

# RSS International Conference

for all statisticians and data scientists

**Conference directory**

**CARDIFF, WALES 3-6 September 2018 #RSS2018Conf**

**[www.rss.org.uk/conference2018](http://www.rss.org.uk/conference2018)**

Headline sponsor

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Thursday 6<sup>th</sup> September, 11:30am – 12:50pm

Speakers:

- **Brian Tarran**, Editor, *Significance* magazine
- **Professor Harvey Goldstein**, University of Bristol, Joint Editor of the *Journal of the Royal Statistical Society, Series A*
- **Paul Smith**, University of Southampton, Discussion Papers Editor of the *Journal of the Royal Statistical Society*
- **Stephen Raywood**, Senior Journals Publishing Manager, Wiley
- **Beverley Harnett**, Senior Marketing Manager, Wiley

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# Welcome



Croeso cynnes iawn i Gymru, i Gaerdydd, ac i **Gynhadledd RSS 2018**. A very warm welcome to Wales, her vibrant capital Cardiff, and to the **2018 RSS Conference**. We hope you will enjoy some Welsh hospitality and culture, as well as an abundance of statistics, during your visit. The conference venue, Cardiff's majestic City Hall, is ideally located close to the impressive Cardiff Castle, the University's main historic buildings, the city's commercial centre, and the National Museum, where the opening reception will take place. On Thursday, those joining us for the conference dinner will have a chance to enjoy some more of the city's iconic architecture – old and new – at the waterfront development of Cardiff Bay.

The conference team has worked extremely hard to produce an exciting, varied line up of distinguished keynote speakers, streamed parallel sessions and a comprehensive range of professional development workshops. This year, for the first time, we are hosting a multi-speaker plenary on Wednesday with speakers giving different perspectives on the controversial topic of significance tests, to be followed – we anticipate – by lively discussion. After its inaugural success last year, a series of “rapid fire” presentations is again planned, as well as the customary large selection of posters, which, like the talks, cover the widest possible range of topics under the increasingly broad umbrella of statistics and data science.

Along with the Welcome Reception (including a performance from Cardiff-based choir Côrddydd, recently crowned “Choir of the Festival” at the National Eisteddfod) and the Conference Dinner at the Exchange Hotel (where we'll be entertained by sell-out Edinburgh Festival stand-up mathematician Matt Parker) a range of other social events are also planned, including the RSS Awards Reception and our annual pub quiz (organised by the Young Statisticians Section, who will be visible throughout the event offering help and support to those who are newer to attending the conference).

We hope you have an excellent week, catching up with old friends, and making new ones.

**“Shw' mae?”** = **“How are you?”** (NB this is a greeting rather than a genuine question; the customary reply is another “Shw' mae?”), **“Pice ar y maen”** = **“Welsh cakes”**, **“Mae'n bwrw glaw yn sobor iawn”** = **“It's raining cats and dogs”**, (but we live in hope...).

**Scott Heald** • Interim Chair, RSS Conference & Events Board    **Daniel Farewell & Rhian Daniel** • RSS 2018 Programme Chairs

# General event information

## Accessibility

The building is accessible on the ground floor via a wheelchair lift at street level with a further lift to the rooms on the first floor. All rooms offer step-free access with the exception of the Ferrier Hall.

## Badges

Conference attendees are asked to wear their badges and lanyards at all times while at the conference.

Lost badges will be replaced at the discretion of the conference organisers. A replacement fee may be charged.

## Catering (Daytime)

Lunch as well as tea/coffee on arrival and at the mid-morning break and the mid-afternoon break is provided as part of your conference fee. All refreshments will be served in the Exhibition area in the Lower Hall on the ground floor of City Hall. Due to the large number of attendees at the conference there will be queues for refreshments, especially at lunchtime, so we do ask you to be patient and stagger your arrival at the serving points wherever possible.

## Cloakroom

An unstaffed cloakroom will be available on the ground floor of City Hall. This will be open each day during the hours of the conference programme. Please note that attendees leave coats, bags and other personal items in the cloakroom entirely at their own risk – the Society and City Hall accept no responsibility for items which are lost or damaged.

## Dietary requirements

For those attendees who have notified the organisers of special dietary requirements\* the following arrangements will be made:

- Lunchtimes – please ask a member of catering staff
- Thursday night dinner – please make yourself known to the RSS staff at the registration desk when you arrive at the Exchange Hotel.

*Please note that at the reception on Monday evening canapés are being served and nibbles at the Tuesday evening reception.*

- The conference organisers have tried to cater for all dietary requirements, however for some social events the venues may be limited on what they can accommodate. If you are concerned about this, please contact the RSS conference team.

\* **N.B.** There will be vegetarian options provided at lunchtime and the evening receptions which do not require any special arrangements but for the conference dinner vegetarians should talk to the RSS registration staff as above.

## Exhibition

The exhibitors' stands are located in the Lower Hall alongside the catering area. The Lower Hall will be open at the following times:

<b>TUESDAY 4 SEPTEMBER</b>	<b>8 AM – 8 PM</b>
<b>WEDNESDAY 5 SEPTEMBER</b>	<b>8 AM – 5.30 PM</b>
<b>THURSDAY 6 SEPTEMBER</b>	<b>8.30 AM – 4 PM</b>

Please make time to visit our exhibitors – please note that not all stands will be present on all days of the conference.

## Meeting conduct

The Society operates a meeting conduct policy and requires attendees to adhere to the policy at all times while in the conference and its associated events. The full text of the policy can be found on the conference website, on the noticeboard by the registration desk and in your conference packs.

## Mobile phones

We ask that you switch your mobile phones and other hand-held devices to silent when you are in sessions.

## Photography and filming sessions

The Society will have a photographer taking photographs in many sessions and at social events. The Society may use photographs taken in conference reports, publications and in future publicity materials. If you would prefer your photograph not to be used in this way please contact the conference manager.

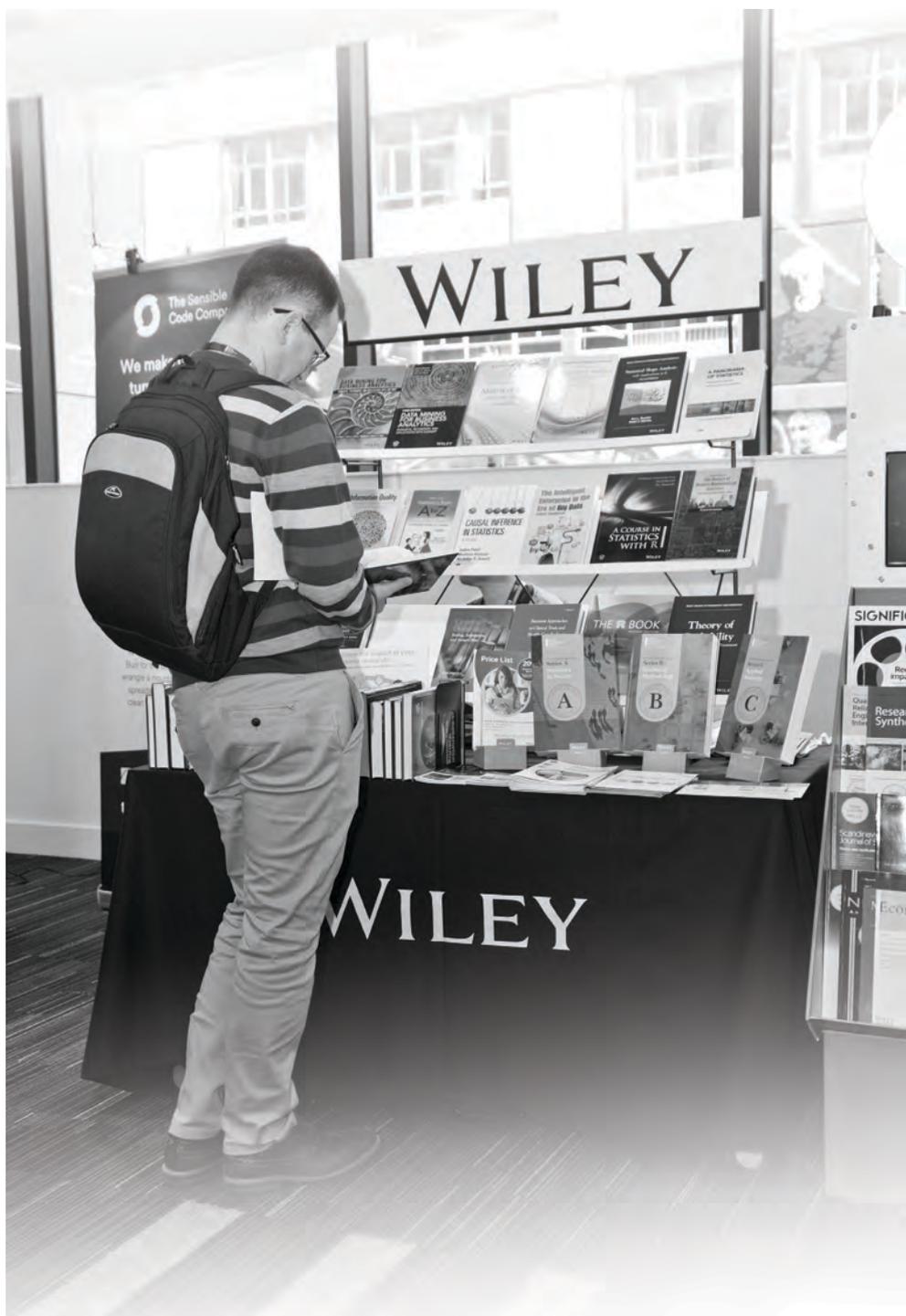
*Please note that the Society will also be recording a number of key sessions during the conference which will be made available from the Society's website in due course.*

## Poster presentations

Posters will be on display in the Marble Hall throughout the conference. There will be two lunchtime organised viewing sessions on Wednesday and Thursday – please see the relevant insert at the back of the directory for the list of posters being presented.

## Presentation Room

For speakers wishing to submit or amend their presentations during the conference and for poster presenters registering their poster the presentation room is located in Room H off the Marble Hall on the first floor.



## Registration and information desk

The conference registration desk can be found on the left-hand side of the entrance hall to City Hall.

The Registration desk will open at the following times:

<b>MONDAY 3 SEPTEMBER</b>	<b>3PM – 6.30PM</b>
<b>TUESDAY 4 SEPTEMBER</b>	<b>8AM – 6.30PM</b>
<b>WEDNESDAY 5 SEPTEMBER</b>	<b>8AM – 6PM</b>
<b>THURSDAY 6 SEPTEMBER</b>	<b>8.30AM – 2PM</b>

## Session locations

Keynote talks will be held in the Assembly Room on the first floor of City Hall. All other sessions will be held in one of 10 rooms which are all on the first floor of the venue with the exception of Room 137 on the ground floor.

**ALL sessions are open to all attendees registered to attend on the relevant day (unless otherwise stated)**

## Social events

If you have booked to attend one of the evening social events this will be indicated on your conference badge. There are no tickets for these events, however you will be required to present your badge on entry to the Welcome Reception and the Conference Dinner, and you will only be served at the Awards Reception if you are wearing your badge.

## Stewards and Staff

RSS stewards (in RSS t-shirts) and RSS staff members (identified by their badges) will be happy to assist you throughout the conference.

## Timings for presentations

The following timings for presentations will *normally* apply:

- Keynote talks: 30-45 minutes **plus** time for questions and discussion
- Invited talks: 20-30 minutes **plus** time for questions and discussion
- Contributed talks: 20 minutes **including** time for questions and discussion
- Rapid-fire talks: 5 minutes with **no** questions or discussion

## Twitter

You can follow the conference on Twitter: **RSSAnnualConf** – please use the hashtag **#RSS2018Conf**

## WiFi Access

Free wifi is available in the venue. You can connect to 'Cardiff free wifi' and just need to enter an email address to register.

# Exhibitors at RSS 2018 Conference

 **1. Esri** is the global market leader in geographic information systems (GIS), offering the most powerful mapping and spatial analytics technology. Since 1969, Esri has helped customers unlock the full potential of data to improve operational and business results. Today, Esri software is deployed in more than 350,000 organisations including the world's largest cities, national governments, as well as colleges and universities around the world.

 **2. SAIL Databank** is a safe haven for billions of person-based records combined with a complete data linkage and analysis toolset that helps researchers answer important questions for the benefit of society. SAIL is a world-class complete solution to sourcing, accessing, linking and analysing health and population data all within a governed infrastructure that is safe and secure. Researchers can access a broad range of routinely collected data spanning up to 20 years from an entire population. SAIL Databank provides linkable, anonymised datasets ready for analysis that can be accessed remotely via our unique SAIL Gateway platform, complete with analysis tools. [www.saildatabank.com](http://www.saildatabank.com)

**Minitab**  **3. Minitab®** is the leading software for statistics education worldwide. Minitab provides a comprehensive collection of statistical tools and graphs to help instructors teach, and includes a user-friendly design that allows students to quickly master the software and learn statistical concepts. Since thousands of distinguished organizations in more than 100 countries use Minitab, learning statistics with Minitab also prepares students for a wide range of jobs in the real world. There's a reason our software is the package of choice at more than 4,000 colleges and universities around the world.

 **4. The International Journal of Population Data Science (IJPDS)** is an electronic, open-access, peer-reviewed journal focussing on the science pertaining to population data. It publishes a wide variety of articles on all aspects of research, development and evaluation connected with data about people and populations. [www.ijpds.org](http://www.ijpds.org)

## 5a. Public Health Wales

  
ROYAL  
STATISTICAL  
SOCIETY  
DATA | EVIDENCE | DECISIONS

**5b. RSS 2019 Conference** will take place in Belfast, Northern Ireland in September 2019. Come and find out about the wonderful venue for the conference and also complete our registration for an extra special discount!

## 6. Department of Social Statistics, University of Manchester

  
jmp  
Statistical Discovery. From SAS.

**7. JMP** is a business unit of SAS that produces interactive software for desktop statistical discovery. Introduced in 1989 with scientists and engineers in mind, JMP has grown into a family of statistical discovery products used worldwide in almost every industry. From its beginnings, JMP software has empowered its users by enabling interactive analytics on the desktop. [www.jmp.com](http://www.jmp.com)

  
MANGO  
SOLUTIONS

**8. Mango Solutions** provide advanced data analysis solutions, consulting, training, and application development for some of the largest companies in the world. They offer a number of bespoke products for data science, including validation of open source software for regulated industries.

  
SAGE  
Publishing

**9.** Founded in 1965, **SAGE Publishing** is an independent company that disseminates journals, books, and library products for the educational, scholarly, and professional markets. [www.sagepublishing.com](http://www.sagepublishing.com)



**ROYAL  
STATISTICAL  
SOCIETY**

DATA | EVIDENCE | DECISIONS

**10/11.** The **RSS membership team** invites fellows and non-members to visit the RSS member zone during the RSS International Conference. We will be hosting drop-in sessions throughout the week ranging from volunteering opportunities to a Q&A session on our professional accreditation pathways. For the first time, we'll also be offering you the opportunity to sign up as a fellow on the stand. Come along and chat to the team to find out more about the wide range of benefits on offer and how to get involved in our activities.

**WILEY**

**12. Wiley** is a global provider of knowledge and knowledge-enabled services that improve outcomes in areas of research, professional practice and education. We partner with learned societies, including the Royal Statistical Society, and support researchers to communicate discoveries that make a difference. Our digital content, books and 1600 online journals build on a 200-year heritage of quality publishing. For further information, visit [www.wileyonlinelibrary.com](http://www.wileyonlinelibrary.com)

**XLSTAT**  
Your data analysis solution

**13. XLSTAT** - Featuring over 200 standard and advanced statistical features, XLSTAT works as an add-on to MS Excel for Windows and Mac. Today XLSTAT offers a wide range of field-specific solutions designed for each and every one of your needs: Forecasting, Machine learning, Simulations, Market research, Sensory analysis, Statistical process control and more.

**14. Cambridge University Press**



**15. Jumping Rivers** founded in 2016 is bringing a fresh approach to the world of data analytics. Our consultants come with over 40 years combined experience in R, Python, Stan, Scala and other programming languages. We have worked with some of the largest (and smallest) companies in the world providing both consultancy and training.

**16. Office for National Statistics**



**The  
Alan Turing  
Institute**

**17. The Alan Turing Institute** is the UK's national institute for data science and artificial intelligence. The Institute is named in honour of Alan Turing, whose pioneering work in theoretical and applied mathematics, engineering and computing is considered to have laid the foundations for modern-day data science and artificial intelligence. The Institute's goals are to undertake world-class research in data science and artificial intelligence, apply its research to real-world problems, drive economic impact and societal good, lead the training of a new generation of scientists, and shape the public conversation around data. [www.turing.ac.uk](http://www.turing.ac.uk)

**18. Health Technology Wales**, HTW, is responsible for delivering a strategic, national approach to the identification, appraisal and adoption of new health technologies into health and care settings across NHS Wales. We cover all health technologies that are not medicines, such as medical devices, surgical procedures, tele monitoring, psychological therapies, or rehabilitation.

**OXFORD  
UNIVERSITY PRESS**

**19. Oxford University Press** is a department of the University of Oxford. It furthers the University's objective of excellence in research, scholarship, and education by publishing worldwide.

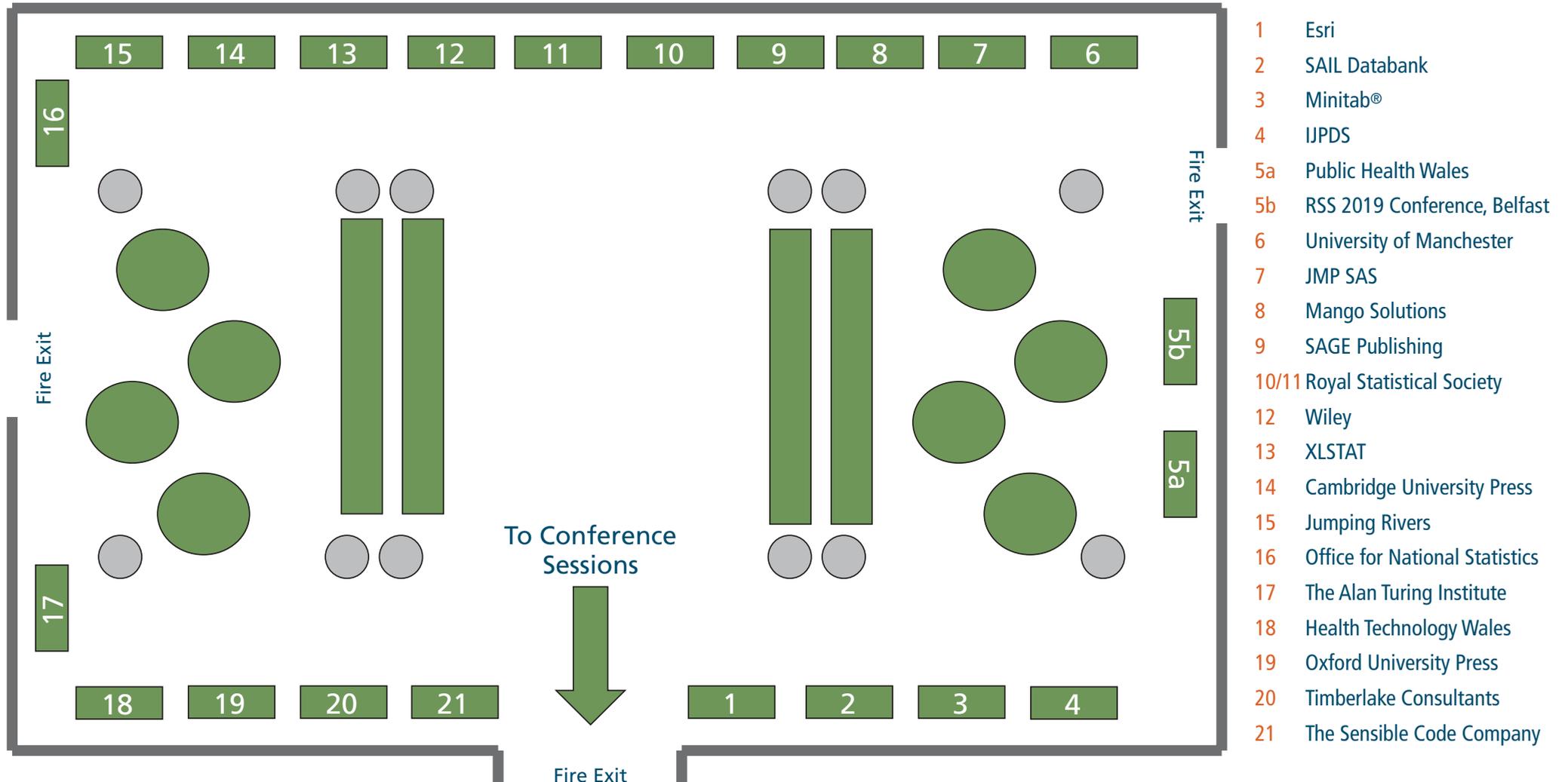
**20. Timberlake Consultants** is a global brand with over thirty years of experience and expertise as a supplier of statistical, econometric and forecasting software packages; the delivery of quality training courses; and a consultancy service provider. We provide a total solution to our diverse range of clients across the fields of statistics, econometrics, forecasting, quantitative and qualitative research, epidemiology, finance, political and social sciences as well as data visualisation.

 **The Sensible  
Code Company**

**21. The Sensible Code Company** - We make TableBuilder; it allows large confidential data sets to be published safely by applying a statistical disclosure control algorithm; it's being tested by the ONS for disseminating Census 2021 data.

# Exhibition Plan

## Lower Hall, City Hall





## Drop-in to the RSS Member Zone

Throughout the conference the RSS Membership team will be hosting a series of drop-in sessions in the Member Zone (stands 10 and 11 in the Lower Hall **unless shown otherwise**)

### Tuesday 4 September: 13:00 - 14:10 (member zone)

Want to offer your skills on a pro bono basis to charities? **Rob Mastrodomenico** will answer any questions you have about volunteering with Statisticians for Society.

### Tuesday 4 September: 13.20 - 14.00 (in Room G)

**Karen Facey** (RSS Honorary Officer for Sections and Local Groups) will meet with Local Group representatives for a discussion on current and forthcoming activities at the Society.

### Tuesday 4 September: 16:40 - 17:10 (member zone)

Becoming a professional member – **Ricky McGowan** (RSS Professional Affairs and Accreditation) and Paul Baxter (RSS Vice-President for Professional Affairs) will be available to talk about pathways to GradStat and CStat.

### Tuesday 4 September: 18.40 - 19.30 (in Room G)

**Karen Facey** (RSS Honorary Officer for Sections and Local Groups) will meet with Section representatives for a discussion on current and forthcoming activities at the Society.

### Wednesday 5 September: 10:50 - 11:20 (member zone)

Come and meet the **membership team** to see how RSS membership could benefit you.

### Wednesday 5 September: 13:20 - 14:30 (member zone)

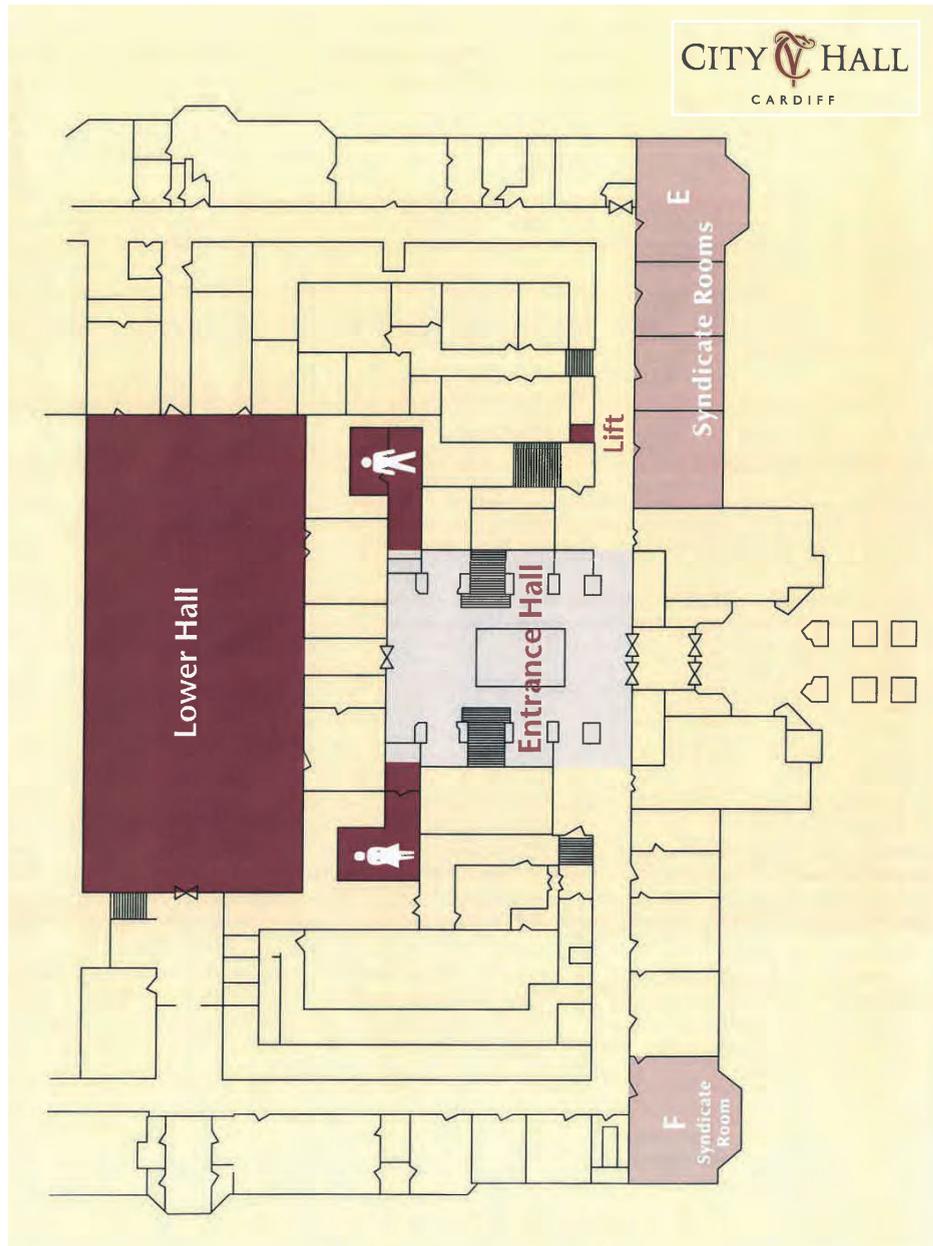
**Volunteering within Professional Affairs** – a drop in session where PAC members and other volunteers discuss how you can become involved in accreditation reviews, Professional Affairs and RSS mentoring scheme.

### Thursday 6 September: 12:50 - 14:00 (member zone)

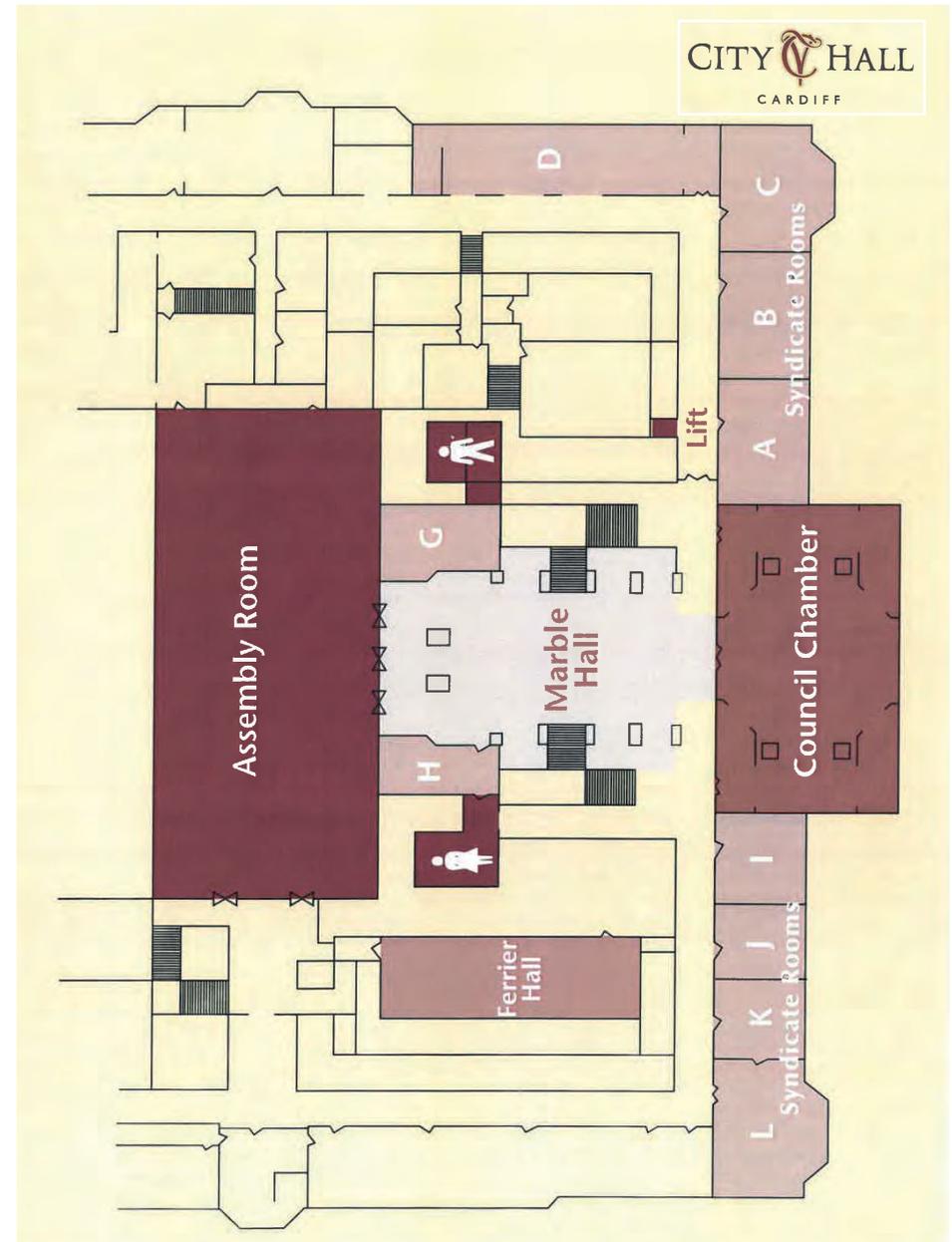
Come and meet the **RSS International Development Section** and find out what the Section has to offer and how you can get involved.

# Venue plan

City Hall, Ground Floor Plan



City Hall, First Floor Plan



# FULL PROGRAMME

ALL CONFERENCE SESSIONS ARE ORGANISED IN STREAMS. FOR EASE OF REFERENCE, EACH STREAM IS REPRESENTED BY A COLOUR IN THE PROGRAMME:

Communicating Statistics

Medical Statistics

Keynote

Data Science & computing

Methods & Theory

Professional Development

Environment and Spatial statistics

Official Statistics

Social Statistics

Industry & Finance

Other

Applications of Statistics

# Monday 3 September

18:00 – 19:00

**Welcome to Conference and Keynote 1**  
**- Mobilise the power of data to make better decisions**



**Assembly Room**

**Speaker:**

John Pullinger - *UK National Statistician*

*Followed by: A tribute to Professor Doug Altman*

**Speaker:**

Stephen J.W. Evans - *London School of Hygiene & Tropical Medicine*

19:00 – 21:00

**Welcome Reception – National Museum Cardiff**  
Cardiff welcomes conference attendees over drinks and canapés



# Tuesday 4 September

08:30 – 09:00

**Professional Development: PD1 Professional Development: The Young Statistician's Guide to the Conference**

**Ferrier Hall**

An introduction to the RSS Young Statisticians Section (YSS) and the YSS organised events running throughout the conference, followed by an introduction to the RSS Conference and advice on how to make the most of the large conference from a regular RSS conference goer.

Everyone welcome from RSS conference newcomers to conference veterans!

*Organised by the RSS Young Statisticians Section*

09:00 – 10:00

**Medical: 1.1 Contributed - Prognosis and Prediction**

**Syndicate Room C**

Investigating the impact of competing events on prognostic model outcomes:  
A simulation study

Lucy Teece - *Institute of Primary Care and Health Sciences, Keele University*

Tailoring prediction models for use in new settings: Individual participant data meta-analysis for ranking model recalibration methods

Joie Ensor - *Keele University*

The usability of the three-zone diagnostic decisions

Natasa Kezjar - *University of Ljubljana, Faculty of Medicine, Slovenia*

**Official Statistics & Public Policy: 1.2 Contributed - Datasets, admin data, and collaboration across the GSS**

**Syndicate Room B**

Dataset families: making statistics easier to find and apply

Darren Barnes - *ONS*

Small Area Estimation of Fuel Poverty in England - collaboration between BEIS and ONS

Katie Allison - *BEIS*

Using administrative data to estimate rates of casualties resulting from road-traffic collisions

Rob Johnson - *MRC BSU*

**Applications of Statistics: 1.3 Contributed - Universal Applications****Syndicate Room D**

Analysis of Linguistic Change Using Chain Graph Models for Structural Inference  
 Craig Alexander - *University of Glasgow, United Kingdom*

Tracking data analytics as a tool for performance management of football players:  
 A Case Study from Chelsea Football Academy  
 Varuna De Silva - *Loughborough University, United Kingdom*

Massively parallel iterative Bayesian nonparametrics for cosmological parameter estimation  
 Ben Moews - *The University of Edinburgh*

**Social Statistics: 1.4 Contributed - Social Statistics****Syndicate Room A**

The Multi-Trait Multi-Error Approach to Estimating Measurement Error  
 Alexandru Cernat - *University of Manchester, United Kingdom*

Methods for analysing life history sequence data containing rare and uncommon states  
 Jennifer Prattley - *Department of Social Statistics, University of Manchester*

Tackling Selection Bias in Sentencing Data Analysis: A New Approach Based on Mixture Models, Expert Elicitation Techniques, and Bayesian Statistics  
 Jose Pina-Sánchez - *University of Leeds, United Kingdom*

**Methods & Theory: 1.5 Contributed - Dynamic and Markov Models****Syndicate Room L**

Robust and Sparse Dynamic Models  
 Paola Stolfi - *National Research Council of Italy*

Estimation of Viterbi path in Bayesian hidden Markov models  
 Kristi Kuljus - *University of Tartu*

Multi-state Event Analysis with Dynamic Longitudinal Covariates and Time-varying Coefficients  
 Chuoxin Ma - *School of Mathematics, University of Manchester, United Kingdom*

**Communicating Statistics: 1.6 Contributed - Learning statistics in applied contexts****Council Chamber**

Graphical principles for creating effective data visualizations  
 Mark Baillie - *Novartis*

Teaching the concept of prior probability to medical students, doctors and other non-statisticians using 'P maps'  
 Huw Llewelyn - *Aberystwyth University, United Kingdom*

Revealed: What Every Statistician Should Know  
 Neil Spencer - *University of Hertfordshire*

**Methods & Theory: 1.7 Contributed - Event Time Analysis****Syndicate Room K**

Support Vector Estimation of Counting Process Intensities  
 Antonio Eleuteri - *Royal Liverpool & Broadgreen University Hospital - Department of Physics, University of Liverpool*

A genetic algorithm of the maximum likelihood estimation for the parameters of Marshall-Olkin generalized exponential distribution  
 Iklm Balay - *Ankara Yildirim Beyazit University, Turkey*

Causal Mediation Analysis with Sequentially Ordered Mediators Using Cox Proportional Hazards Model  
 Shu-Hsien Cho - *Institute of Statistical Science, Academia Sinica, Taiwan*

**Applications of Statistics: 1.8 Contributed - Customers and Clients**

**Syndicate Room I**

Understanding our customer base through the use of unsupervised customer segmentation and supervised CART analysis

Anselma Dobson-McKittrick - *DWR Cymru Welsh Water*

Monitoring customer complaint data using survival analysis to track batch performance  
Cameron Hogg - *SPD Development Company Limited, England*

Dynamic Prediction of Propensity to Purchase by Landmark Modelling  
Ilan Fridman Rojas - *University of Essex and Profusion Media LTD*



**Environmental & Spatial Statistics: 1.9 Contributed - Environmental & Spatial Statistics**

**Room 137**

Assigning ambient air pollutant exposures using Bayesian spatio-temporal models  
Neil Wright - *University of Oxford, United Kingdom*

Ozone and particulate matter air quality in Bogota and Mexico City: a comparative study  
Eliane R. Rodrigues - *Universidad Nacional Autonoma de Mexico (UNAM), Mexico*

Estimates of CO2 Fluxes from the City of Cape Town through Bayesian Inverse Modelling  
Alecia Nickless - *Nuffield Department of Primary Care Health Sciences, University of Oxford, United Kingdom*

**10.10 – 11:30**

**Medical: 2.1 Sample size for risk prediction & prognostic model research**

**Syndicate Room C**

Rules of thumb for sample size calculations in prediction research

Gary Collins - *University of Oxford*

Simulation-based sample size calculations for studies validating a prediction model

Kym Snell - *Keele University*

Sample size formulae for developing a prediction model based on expected shrinkage

Richard Riley - *Keele University*

*Organised by Richard Riley – Keele University*

**Official Statistics & Public Policy: 2.2 Bean Review and beyond**

**Syndicate Room B**

Two and a half years on from the Bean Review report, this session will present an opportunity for ONS and the UK Statistics Authority to provide an update on progress implementing the recommendations, review what else has changed since, invite comment on what difference it has made in practice, and discuss what the next steps should be.

**Speakers:**

Penny Babb, Office for Statistics Regulation, UK Statistics Authority

Richard Heys, Deputy Chief Economist, ONS

*Organised by David Matz and Bex Newell*

**Applications of Statistics: 2.3 Statistics and Performance analysis - what's it all about?**

**Syndicate Room K**

This session will take a panel format with three short introductory presentations about different perspectives on performance analysis followed by a question and answer session.

Performance analysis for improvement of performance

Peter O'Donoghue - *Cardiff Metropolitan University*

Performance analysis for outcome forecasting

Rob Mastrodomenico - *Global Sports Statistics*

Perspectives on a Performance Analysis MSc

Bev Hale - *University of Chichester*

## Social Statistics: 2.4 Capacity & capability priorities for complex analysis of large longitudinal studies

### Council Chamber

Understanding cross national regularities in the natural history of social inequalities in child development: unique insights from national birth cohort studies

Liz Washbrook - *University of Bristol*

The ESRC has recently reviewed their longitudinal studies funding portfolio and identified skills capability for complex analysis to make use of them as requiring further attention. This session will consider what the implications are by reviewing examples of the impact of such complex analysis and the training needed for social statisticians to utilise such studies. Discussion will include priorities for methodological development and potential for synergies with other disciplines and funders.

Evidence from ESRC Reviews of Longitudinal Studies and Skills

Rebecca Fairbairn - *ESRC*

Skills to realise the full potential of UK longitudinal studies

George Ploubidis - *UCL*

Organised by Tom King on behalf of RSS Social Statistics Section

## Methods & Theory: 2.5 Multilevel models: imputing level-2 missing data. From theory to practice

### Syndicate Room L

Aggregating level-1 information for imputing level-2 missing data

Omar Paccagnella - *University of Padua, Department of Statistical Sciences, Italy*

Multiple imputation of missing level 2 covariates in a multilevel model: analysis of the relationship between student ratings and teacher beliefs and practices

Leonardo Grilli - *University of Florence, Italy*

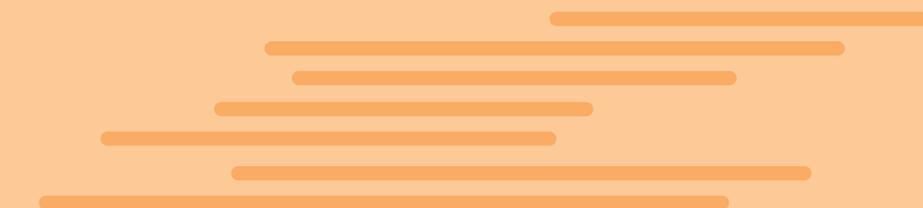
Bayesian Multilevel Latent Class Models for the Multiple Imputation of Nested Categorical Data

Davide Vidotto - *Tilburg University, Netherlands*

**Speakers – Discussant:**

Rachael Hughes - *Bristol Medical School, University of Bristol*

Organised by Omar Paccagnella - *University of Padua*



## Official Statistics & Public Policy: 2.6 Euro-Peristat - Are we comparing like with like?

### Syndicate Room A

International comparisons of pregnancy outcome indicators, such as infant mortality and preterm birth are often derived from systems which fail to take account of differences in definitions, thresholds for inclusion or methods of data collection.

Since 2000, the Euro-Peristat collaboration has been developing ways of taking account of these key factors when making comparisons. [www.europeristat.com](http://www.europeristat.com)

#### The talks will cover

1. The background to Euro-Peristat and development of our approach to making valid international comparisons
2. Trends and variations in perinatal and infant mortality and other key indicators of the outcome of pregnancy in Europe.
3. To compile data for our most recent report, we have experimented with collecting microdata. We will describe the advantages and disadvantages of this approach compared to our longstanding method of using tables of aggregated data.

#### Speakers

Henrique Barros - *University of Porto Medical School*

Mika Gissler - *National Institute for Health and Welfare, Finland*

Alison Macfarlane - *City University London*

Organised by Alison Macfarlane on behalf of Official Statistics Section and Euro-Peristat

## Data Science: 2.7 Shorts - sharing knowledge for public good

### Ferrier Hall

This session will provide delegates with the opportunity to explore and comment on current data science issues. We will use a knowledge café format (a structured conversational process for sharing knowledge in which groups of people discuss a different topics at several tables). Individuals can choose to switch tables periodically and be introduced to the previous discussion at their new table by an invited "table host".

The topics for discussion will include technical and ethical challenges, building effective collaborative partnerships, growing data science skills and delivering impact. The session will be chaired by Dr Tom Smith, Managing Director of the Data Science Campus at the Office for National Statistics (ONS).

The invited table hosts will be Idris Eckley (Professor of Statistics at the University of Lancaster), Professor Sofia Olhede (Department of Statistical Science, University College London), Guy Nason (Professor of Statistics at the University of Bristol) and ONS colleagues from the Data Science Campus and Big Data Team.

Organised by Data Science Campus, Office for National Statistics



**Industry & Finance: 2.8 Optimality issues in experimental design for business and industry**

**Syndicate Room I**

The talks in this session will all be tackling issues related to the optimal design of experiments in different circumstances: (i) continuously varying independent variables; (ii) blocks which are not inherently determined; (iii) the need to balance time/cost against the amount of data collected.

Designing industrial experiments with functional independent variables with pharmaceutical applications

David Woods - *University of Southampton, United Kingdom*

Blocking in multi-stage experiments

R. A. Bailey - *University of St Andrews, United Kingdom*

NCIS (New Constrained Imputed Designs) for incomplete Designs

Trevor Duguid Farrant - *Mondelez, United Kingdom*

*Organised by Neil Spencer on behalf of the RSS Business & Industrial Section*

**Data Science: 2.9 The future of SPC in a big data world**

**Syndicate Room D**

The impact of Big Data on creating insightful SPC

Gillian Groom - *Minitab Ltd*

Statistical Process Control was developed in the 1920s as a means of controlling processes by interpreting the results of a series of small samples. Nearly 100 years later, many processes generate thousands and millions of data points for the purposes of process control. Is traditional SPC out of date, in need of renovation or still relevant in the world of big data?

Does SPC have a role anymore?

Omar McCarthy - *AstraZeneca*

Data Science and Predictive Analytics at BT

Blaise Egan - *BT*

*Organised by the RSS Quality Improvement Section*



**Other: 2.10 Exploring the gender data gap**

**Assembly Room**

This session will look at the gender data gap from an international development perspective. In particular, it will discuss what work is being done on goal five of the Sustainable Development Goals - "Achieve gender equality and empower all women and girls".

*Organised by Mags Wiley - Royal Statistical Society*

**11:30 – 12:00**

Refreshment break - Lower Hall

**12:00 – 13:00**

**Keynote 2 - Statistical Inference for Analysis of Massive Health Data: Challenges and Opportunities**



**Assembly Room**

Presented by: Professor Xihong Lin - *Chair, Department of Biostatistics, Harvard T.H. Chan School of Public Health*

**13:00 – 13:15**

Annual General Meeting of the Royal Statistical Society

**Assembly Room**

All welcome

Agenda papers can be found on the website

**13:00 – 14:10**

Refreshment break - Lower Hall

**13:20 – 14:00**

Young Statisticians Section Reception

**Ferrier Hall**

Come and meet the Young Statisticians' section and other statisticians over lunch. Everyone welcome, of all ages, backgrounds and experiences!

Sponsored by Software Sustainability Institute





14:10 – 15:30

### Medical: 3.1 Flexible hazard regression models for time-to-event data

#### Syndicate Room C

The aim of this session is to showcase applied and methodological research in the context of flexible hazard regression models using flexible functional forms (e.g. splines and penalised splines). This session will include methodological developments in this area as well as some applied examples on the use of these models on population-based cancer registry data. In particular, one application using flexible functional forms for modelling the excess mortality hazard associated to cancer patients, in a Bayesian context, will be presented.

Smooth additive survival models and selection: if a tree falls in the forest, why?

**Simon Wood** - *University of Bristol*

Multidimensional penalised splines for hazard and excess hazard regression

**Mathieu Fauvernier** - *University of Lyon*

Flexible Bayesian Excess Hazard models using Low-Rank Thin Plate splines

**Manuela Quaresma** - *London School of Hygiene & Tropical Medicine*

*Organised by Aurelien Belot and Francisco Javier Rubio, London School of Hygiene & Tropical Medicine*

### Official Statistics & Public Policy: 3.2 Improving and developing international migration statistics to inform public and policy debate

#### Syndicate Room B

International migration flows into and out of the country are currently estimated using the International Passenger Survey (IPS). Whilst significant improvements have been made to the IPS in recent years, the landscape and demands for information have shifted and continue to shift. There is now much more interest in the stock of migrants residing in the UK and the impact they have on the economy and society. There are currently sources of data that shed some light on this but these only go so far in meeting the needs of the public, media and policymakers.

This session will start by looking at the recent improvements we have made to our outputs following a greater demand for information by either improving our current publications or providing new statistics and analysis where we can. However, we are limited on the information we can provide from current data sources and have gaps in our existing knowledge. We will then present the collaborative work across the Government Statistical Service to improve migration statistics and explain the approach we are taking to make better use of new and existing data sources. These new data sources currently concentrate on administrative data and this session will share how we have started to explore Home Office Exit checks data and how this administrative data source can be used to help us understand international migration further. We will also describe new and innovative ways of bringing together migration data from across the GSS and challenge our current methods.

Adjusting for changes in international migration intentions

**Alison Reynolds/Amelia Ash** - *Office for National Statistics*

Meeting the demand for new and better statistics on International Migration'

**Nicola Rogers/David Matz** - *Office for National Statistics/Home Office*

Discovering the international migration data landscape

**Nicola White/Hannah McConnell** - *Office for National Statistics*

*Organised by Nicola Rogers and Nicola White, Office for National Statistics*

### Social Statistics 3.4 Gendered trends - women, men and tracing trajectories of change

#### Council Chamber

Eleanor Attar Taylor, Social Attitudes Team, National Centre for Social Research

'Gendered trends: the changing attitudes to men and women'

Sally McManus, Health and Bio Surveys Team, National Centre for Social Research

'Gendered trends: the changing lives of men and women'

Julia Griggs, National Centre for Social Research

'Gendered trends: the changing patterns of mental health and self-harm'

*Organised by National Centre for Social Research*

**Methods & Theory: 3.5 Understanding when selection bias can occur**

**Syndicate Room L**

To recognise the different forms of selection into a study, how to identify a plausible selection process (or processes), and determine if an exposure-outcome association may be biased by selection for different types of analyses.

Survivor bias in Mendelian randomisation analyses

Stijn Vansteelandt - *Ghent University, and the London School of Hygiene and Tropical Medicine, Belgium*

Causal Inference under Outcome Dependent Sampling

Vanessa Didelez - *Leibniz Institute for Prevention Research and Epidemiology - BIPS, Germany*

*Organised by Rachael Hughes, University of Bristol*

**Communicating Statistics: 3.6 Data Journalism**

**Assembly Room**

Lies, Damned Lies and Adele

Joe Twyman - *Deltapoll*

How the BBC personalises data stories

Clara Guibourg – *BBC News*

Making the available, accessible – investigative data journalism in the public interest

Charles Boutard - *The Bureau of Investigative Journalism*

Turning a data avalanche into the regional daily's splash

Claire Miller - *Deputy head of data journalism at Reach*

Simpson's Paradox and the adolescence of data journalism

John Burn-Murdoch – *Financial Times*

*Organised by Jackie Carter – Cathie Marsh Institute, University of Manchester*



**Data Science: 3.7 Industrialisation & Professionalisation of Data Science**

**Syndicate Room D**

The Data Science Section will present the results from a series of regional workshops held during 2018 on the "Industrialisation and professionalization of Data Science". The findings will relate to 4 questions of the 12 noted at the DSS launch event and include:

- What does a good DS workflow look like?
- How should DS fit into the structure of an organisation
- What do executives and managers need to know about DS
- What is a Data Scientist's responsibility to wider society?

**Speakers:**

Andrew Garrett – *Icon plc*

Richard Pugh – *Mango Solutions*

Magda Piatkowska - *BBC*

Paddy Brock – *DFID*

*Organised by the RSS Data Science Section*



**Industry & Finance: 3.8 Enhancing the Financial Accounts in the UK**

**Syndicate Room A**

The financial crisis in 2007-2008 highlighted the need for better data to understand the complex nature of the modern financial system. In this session, we will build on our successful talk last year in which we introduced the joint ONS-BoE Enhanced Financial Accounts (also known as "Flow of Funds") initiative. This is an important project with the goal of improving the coverage, granularity and counterparty information of the financial accounts data in the UK. The new flow of funds data will allow users to understand how money moves in, around and out of the UK economy, and to identify the build-up of potential risks within the highly interconnected system.

After an introduction to the initiative, we will focus on three aspects of the new data: analytical examples, commercial data development and application in financial policy.

The success of this initiative relies on receiving feedback from a wide range of stakeholders, experts and interested parties, to ensure the end product will be accessible, well understood, relevant and useful. To this end the session will be interactive, giving the audience the opportunity to share their views and ask questions.

**Speakers:**

Phillip Davies (*Office for National Statistics*)

Keith Lai (*Office for National Statistics*)

Oliver Haines (*Office for National Statistics*)

Benjamin King (*Bank of England*)

Steven Dodkins (*Bank of England*)

*Organised by Keith Lai and Richard Campbell, Office for National Statistics*

## Professional Development: PD3 CStat and GradStat: What? Why? How?

### Syndicate Room I

This workshop is intended for anyone who is thinking about applying for Gradstat or CStat status or anyone interested in knowing more about Gradstat and CStat.

Speakers will give information about GradStat and CStat (answering the questions What? Why? How?), will share their own experiences of the application process and highlight the benefits of professional accreditation for statisticians of all backgrounds.

**Presenters:** Rob Mastrodomenico (CStat, Global Sports Statistics), Dr Paul Baxter (CStat, University of Leeds) and Ricky McGowan (Professional Affairs and Accreditation Manager, Royal Statistical Society)

*Organised by the RSS Young Statisticians Section*

15:40 – 16:40

## Medical: 4.1 Contributed - Medical: Meta-analysis

### Syndicate Room C

Model-based network meta-analysis for time-course relationships: A union of two methodologies

**Hugo Pedder - University of Bristol**

Multilevel network meta-regression for population adjustment based on individual and aggregate level data

**David Phillippo - University of Bristol, United Kingdom**

Multivariate meta-analysis of correlated outcomes: how much borrowing of strength do we expect?

**Miriam Hattle - Keele University**

## Official Statistics & Public Policy: 4.2 Contributed - UK Trade & Economy

### Assembly Room

Firm survival, growth and job creation in the UK: a cohort approach

**Michael Anyadike-Danes - Aston Business School and Enterprise Research Centre, United Kingdom**

Understanding asymmetries in UK bilateral trade data

**Marilyn Thomas - ONS, United Kingdom**

Overseas Trade in Goods Statistics: Improving the way we process big, multidimensional datasets in ONS

**George Zorinyants - Office for National statistics**



## Applications of Statistics: 4.3 Contributed - Prediction

### Syndicate Room K

Development of a model for predicting allergenicity of new and modified proteins

**Tanja Krone - TNO, Netherlands**

Statistical modelling for assessing the risk of electricity shortfalls in Great Britain

**Amy Wilson - University of Edinburgh, United Kingdom**

Adoption and abandonment rules for economic evaluation of health care technologies: a Bayesian real options approach

**Daniele Bregantini - University of Liverpool**

## Prize Winners: 4.4 RSS Prize Winners - Statistical Excellence for Early Career Writing 2018

### Ferrier Hall

A special session in which the three finalists for the Statistical Excellence Award for Early-Career Writing 2018 will deliver presentations based on their articles

Cooking up statistics: The science and the art

**Letisha Smith - New York University**

Curing cancer: Mere rhetoric or a promising plan?

**Morten Valberg - University of Oslo**

The trillion-dollar storm (or, how much can we trust our sun?)

**Thomai Tsiftsi - Universidad Nacional Autonoma de Mexico**

*Organised by Significance magazine and the RSS Young Statisticians Section*

**Methods & Theory: 4.5 Contributed - Design and testing**

**Syndicate Room L**

Sample Size Requirements for Validating a Reliable Risk Prediction Model using Binary Outcomes: A Simulation Study

**KHADIJEH Taiyari** - *MRC Biostatistics Unit*

Location-adjusted Wald statistic for scalar parameters

**Claudia Di Caterina** - *Department of Statistical Sciences, University of Padova, Italy*

An outlier in an independent samples design

**Ben Derrick** - *University of the West of England, Bristol, United Kingdom*

**Communicating Statistics: 4.6 Contributed - Communicating Statistics in a Digital World**

**Council Chamber**

The RSS Champion Award for Excellence in Official Statistics Winner 2018 - The Future Farming and Environment Evidence Compendium

**Jamie Jenkins** - *Defra*

Transforming Health and Social Care Publications in Scotland

**David Caldwell** - *NHS National Services Scotland*

Meeting Census 2021 user needs: the development of an online flexible dissemination system

**Chris Ashworth** - *Office for National Statistics*

**Data Science: 4.7 Contributed - Data Science**

**Syndicate Room D**

Syndromic surveillance: the benefits of embedding a statistician within your team

**Roger Morbey** - *Public Health England*

Demystifying big data in official statistics - it's not rocket science!

**Jens Mehrhoff** - *European Commission, Luxembourg*

Data Science at Dŵr Cymru Welsh Water

**Kevin Parry** - *DŵrCymru Welsh Water*

**Industry & Finance: 4.8 Contributed - Banking culture and risk assessment**

**Syndicate Room A**

What have we learnt assessing culture in UK banking?

**Qamar Zaman** - *Banking Standards Board*

Why expected loss is not the right measure of credit risk: tail inference for balance sheet data

**Andrei Sarychev** - *European Central Bank, United Kingdom*

Analysis of Microfinance Strategies for financial risk management

**Oyetayo Oluwatosin** - *Federal University of Agriculture, Abeokuta, Nigeria*

**Environmental/Spatial: 4.9 Contributed - Environmental & Spatial Statistics**

**Room 137**

Detecting coherent changes in flood risk in the Great Britain

**Ilaria Prosdocimi** - *University of Bath, United Kingdom*

Spatial and Statistical Analysis of Long Term Seasonal Rainfall Variations in a Southern Caribbean Island

**Aruna Rajballie** - *The University of the West Indies, St. Augustine, Trinidad and Tobago, Trinidad and Tobago*

Statistical analysis of weather-related property insurance claims

**Christian Rohrbeck** - *Lancaster University, United Kingdom*

**Methods & Theory: 4.10 Contributed - Nonlinear models**

**Syndicate Room B**

A flexible sequential Monte Carlo algorithm for shape-constrained regression

**Kenyon Ng** - *The University of Western Australia, Australia*

Beyond Beta regression: modelling bounded-domain variables in the presence of boundary observations

**Ioannis Kosmidis** - *University of Warwick, United Kingdom*

Non-Extensive Cross-Entropy Econometrics: introducing to the Nonlinear Simultaneous equation modelling

**Second Bwanakare** - *University of Information Technology and Management in Rzeszow*

## Professional Development: PD4 Get Involved - RSS Volunteers Internationally

### Syndicate Room I

Join us to find out how statisticians of all ages (from the young to the most experienced) have been volunteering for the RSS and associated initiatives and how you may be able to get involved.

This session will focus on volunteering abroad.

**Speakers:** Emanuele Giorgi and Will Hulme who will speak about their experiences of the African Institute of Mathematical Sciences (AIMS) and Amaka Nwagbara (Membership Engagement Manager, Royal Statistical Society)

*Organised by the RSS Young Statisticians Section*

**16:40 – 17:10**

Refreshment break - Lower Hall

**17:10 – 18:10**

## Keynote 3 - Significance Lecture - Hannah Fry's Guide to Being Human in the Age of Algorithms



Assembly Room

**Speaker:**

Hannah Fry - *University College London*

**18:10 – 18:40**

## Royal Statistical Society Awards Ceremony

Assembly Room

Details of the award recipients can be found in the relevant insert at the back of the directory

All welcome

**18:40 – 20:00**

Awards Reception - Lower Hall

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# Wednesday 5 September

8:30 – 09:50

## Medical: 5.1 Contributed - Recent developments in growth trajectory charts for infants

### Syndicate Room C

Post-natal weight gain in preterm-born children- a method assessing conditional trajectory  
**John Lowe - Cardiff University**

Assessing infant weight gain with growth charts – thrive lines and correlation surfaces  
**Tim Cole - UCL Great Ormond Street Institute of Child Health, United Kingdom**

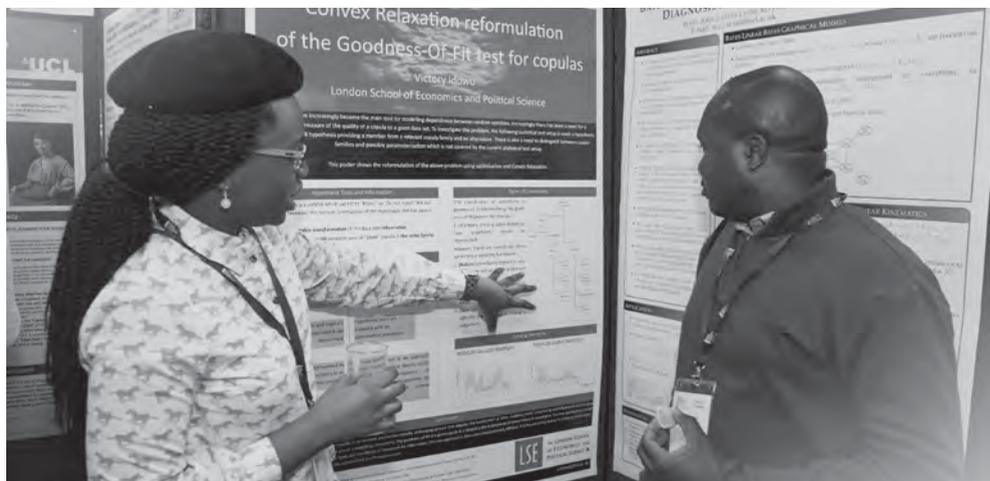
On reconsidering early life growth trajectories for Premature children  
**William Watkins - Department of Infection and Immunity, Cardiff University, United Kingdom**

Growing Preterm Infants in the United States Proportionally ... the Past, the Present, and the Future

**Dr A. Nicole Ferguson - Kennesaw State University, USA**

Infant growth charts have long been widely used to assess a child's "progress" from birth onwards. This session will provide an introduction to the current state of growth charts as well as introducing some new ideas around their production particularly to take into account the special cases that are premature children.

*Organised by William John Watkins (Senior Statistician, Division of Infection and Immunity, School of Medicine, Cardiff University)*



## Official Statistics & Public Policy: 5.2 Official Statistics: a global perspective

### Assembly Room

This session will take a global look at developments in the field of official statistics. Topics to be covered include the work ONS and the Department for International Development (DfID) are doing to build the capability of several National Statistical Institutes abroad, the latest on how the statistical system is preparing for Brexit, and the pioneering work underway to build a global data platform.

#### Speakers:

Building statistical capability abroad

**Rob Bumpstead - UK Statistics Authority**

The work of the GSS International Committee

**Will Laffan - UK Statistics Authority**

Building a global data platform

**Mark Craddock - Office for National Statistics, UK**

*Organised by the UK Statistics Authority*

## Applications of Statistics: 5.3 Statistics and Genetics: A fruitful relationship

### Ferrier Hall

Statistics and Genetics: A Fruitful Relationship - A brief history of the relationship between the two disciplines

**Heather Cordell - Newcastle University**

Inferring causality from genome wide association studies

**Toby Johnson - GlaxoSmithKline, United Kingdom**

Statistical challenges of the "Let's Measure Everything" era of human genetics

**Luke Jostins-Dean - University of Oxford**

*Organised by Nicholas Galwey, GSK*

**Social Statistics: 5.4 Bayesian applications in social contexts: dealing with data difficulties**

**Syndicate Room B**

Bayesian Methods in Demography Using Child Labour as an Exemplar  
Wendy Olsen - *University of Manchester Department of Social Statistics, United Kingdom*

Bayesian Analysis of Social Network Data from Patchy Sources  
Johan Koskinen - *University of Manchester, United Kingdom*

Teaching Files for this session can be downloaded from:  
[github.com/WendyOlsen/HelpIntroBayesianSocialScientists](https://github.com/WendyOlsen/HelpIntroBayesianSocialScientists)

*Organised by Wendy Olsen, University of Manchester*



**Methods & Theory: 5.5 Variable selection in high-dimensional and non-standard settings**

**Syndicate Room L**

On the Model Selection Properties of the Lasso  
Ulrike Schneider - *Vienna University of Technology, Austria*

Exponential Family Principal Component Analysis  
Luke Smallman - *Cardiff University, United Kingdom*

Post Selection Inference for Stepwise Regression Using Multiple Comparisons  
Kory Johnson - *University of Vienna*

This session will discuss variable selection algorithms the appropriateness of classic variable selection algorithms in high dimensional settings as well as variable selection methods for complex-structured data.

**Communicating Statistics: 5.6 STEM Showcase: showcasing statistics through outreach and public engagement**

**Council Chamber**

The session will explore effective and engaging statistical activities used in outreach (e.g. STEM curriculum enrichment) and public engagement (e.g. science festivals). The session will be of interest to attendees interested in participating in outreach and public engagement, such as becoming a STEM Ambassador.

Presenters will be Jeff Ralph (University of Southampton), Laura Bonnett (University of Liverpool & RSS Education Committee) and Joanna Bunnett (NHS Blood and Transplant).

*Organised by the RSS Young Statisticians' Section & RSS Education Committee*

**Data Science: 5.7 Data science for official statistics: the story so far**

**Syndicate Room D**

With the data revolution occurring all around us, official statistics have to work harder to measure what is going on in society and the economy. We have to ensure that decisions are taken with the right evidence at the right time. Whilst there is great potential with more data, statistics producers have to be increasingly efficient and do more with less. ONS is striving to lead the way and be at the forefront of this revolution.

Within ONS, the Big Data Team and Data Science Campus are the core teams exploring the use of new sources of data and data science techniques in the production of official statistics, as well as exploring some of the challenges. This session will showcase some of the innovative projects being undertaken across social and economic statistics, using methods like image processing, machine learning and natural language processing. All talks will show how they fit into the Government Statistical Service (GSS) strategy for Better Statistics: Better Decisions, and will outline the lessons learnt and plans for the future. An experienced data scientist from academia will bring together the themes arising from these talks, and raise some points for discussion.

Introduction

Tom Smith - *Managing Director, Data Science Campus, ONS*

Statistics on Jobs, Businesses and People – where data science is adding value

Karen Gask - *Big Data Team, ONS*

Data is coming: The Data Science Campus and its projects

Jasmine Latham - *Data Science Campus, ONS*

Discussant

Suzy Moat - *Professor of Behavioural Science, Warwick Business School*

*Organised by Owen Abbott, Office for National Statistics*

## Industry & Finance: 5.8 Design and analysis of industrial and network experimentations

### Syndicate Room I

A graph-theoretic framework for algorithmic design of experiments  
**Ben Parker - University of Southampton, United Kingdom**

Designing Experiments with Unstructured Treatments for General Network Structures  
**Frederick Kin Hing Phoa - Academia Sinica, Taiwan**

Closed-loop automatic experimentation for optimisation  
**Timothy Waite - University of Manchester**

Experimentation is a common practice in most scientific investigations and industrial processes, but traditional experimental designs may not fit the needs in modern experiments well. In the era of big data, there are different types of experiments that needs special design properties to fulfil their requirements. In this session, we investigate these design and analysis of experiments from both theoretical and practical perspectives. The network experiment is our main focus but any industrial designs are of our interest.

## Environmental/Spatial: 5.9 Invited - Environmental monitoring

### Syndicate Room A

Monitoring marine contaminants: part statistics, part data management, part communication.  
**Rob Fryer - Marine Scotland, United Kingdom**

Now you see them, now you don't: the importance of modelling butterfly populations  
**Emily Dennis - Butterfly Conservation**

Spatially biased sampling from citizen scientists and impacts on estimated species distributions.  
**Alison Johnston - Cambridge and Cornell Universities**

We will discuss statistical aspects of environmental monitoring. We have a range of speakers on: marine contaminants, UK butterfly populations and bird populations. A key theme to our session is the relationship between statistical techniques and the complexities of the real world.

**Organised by Jon Barry (CEFAS) and Peter Henrys (CEH)**



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10:00 – 10:50

**RF1: Rapid-Fire Talks**

**Council Chamber**

Using Spatio-temporal clustering to model antibiotic use  
**Jonathan Ansell - The University of Edinburgh Business School, United Kingdom**

Bayesian Ensemble of Nonparametric Quantile Trees  
**Mauro Bernardi - University of Padova**

Predictive Modelling: What's the customer's propensity to pay?  
**Vasiliki Bampi - Dwr Cymru Welsh Water**

On the sample mean after a group sequential trial  
**Ben Berckmoes - Universiteit Antwerpen, Belgium**

Detecting signals for adverse drug reactions (ADRs) using non- constant hazard in longitudinal data: a comparison of three model-based methods  
**Victoria Cornelius - Imperial College London, United Kingdom**

Using Extreme Value Theory Approach to Forecast the Level of Extreme Rainfall in Oyo state, Nigeria  
**Oluranti Afolabi - The Polytechnic Ibadan, Ibadan, Nigeria**

**RF2: Rapid-Fire Talks**

**Ferrier Hall**

What do newly developed ONS business surveys tell us about the UK economy?  
**Chloe Gibbs - Office for National Statistics**

Statistical models for longitudinal zero inflated count data: Application to Seizure Attacks  
**Haile Mekonnen Fenta - Bahir Dar University**

Fisher's Fundamental Theorem: it's not just about genetics  
**Nicholas Galwey - GlaxoSmithKline, United Kingdom**

Development and validation of a clinical prediction model to identify adult patients (aged 18 - 50) with type 1 diabetes requiring early insulin therapy  
**Anita Grubb - University of Exeter Medical School, United Kingdom**

Implicitly weighted robust classification for high-dimensional data  
**Jan Kalina - Institute of Information Theory and Automation of the Czech Academy of Sciences**

**RF3: Rapid-Fire Talks**

**Syndicate Room A**

The design and analysis of sequential trials with binary outcomes, when errors in achieving and measuring the stimulus are present  
**Mike Hicks - Defence Ordnance Safety Group, England**

Adherence to the MIND Diet predicts a lower risk of Mild Cognitive Impairment in the Framingham Heart Study  
**Jayandra Himali - Boston University, United States**

Mallows Model Averaging Estimator for Support Vector Regression  
**Francis Kiwon - McMaster University, Canada**

Sequence balance minimisation: new minimisation procedure for clinical trials using unequal treatment allocation ratios  
**Vichithranie Madurasinghe - Queen Mary University London, United Kingdom**

Developing a predictive risk model for anxiety after treatment for breast cancer: applying best practice in prognostic statistics to inform psycho-oncology  
**Jenny Harris - King's College London/ University of Surrey, United Kingdom**

Managing Discolouration Risk in a Water Distribution Network through Machine Learning and Data Visualisation  
**Isaac Bowen - Dwr Cymru Welsh Water**

**RF4: Rapid-Fire Talks**

**Syndicate Room B**

On using predictive-ability tests in the selection of time-series prediction models  
**Robert Kunst - Institute for Advanced Studies, Austria**

Identification of Disease Subtypes Using Multivariate Longitudinal Data: a Comparison of Growth Curve Mixture Models and a Two-Stage Cluster Analysis Approach  
**Benjamin Leiby - Thomas Jefferson University, United States**

Distribution comparison and dependency measure in d dimensions based on fractal transport of probability measures  
**Gilles Mordant - Université Catholique de Louvain**

Graphical methods to aid assessment of item performance in monitoring developmental outcomes of children aged 0-3 years in low and middle income countries  
**Gillian Lancaster - Keele University**

Evidence evaluation and functional data analysis  
**Ya-Ting Chang - United Kingdom**

Determining the extent of web-based intervention use in health research: a systematic review  
**Elena Koneska - University of Liverpool - ITM, United Kingdom**

**RF5: Rapid-Fire Talks****Syndicate Room C**

Estimating heterogeneity variance under sparsity

**Susan Martin** - *University of Southampton, United Kingdom*

Investigation of VAT Expenditure as a quarterly source of Intermediate Consumption

**William Perks** - *ONS, United Kingdom*

Evaluating service development in critical care: Impact of establishing a medical high dependency unit on intensive care unit workload, case mix, and mortality

**Gordon Prescott** - *Medical Statistics Team, Institute of Applied Health Sciences, University of Aberdeen*

Perhaps the censoring in my data is not non-informative. Does it matter?

**Alan Kimber** - *University of Southampton, United Kingdom*

A case-subcohort study for pancreatic cancer in the China Kadoorie Biobank

**Christiana Kartsonaki** - *University of Oxford, United Kingdom*

Variable Neighborhood Search Algorithm to Achieve Balanced Allocation Design for Known Categorical Covariates

**Samrat Hore** - *Tripura University*

**RF6: Rapid-Fire Talks****Syndicate Room D**

Stratified multivariate permutation tests for mixed variables with applications in industrial statistics

**Luigi Salmaso** - *University of Padova, Italy*

Correcting unwanted variation in RNA sequencing data derived from a multi-centre study of leukemia

**Anna Quagliari** - *Walter and Eliza Hall Institute of Medical Research, Australia*

MAIC-ing the most of trials?: A Bayesian exploration of Matching Adjusted Indirect Comparison in a Network Meta Analysis

**Joy Leahy** - *Trinity College Dublin, Ireland*

Modelling reassurances of clinicians using Hidden Markov Models

**Valentin Popov** - *University of St Andrews, United Kingdom*

Metadata: a Stata procedure for meta-analysis of diagnostic accuracy data

**Victoria Nyaga** - *Scientific Institute of Public Health*

Grouping anti-social behaviour types based on co-occurrence or impact?

**Puneet Tiwari** - *Nottingham Trent University, United Kingdom*

**RF7: Rapid-Fire Talks****Syndicate Room L**

Modeling Three Dimensional T-cell Motility Using Multivariate Normal Distribution

**Elaheh Torkashvand** - *University of Waterloo, Canada*

Joint Modelling of Mean and Dispersion Effects for Longitudinal Data

**Ka Yui Karl Wu** - *Singapore University of Social Science*

A systematic review and classification of the methods to 'Borrow Strength' in Health Technology Assessment

**Georgios Nikolaidis** - *Centre for Health Economics, University of York, United Kingdom*

A detection algorithm for the first jump time in jump-diffusions

**Jiao Song** - *Swansea University Medical School*

Effectiveness of a school based smokeless tobacco intervention in Karachi, Pakistan:

A cluster randomized trial

**Dr Shafquat Rozi** - *Department Of Community Health Sciences, Aga Khan University, Karachi, Pakistan, Pakistan*

Evaluating kidney function while allowing for selection bias

**Matthew Robb** - *NHS Blood and Transplant, United Kingdom*

**RF8: Rapid-Fire Talks****Syndicate Room K**

Women and Children's Health Management Big Data Platform---A Case on National Health and Family Planning Commission of the People's Republic of China

**Huaihai Hui** - *University of Leeds, United Kingdom*

Mapping the urban forest

**Philip Stubbings** - *ONS Data Science Campus*

A new gamma- generalized gamma mixture cure fraction model: application to ovarian cancer at the University College Hospital, Ibadan, Nigeria

**Serifat Folorunso** - *Department of Statistics, University of Ibadan*

Sparsity and network measures: an application towards a new index measuring the extent of Common Ownership in a given industry.

**Nicoletta Rosati** - *Joint Research Center - European Commission, Italy*

Back-calibration from splines

**David Wille** - *GSK, United Kingdom*

10:50 – 11:20

Refreshment break - Lower Hall

11:20 – 13:20

### Keynote 4 - Significance Tests: Rethinking the Controversy

#### Assembly Room

Intermingled in today's statistical controversies are some long-standing, but unresolved, disagreements on the nature and principles of statistical methods and the roles for probability in statistical inference and modelling. In reaction to the so-called "replication crisis" in the sciences, some reformers suggest significance tests as a major culprit. To understand the ramifications of the proposed reforms, there is a pressing need for a deeper understanding of the source of the problems in the sciences and a balanced critique of the alternative methods being proposed to supplant significance tests. In this session, speakers offer perspectives on significance tests from statistical science, econometrics, experimental psychology and philosophy of science.

What do we learn about significance tests from the replication crisis?

Deborah Mayo - *Department of Philosophy, Virginia Tech*

Should we redefine statistical significance?

Richard Morey - *School of Psychology, Cardiff University*

The Use and Abuse of Significance Testing and its Role in Statistical Model Validation

Aris Spanos - *Department of Economics, Virginia Tech*

In Gentle Praise of Significance Tests

Sir David Cox - *Nuffield College, Oxford*

*Followed by panel discussion (with questions from audience)*

13:20 – 14:30

Lunch - Lower Hall

13:40 – 14:20

#### Poster Viewing A - Marble Hall

Information about the poster presenters at this session can be found in the relevant insert at the back of the directory



14:30 – 15:50

### Medical: 6.1 Can clinical prediction be improved with the use of longitudinal data?

#### Syndicate Room C

In recent years there has been a rapid development of multivariate modelling approaches to deal with the large amount of data available in healthcare. The prediction of the correct diagnosis or prognosis, especially before the patient presents clear structural and/or functional change, is the focus of many clinical applications. In this session we will explore and discuss to what extent these new developments show an improvement in clinical prediction accuracy.

Improving the accuracy of diagnostic/prognostic models using longitudinal data

Dr. Marta García-Fiñana - *University of Liverpool, United Kingdom*

Use of repeated measurements of risk factors in electronic health records to predict future disease risk

Dr. Michael Sweeting - *University of Cambridge, United Kingdom*

Mixed Model tools for multivariate longitudinal classification in R

Dr. David Hughes - *University of Liverpool, United Kingdom*

Followed by a panel discussion

*Organised by Liverpool Multivariate Modelling group & the EPSRC Liverpool Centre for Mathematics in Healthcare*



## Applications of Statistics: 6.3 Ensuring reliability of forensic scientific evidence

### Syndicate Room K

Testing for drug driving: determining the measurement error distribution  
**Simon Spencer - University of Warwick, United Kingdom**

How the Regulator monitors and influences the quality of scientific evidence  
**Jeff Adams, Home Office**

Comparisons of open source software for complex DNA  
**Keith Inman, California Stats University**

Designing and implementing procedures, relating to both technical and behavioural aspects of forensic science, in order to assure the courts on the reliability of an expert's evidence.

*Organised by RSS Statistics & the Law Section*

## Social Statistics: 6.4 Multilevel modelling in the social sciences

### Syndicate Room B

Local Regularization in Spatially-Correlated Multilevel Models  
**Levi Wolf - University of Bristol**

Automating Multilevel analysis and statistical teaching preparation  
**William Browne - University of Bristol, United Kingdom**

Avoiding Bias When Estimating the Consistency and Stability of Value-Added School Effects Using Multilevel Models

**George Leckie - University of Bristol, United Kingdom**

Multilevel modelling is now a well-established advanced statistical approach in the social sciences thanks in part to easily available statistical software. The field is however still developing and in the session we showcase three talks on new developments in the field.

*Organised by Bill Browne, Centre for Multilevel Modelling, Bristol*

## Official Statistics & Public Policy: 6.2 Measuring inflation in the UK

### Assembly Room

This session will provide an overview of the current consumer price statistics landscape, and the future developments that ONS's Prices Division is working towards. The history will be discussed, and 'use cases' for each of the consumer price indices will be set out. There will be a description of current work to meet existing user needs by developing Household Costs Indices. This is a set of measures that will reflect changing prices as experienced by different household groups. The session concludes with a panel discussion on the UK's range of consumer price statistics.

The consumer price statistics landscape  
**Speaker TBC - Office for National Statistics**

Developing measures of price change as experienced by households

**John Astin - independent**

**Jill Leyland - independent**

**Chris Payne - Office for National Statistics**

### Panel discussion on consumer price statistics in the UK:

**Dame Kate Barker (Chair of the Advisory Panel on Consumer Prices – Stakeholder)**

**Nick Vaughan (Chair of the Advisory Panel on Consumer Prices – Technical)**

**Jill Leyland**

**John Astin**

*Organised by Prices Division, Office for National Statistics*

**Methods & Theory: 6.5 Recent developments in covariance modelling**

**Syndicate Room L**

A calibration method for non-positive definite covariance matrix in multivariate data analysis

Chao Huang - *University of Hull*

Joint Mean-covariance Modelling and its R Package: JMCM

Yi Pan - *University of Birmingham*

Joint modelling of survival and longitudinal data

Hongsheng Dai - *University of Essex*

This session aims to provide and discuss the recent development in covariance modelling and calibration, in both theoretical and practical perspective.

*Organised by Chao Huang, University of Hull*

**Communicating Statistics: 6.6 Building statistical literacies for the Sustainable Development Goals: Data, Skills and Training**

**Ferrier Hall**

This session will explore three aspects of statistical literacies development. First, we introduce how international organisations are strengthening statistical data capacity in national statistical organisations. Second, we discuss the statistical skills development in the student population, through initiatives such as Q-Step in the UK. And third, we show how we are sharing the training capacity in the UK and the US through the joining up of these initiatives, and contributing to knowledge transfer with government and research organisations. The panel will focus on the Sustainable Development Goals and the indicator framework to measure and track progress towards them.

**Speakers:**

Deirdre Appel - Data Policy Associate, Open Data Watch

Grace Desouza - Q-Step intern, University of Manchester

Frensis Bras - Office for National Statistics

This panel discussion will explore good practices on building statistical literacy in these different contexts – our student and research populations and at the country level for sustainable development.

*Organised by Cathie Marsh Institute, Q-Step, University of Manchester and Open Data Watch, Washington, D.C.*



**Data Science: 6.7 Invited - Data Science Hackathon - the results**

**Syndicate Room D**

RSS Data Science Section are organising a pre-conference hackathon with the aim of encouraging statisticians to find out more about data science.

This session will present the Hackathon results.

*Organised by RSS Data Science Section and Mango Solutions*



**Industry & Finance: 6.8 Papers from the Journal of the Royal Statistical Society**

**Council Chamber**

The Repayment of Unsecured Debt by European Households

Charles Grant - *Brunel University*

Do debit cards decrease cash demand? Causal inference and sensitivity analysis using Principal Stratification

Andrea Mercatanti - *LISER, Luxembourg Institute of Socio-Economic Research*

Parameter stability and semiparametric inference in time varying auto-regressive conditional heteroscedasticity models

Lionel Truquet - *ENSAI, France*

The papers have the common theme of 'finance' in the applications that they consider to illustrate the novelty and usefulness of their statistical techniques

*Organised by Martin Owen on behalf of the RSS Journal Series Editors*

## Environmental/Spatial: 6.9 What happens when the environment meets the national accounts?

### Syndicate Room A

Environmental statistics are changing rapidly as demand for the environment to be accounted for in decision making grows and technology available to monitor it improves.

ONS are developing Environmental and Natural Capital accounts which bring together a host of environmental statistics to provide an overall picture about the impact we have on the environment and the benefits the environment gives back to us.

This session will provide an overview of ONS's work, which much is produced in partnership with Defra. We will look at why accounts are important, how they sit within wider economic and social statistics and how they can be used to inform policy.

Special focus will also be given to the challenges faced in bringing together and standardising statistics that are traditionally produced by a number of different organisations.

#### Speakers:

Gemma Thomas - Office for National Statistics

Hazel Trenbirth - Office for National Statistics

Rocky Harris - DEFRA

Organised by Gemma Thomas & Emily Connors, Office for National Statistics

## Professional Development: PD5 Modernising data dissemination and protecting data confidentiality

### Syndicate Room I

Organisations seek to publish more data whilst meeting tough regulatory requirements. Disseminating data safely presents significant challenges around data privacy and data protection. This event looks at how the ONS is looking to use modern technology to protect Census 2021 data and looks at legal considerations for data publishing as required by the GDPR.

#### Presenters:

Samantha Hall, Transformation Lead in Digital Publishing at Office for National Statistics.

Darren Barnes, Transformation Team in Digital Publishing at Office for National Statistics

TBC, Representative from the Open Data Institute

Duncan Harris, Privacy Engineering, Sensible Code

Francis Davey, Barrister, Mathematician and Computer scientist, Anderson Law LLP

Organised by Sensible Code with the Office for National Statistics

15:50 – 16:20

Refreshment break - Lower Hall

16:20 – 17:20

## Medical: 7.1 Contributed - Joint Modelling and Dynamic Prediction

### Syndicate Room C

Dynamic prediction of conception in couples with unexplained infertility

David McLernon - *University of Aberdeen*

Beyond the mean: a joint modelling approach to relate within-individual variation in repeated measures, longitudinal data, to a future outcome

Richard Parker - *University of Bristol, United Kingdom*

Dynamic personalised prediction of survival using routinely collected data: An empirical comparison of landmarking and joint modelling

Ruth Keogh - *London School of Hygiene and Tropical Medicine*

## Official Statistics & Public Policy: 7.2 Contributed - Innovative approaches

### Council Chamber

New methodologies for the measurement of inflation using web scraped data in a UK context

Robert Bucknall - *Office for National Statistics, United Kingdom*

Investigating the feasibility of using alternative data sources in official consumer price statistics

Jack Philips - *ONS, United Kingdom*

The feasibility of measuring the sharing economy of the UK

Pauline Beck - *Office for National Statistics*

## Applications of Statistics: 7.3 Contributed - Medical Applications

### Syndicate Room A

A Bayesian statistical analysis to establish best practices for organs-on-chips experiments

Beate Ehrhardt - *AstraZeneca, United Kingdom*

Modification of Cramer-von Mises test with applications in genomics

Alison Telford - *University of Leeds, United Kingdom*

Evaluating Community-Based Translational Interventions Using Historical Controls: Propensity Score vs. Disease Risk Score Approach

Luohua Jiang - *University of California Irvine*

**Social Statistics: 7.4 Contributed - Social Statistics**

**Syndicate Room B**

Assessing the role of the field of study in determining university attractiveness: a comparison study based on generalized mixed-effect models

Silvia Columbu - *University of Cagliari, Italy*

Fifty years of multidimensional poverty research in Britain

David Gordon - *University of Bristol*

An Alternative Definition and Bayesian Estimation of Child Labour in India

Jihye Kim - *University of Manchester*

**Methods & Theory: 7.5 Contributed - High-dimensional data**

**Syndicate Room L**

On Ridge Estimation for Probability Densities of Dependent Multivariate Data

Jan Beran - *Department of Mathematics and Statistics, University of Konstanz, Germany, Switzerland*

Clustering using Nonparametric Mixtures and Mode Identification

Shengwei Hu - *the University of Auckland, New Zealand*

Gene Hunting with Hidden Markov Model Knockoffs

Matteo Sesia - *Stanford University, United States*

**Communicating Statistics: 7.6 Contributed - Teaching statistics - tips and techniques**

**Assembly Room**

Using learnr to create interactive tutorials for R: from the pinnacle to the pit

Andy Field - *University of Sussex, United Kingdom*

Using video feedback when assessing R code

Deirdre Toher - *University of the West of England, United Kingdom*

The (Q-)Step Change in Demand for Quantitative Social Science: evaluating intervention on a principal-agent problem

Thomas King - *United Kingdom*

**Data Science: 7.7 Contributed - Data Science**

**7.7 Syndicate Room D**

Toward the Best Discrepancy Forests: A Systematic Comparison with Random Forests

Jialin Bi - *Shandong University, Weihai, United Kingdom*

The Influences of Dataset Meta-Features and of Classifier Properties on The Performance of Cross Validation Techniques

Liang Guo - *Shandong University at Weihai, United Kingdom*

Wind power forecasting using Gaussian process dynamical models

Tobias Jung - *Uniper, Germany*



**Industry & Finance: 7.8 Contributed - Statistical challenges in the energy industry**

**Syndicate Room I**

Beyond Optimization via Statistical Emulation and Uncertainty Quantification

Hailiang Du - *Durham University, United Kingdom*

Allocation of oil and gas and how to win the lottery

Phillip Stockton - *Accord Energy Solutions Ltd*

Dynamic dependence modelling for financial time series

Georgios Aivaliotis - *University of Leeds, United Kingdom*

**Professional Development: PD9 Text mining - Analysing customer experience**

**Room 137**

Text mining allows to extract valuable information from textual data such as product reviews, political tweets, clinical patient data and many other. In the first part of this workshop, we will introduce you to the principles, common applications and techniques of text mining. We will then present how we used text mining tools to explore our clients' inquiries and feedback. We will start from a bag-of-words feature extraction followed by a Word Cloud visualisation and then a Fuzzy k-means clustering for further analysis. A live demonstration of the XLSTAT software, used for this study, will be provided in the last part.

Presented by Sebastien Dri and Efthalia Anagnostou - XLSTAT



### Prize Winners: 7.10 Best presentations of RSC 2018

#### Ferrier Hall

Come and hear the prize winning presentations of the Research Students Conference 2018 which took place in Sheffield in July 2018

Bayesian Nonparametric Methods for Stochastic Epidemic Models

Rowland Seymour - *University of Nottingham*

Using Health Economics in the Design, Monitoring and Analysis of Adaptive Clinical Trials

Laura Flight - *University of Sheffield*

Parallelisation of a common changepoint detection method

Sam Tickle - *Lancaster University*

Organised by the RSS Young Statisticians Section

17:30 – 19:30

### Keynote 5 - Discussion Meeting: Data Visualisation

#### Assembly Room

Visualizing spatiotemporal models with virtual reality: from fully immersive environments to applications in stereoscopic view.

Stefano Castruccio - *University of Notre Dame, USA*

Marc Genton - *King Abdullah University of Science and Technology*

Ying Sun - *King Abdullah University of Science and Technology*



**Chair:**  
David Spiegelhalter  
RSS President

#### Visualization in Bayesian workflow:

Michael Betancourt - *Columbia University, New York, and Symplectomorphic, New York*

Jonah Gabry - *Columbia University, New York*

Andrew Gelman - *Columbia University, New York*

Daniel Simpson - *University of Toronto*

Aki Vehtari - *Aalto University*

#### Graphics for uncertainty:

Adrian Bowman - *University of Glasgow*

Organised by the RSS Discussion Meetings Committee

### Environmental/Spatial: 7.9 Contributed - Environmental & Spatial Statistics

#### Syndicate Room K

Parametric link functions for spatial generalised linear models

Evangelos Evangelou - *University of Bath*

Stochastic modelling framework for synthetic time series simulation

Sandhya Patidar - *Heriot-Watt University, United Kingdom*

Tree-Based Inference for Regionalization: A Comparative Study of Global Topological Perturbation Methods

Mark Janikas - *ESRI*

20:30 – 23:00

Conference Pub Quiz Night - Kongs, 114-116 St Mary Street, Cardiff, CF10 1DY

Organised by the RSS Young Statisticians Section

# PUB QUIZ NIGHT

Wednesday 5th September, from 8.30pm

Venue:

Kongs, 114-116 St Mary Street, Cardiff, CF10 1DY  
'Level 2' reserved (separate upstairs area)

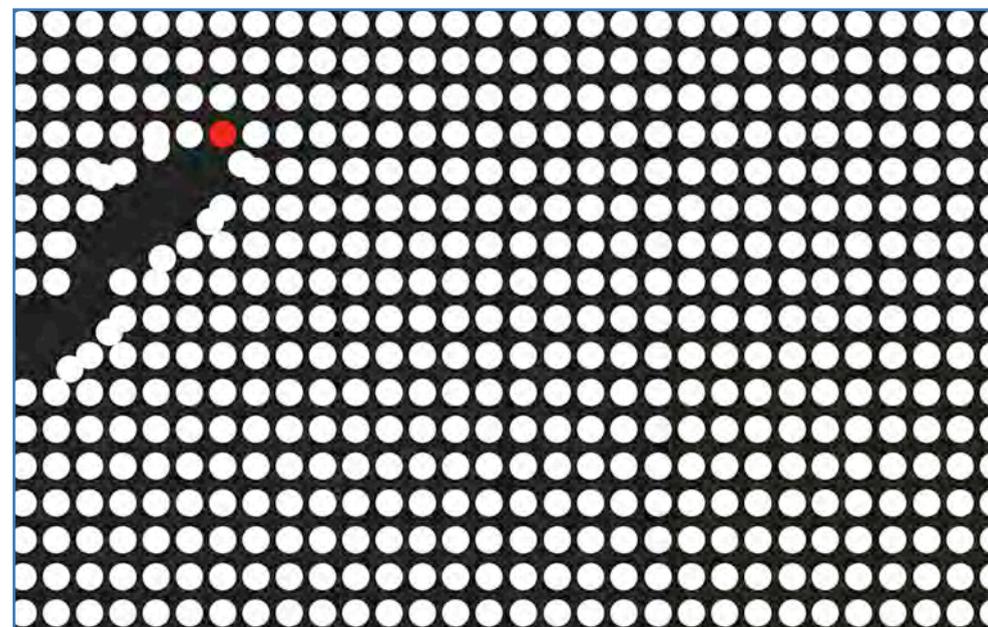
## All welcome!

Come and enjoy a few casual drinks with fellow attendees and try your hand at our general knowledge quiz – prizes on offer and free drinks will be available courtesy of ATASS, and food can be ordered.

Teams will be arranged on the night – arrive by 8:30pm to register on a team

Event organised by the **Young Statisticians Section (YSS)** and generously supported by **ATASS Sports**

**YSS**  
YOUNG STATISTICIANS SECTION



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# Thursday 6 September

08:50 – 09:50

## Medical: 8.1 Contributed - Causal Inference

### Syndicate Room C

Currently available diagnostics can be unreliable at identifying errors in propensity score specification

Emily Granger - *University of Manchester*

Counterfactual outcome state transition parameters: A new approach to effect heterogeneity for binary outcomes

Anders Huitfeldt - *London School of Economics*

Benefits and Risks of Radiotherapy in Early Breast Cancer

Sarah Darby - *University of Oxford*

## Prize Winners: 8.10 - Best presentations of YSM 2018

### Ferrier Hall

Come and hear the prize winning presentations of the Young Statisticians Meeting 2018 which took place in Oxford in July 2018

Modelling the UK University Admissions Process

Ella Kaye - *University of Warwick*

Why we need randomised trials to study radiotherapy dose in cancer treatment

Johanna Ramroth - *University of Oxford*

Title TBC

Grace Young - *University of Bristol*

(Sean Harrison – University of Bristol – will be presenting on Grace's behalf)

Organised by the Young Statisticians Section

## Official Statistics & Public Policy: 8.2 Contributed - Using Data for Public Good

### Syndicate Room D

How integrated data can be used for public good

Becky Tinsley - *Office for National Statistics*

Measuring National Well-being: Insights into the differences in quality of life and well-being across age groups

Rhian Jones - *Office for National Statistics (ONS)*

Collaboration across government and beyond to enable better decisions to be made about the handling of domestic abuse

Alexa Bradley - *Office for National Statistics*

## Applications of Statistics: 8.3 Contributed - Prisons and Pensions

### Assembly Room

What works in the rehabilitation of people who have offended? A meta-analysis of JDL findings

Sandra von Paris - *Middlesex University, United Kingdom*

Statistical significance - meaningful or not

Colin Aitken - *The University of Edinburgh*

How to value pension funds

Jane Hutton - *The University of Warwick, United Kingdom*

## Social Statistics: 8.4 Contributed - Social Statistics:

### Syndicate Room B

Validating non-participation bias methodology using register-based health surveys

Megan Yates - *MRC/CSO Social and Public Health Sciences Unit, University of Glasgow*

Transform or translate? How to optimise uptake of on-line social surveys.

Ian O'Sullivan - *ONS*

Counting Welsh speakers in Wales: Measuring reality not perception

Eilir Jones - (*Freelance*), *United Kingdom*

**Methods & Theory: 8.5 Contributed - Regression and ranking models**

**Council Chamber**

Leverage-weighted least squares estimation

Keith Knight - *University of Toronto, Canada*

Time-varying Regression Slope Estimation for Time series data

Sucharita Ghosh - *Statistics Lab, Swiss Federal Research Institute WSL, Birmensdorf, Switzerland, Switzerland*

Issues in Modelling Rankings Data

Heather Turner - *Freelance, United Kingdom*

**Communicating Statistics: 8.6 Contributed - Communicating Statistics:**

**Syndicate Room K**

What can we learn about the teaching of statistics from the historical relationship between sociology and statistics in Britain?

Plamena Panayotova - *The University of Edinburgh, United Kingdom*

Language and images that support the conceptual understanding of Statistical Inference

Hilary Watt - *Imperial College, United Kingdom*

Online, interactive data skills modules - making learning more accessible

Vanessa Higgins - *UK Data Service, University of Manchester*

**Medical: 8.7 Contributed - Linear Models and Multiple Testing**

**Syndicate Room A**

Robust mixed modelling: A new approach to handle time-varying outlier impacts

Laura Boyle - *Queen's University Belfast, United Kingdom*

Epidemiology and information theory: R2, entropy and information

Deborah Schneider - *Imperial College London, United Kingdom*

Multiple testing approaches for evaluating the effectiveness of a drug combination in a multiple-dose factorial design

Saswati Saha - *University of Bremen*

**Methods & Theory: 8.8 Contributed - Missing and censored data**

**8.8 Syndicate Room L**

Bayesian missing data models with weights

Harvey Goldstein - *University of Bristol*

On the use of the Not at Random Fully Conditional Specification Procedure (NARFCS) in Practice

Daniel Tompsett - *MRC Biostatistics Unit, University Of Cambridge*

A non-proportional hazards MPR model for interval censored data.

Gilbert MacKenzie - *University of Limerick, United Kingdom*

**Environmental & Spatial: 8.9 Contributed - Environmental & Spatial Statistics**

**Syndicate Room I**

A spatial regression model for the disaggregation of areal unit based data to high resolution grids with application to vaccination coverage mapping

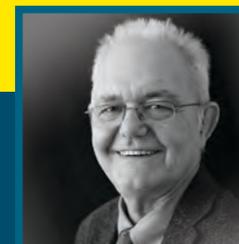
Chigozie Utazi - *University of Southampton*

Sampling and oversampling units with prescribed characteristics: an adaptive design proposal

Federico Andreis - *University of Stirling, United Kingdom*

**10:00 – 11:00**

**Keynote 6 - Barnett Lecture: Analyse problems, not data**



**Assembly Room**

**Speaker:**

Peter Diggle - *Lancaster University*

11:00 – 11:30

**Refreshment break - Lower Hall**

11:30 – 12:50

**Medical: 9.1 STRENGTHENING ANALYTICAL THINKING FOR OBSERVATIONAL STUDIES (THE STRATOS INITIATIVE)****Syndicate Room C**

Review and comparison of spline procedures in multivariable regression  
 Aris Perperoglou - *University of Essex*

The STRATOS initiative, illustrated by issues in Topic group 2: selection of variables and their functional forms

Willi Sauerbrei - for the STRATOS initiative - *Medical Center University of Freiburg, Germany*

How to impute missing data in Cox regression: New developments incorporating non-proportional hazards

Ruth Keogh - *London School of Hygiene and Tropical Medicine*

Although substantial progress has been made in designing and analysing data from clinical and epidemiological studies, real-world application lags far behind the advances. This is largely because most researchers have limited knowledge and experience in using advanced statistical methods and software, and even experts can disagree on how best to analyse complex study data, with no consensus on "state-of-the-art" methodology.

The STRATOS initiative began in 2013 and has grown to more than 80 members from 16 countries in 2017. The Initiative aims to fill this gap by developing guidance and tools for applying statistical methods for observational research. After a short general introduction the session will illustrate key issues of topic group 2 'Selection of variables and functional forms in multivariable analysis'.

*Organised by Aris Perperoglou, University of Essex*

**Official Statistics & Public Policy: 9.2 Invited - Post-Brexit and Post-Wales Act – what statistics do we need in Wales?****Assembly Room**

We are entering a post-European Union world and, separately, more powers are being devolved to Wales including the first Welsh taxes in 800 years. Do we have the statistics we need to be able to develop public policy – social, economic and cultural – in this new constitutional landscape?

This interactive panel discussion is presented by the RSS South Wales Local Group, and brings together experts from business, financial services, academia and government to discuss key questions such as:

1. How can official statistics or the academic community meet these challenges together?
2. What role can new data sources and techniques have in helping us understand Wales?
3. There are statistical and conceptual issues about developing statistics at a sub-national or local level. How can we ensure such data are fit for purpose?

Confirmed panellists include representatives from Welsh Government, Development Bank Wales and the Institute of Welsh Affairs.

*Organised by James Tucker for RSS South Wales Local Group*

**Applications of Statistics: 9.3 Invited - Emerging applications in statistics****Ferrier Hall**

Outcome-driven mixture modelling of longitudinal data with side information for precision medicine: study of cognitive decline

Anaïs Rouanet - *MRC Biostatistics Unit*

The Endless Quest for Understanding Terrorism

Andre Python - *University of Oxford*

A Spatial Modeling Approach for Linguistic Object Data: Analysing dialect sound variations across Great Britain

Shahin Tavakoli - *University of Warwick*

Title TBC

Emma Suckling – *University of Reading*

The remit of the Emerging Applications Section is to bring to the attention of the wider community new applications of statistics. We have 4 talks ranging from applications in linguistics, climate, medicine and anti-terrorism!

*Organised by Sara Geneletti on behalf of Emerging Applications Section*

**Social Statistics: 9.4 Using statistics to understand, predict and evaluate domestic abuse**

**Syndicate Room B**

Simple Statistics and Domestic Abuse

Matthew Bland - *Cambridge Centre for Evidence Based Policing*

Can we predict domestic abuse?

Ruth Weir - *University of Essex*

Domestic violence and policy intervention in Essex

Pierre Rialland - *University of Essex*

The human and economic costs of domestic abuse are substantial with two women a week dying a week as a result of their abuse and an estimated annual cost to society of £15.7 million. It is one of the most underreported crimes, with only about 20% reported to the police. This session showcases three research projects that use statistics to understand domestic abuse, predict the rate at the neighbourhood level and evaluate interventions that have been brought in to reduce its impact.

*Organised by Ruth Weir, Department of Sociology, University of Essex*

**Methods & Theory: 9.5 Advances and recent applications in two-phase designs**

**Syndicate Room L**

Multi-wave, Outcome Dependent Sampling Designs for Longitudinal Binary Data

Jonathan Schildcrout - *Vanderbilt University Medical Center, United States*

Semiparametric Inference for Merged Data from Multiple Sources

Takumi Saegusa - *University of Maryland, USA*

Generalized Meta-Analysis for Multivariate Regression Models Across Studies with Disparate Covariate Information

Nilanjan Chatterjee - *Johns Hopkins University*

On the analysis of two-phase designs in cluster-correlated data settings

Sebastien Haneuse - *Harvard T.H. Chan School of Public Health*

The session aims to cover the following topics:

- Use of information from external sources in two-phase designs.
- Advances in software for two-phase designs.
- Correlated data and two-phase designs
- Semi-parametric models and two-phase designs

*Organised by Claudia Rivera-Rodriguez, The University of Auckland*

**Communicating Statistics: 9.6 Communicating complex data: teaching, learning and doing. Perspectives from Q-Step academics and graduates**

**Council Chamber**

Using 'mental modelling' exercises as a teaching tool

Lorien Jasny - *University of Exeter*

Using virtual populations as a teaching tool

Nora Wikoff - *University of Nottingham*

Because there's not enough experts: strategies for effective data communication

Siobhan McAndrew, Tom Owton and Lucy Moor - *University of Bristol*

Communicating measures of accuracy

Victoria Ayodele - *University of Exeter*

Title TBC

Carly Johnson - *Cardiff University*

Analysing IMCD data on literacies

Michaela Drummond - *University of Glasgow*

*Organised by Simon Gallacher, Nuffield Foundation*

**Data Science: 9.7 Data science and statistics in developing countries and emerging economies**

**Syndicate Room D**

After several years of hype official statisticians are finally starting to develop concrete applications of data science in official statistics in developing countries.

This session will showcase some of the innovative examples across social and economic statistics.

Introduction

Emily Poskett, Head of International Development Team, Office for National Statistics

Global initiatives on data science for development

Rachel Bevan or Derval Usher, DFID & Global Pulse

UK projects on data science for development

Sebastian Mhatre, DFID

Big Data and Employment Promotion in Mozambique

Paul Jasper, OPML

Discussant

Matthew Powell, Senior Consultant, OPML Ltd.

*Organised by Matthew Powell and Emily Poskett*

**Medical: 9.8 Stepped-Wedge Challenges****Syndicate Room K**

Practical workshop on sample size calculation for efficient cluster and stepped wedge randomised trials

**Karla Hemming** - *University of Birmingham*

Brief introduction to the stepped wedge design

**Mona Kanaan** - *University of York, United Kingdom*

Sample size for stepped wedge trials

**Richard Hooper** - *Queen Mary University of London*

Issues related to the Efficiency of the stepped wedge design

**Simon Bond** - *Cambridge University Hospitals*

The use of the stepped wedge design in randomised controlled trials has seen a marked increase over the past decade. However, challenges of communicating and reporting the design and its results remain. In this session, we will address some of these challenges.

To make the most of this session's workshop attendees will need access to the internet and a laptop or other electronic device. Please note that you can also pair up with other attendees.

*Organised by Mona Kanaan on behalf of the RSS Medical Section*

**Environmental & Spatial: 9.9 Contributed - Spatial inequalities in disease risk: How unequal is society?****Syndicate Room A**

Extending interrupted time series for matched small area data with spatial discontinuity: an application to Municipal Waste Incinerator effects.

**Anna Freni-Sterrantino** - *Imperial College London*

Hierarchical age-period-cohort models for spatially heterogeneity in mortality trends

**Theresa Smith** - *University of Bath, United Kingdom*

Refining global models of social inequality and ill health with local data

**Dianna Smith** - *University of Southampton, United Kingdom*

*Organised by Craig Anderson and Duncan Lee, University of Glasgow*

**Professional Development: PD6 Getting your research published and maximising its impact****Syndicate Room I**

This session will be of interest to career young researchers and/or those who wish to publish their work in academic journals and magazines and raise the visibility of their research.

The session will provide valuable advice for writing articles of different formats and for different audiences, explore what makes a "good" article, highlight common mistakes to avoid, give an overview of journal review processes, and explore available self-promotional tools.

Presenters will be Professor Harvey Goldstein (University of Bristol, Joint Editor of Royal Statistical Society Journal, Series A), Paul Smith (University of Southampton, Discussion Papers Editor of the Journals of the Royal Statistical Society), Stephen Raywood (Journals Publishing Editor, Wiley), Beverley Harnett (Marketing Manager, Wiley) and Brian Tarran (Significance magazine).

*Organised by Wiley & RSS Young Statisticians Section*



**12:50 – 14:00**

**Lunch - Lower Hall**

**13:10 – 13:50**

**Poster Viewing B - Marble Hall**

Information about the poster presenters at this session can be found in the relevant insert at the back of the directory

14:00 – 15:00

**Medical: 10.1 Contributed - Survival Analysis**

**Syndicate Room C**

How competing risks can bias estimated hazard ratios in survival analysis

John Gregson – *LSHTM*

Survival analysis based on high-dimensional genomic data

Arief Gusnanto - *University of Leeds, United Kingdom*

Predicting the chances of remission from epileptic seizures over time

Laura Bonnett - *University of Liverpool*

**Official Statistics & Public Policy: 10.2 Contributed - 50th Anniversary of UK National Housing Surveys**

**Ferrier Hall**

The House Condition Survey and the impact on policy in Northern Ireland

Karly Greene - *Northern Ireland Housing Executive*

50 years of Welsh housing conditions

Jenny Davies - *Welsh Government (Llywodraeth Cymru)*

English Housing Survey at 50: how housing and survey methodologies have changed over half a century

Brendan Donegan - *MHCLG*

**Applications of Statistics: 10.3 Contributed - Surveys and Censuses**

**Syndicate Room A**

Automated cleaning of large administrative data-sets

Andrew Sutton - *ONS*

Application of the Hierarchical Hybrid Bayes to a small-area estimation problem using survey and census data from Mexico

Hector Najera - *University of Bristol*

Design-based “optimal” calibration weights under unit nonresponse in survey sampling

Per Gösta Andersson - *Stockholm University, Sweden*

**Social Statistics: 10.4 Contributed - Social Statistics**

**Council Chamber**

Valida Hierarchical model for forecasting the outcomes of binary referenda

Arkadiusz Wisniewski - *University of Manchester*

Quantifying the Bradley effect: an application to US and UK elections

John Fry - *Manchester Metropolitan University, United Kingdom*

Predicting the Results of the 2017 UK General Election

Timothy Martyn Hill - *LV*

**Methods & Theory: 10.5 Contributed - Causal inference**

**Syndicate Room L**

Selection bias in Instrumental Variable analyses

Rachael Hughes - *University of Bristol, United Kingdom*

Data-adaptive doubly robust instrumental variable methods for treatment effect heterogeneity

Karla Diazordaz - *LSHTM, United Kingdom*

Combining multiple observational data sources to estimate causal effects

Peng Ding - *University of California, Berkeley, United States*

**Communicating Statistics: 10.6 Contributed - Communicating Statistics: Communicating statistics in a post-truth age**

**Assembly Room**

Perceptions vs reality: Presenting statistics to bust myths

Iain Bell - *Office for National Statistics*

Fake stats: mythmaking in the digital media age

Fraser Nelson - *The Spectator*

Understanding our impact

Martin Nicholls - *ONS*

**Data Science: 10.7 Contributed - Data Science****Syndicate Room D**

Traffic flow as an early indicator for GDP

Edward Rowland - *Office for National statistics*

Using geospatial data to analyse UK port and shipping operations

Ioannis Tsalamani - *ONS*

Pretty vacant: text analysis of 15 million job vacancies shows the UK labour market in unprecedented detail and can help to solve the UK's productivity puzzle

Arthur Turrell - *Bank of England*

**Methods & Theory: 10.8 Contributed - Methods & Theory: High-dimensional regression****Syndicate Room K**

Locally adaptive and wavelet regressions for compositional data

Andrej Srakar - *Institute for Economic Research (IER), Ljubljana and Faculty of Economics, University of Ljubljana*

Predictor Variable Prioritization in Nonlinear Models: A Genetic Association Case Study

Seth Flaxman - *Imperial College London*

Bayesian regularisation from stochastic constraints

Joshua Bon - *School of Mathematics and Statistics, University of Western Australia*

**Environmental & Spatial: 10.9 Contributed - Environmental & Spatial Statistics****Syndicate Room B**

Modelling the spatio-temporal dependence of wind fields over complex terrain

Rachael Quill - *School of Mathematical Sciences, University of Adelaide, Australia*

Towards a general theory for preferential sampling: detecting the preferential selection of sites over time from a fixed population of possible locations

James Zidek - *University of British Columbia*

Modelling the spatial extent and severity of extreme European windstorms

Paul Sharkey - *JBA Consulting*

**Professional Development: PD7 Professional Development: Get Involved: Volunteering in the UK****Syndicate Room I**

Join us to find out how statisticians of all ages (from the young to the most experienced) have been volunteering for the RSS and associated initiatives and how you may be able to get involved.

This session will focus on volunteering in the United Kingdom through the following schemes and initiatives:

- Statistics behind the headlines (speaker: Deirdre Toher, University of the West of England)
- STEM Ambassadors (speaker: Simon White, University of Cambridge and RSS Education Committee)
- Sections and Local Groups (speaker: Karen Facey, RSS Honorary Officer for Sections & Groups)

*Organised by the RSS Young Statisticians Section*

**15:00 – 15:30**

**Refreshment break - Lower Hall**

**15:30 – 16:50**

**Medical: 11.1 Invited - Simplifying the complex questions in survival analysis****Syndicate Room C**

The session focuses on questions that would be hard to answer using the general hazard based approach, but can be importantly simplified by using methods like pseudo-observations, landmarking, etc. Each of the speakers shall describe an actual complex practical problem and present his solution using such methods.

Pseudo observations in relative survival estimation

Maja Pohar Perme - *University of Ljubljana, Faculty of Medicine*

The measurement of socioeconomic inequalities in life years lost by cause of death

Aurélien Latouche - *Institut Curie*

Solving the Fine-Gray riddle

Hein Putter - *Leiden University Medical Cent, Netherlands*

*Organised by Maja Pohar Perme, University of Ljubljana*

## Official Statistics & Public Policy: 11.2 Invited - A new model for publishing GDP

### Council Chamber

The session will showcase the work that the UK Office for National Statistics (ONS) has been doing to radically change the way that GDP estimates are published and communicated.

From July 2018, ONS introduced a new publication model that presents a more coherent picture of the economy. In summary, this model gives two (rather than three) estimates of quarterly GDP, and speeds up the publication of the Index of Services publication by two weeks, enabling the publication of monthly GDP estimates.

While our current publication model has the benefit of quick and credible estimates of GDP, the proposed approach results in estimates of monthly GDP as well as allowing ONS to publish a quicker balanced picture of the whole economy and a higher quality first estimate of GDP. The move of the Index of Services also gives further clarity to the publication of economic statistics and was the final key step in reducing the “see-saw” narrative that can emanate from statistics on a related theme being published at different times. It is also noteworthy that the publication of monthly GDP estimates consolidates the UK’s position at the forefront of short term GDP estimation.

The conference will be held shortly after the new model is introduced, and we will be able to present on the following areas:

- The rationale and the need for change
- Communication of the changes: developing new products and communicating with different audiences

**Presenter:** James Scruton - Head of Monthly GDP, Office for National Statistics:

- The benefits and trade-offs of the new model
- Interpreting monthly estimates of GDP

**Presenter:** Sumit Dey-Chowdhury - Lead GDP economist, Office for National Statistics

- A media response to the new model – how do users view the changes?

**Presenter:** Gemma Tetlow – Institute for Government

- A policy response to the new model – how do the changes meet policy needs?

**Presenter:** Amit Kara - NIESR

*Organised by Darren Morgan, Office for National Statistics*

## Applications of Statistics: 11.3 Invited - Biofortified food crops in developing countries: are they effective?

### Ferrier Hall

The session will introduce the topic of biofortification to the audience and the challenges in assessing and evaluating its effectiveness in improving the health of poorer people in developing countries. There will then be two more technical papers, one on meta analyses of trials and observational studies in this field and one on the problems induced by measurement error in the response variable (dietary intake). The session will conclude with a perspective from a major funder of biofortification.

Food Fortification and Biofortification in Low and Middle-Income Countries: Global Status and Evidence of Impact

**Greg Garrett** - *Global Alliance for Improved Nutrition (GAIN)*

Statistical challenges in assessing the effectiveness of biofortification  
**Ian Plewis** - *University of Manchester*

Statistical issues related to dietary intake as the response variable in intervention trials  
**Ruth Keogh** - *London School of Hygiene and Tropical Medicine*

*Organised by RSS International Development Section*

## Social Statistics: 11.4 Invited - Surveys, Bayes and the Machine Learning Craze - the future of forecasting elections

### Assembly Room

Why do pollster’s election predictions keep missing the mark? Is the problem that the pollster’s sampling methodology is not accurate enough? Dr. Gary Brown a sampling expert argues this is the case and explains how sampling should be done. But is the question of capturing the voting public too problematic to poll with any precision? Should we look beyond surveys? What scope do alternative methods have? Dr. Gianluca Baio argues the case for using Bayesian modeling incorporating polls, external data and expert opinion. Whilst John Sandall, explains how his project SixFifty, used machine learning and only open data sources to predict the outcome of the 2017 elections. A debate around the scope of alternative methods ensues.

Dr. Gary Brown, Office for National Statistics

*“In defence of surveys; why polling is a sampling problem.”*

Dr. Gianluca Baio, UCL.

*“Beyond surveys; using Bayes to combine polls and external data”*

John Sandall, Data Scientist, SixFifty.

*“SixFifty’s Story; How machine learning and open data can predict elections”*

*Organised by Charlotte Gaughan, Office for National Statistics*

## Methods & Theory: 11.5 Invited - Regression & dimension reduction methods for high dimensional data

### Syndicate Room L

This session will discuss regression and dimension reduction methods for complex structured data such as functional data, graphs, image data as well as the combination of machine learning methods to:

Near-equivalence of Dimension Reduction Methods in Large Panels of Macro-variables  
Efstathia Bura - *Vienna University of Technology, Austria*

Dimension reduction for functional data based on weak conditional moments Functional dimension reduction

Bing Li - *The Pennsylvania State University, United States*

Followed by discussion

Organised by *Andreas Artemiou, Cardiff University*

## Official Statistics & Public Policy: 11.6 Invited - Measuring multiple deprivation across the UK: what have we learned?

### Syndicate Room B

The session will cover the development and use of official multiple deprivation indices across the four jurisdictions in the UK, including suggestions for future development of more 'real time' approaches for monitoring how local areas are changing over time.

Elizabeth Fraser - *Communities Analysis Division, Scottish Government*

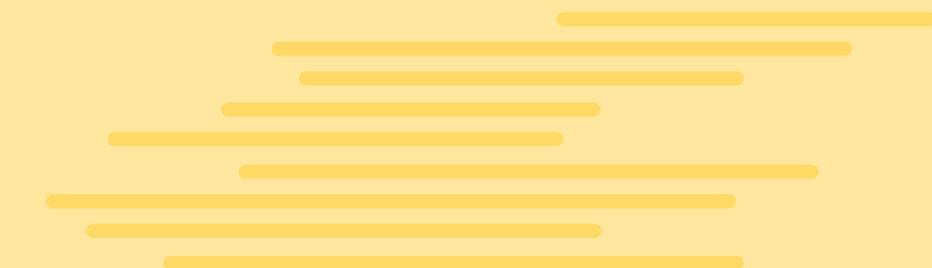
Jos IJpelaar - *Deprivation and Geography, Northern Ireland Statistics and Research Agency*

Nia Jones - *Knowledge and Analytical Services, Welsh Government*

Bowie Penney - *Neighbourhoods and Community Cohesion Analysis, Ministry of Housing, Communities and Local Government*

Tom Smith - *Data Science Campus, Office for National Statistics*

Organised by *Elizabeth Fraser, Scottish Government Communities Analysis Division*



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## Data Science: 11.7 Invited - Evolution of Data-Centric Engineering

### Syndicate Room D

This session aims to showcase innovative research in the application of data science to engineering. The projects to be presented aim to directly address the grand challenges of improving resilience in infrastructure and safety in society, as well as to generate scientific advances that will have international impact.

Data Driven Engineering, from Theory to Application  
Emma McCoy - *Imperial College London*

The role of network science in coupled human and natural water systems  
Dr Weisi Guo - *University of Warwick*

A Statistical Model for Addressing Uncertainty in the Assessment of Performance of Ageing Retaining Structures to Groundwater Inundation  
Victoria Stephenson - *UCL/The Alan Turing Institute*

Machine learning of beam structures by blending physical models and data  
Alastair Gregory - *Imperial College London, United Kingdom*

Organised by *Lloyd's Register Foundation programme on data-centric engineering at the Alan Turing Institute, UK*

**SAGE**  
Publishing

**Environmental & Spatial: 11.9 Invited - Geospatial methods for global health applications**

**Syndicate Room A**

Explaining the spatial variation in disease risk and characterising exposure to environmental hazards have become increasingly important to supporting more efficient, cost-effective policy interventions. Talks in this session will present advances in the development and application of space-time statistical methodology to address public health problems in tropical disease epidemiology through case studies in developing countries.

Age-structured modelling of population and childhood vaccination coverage in low and middle income countries

**Victor Alegana** - *University of Southampton*

Mapping multiple diseases and risk factors: practical lessons from diagnosing modeled spatiotemporal health predictions

**Aaron Osgood-Zimmerman** - *University of Washington, United States*

Mapping changes in housing in Africa, 2000 to 2015

**Samir Bhatt** - *Imperial College London*

*Organised by Emanuele Giorgi and Peter M. Atkinson, Lancaster University*

**Professional Development: PD8 Growing your statistics and data science career**

**Syndicate Room I**

A chaired workshop on career growth that includes:

A brief overview of the future of the statistical profession followed by three short sessions led by different officers from within the Knowledge, Capability and Learning team within ONS.

**Chair:** Hayley Woodward, Head of Analytical Learning ONS

**Speakers:**

Head of GSS Pathways, facilitator Sophia King, ONS and GSS Careers

Career checkpoint facilitator Julian Boyer, GSS Learning and Development

*Organised by Paul Littler and Gareth Clancy, Office for National Statistics*

**17:00 – 18:00**

**Keynote 7 - Campion (President's Invited) lecture: Viewed through Tinted Glasses? Public Reactions to the Brexit Process**



**Assembly Room**

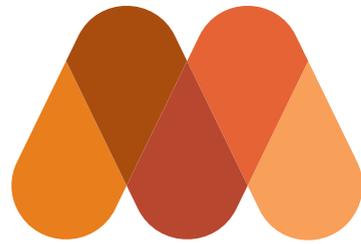
**Speaker:**

**Sir John Curtice** - *University of Strathclyde*

**19:30 – 23:00**

**Conference Dinner - The Exchange Hotel**





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## Venues

**Geoff Cook**, **David Goodrum** and colleagues at Cardiff City Hall for the main conference and awards reception.

The staff at the **National Museum Wales** and at **Elior Catering** for the Welcome Reception.

**Michelle Edwards** and colleagues at The Exchange Hotel for the conference dinner.

**Faye Tanner**, **Amanda Jones** and colleagues at Cardiff Convention Bureau for venue and supplier sourcing, site visit coordination, and for the accommodation booking service.



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