and the NHS. The event will take place on 17th November at Warwick Business School, University of Warwick.

Simulation modelling has been used widely in health and social care from modelling four hour waiting time targets in accident and emergency departments to understanding the dynamic behaviour of a whole system of care. However, simulation is still rarely used by the NHS and many healthcare professionals are unfamiliar with it. This workshop aims to explore how links between simulation research and practice can be improved.

The workshop will be divided in two parts. During the morning, speakers with extensive experience in research and practice of simulation modelling in health and social care will provide an overview of their experience through their personal work in the area. In the afternoon, there will be a simulation market place where delegates can see and interact with practitioners/researchers and engage with a selection of simulation models from health and social care. The day will finish with a panel session debating the opportunities and challenges in fostering links between simulation research and practice in the NHS.

The special interest group particularly encourages attendance of delegates from the NHS and its associated organisations and from the world of simulation practice.

Refreshments and lunch are provided. Registration costs £20 + VAT.

For all enquires on the workshop please contact Martin Kunc (martin.kunc@wbs.ac.uk) or Thomas Monks (thomas.monks@soton.ac.uk)

For all enquiries related to registration please contact Jennie Phelps (jennie.phelps@theorsociety.com)

To book online please go to :
http://www.theorsociety.com/DIF.aspx?page=SimulationWorkshop

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OR-30

September, 1984

John Crocker

The first paper in the September issue was by Colin Eden and Sue Jones about the use of repertory grids. In their paper they use the potential purchase of a replacement car as an example taking us through each stage in the process. From this they go on to explain how this type of approach can be used in a variety of ways to solve, or, at least, help solve, many types of problem. As they say, '…the theory has much to say about how we think about the world we inhabit'.

Orienteering is not dissimilar to the travelling salesman problem. Basically, one has to visit a number of locations (controls) receiving a stamp from each and return to the starting point faster than all of the other competitors. One of the differences is that there can be many different routes between any two points with the most direct route often not being the quickest. The shortest route could, for example, involve some serious rock-climbing which may take too long or be beyond the capability of the individual. Hayes and Norman, describe how they use dynamic programming to design a course.

The aim of the planner is 'to design a course that is not only physically, but mentally challenging'. The race essentially comprises two separate stages: reading the map to try to determine the optimum route and; actually following that route on foot. The skill of the planner is to position the controls in such a way that there is no single obvious optimal route between any pair.

In addition to making life as difficult as possible for the competitors, the planners also have to consider safety and, to a certain extent, the comfort of the marshalls who may be required to stay at one location for up to eight hours 9in all weathers). From the safety consideration, mountain rescue teams may need to be placed at strategic points. These would be where a large number of optimal routes merge.

Tsiligirides also looks at orienteering but at a different form of the sport. Instead of having to visit every control, there is a time limit with penalties for taking too long. Each control is allocated a score, usually based on how difficult it is to reach. The winner is the person who gets the highest number of points after any deductions for overrun. He explains this is a generalized travelling salesman problem in that it is similar to the standard form but instead of visiting every city, the salesman selects those which will maximise his sales whilst keeping the total distance within to that which he can achieve in a given time.

It is assumed that the competitor (or salesman) knows the distances between the points, how long it will take him to cover those distances and what total distance he can cover within the time allowed. The paper describes an heuristic approach but also uses a Monte Carlo simulation that is shown to be a 'powerful alternative'.

Eden, Colin and S. Jones (1984), Using Repertory Grids for Problem Construction, *JORS* **35.**9, pp 779-790 (jors1984160a.pdf)

Hayes, M and J.M. Norman, (1984), Dynamic Programming in Orienteering: Route Choice and the Siting of Controls, *JORS* **35.**9, pp 791-796 (jors1984161a.pdf)

Tsiligirides, T. (1984), Heuristic Methods Applied to Orienteering, *JORS* **35.**9, pp 797-809 (jors1984162a.pdf)

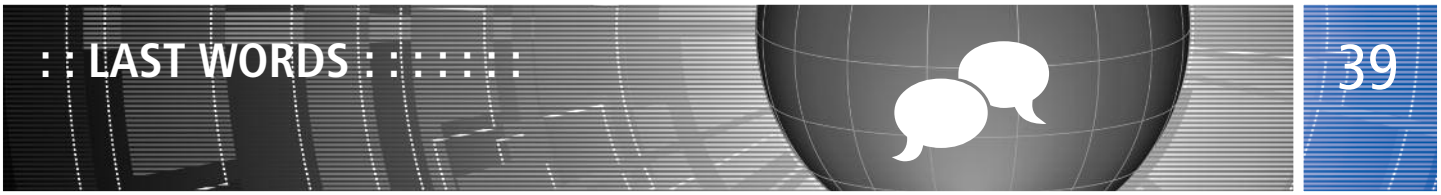
<OR>

OR-20

Of EURO and holidays

'Don't send me a postcard, just an editorial.' These were the Secretary's response when I told him I was away for the next two weeks. So here I am on a sunny Mediterranean beach, wondering what will interest people when this editorial appears at the start of the British Autumn, when the climax of the cricket season is again submerged by the start of another ten months of our national game – or rather Europe's continental game, given the quarter-finalists in the World Cup. Given that last week was spent at the EURO and national joint conference basking- yes basking – in the Glasgow heat, European Operational Research is the obvious theme.

It was fourteen years ago since last the EURO conference was held in the UK at Cambridge. The vignette I remember most of that conference is when a recently retired professor of Operational Research managed to distract the attention of a current vice-president of the Society just as he was punting under one of the bridges, with the obvious consequence. Fourteen years is a fair time and so it was interesting to see how the two cultures combined, because there are two cultures – the mainland European delegates with a strong emphasis on multi-objective problems and deterministic scheduling and the need for exact problem formulation, the UK participants more inclined to justify their talk by reference to an application. These are over generalisations but the difference were there. What struck me more was the commonality, in that the breadth of the subject is almost identical in most countries and all have realisation that the strength of O.R. is the diversity of possible approaches to a real problem. It was



heartening to hear that the two German O.R. Societies – divided by their approach to the subject – are now having joint conferences, and that almost everywhere the academic / practitioner interface is improving. Two bon mots from the daily conference newsletter exemplified this:

Academic: 'There's more practical work being claimed to be done in university O.R. departments than in the whole of British industry.'

Practitioner: 'That's because there is more O.R. theory being developed by consultants than in the whole of British academia.'

The other point the EURO conference reinforced for me was the impact British O.R. has made and continues to make in Europe. The language of the conference was English, not because of where it was held, because the delegates did not understand Glaswegian, but because that is the language of the subject. When Europeans talk O.R. to each other English is what they use. Moreover the traditional areas of application – production, logistics, health and education – were those pioneered by people in the UK and the US, while the newer areas like portfolio analysis, option pricing, and performance measures come from business and management ideas first developed in the UK and the US.

Enough of this speculation. Holidays are for forgetting about O.R. for a few days and enjoying a good book, where I learned what a zeugma is and contemplated the following quotation:

'Intelligence and intellect are not one and the same gift of nature. You can't have the second without the first, but you may be blessed with heaps of the first and not own a mustard seed of the second – which is the case with many a university graduate. They can tell you all about the causes of the French revolution, aspects of symbiosis in the orchid and the fungus, but they haven't the feeblest clue what to do with the knowledge they've accumulated in the dark lumber rooms of their tiny brain cells. They may even be brilliant mathematicians and yet remain intellectual morons.

No prizes for guessing the name of the book! Yet O.R. keeps intruding. Twenty miles down the coast the O.R. in Health working group is having its conference – that was an excellent piece of location analysis! My reveries are interrupted by thoughts of how difficult is the aircraft scheduling problem airlines have in the summer months, what scheduling algorithm do aircraft controllers use; how do holiday companies determine the suitable pricing policy between flights that arrive at 4.00pm and 4.00am in the holiday destination, are there any checks being made on the authorisation of your foreign credit card transactions and if so are they based on expert systems or fraud scoring, the multi-objective problem of what to do do each day so all the family are satisfied; even what is the algorithm for deciding when the next record high wave is going to race up the beach and disturb my dreaming.

O.R. on holiday? No Way!

By Lyn Thomas

<OR>

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

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