#BeBoldForChange
Women in STEM Careers

inside:

Toastmasters
From Inception to Chartership
theorsociety.com

O.R.
in the
Science Museum

Procurement and the role of O.R.
Ben Ludford of Efficio Consulting

Get an edge
Conner Weller of TUI at our 2016 Careers Open Day
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Full details of our events can be found at www.theorsociety.com and events news is regularly published on Twitter at @theORSociety. Non-society events can be found at www.theorsociety.com/Pages/NonSociety/NSEvents.aspx.

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### Submitting Articles for Inside O.R.

**Contributions are made in four parts:**

1) headline of approximately six words;
2) mini-abstract up to maximum of 25 words;
3) main body of article at 500 words per page; and
4) key words.

Articles will be shortened and edited at the discretion of the editor. Contributions should be submitted electronically as a word document emailed to insideor@theorsociety.com with illustrations attached in JPG, PNG, GIF, TIF or other common formats. When this is not possible, contributions should be posted to The OR Society’s offices at the given address. The editor’s decision on all contributions is final and no correspondence will be entered into.

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### About Inside O.R.

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It is with great sadness that we have had to announce the death of one of what our American colleagues would call a Titan of Operational Research, Brian Haley. I first met Brian in the very early 1970s (probably 1971) when I attended an “Introduction to O.R.” course at the University of Birmingham. It is perhaps a reflection on my age that I am now starting to remember more of the course than I probably did at the time. My next encounter with him was when I became a member of the Publications Committee when Brian was its Chairman and remember the concern he had over who might replace him. (I think his worst nightmare was that it might be me.) Incidentally, the February 1987 issue of JORS carried an “Appreciation of Donald Hicks” one time boss of Brian Haley – to find out more about this early pioneer of O.R. see OR-30.

In November we held the Careers Open Day, as we have done for many years. Reading through the articles from that event, it looks like now is a very good time to be involved in operational research and analytics. Certainly, every month there seems to be no shortage of stories of new developments in the field of machine learning (ML) or artificial intelligence (AI) and in the application of analytics particularly in the worlds of health and commerce from the identification and diagnoses of rare conditions to the production of exotic chemicals to the changing ways we should look at potential customers and to the ways of keeping wolves from our doors or, more accurately, Italian sheep and livestock.

Last month we carried a notice about the opening of a new Mathematics Gallery at the Science Museum; this month you can read what Graham Rand thought about it when he visited it at Christmas. If I can get to London early enough on 2 March to listen to John Friend present this year’s Beale Lecture then I may very well take a detour and have a look at it for myself – it certainly sounds interesting, albeit a rather long walk from the Royal Society. On the other side of town, in Hoxton, to be precise, you could do worse than take up Matthew Robinson’s invitation to spend an evening at the Data Scientist Speakers Club, a branch of the Guild of International Professional Toastmasters. Although there have been some very famous female scientists, technicians, engineers and mathematicians, they are still very much a minority. I seem to recall from a recent survey that O.R. is one of a very small number of disciplines in which there is near-equality between the sexes, at least in terms of numbers. Sayara Beg our Diversity Champion, in this month’s Leader, talks about what we can all do to help get more young ladies to consider a career in one of the STEM areas. She has also included an interesting list of the most famous ladies in these areas who passed away during the past two years including the “Shark lady” and the “Mother of Bone Marrow Transplantation”.

Louise, our Y2OR editor, has persuaded Ben Ludford to write the first “Guest Feature” on Procurement and how his background in O.R. has helped him change roles to become a Procurement Consultant.
OR Society Training Workshops on the Public Sector Scorecard

The Public Sector Scorecard has been described in the O.R. Society publication Impact as ‘moving performance management from a top-down, blinkered, blame-game approach to a system founded on inclusiveness, cooperation and understanding’. Making use of both soft and hard O.R. approaches and systems thinking, it will help O.R. and Analytics professionals make a greater contribution to performance management in the public and third sectors. You will learn how to develop strategy maps and performance measures around the outcomes that matter to service users and stakeholders, including value for money. The workshop will be presented by Max Moullin, director of the PSS Research Centre, who worked in OR in central government and British Coal before becoming a principal lecturer at Sheffield Business School. Max is an experienced plenary speaker and workshop presenter.

The workshop on ‘Developing Strategy and Performance with the Public Sector Scorecard’ takes place in Birmingham on the 20 March. For more details turn to page 19.

Don’t turn your nose up

A predictive analytics algorithm has been developed that can “sniff out” sepsis in patients more accurately and in half the time it typically takes clinicians. The algorithm categorises patients at risk and significantly reduces the amount of time nurses need to spend screening patients thus freeing them to perform other tasks.

Sepsis once it is established is easily detected – it stinks – but this algorithm can identify patients at risk much earlier. Apparently sepsis affects more than a million patients in the US annually and costs them more than $20 billion.


The Turing Guide

A review by Andrew Robinson of this book, the latest to be published about Alan Turing and his works, appeared in The New Scientist dated 7 January 2017. By the time you read this, it should be available from the publishers (Oxford University Press) in hardback at £75. Alas, I have not had a chance to read it yet but according to Andrew Robinson this is a “massive and extraordinarily wide-ranging volume about the life, work and influence of mathematician Alan Turing”. He strongly recommends the book but suggests that newcomers to Turing should start with Andrew Hodges’ Alan Turing: The Enigma and graduate to this book.

Order your copy at: http://bit.ly/2j0wVpl

Let’s face it

There are some 7000 rare diseases, such as Mowat-Wilson syndrome, which exhibit characteristic facial features. Face2Gene is a new app using facial recognition software which can be used to help in the diagnosis of such diseases. The algorithm maps points on a patient’s face and compares these with those in its database of thousands of other faces. From this data, it suggests possible diagnoses. Every new case is added to the database and aids the algorithm’s machine learning capabilities. At present, it is recommended to only be used by experts although it is publicly available.

More at: http://nbcnews.to/2j3GiFa

Alchemy?

Machine learning meets biology and the result could be the start of yet another new industrial revolution. Lygos, a Berkeley-based bio-engineering start-up is developing microbes to turn low-cost chemicals (such as sugar) into high-value, speciality chemicals (such as malonic acid). They are doing this by what used to be called genetic engineering. Using techniques to read, write and edit DNA, they are able to generate new strains of microbes that can produce chemicals much cheaper, quicker, safer and more efficiently than more traditional methods.

More at: http://tek.io/2iAxsLF
The Tizard Mission

As many of you will know, Sir Henry Tizard did much to advance operational research and the use of scientific methods in warfare. Our scientists were developing many ideas which might prove effective but we did not have the finances or resources to develop all of these. We needed the help from the USA government and research establishments but, at this time they were neutral and, in many cases anti-British. Tizard was sent on a mission to the US to get their help but in exchange he would have to divulge some of our most valued secrets but which? Did Tizard choose wisely?

Find out at www.bbc.co.uk/guides/z3b77hv

Ancient and Modern

Washington State University archaeologists are spearheading new research using agent-based simulation to learn how past societies responded to climate change. Their work, which links ancient climate and archaeological data, could help modern communities identify new crops and other adaptive strategies when threatened by drought, extreme weather and other environmental challenges.

According to Kohler, emeritus professor of anthropology at WSU, “for every environmental calamity you can think of, there was very likely some society in human history that had to deal with it. Computational modelling gives us an unprecedented ability to identify what worked for these people and what didn’t.”


Genetic or Environmental

Patients with complex diseases have a higher risk of developing another. Multi-morbidity represents a huge problem in everyday clinical practice because it makes it more difficult to provide successful treatment. Many diseases have a genetic cause but, many have an environmental cause whilst there are some such as diabetes, COPD and asthma which are multifactorial. By comparing molecular networks, Peter Klimek and Stefan Thurner, Head of the Section for Science of Complex Systems at MedUni Vienna, have managed to develop a mathematical model which provides a Geneticity Index. The higher the score, the more likely the cause is genetic whilst a low score indicates environmental factors.

More at: https://www.sciencedaily.com/releases/2016/12/161227083456.htm

Going up

Whilst agriculture and related subjects are leading the way in post-graduate degree courses, paradoxically, veterinary courses saw the greatest decline in student numbers.

Data science is showing considerable uptake. The University of Salford has introduced a cyber security, threat intelligence and forensics MSc. The University of Stirling launched a data science for business MSc and at the University of Edinburgh, four of the 18 new postgraduate offerings are related to data science, statistics and operational research.


Where Wolf?

The Apennine’s areas in the Umbria region of central Italy, in particular Gubbio and Norcia, are at the greatest risk of wolf attacks on livestock farms, according to new research from the University of Portsmouth.

Using an analytic hierarchy process, the 92 municipalities in this region of Italy have been risk-assessed. Gubbio and Norcia have been given the highest risk category of 4 while Bastia Umbra and Terni have the lowest rating (1). Lead author of the study, Professor Alessio Ishizaka from the University of Portsmouth’s Centre for Operational Research and Logistics (CORL), said: “The design of effective conservation and management plans needs to be informed by an effective decision support system. Our study shows the hotspots that are at risk, which can help the local government in planning conflict mitigation strategies.”

Academic Moneyball

Could predictive analytics transform the way academics are selected for their research programs? This could be the future of academic hiring, tenure and promotion decisions if we are to be guided by a group of management professors from MIT. They suggest that it is ironic that the one place where analytics has had little impact is where it was born – in the halls of academia.

The MIT researchers argue that making data-based personnel decisions is in the public interest: “These decisions impact not just the scholars’ careers but the funding of universities and the overall strength of scientific research in private and public organizations as well.”


Reimagine Optimisation?

As I am sure most of you will know, it is sometimes useful to look at a problem in a different way. According to Harvard Business Review, businesses looking to achieve process optimisation should rethink their optimisation requirement and reimagine processes as platforms.

Giving customers more information up-front, such as inventory data, may prove counter-productive. If you know from the start that the item is not available then you are likely to look elsewhere but, if you have gone down through the process of choosing the colour, size and style provided you are “happy”, you may still decide to buy it even if you have to wait for it.


Mark Turnquist died 5 December 2016

Mark Alan Turnquist, professor emeritus of civil and environmental engineering at Cornell, died 5 December 2016 at his home in Falmouth, Maine, aged 67. He will be remembered in the world of O.R. for research which focussed on the development of advanced algorithms and computer models for management and optimisation of large, complex systems under uncertain conditions.

He was a winner of the INFORMS Franz Edelman Award in 2005 for improvement of throughput management methods, and he received teaching awards from the College of Engineering in 2003 and 2013, and was the recipient of the Chi Epsilon Professor of the Year Award in 2006.

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- **Decision Explorer®** - an ideas mapping tool used to organise and structure an individual’s or 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.  

  “Decision Explorer® has proven to be a powerful facilitative tool. Used ‘live’ in workshops it provides a very efficient and productive means of keeping participants focussed and communicating. As a means of joint decision making, I have not found better.” Kenny Forsyth, Consultant  

- **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.  

Contact us for details of any of these products.
The year 2016 saw many famous stars and celebrities pass away. For many, as for me, it was a heart-breaking end of an era.

However, whilst not as famous as some celebrities, one blog in an online magazine titled ‘Scientific American’ written by Maia Weinstock, also brought into perspective other losses in 2016, by outlining notable women in STEM careers who had passed away during 2016 and highlighting their achievements, having successfully published a similar blog of notable STEM career women passing away in 2015. When I read the two articles, I was stunned to read about so many amazing women and their achievements, but what surprised me was the fact that I felt so stunned in the first place. I hadn’t appreciated how many women out there had achieved so much; having assumed that there were not that many.

As a fulltime working mother raising two teenage daughters, I know how hard it is to inspire and motivate young girls today into considering a STEM career. It often feels like there are so few high achieving women to showcase; to mention in passing, to motivate and inspire young girls with. As the Diversity Champion for the OR Society, I am equally on the lookout to draw attention to high achieving women in STEM careers to showcase for the OR Society conferences, events and our own newsletter articles. But Maia Wienstock’s online blog in the Scientific American, demonstrates that there are high achieving STEM women who have made it big and there are many of them. So I should not be so stunned after all, because there are probably many high achieving STEM women all around us and we all just need to look harder.

As Mahatma Ghandi said “We need not wait to see what others do” (a quote that is often paraphrased as “Be the change”) so I want to remind you all that we, as individuals and as collective communities, do not need to let others make the changes we want to see around us; we can try to make those changes ourselves, each one of us in our own individual way and each collective community in their own unique way. This is also the theme of the International Women’s Day for 2017 which they brilliantly express using the twitter hashtag, #BeBoldForChange along with the excellent strapline “call on the masses or call on yourself to help forge a better working world – a more gender inclusive world”.

So who were these high achieving STEM women, you ask? What did they achieve? How did they contribute to a more gender inclusive world? Well, here is the list; why not pick one or two, be curious and dive a little deeper in to their achievements.
NOTABLE STEM WOMEN OF 2016

• Ann Caracristi – Leading NASA Cryptanalyst (code breaker); aged 94yrs
• Suzanne Corkin – Pioneer in cognitive neuroscience; aged 79yrs
• Yvette Fay Francis-McBarnette – Ground-breaking work on sickle-cell anaemia; aged 89yrs
• Ursula Franklin – Physicist, pacifist, feminist and expert in the social impact of technology; aged 94yrs
• Katharine Blodgett Gebbie – Leading physicist and expert in stellar spectroscopy and helioseismology; aged 84yrs
• Ruth Hubbard – Pioneer in the Biochemistry of vision and how eyes turn light into information, long time champion of gender and race diversity in STEM fields; aged 92yrs
• Deborah Jin – Quantum physicist, noted prize-winner and innovator; aged 47yrs
• Susan Lindquist – Leading world expert in genetics and specifically in protein folding; aged 67yrs
• Jemma Redmond – Biotechnologist with significant strides in 3-D bioprinting; aged 38yrs
• Vera Rubin – Astronomer and cosmologist revealing the existence of dark matter; aged 88yrs

NOTABLE STEM WOMEN OF 2015

• Claudia Alexander – US Project Manager for the European Space Agency’s Rosetta mission; aged 56yrs
• Kathryn Barnard – Notable research on the positive effects of rocking and heartbeat sounds on infants; aged 77yrs
• Eugenie Clark – American Ichthyologist famously known as “the Shark Lady” for her work on shark behaviour; aged 92yrs
• Aida Fernandez Rios – Marine biologist and climate scientist, expert in ocean acidification; aged 68yrs
• Rose Frisch – Pioneering scientist specialising in fertility and human development; aged 96yrs
• Frances Kelsey – Pharmacologist and physician who refused to approve thalidomide for sale in US; aged 101yrs
• Anita Kurmann – early career research scientist advancing tissue biology and stem cells; aged 38yrs
• Dottie Thomas – Famously known as the “mother of bone marrow transplantation”; aged 92yrs
• Margaret Tisdale – Expert in antiviral resistance and her work on HIV drug resistance; aged 64yrs
• Miranda Yap – Notable professor in chemical and biomolecular engineering; aged 67yrs

This year, on the 8 March 2017, on International Women’s Day, why not #BeBoldForChange in your own small way and inspire a friend or colleague about one or more of the above notable STEM career women; discussing their high achievements and how you think they helped forge a more gender inclusive world. 🎉
Conner Weller, speaking for TUI at our 2016 Careers Open Day said, “What the world needs now is analytics!”

Going back 10 or 15 years, everyone was using tools like Excel to record and present information which could then be interpreted to provide competitive advantage for business, but the world has moved on. We routinely use online retail services like Amazon and online location services like Google Earth and Google maps and through this usage huge amounts of data is being streamed and recorded.

This data is too unwieldy to be presented and interpreted via the tools of yesterday. To extract value, generate competitive advantage and derive insight from them, it was now necessary to apply analytics technologies. The availability of online services has given everyone far more engagement than ever before.

Whilst they enjoyed the convenience of having access to online services and online data, they are, in fact, creating vast amounts of data themselves, data that could be made actionable by the application of analytics.

TUI is a company that can really add value to data; it uses a “variety of different tools” like SQL, Alteryx and the Adobe marketing cloud analytics toolset to create “one aligned outcome”. He (Connor) explained that Alteryx is very much an analytical tool that can forecast, provide tree analysis and save time by automating common data preparation.

Knowledge of any of these specialist software products would be both desirable and beneficial to fledgling data professionals in search of employment. It would give them an edge over those with only Excel experience.

In presenting a future where new analytics tools would be routine in data analysis, Conner said that he wanted to get across the notion that, “Analytics did not need to be boring, it doesn’t need to build bar charts, pie charts and line graphs to be interesting and understandable. It’s our job to make it understandable in Operational Research, we need to do the work, but we also need to do it in a way people can understand. The world is changing and we need to ensure that we are changing with it!”

‘Analytics did not need to be boring, it doesn’t need to build bar charts, pie charts and line graphs to be interesting and understandable...’
EU-funded mathematicians under the HDSPCONTR project have developed a series of algorithms and mathematical models that can predict and influence the behaviour of social groups.

While there has been a long history of research into predicting behaviour in social groups, it is only recently that the power of mathematical modelling has been applied to social systems and their dynamics.

Many researchers have said that it so close to impossible to predict such behaviour that apart from research, no active action should be taken to try and predict the many interactions between the physical, cognitive and social domains of group social behaviour. Others however are now confident that such analysis with accurate prediction is achievable due to advances in computer power and new and improved mathematical modelling.

In a bold step toward predicting group social behaviour, a team at the Technical University of Munich (TUM) is now on its way to making accurate prediction of such behaviour a reality. Reporting the key results of the HDSPCONTR (High-Dimensional Sparse Optimal Control) project at the European Congress of Mathematics in July 2016 and since published in the congress’s official ‘Proceedings’, the project team argues that it is quite different when considering people in traffic, in social networks or at major events. This is because they are appearing as individuals but also as part of a crowd.

Adopting an approach which can ‘see’ the individuals as particles of a whole, may be useful though. In physics, it is not necessary to know the properties of every individual particle to calculate with a high probability the direction of flow of a large number of gas molecules, it is merely enough to understand their mean motion properties.

According to Professor Massimo Fornasier, Principal Investigator of the project, it is now possible to “take the same approach when looking at flows of human masses, animal swarms or interacting robots.” This approach he says, is analogous, “to the force of attraction between molecules in a gas, we can describe generalised behavioural patterns as resulting from interacting social forces between individual agents and represent them in mathematical equations.”

To this end, mathematicians in Professor Fornasier’s team have already shown they can describe potential collective behavioural patterns of a large number of individuals who mutually influence each other in a given situation. The next step in this research is to make predictions about future behaviour, according to Fornasier, once this is achieved. “We can calculate the behaviour of a group of interacting agents in advance, so we are only one small step away from controlling them.”

Fornasier and his team recently put their research into action by conducting an experiment in collaboration with Italy’s National Research Council (CNR) and Rome’s La Sapienza University. They assigned two groups of 40 students each the task of finding the specific location of a building. However the researchers planted two incognito informed agents into one of the groups. By merely moving very determinedly in a predefined direction, the agents were able to steer the group towards the target spot. Overall, the experiment showed that taking control of self-organising systems, which also include groups of individuals, is possible with surprisingly little effort. The research team also highlighted how opinion forming in groups also builds on the interactions of people, and they say it is most effective in their current models to “concentrate on the most radical defenders of a given opinion, whereby if you manage to convince them, the rest of the group will easily follow.”

Every year we host our Careers Open Day in which students can meet and talk with representatives of companies who actively employ people with O.R. experience, companies who are willing to take on new recruits and foster memorable and rewarding careers.

Our 2016 Careers Open Day was held at Millennium Point in Birmingham on 23 November 2016. Many of the best known and most prestigious O.R. recruiters attended with information packed stands populating our recruitment exhibition. Some of these companies supplied personnel who recounted their experiences from student to employment in O.R.

The first presentation was given by Emily Righini Nisbet, from the defence and security division at Dstl. She began it by talking about her background in O.R., what Dstl does, and in particular her team at Dstl which specialises in ‘Force Structure Analysis’.

She said that in 2012, she had started a chemistry degree and then she joined the University of Birmingham Air Squadron, which gave her a “really good insight into the careers available in the military and what life was like in the air force. From there I started summer placement at Dstl where I worked in capability analysis and the benefits of investment – high level problems”.

In 2015 she finished her chemistry degree and “almost straight away”, joined Dstl as a graduate working in cyber and C4ISR (command, control, communications, computers, intelligence, surveillance and reconnaissance) before moving into force structure analysis in 2016. This had allowed her to use some sophisticated analytical tools too such as Dyrect (Dynamic Readiness and Concurrency tool). It is used, for example, to stochastically generate “future histories”. It can also assign Force Elements to meet the scenarios which occur in such futures and assess the supply against the demand, this allowed the analyst to investigate how robust a Force Structure was to different future histories.

Using Dyrect presented many opportunities for analysis, she also spoke of her experience in investigating the size and shape of the Armed Forces and how robust the Force Structure was to different policy situations or different levels of operational demand. It was possible she said with a tool like Dyrect, to investigate how Force Elements could meet demand and also determine how such demand could be affected by altering readiness profiles – this application alone provided its operator with significant variety, and Dstl was replete with many more bespoke applications accessible to those who choose to opt for a career as an analyst with them.

Emily said that the Dstl offered opportunities for anyone from, “pretty much any background, which is really fantastic because it means there are loads of opportunities available”. It was clear that there are plenty of opportunities and a great deal of variety.
Gordon Squire of DecisionLab gave a compelling talk during the 2016 Careers Open Day, urging graduates to consider opting for a career in advanced analytics.

DecisionLab utilises advanced analytics to develop solutions that enabled its clients to make better, evidence-based decisions. It is a young, fast-growing analytical modelling consultancy which specialises in optimisation, simulation and data science.

Although the company was young, it had already gained many important contracts in power, water, aerospace, and the defence industries. It is collaborative, innovative and agile and looking for new people, graduates from the world of O.R, in particular.

Graduates could expect an interesting and varied career with DecisionLab and would be helping world leading organisations to "get an edge" by answering questions like: how do you ensure London has enough water? how do you predict when an aeroplane will have a fault? and how do we cut aviation costs by millions of pounds?

DecisionLab has already provided solutions for the likes of: Northern Power, Rolls Royce, Yorks Water, Royal Mail, Marie Cure Cancer Care and Thorntons, and the list is growing. There is a constant need for new recruits, so they’re hiring.

One example that Gordon gave showed how the application of simulation using AnyLogic and Optiquest solver, in the aero-engine aftermarket had resulted in generating savings of 10 million pounds, over the previously deployed methods used.

Machine learning algorithms, such as logistic regression and random forest had been used to develop predictive models which could be run from ‘Cloud’ sources to gain efficiencies. His company had proved that deploying such technologies to deal with big data volumes in its fault finding program, had provided viable solutions to the ‘very infrequent warnings’ that typify aviation.

DecisionLab are looking for the brightest minds to join its growing team. DecisionLab uses leading edge O.R. techniques and employs an active program of experience and skills development by providing training from experts.

For those considering working in an O.R. Consultancy, skills in analytics and data science were essential attributes. They had to be ready to tackle diverse projects, solve challenging problems, make a genuine impact improving organisations, and last but not least, possess or develop a broad range of business skills.
The main reasons for joining were that I was keen to improve my skills and get evaluated by others. After all, how many of us get feedback on our presentation skills on a regular basis? Toastmasters provides an environment where you can concentrate on specific aspects of your public speaking skills and receive constructive and informed evaluation.

In the Toastmasters International annual elections in July 2015, I found myself being put forward as the Club President. This role involves motivating and facilitating the running of the club as well as showing respect for all members and providing leadership. It was certainly not a role I would normally consider but I relished the challenge within the supportive environment of Toastmasters and my Club committee members.

It was during my year as President that the Club submitted for its chartership status to recognize and establish the Club formally within the international Toastmasters community. I am pleased to inform you we achieved this status on 1 January 2016, eighteen months from inception. This means that the Club is now widely advertised by Toastmasters International to potential new members and also visiting Toastmasters from other clubs around the world. To celebrate this achievement, we held a Chartership Ceremony and invited the District winner of last year who went on to represent the UK and Ireland at the World Public Speaking competition and also this year’s District winner who also went on to represent the UK and Ireland on the global stage. We were fortunate that both winners came from the same Division as our newly Chartered club, providing a great opportunity for new members of a new club to get to see, hear and speak with Public Speaking Champions.

On a personal level, I also achieved the first step towards Distinguished Toastmaster certification by completing the Competent Communication manual – a series of 10 speeches each between 5 and 7 minutes intended to focus on specific areas of public speaking and communication. Certainly a busy and productive year individually and for the club.

The Club continues to grow and strengthen and although I passed on the role of President the annual Toastmaster elections of July 2016, I am moving forwards in my speech making by focusing on the more advanced topic of technical presentations including giving a technical briefing to non-technical people. I have learnt techniques to improve my presentation skills and I find the evaluation of my speeches invaluable in addressing areas for improvement. Whilst the club is supported by the Operational Research Society and is named the Data Science Speakers Club, we welcome all to our meetings and indeed several people have used the club to find out more about O.R. and Data Science.

I would strongly encourage anybody who wants to improve their public speaking or meet fellow Data Scientists in a friendly atmosphere to come along to one of our fortnightly meetings in Hoxton, North London. I am certainly benefitting from the Club.
O.R. in the Science Museum

GRAHAM RAND

As a mere provincial I’m not often in London with time to investigate the galleries and museums. But this Christmas I was, and took the opportunity to see Flaming June, good timing, at Leighton House, followed by a quick visit to the Science Museum, in particular to the new Mathematics Gallery. This was partially inspired by the reference to it in January’s News in Brief.

As we were told last month, you are immediately confronted with a 1929 Handley Page biplane, placed in Zaha Hadid’s design of billows and curves representing the airflow around it: a stunning display of imagined aerodynamics. Surrounding that, the 120 or so objects are placed in curved displays that follow the lines of air that would have flowed around the aircraft. They are grouped in 21, if I remember correctly, stories such as “The Power of Computers”, “Recognising Patterns”, “Maps and Models”, “Form and Beauty”, “Money”, “Trade and Travel”, and “Life and Death”.

I found four references to O.R., all under the heading, I think, of “Peacetime Payoff”. The first I noticed said “OR used mathematics to analyse large amounts of data. OR was widely used after the war ended, in fields as diverse as biology, commercial logistics and farming. New computing technologies increased its power”. Next to it was a quotation from Archibald Hill, O.R. pioneer, in 1941: “The essence of research in war is to be ahead of the enemy. OR involves new, untried equipment which is going through its teething troubles and which has to be tried out under war-like conditions.”

An Elliott 401 computer is exhibited, which we are told was “used for 11 years at the Rothamsted Agricultural Institute for everything from crop trials to insect damage, to work in the mathematics of genetics. It was brought there by Frank Yates, a wartime operational researcher who established Rothamsted as a peacetime statistical computing centre”. My next-door neighbour tells me that when he first arrived at Rothamsted in the 1970s, the computer department was located in a huge building, with special windows and doors to stop dust getting in. Common mortals were not allowed in the building. People worked 8 hour shifts, over 24 hours a day, 7 days a week to use the mainframe. Apparently these long hours were not good in the summer, as they reduced the opportunity for playing cricket.

However, I was disappointed to see the caption to a model of the myoglobin molecule from 1957: “This research involved vast amounts of measurement and computation. To help make sense of it, Kendrew (molecular biologist) used the mathematical technique known as operational research, which he had helped develop during the Second World War. This was useful in problems with lots of data that was often incomplete”. I have pointed out to the curator that O.R. is not a mathematical technique, and asked if the caption can be edited, perhaps by deleting “the mathematical technique known as”. Watch this space! But also look at the space which is the stunning new mathematics gallery.

As a result of shortage of time, I hot-footed it to a far-flung corner of the museum, passing through the space exhibition and past steam locomotives (oh how could I?) to a small exhibition “Our Lives in Data” which investigates the rapidly evolving role of big data in all our lives and how it is being used to transform the world around us, and features work by the Transport for London analytics group headed by Sandra Weddell. We are told that over 90% of all available human data has been recorded in the last two years, driven by recent advances in technology and data science. Our Lives in Data looks at the crucial role of big data in medical science as well as its importance in planning and improving public transport in London. The small exhibition asks some big ethical questions, as it explores some of the diverse ways that our data is being collected, analysed and used.

“The essence of research in war is to be ahead of the enemy.”
The OR Society’s Beale Medal is awarded each year in memory of the late Martin Beale. It gives formal recognition to a sustained contribution over many years to the theory, practice, or philosophy of O.R. in the UK.

**Lecture:** “Linking Public Policy Worlds: Working Together to Shape Public Policy Choices”  
Mr John Friend (Beale Medal Winner 2015)  

John is best known in the O.R. world for his pioneering role in developing the Strategic Choice Approach, now viewed as a leading member of the softer O.R. family of problem structuring methods. He has also attracted international attention among policy professionals and academics as a source of fresh insights into the inter-organisational dynamics of public policy choice. He will argue that UK universities are now strategically placed to develop links with international partners in promoting the further development of a useful science of public policy design.

**Opening talk:** “Randomized Coordinate Descent Methods for Big Data Optimization” Dr Martin Takác (PhD Winner 2014)  

There is an ever increasing demand for solving “big data” problems, each described by gigabytes or terabytes of data from uncountable sources. Often, the problem is formulated as an optimization problem, and in this talk we analyse iteration complexity of coordinate descent methods for various loss functions. Moreover, in order to make use of the modern high-performance computers, the parallel version of CDM is proposed and analysed.

**Thursday 2 March 2017**  
The Royal Society,  
6-9 Carlton House Terrace,  
London. SW1Y 5AG  

**Timings:**  
14:30   Tea and biscuits  
15:00   Lectures starts  
16:30   Approximate finish  
Entry free  

Register your place at:  
www.theorsociety.com/beale  
Please contact Hilary Wilkes  
hilary.wilkes@theorsociety.com  
with any queries.
YOUNG to OR20  CALLING FOR PAPERS

4 – 6 April 2017, the Wesley Hotel, London

IMPORTANT EXTENDED DEADLINES

03 Feb 2017  Deadline for submission of full Keynote Papers and Extended Abstracts.
10 Feb 2017  Deadline for submission of titles and abstracts in time to appear in the Conference Programme.

To submit your title and abstract please go to www.theorsociety.com/YOR20
Full papers are not compulsory, just a title and up to 300 words of abstract text!

Young to OR 20 (YOR20) is the conference for those whose Operational Research careers are less than ten years in duration. Whether you’re a practitioner or an academic, come and present to your peers and learn about how O.R. and Analytics are used in a wide range of applications.

A full programme will include:
• At least four excellent Plenary speakers
• Elsie Cropper award for Best Paper
• A great Scientific Programme and several Workshops to get involved with.
• Speed networking, a helping hand to meet fellow academics and practitioners
• Careers panel – get advice from the experts

The Elsie Cropper Award

All presenters at YOR20 are eligible, except for Plenary, Workshop and Keynote speakers.

The following criteria will be used as guidelines:
1) Impact of the work – both qualitative and quantitative
2) Technical content – e.g. appropriate choices of techniques and methodologies
3) Quality of presentation – e.g. logical structure, clear slides etc.

The winner is announced on the last day of the YOR20 conference, and they will have their name inscribed upon the Elsie Cropper Shield. The winner will also be invited to attend the Blackett Lecture in November 2017 for formal presentation and to receive a commemorative plaque.
OR Society Training Programme
For February and March 2017

February

The purpose of this day is to build or refresh the statistical skills of participants, with a particular focus on sampling and regression analysis. During the day, after the relevant modelling approaches have been introduced, participants will work on ‘real world’ case studies where the theoretical concepts can be applied, and their interpretation discussed via group work.

The topics covered during the day are:
- Normal Distribution
- Sampling
- Regression analysis

March

02 March – Data presentation for Analysts
This course explains how to use charts and tables to communicate with a non-technical audience in a way they will be able to follow. You’ll learn the difference between messages and analytical findings and their importance to audiences; the need for selectivity and the need to address the interests of the audience; basic standards and best practice for constructing and presenting short tables to non-specialists; and much, much more.

06 March – Essential O.R. Skills for Practitioners
This course is ideal for early career O.R. staff and those moving into an O.R. career without formal background in operational research. It provides an overview of O.R. – with hands-on experience of OR techniques. This is an intensive course with a lot packed into the day, taught by experienced practitioners who do O.R. as their ‘day job’.

13 March – Data Mining: Techniques and Applications
This course provides an overview of popular techniques and applications of data mining. You’ll gain an overview of popular techniques used in data mining; an overview of popular applications of data mining; new insights into data pre-processing and exploratory data analysis; opportunities for improved decision making in a data-driven way and a high-level overview of data mining for social network analysis.
The Training Guide for 2017 has been published and is full of courses which have been selected to give you the widest options for training within the fields of Operational Research and Analytics. An electronic copy is available from our website www.theorsociety.com/pages/training/training courses.aspx and print copies are available upon request.

14 March – Data Mining: Advanced Data Mining
You’ll gain an overview of advanced techniques used in data mining such as social network analytics, survival analysis and Bayesian networks. You will also get an overview of emerging applications such as fraud detection and recommender systems. You will also learn how to deploy and monitor analytical models.

20 March – Developing Strategy and Performance with the Public Sector Scorecard
On this course, you will gain a greater understanding of the topics of quality, excellence and performance measurement and an appreciation of the need for performance measurement to be based on stakeholder needs, the organisation’s strategy and process; appreciate the debate on targets in the public sector and the eight essentials of measurement.

21 March – Using Soft Systems Methodology
This is a practical course aimed at introducing and developing expertise in applying Soft Systems Methodology (SSM). The course looks at the understanding the use of SSM techniques for problem structuring within complex projects, as well as how to use the approach in practical situations. The emphasis is on learning by doing using case material and is particularly useful for the early stages of planning projects, thinking through decisions and planning their implementation.

22 March – Practising Soft System Methodology
This is a practical course aimed at furthering delegates’ expertise and confidence in the use of Soft Systems Methodology (SSM). The course develops the skills learnt in ‘Using Soft Systems Methodology’ course and may be combined to form a two day programme. Alternatively, it can be used to refresh skills or gain feedback on using SSM.

23 March – Using Cognitive Mapping
The course will help you to find out how to capture, structure and visually represent the issues within complex problem situations; understand how to scope a client problem and their goal hierarchy before embarking on analysis; gain confidence in interviewing stakeholders and clients using Cognitive Mapping; learn how to appreciate and represent differing stakeholder perspectives of a problem situation and improve your ‘soft’ skills.

24 March – Facilitating Groups with Cognitive Mapping
You’ll obtain practical skills in applying Cognitive Mapping to group situations using Oval Mapping Technique (OMT), using OMT to structure the interacting perspectives of a situation, process skills of applying OMT, facilitation tools and skills appropriate to OMT and trivialities and practicalities of applying OMT live with participants.

29 March – Supporting Strategy
This is a practical course aimed at developing expertise in deploying frameworks, methods and models to support strategy development. The course looks at the use of manual and computised techniques for conducting various strategy development activities such as setting direction, creating strategic initiatives, making sense of internal and external environments.

30 March – Simulation: A Practical Guide to Developing and Using Models
You’ll learn how to build valid and credible simulation models and perform experiments with models to compare the results of different scenarios appropriately and efficiently. The focus is not on a specific software package, but on the broader skills required for successful simulation studies.
How did you get into O.R., and into Public Policy?

My introduction to O.R. was in a very conventional sense in the days of the early 1950s and 60s when I first became involved. I did a lot of analytical work in industry as a maths graduate.

Then in 1964, I had a complete change of direction when I found myself working on a study of policy-making in local government, which involved working closely with Coventry City Council.

I found that there wasn’t much data of the conventional form that I could analyse and gain insights from, but I did have colleagues who were social scientists and I sat beside them in committee meetings and all kinds of meetings including political meetings where people were arguing out how to deal with difficult strategic problems. And this experience – this different kind of research – had important influence upon my career.

How so?

My colleagues and I realised we had to become facilitators of other people, drawing on the information they carried with them in their heads, rather than analysts of any kind of data.

This was a difficult transition to make, but it was important and liberating in a way. We were not sitting at a desk but standing in a room, putting up flip charts, asking questions of people, getting the answers, putting them together, picking out differences of opinion as they came out, registering sources of uncertainty, and gradually making progress over the course of a day or so.

Eventually we came up with a set of alternative techniques, now called Soft O.R. techniques, which involved drawing graphical representations of problems and uncertainties, working with groups of people building up a common view of what the difficulties were and how it might be possible to move ahead.

This is a variety of O.R. – facilitation rather than analysis – which has since spread very widely.

Do you see the same problems you encountered in the 1960s which are still encountered now?

No. In industrial O.R. in the 1960s most of the problems were internal to the organisation. Now in local government, in town planning for example, most problems are not internal; they come from various directions from outside, so there’s no routine in a way of dealing with problems. You have to build pictures of the problems as they come up, and try to work through them, build structural diagrams of them and address them in those terms.

Industrial problems have shrunk with our industries but the problems you are talking about have ballooned. These sorts of complex problems are in the health service, local government, in central government; they’re actually overwhelming those at the moment.

In the 1960s most O.R. work was concentrated in the major industries such as coal and steel and the situation now, even in industry, is very different. It is much more open. People have to negotiate with each other. They talk about the ‘gig economy’ now, for instance. Small businesses are much more prominent. I was involved in one project not long ago with small agricultural businesses in Lincolnshire. They had to develop their own strategies in competition and in collaboration with other businesses and public authorities.

After that first project, where did you take your skills next?

We started working with the Institute of Local Government Studies and Birmingham University. They found they had various local authorities where people were keen to start using our approach and practice, and they helped us develop a programme which got six local authorities to collaborate with us and we applied these analytical techniques in real time to problems.
concerning them at the time – a very depressed housing estate in Teeside, and an area of housing expansion in Berkshire.

What further developments followed?
There was further research, sponsored by the Social Science Research Council, on the inter-organisational aspects of public planning. There were projects for government departments, there were training programmes which took off in the early 1970s where we designed programmes which got people stuck into urgent issues like neighbourhood planning in a neighbourhood which was threatened with being dispersed to different parts of the country and we pitched in, people were invited to work in small groups and work on problems, develop their own charts to structure problems and work in stages until they came to some kind of incremental answer that was appropriate at that time.

And what was the international reach of the work?
The approach that we've introduced has become quite widely used in several parts of the world. In Sweden, several groups are doing impressive work on water and sanitation problems in their own country and the developing world; in the Netherlands, there has a been a lot of environmental work; I've worked in South America in Brazil and more recently in Venezuela in planning defences to overcome natural disasters like flooding and so on in hillside areas. There are communities around the world which have made wide use of these methods; have made their own adaptations to them.

I recently heard from a major university in Peru that they'd been successfully running courses with enthusiastic graduates and I was sent a copy of an exercise which was dealing with a problem of how to deal with gang culture in a major Peruvian sea port. This is one example of the ways in which the approach can engage with younger people and turn them on to new ways of doing things.

I think there are things here which will appeal greatly to younger generations of O.R. people who don't want to get stuck in technical analysis roles, who feel the complexity of the world around them, and who are interested in changing their skillsets accordingly.

How does a Maths graduate go from Maths to soft O.R.? Are you still drawing on your maths in this?
I've always drawn on my mathematical discipline as a means of structuring things in a logical way. Formal maths doesn't come into this very much at all. There are questions of evaluation by comparing alternatives, and comparing them under uncertainty using visual means which others can engage with is an important part of the practice which we as a group have learned to develop.

I think we can regard O.R. even as a sort of laboratory for the continual development of new and more appropriate methods for dealing with complex problems which are not often confined with the boundaries of a single organisation.

Your Beale lecture is coming up – what is your essential message for anyone thinking of attending?
I believe that there is a great opportunity in O.R. which is not widely recognised in the O.R. community, and it is in the field of public policy design. I’d like to see academics, government people there, academic O.R. people there who are interested in bringing colleagues along with them from other departments. I hope that the lecture will also be a starting point from which meetings can be held between interested people – particularly in universities but also in governmental bodies, central and local – who are important reference points in developing future programmes.

Partnership between O.R. and other schools like health, town planning, politics and political science is essential.
Criminal Justice SIG

SPRING MEETING

Date: Thursday 23 February 2017
Time: 13.30 – 16.30
Venue: Central London
Speaker: Various

Our Spring meeting will be held in central London this year. We are most grateful to our speakers who are covering a range of interesting topics, including Eric Young (Home Office) who will give an overview of OR across the Home Office; Rosemary Byde (RBS) who will discuss her modelling and other work relating to ‘money mules’ and customer vulnerability to fraud; and Emma Williams (Deputy Director of the Canterbury Centre for Policing Research) who will describe potential barriers to evidence based policing.

Please see our website for up to date information www.theorsociety.com/Pages/SpecialInterest/CriminalJustice_future.aspx

For further information or to book a place please contact suemerchant@hotmail.com

Third Sector SIG

APPLICATION OF SYSTEMS THINKING

Date: Friday 17 March 2017
Time: 14.00-17.00 (Arrival/registration/ tea and coffee from 13.30)
Venue: CAN-Mezzanine 7-14 Great Dover Street, London, SE1 4YR
Speaker: See below

Systems thinking is a powerful way of understanding the world, and accordingly, systems approaches can be powerful ways of addressing real-world problems. This half-day event is an opportunity to hear from people who are using systems approaches to address community and social issues, and to discuss the potential and the challenges of such approaches.

Speakers include Gerald Midgley, Professor of Systems Thinking at Hull University Business School, talking about resolving stakeholder conflict in a range of community settings; Miles Weaver from Edinburgh Napier University on how systems approaches have helped identify better ways for communities and socially responsible businesses to build value; and Penny Lawrence, Deputy Director of Oxfam, on applying systems thinking to Oxfam’s change programme.

The event should be of interest to third sector managers interested in how systems thinking can be applied to their own challenges; to OR professionals interested in learning about different systems methodologies and their applications; and to anybody interested in how systems thinking can help us to drive change.

To book: The event is free to attend but we expect this to be a very popular event and space is limited, so places must be booked in advance, by visiting: www.eventbrite.com/e/or-society-third-sector-sig-applications-of-systems-thinking-tickets-31120017811

For further information please contact: felicity.mcleister@theorsociety.com

Provisional timetable
2.00-2.05 Introduction/welcome
2.05-2.45 Gerald Midgley
2.45-3.15 Miles Weaver
3.15-3.30 Break
3.30-4.00 Penny Lawrence
4.00-4.30 Further speaker tbc
4.30-5.00 Discussion, informal networking
**Joint SWORDS/WORDS Event**

**DIVERSITY AND IDENTITY: CHALLENGES AND OPPORTUNITIES FOR UK O.R.**

**Date:** Tuesday 07 February 2017  
**Time:** 17.15 – 19.00  
**Venue:** Cardiff School of Mathematics  
**Speaker:** Ruth Kaufman, President of the OR Society

**Abstract:** People engaged in an activity like O.R., can be described on countless dimensions. For example, personal characteristics (the ‘protected characteristics’ of ethnicity, gender etc that are part of formal diversity initiatives, but also values, preferences, personality), daily work activities, customer, owner, career path, whether they have ever heard of O.R. Diversity can be a strength; but so can uniform identity. This talk reviews some significant dimensions of diversity and identity in UK OR, to consider what we might need to do to overcome the challenges of too much or too little diversity, and where we can exploit the enormous potential benefits of the glorious variety of ways of ‘being an O.R. person’.

Please see [www.theorsociety.com/Pages/Regional/swords_future.aspx](http://www.theorsociety.com/Pages/Regional/swords_future.aspx) for more details.

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**SWORDS**

**TOWARDS SOLVING TWO UNSOLVED PROBLEMS IN LOGISTICS**

**Date:** Tuesday 7 March 2017  
**Time:** 18.00 – 19.00  
**Venue:** Cardiff School of Mathematics  
**Speaker:** Patrick Beullens, Southampton University

**Abstract:** This talk will focus on two seemingly unrelated problems in the area of logistics:  
(a) what is the optimal economic order quantity to maximise a firm's profits after tax?  
(b) what is the optimal speed of a time chartered ship?

We demonstrate that both problems can be viewed as comparing an infinite set of mutually exclusive choices of investments of different duration. Based on first principles of corporate finance theory, an optimal decision is determined from maximising the annuity stream of the cash-flow functions associated with these activities over the duration of the investment.

One benefit of this approach over traditional average profit models is that it can more accurately account for the influence of different contracts that the firm adopts with the outside world. We illustrate this point by examining how tax legislation affects the profitability of a UK firm that has to take economic order quantity decisions(1). We consider the influence of both corporate tax and value added tax on the firm's inventory problem.

A second benefit of adopting this approach is that it can help us to understand the importance of accounting for the opportunity cost of future investment opportunities after the current investment project is finished. We illustrate by looking into the problem of optimising the speed of a time chartered ship across a pre-determined route(2).

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(1) The first problem is based on joint work with PhD student Hua Jin who holds an MSc in Finance and Accounting.  
(2) The second is based on joint work with PhD student Fangsheng Ge who holds an MSc in Operational Research and Finance, and Dominic Hudson, Shell Professor at the University of Southampton.
Many thanks to all of you that got in touch with me on the back of last month’s 2017 roadmap; it was really useful to get your feedback and suggestions on what you would like to see in these pages over the coming months. This month, I’d like to launch straight into my first guest feature; Ben Ludford, a former colleague of mine, will be sharing his thoughts on the role of O.R. in the field of procurement. Having worked for a defence company for the past couple of years, I’m always keen to see how O.R. is being applied in other areas, so I read Ben’s article with great interest. If any of you are keen to share your thoughts on the role of O.R. in your area, then please don’t hesitate to get in touch with me on the usual channels (E: lmaynardatem@live.co.uk, Twitter: @LMAtem). As ever, I look forward to hearing from you; but enough from me, over to Ben…

PROCUREMENT AND THE ROLE OF O.R.

Moving jobs will often trigger a steep learning curve. None more so than when you change careers. At the end of last year, I moved from my role as an Operational Research Consultant to a new position as a Procurement Consultant, and so fully expected this curve. Given I wanted to make the most of my analytical background, some of the questions I constantly asked were what need there is for O.R.? How is procurement already using O.R.? And how will procurement use O.R. in the future? I would like to share some of the answers to those questions with the O.R. community.

Procurement is becoming increasingly important to many businesses for two reasons, the first of which is globalisation. The growing complexity of the world as well as the increase in many products and services has pushed more companies to specialise, thus needing more inter-company buying/selling to reach ever increasing markets. Secondly, businesses continue to strive for efficiency and this is impossible unless you can predict and measure how suppliers are performing?

Procurement is a huge area and I could probably write a whole series of articles on the subject, but for the purposes of this article I am only focussing on areas where I feel O.R. has had a considerable impact.

Efficio Analytics Process Overview

- Collect and import data into the “engine”
- Supplier cleansing module
- Manual review supplier cleansing and categorisation, prioritising the top suppliers
- Classification engine
- Validate
- Refresh module
- Manually review and cleanse data, prioritising the top suppliers
- Consolidate data and visualise in a dashboard
- Correct spelling mistakes and harmonise newly added suppliers names
- Pick up previously encountered names and their variants
- Refresh categorisation applying the rules previously used
- Only applies after the frac spend cube has been built
- Process steps enabled by Efficio proprietary technology
UNDERSTANDING COMPANY SPEND

It may seem surprising to some, but many companies do not have a real understanding of how their money is spent. There are several reasons for this:

1. **Enterprise Resource Planning (ERP) Fragmentation** – Data is often stored across multiple systems with different configurations which makes automatic consolidation impossible.

2. **Finance Driven Taxonomy** – Data in ERP systems is classified to suit finance needs rather than procurement needs, leaving spend registered by supplier rather than by category.

3. **Limited Functionality** – Limited functionality to manipulate and visualise spend data, analysis typically done offline resulting in disparate levels of quality and insight.

Most organisations are manually joining datasets and then crunching huge sets of data in Excel to merge supplier names and work out categories of spend. This inefficient one-off exercise may provide value for a short time (as the data will soon be out of date), but inaccuracies caused by data entry error and non-intuitive taxonomies make it difficult to draw meaningful insights from the data.

More and more, analytics is being used as the route to solving this problem, and here at Efficio we are trying to push the industry forward in this regard. Analytics can automate the data collation, clean the data using algorithms based around linguistic rules and common errors and then classify spend by category. There are still the essential manual steps of viewing the automated changes and doing the cleaning and classifying of the data that an algorithm could not yet complete with great accuracy. However, when you consider that the addition of machine learning will continuously learn from the manual steps, over time, the number of man hours involved will be greatly reduced. After this dataset is complete, organisations can begin to really grasp how much money they are spending, what they are spending it on and who they are spending it with.

UTILISING PROCUREMENT DATA

Understanding company spend is just the beginning of the procurement value-chain related to data. Additional data will help to answer the more detailed types of questions that procurement personnel are asked around topics such as:

- Spend trends and opportunities for savings
- Contract compliance and supplier performance
- Risk exposure to supplier reliability, market indexes and foreign exchange
- The savings being realised and the lost value from the use of non-approved suppliers
- Best practice measures regarding spend profile and commercial arrangements.
- The quality of the data used for drawing insights.

Example: Efficio Executive Summary Dashboard
If procurement departments are collecting this data, then more insights can be quickly drawn out to help answer these questions. Currently, insights are widely drawn on an ad-hoc basis by organisations, but as analytical maturity develops, they can start to use statistics and analytics to develop dashboards that make these insights far easier to find and understand. Dashboards use performance measures, visualisations and alerts to aid decision makers (see example on previous page). Everyone, from the chief procurement officer (CPO) to procurement analyst can now have insight at their fingertips.

OPTIMISING AND MANAGING RISK IN SUPPLY CHAINS

Often, procurement departments don't need to source just individual categories, but instead they need to consider all elements of a supply chain. Previously, individual parts of the supply chain had been handled separately and then built up into a representation of the whole system. Now, however, strategic sourcing can optimise supply chains by sourcing over the entire supply chain simultaneously. This is proving a massive step forward in efficiency, since even a simple supply chain could involve huge numbers of potential solutions with multiple suppliers to choose between. The countless options involved mean that optimisation algorithms are a prime candidate for assistance.

By looking holistically at a supply chain, optimisation will enable you to be sure you are getting the optimal solution based on a number of factors including overall cost, shorter lead times, sustainability, environmental considerations and reduced complexity. Optimisation models can then provide ongoing value by using them to look at ‘what-if’ scenarios to understand the impact of potential situations which may arise, e.g. what is the impact on the supply chain as a whole if supplier X goes out of business?

Simulations can also be used to assist procurement with finding value in supply chains. A simulation could focus on either the supply chain or business operations and then be used to:

- Design a supply chain to guide which items should then be sourced
- Inform negotiations with suppliers, by discovering where specific ‘pain points’ might be – and therefore have a higher impact, as well as the areas that do not have as great an impact
- Quantify the impact on cost or operations of supplier performance, to guide contracting mechanisms, defining key performance indicators (KPIs) and setting performance levels
- Forecast upcoming risks and understand what options are available to manage these risks most effectively.

These uses of O.R. and analytics are, as in many industries, representative of the overall shift towards automation and digital, though I certainly don’t think we’re at the point where robots are poised for takeover, they will instead help to shape and perhaps redefine today’s role of procurement personnel.

Smith and Osagie’s White Paper, ‘The Future of Procurement’, believes that the future activities for procurement departments will be:

- Bringing understanding to support strategic decision making with executives
- Developing and managing procurements software and systems and bring in new technology
- Developing closer supplier relationships
- Conducting negotiations
- Providing commercial judgement on which contracting mechanisms to use in which context
- Managing and monitoring the organisations capability and performance.

What this means is that roles will undoubtedly become both more challenging and more interesting. Efficio VP Toby Munyard believes that the future is ‘a chance for the function to step up as innovators, using their overview of the supplier market to bring in new providers that can truly make a difference to their business and drive costs savings and add value.’ To achieve this, CPOs need to ensure that their staff have the right capabilities.

What this means for us, as O.R. professionals, is that the procurement world will be looking for people to deliver the increased analytics and insights needed for success, for people who work across multiple areas of a business and ask more questions, and for people who can communicate the technical aspects that have supported decisions. To me, that sounds exactly like people with the O.R. skillset.
### Monthly Favourites

**What’s hot on Twitter from @TheORSociety community of 2,524 followers**

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<tr>
<th>SIMUL8 Corporation</th>
<th>Katja Bego</th>
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<tr>
<td>@SIMUL8</td>
<td>@katjabego</td>
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<td>Thinking about using #simulation in your organization? Take your first steps with our guide <a href="http://ow.ly/61Gu307bGJQ">here</a></td>
<td>How can governments best engage citizens to improve planning and decision making? See @nesta_uk’s new report <a href="https://shar.es/1OmPxG">here</a></td>
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<tr>
<th>The OR Society</th>
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<td>@TheORSociety</td>
<td>@FMcLeister</td>
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<td>2017 will be the good kind of busy, with the Annual #Analytics Summit #TAAS17 mixing talks and workshops. 15 June 2017 <a href="http://www.analytics-events.co.uk">here</a></td>
<td>Interested in #analytics? Want to support #charities? Join the #ProBonoOR LinkedIn group for info <a href="http://ow.ly/4vY307R5AN">here</a> @AnalyticNetwork</td>
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<th>David Cope</th>
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<td>@DavidCope_Kew</td>
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<tr>
<td>Excellent article @DefraChiefScienc (not least for your great positive plug for Operational Research)! @TheORSociety: take note of a fan here.</td>
<td>Is dementia risk really much higher near busy roads? @StatsJen explains why context is vital to understanding risk <a href="http://bit.ly/2jaUEni">here</a></td>
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<thead>
<tr>
<th>CDRC</th>
<th>OR MTL Student Chapt</th>
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<tr>
<td>@CDRC_UK</td>
<td>@OR_MTLchapter</td>
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<td>CDRC Director Mark Birkin will chair this #bigdata and #ethics seminar in Leeds later this month. Speakers include Baroness Onora O’Neill.</td>
<td>Want to learn something new in #orms for 2017? Check out Prof. Chris Beck’s #CP tutorial online at <a href="www.mtl-students.com/cp-tutorial">here</a></td>
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### Who the OR Society is following on Twitter:

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<th>COIN-OR Foundation</th>
<th>Sellafied Careers</th>
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<tr>
<td>@coin_or</td>
<td>@SelLtdcareers</td>
</tr>
<tr>
<td>The Computational Infrastructure for Operations Research is an initiative to spur development of open-source software for the operations research...</td>
<td>Sellafied Ltd offers the most technically and commercially challenging projects within the nuclear industry. @SellafieldLtd</td>
</tr>
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</table>

### The OR Society on LinkedIn: join our 4,241 members like:

**Afshin Mansouri**
Professor of Operations and Supply Chain Management at Brunel University London

“A hybrid decision support system for managing humanitarian relief chains”


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Why not join us on Twitter, LinkedIn or Facebook? [www.theorsociety.com/FollowUs](www.theorsociety.com/FollowUs)

Get tweeting and posting: Your contribution might be featured next...
The Annual Analytics Summit delivers a one-day learning and networking event about how big data and analytics are shaping organisational decision-making. Filled with case studies, innovations and strategies on turning data into decisions, the Annual Analytics Summit is the event for practitioners and decision-makers alike.

The summit brings together experts from government, industry and academia, as well as exhibitors from software providers, consultancies and specialist recruitment agencies.

Location
IET
Savoy Place
London WC2R 0BL

www.analytics-events.co.uk
#TAAS17
OR-20 February 1997

HOW O.R. STYMIED ENGLAND (WITH HELP FROM THE TEAM)

It was reported in the December 1996 O.R. Newsletter that Tony Lewis from the University of West of England and the editor of RSS NEWS, Frank Duckworth have produced a new and fairer method for resetting the target score in interrupted one-day cricket matches. The method was adopted for use on England’s recent disappointing tour of Zimbabwe and was actually invoked in the match on New Year’s Day.

Zimbabwe scored 200 in their 50 overs and then, because of rain, England’s innings was reduced before it started, to 42 overs. By the old method of average run rate per over the score to beat would have been 168. The new method, based on the percentage of the combined resources of overs and wickets lost by the interruption, required England to score 92.5% of 200 that is 185. Mot cricket commentators have agreed that the target was fair given that, with fewer overs to bat but still with all 10 wickets available, a team can take more risks and on average score at a higher run rate.

It is history now that after seeming to be cruising to a win England snatched defeat from the jaws of victory by collapsing and scoring only 179 in their 42 overs. Consequently Zimbabwe won and went on to complete a 3-0 whitewash which cricket commentators have agreed was richly deserved. Without the Duckworth/Lewis method England would probably have won the second match and an injustice would then have been done to Zimbabwe because of the relatively modest target which is set in this circumstance by the average run rate method. (Although England did score 179 in 42 overs when chasing 185 it cannot be certain that they would have scored the 169 to win if playing under average run rate rules – they might still have collapsed with the target in sight!)

The newly formed England and Wales Cricket Board (ECB) has agreed to use the method for all domestic one-day county competitions for the 1997 season and discussions are continuing for the method to be used in at least one further international one day competition a little later in the year.

If you wish to comment or discuss the method with them, Tony and Frank’s email addresses are respectively tony.lewis@csm.uwe.ac.uk and f.duckworth@rss.org.uk.

Tony Lewis

OR-30 February 1987

Sadly on Christmas morning 2016 Brian Haley died. Thirty years ago, in January 1986, Donald Hicks died but his obituary (or rather “an appreciation”) did not appear in ORS until February 1987. As is so often the case when compiling this article each month one is struck by the number of coincidences or close links that occur. In Patrick Rivett’s appreciation, he mentions the fact that eleven professors and five presidents of the OR Society passed through his hands. Brian fell into both camps – he was a professor at the University of Birmingham and the President of the OR Society in 1982-1983.

Donald, unlike Brian, was not an academic. The majority of Donald’s career was in and around the coal industry. His career started as a Scientific Officer in the Fuel Research Station of DSIR, then moved to the Coal Survey Organisation of DSIR five years later in 1930 where he remained until the National Coal Board (NCB) was created in 1947.

The act establishing the NCB made a statutory requirement that a member for Science should sit on the Board. The first appointment to this position was Sir Charles Ellis, FRS who had been responsible for O.R. in the Army and he naturally decided to create a similar O.R. capability in the NCB. According to Rivett, the Scientific Department was split into two (from top to bottom); there was the Directorate of Scientific Research and the Directorate of Scientific Control. It was into this second branch that O.R. was placed although as with so many organisations, it was not called “O.R.” rather it went under the name of “Field Investigation Group” (FIG). Donald Hicks was appointed Director of Scientific Control and he set up his three teams responsible for: coal survey; chemical and physical analysis at colliery and area level and; operational research.

‘Hicks, through his appointments to the FIG and through his missionary zeal, created an O.R. activity which combined, in an almost unique way, the scientific outlook and standards of a good university department with an entrepreneurial view. He led by example, and provided for his staff opportunity and encouragement of a positive nature. All O.R. scientists have periods of frustration and depression when what they regard as gold nuggets of treasure are rejected with contempt by bloody-minded managers, and Hicks would always provide a shoulder to cry on. Sometimes he must have had the most damp lapels in the business. But when the crying was over, back would come his answer: “That’s all very well, but what do you want me to do?” This resolution into action was so characteristic of him.

He read every proposal and report overnight, at home and then the next morning ‘the authors trooped in to him to receive questions and suggestions which revealed his insight into the most complex problems’. ‘He would be constructively critical of work but never on personality terms, and always in private.’

Donald Hicks was the first Treasurer of the OR Society (Patrick Rivett, its first Secretary). He was made a Companion of Operational Research in 1983.
New Members, February 2017

The Society welcomes the following new members:

FERNANDO ARENAS, Cali, Columbia;
LAURENCE CHORLEY, Netley;
GERARDO LUEVANO, Mexico;
SAHAR VALIDI, Huddersfield;
BENJAMIN WILLCOCKS, London;

and the following student members:

JORGE COMPOS, University of Leeds;
SANG SOO KIM, Sogang University Seoul;
TOBY KINGSMAN, Lancaster University;
ALEX KELLSALL, Lancaster University;
BOROKA KISS, Anglia Ruskin University;
JINGDI LIU, London School of Economics and Political Science; RUZIVE MAZHANDU, University of Leeds;
RAKEEM NABI, University of Liverpool;
DIMITRIS PETKO, Lancaster University;
JASON POTTER, University of Kent;
LUKE RHODES-LEADER, Lancaster University;
BERNITA TEO, University of Leeds;
SHRIRAM VENKATARAMAN, University of Leeds;
LIAM WARING, University of Sheffield; YINGQI WU, University of Leeds;

Total Membership: 2927

Where Are They Now?

The following member on the Society’s mailing list has recently had his mail returned to the Membership section, presumably because of a change of address.

• Thomas Chidley, Gloucestershire

Would any member who is currently in touch please ask him to email carol.smith@theorsociety.com advising us of current address and contact details so that we can update our database and return to a speedy and efficient service.
Young to OR is a biennial conference for academics and practitioners with up to ten years’ experience in O.R.

Attendees have the opportunity to present their work to peers in a supportive environment, while learning about how O.R. techniques have been used in a wide range of applications.

Providing a great opportunity to meet fellow O.R. practitioners as well as academics, the conference also facilitates sharing of best practice and enables attendees to learn about new areas where O.R. can make an impact. With four Plenary speakers, workshops, a great scientific programme and more, YOR20 promises to be an excellent event.

To discuss opportunities for involvement, contact Tom Baldwin at tombaldwin@polarisconsulting.co.uk or Hilary Wilkes at hilary.wilkes@theorsociety.com for more information.

www.theorsociety.com/YOR20

Venue
The Wesley Euston Hotel
81-103 Euston Street, London, United Kingdom, NW1 2EZ
www.thewesley.co.uk

In easy reach of Euston Station and King’s Cross, the four star Wesley Hotel is the first ethical hotel in the UK, providing “funding for marginalised students and young people in the UK and developing world, who do not have the means to study at higher education level.”

www.thewesley.co.uk/en/why-we-are-ethical.html

Early bird rate:
£325.00 +VAT members
£425.00 +VAT non-members
Early bird rate ends 20 February 2017
This year’s OR Society conference is designed to support everyone – analytics professionals, academics and practitioners – in making an impact.

12-14 September 2017 Loughborough University

What you can look forward to:

Hosted by Loughborough University, The OR Society’s #OR59 will help you present your work, network with colleagues, develop your professional skills and ‘Make an Impact’. You will be immersed in a programme featuring:

- Superb Plenary and Keynote speakers
- 200+ paper presentations
- An excellent choice of streams
- #SpeedNetworking and social networking events
- ‘Making an Impact’ day #MAi59
- Practitioner/Academic collaboration sessions
- And much, much more.

This is an Operational Research event not to be missed and we look forward to seeing you there!

Great opportunities also exist for Sponsors and Exhibitors:

The conference is a great place to meet both academics and practitioners and provides a great opportunity to help Operational Research analysts solve their problems.

A range of sponsorship and exhibitor options are available, from exhibition stands and conference bags to dinners and ticketed events.

For more information, contact hilary.wilkes@theorsociety.com

www.theorsociety.com/OR59

Look out for the #OR59 hashtag on social media.

This year’s conference is three days of:

- An eclectic mix of presentations from 20+ streams
- Speed networking
- One-to one mentoring clinics
- The Big Debate
- Workshops, exhibits, social events and more!