

# M2D

## Models to Decisions

### Decision Making Under Uncertainty

# M2D Conference 2018

## Isaac Newton Institute

### 11 – 14 June 2018

20 Clarkson Rd  
Cambridge  
CB3 0EH

[www.models2decisions.org](http://www.models2decisions.org)

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UK Research  
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# M2D Conference 2018

## Welcome Note

Dear Colleague,

Welcome to the M2D 2018 Models to Decisions Conference.

Models to Decisions is a network funded by a consortium of UK Research Councils. Its aim is to bring together all those interested in the use of mathematical, numerical and statistical models in decision making. This includes decision makers as well as academics studying models and decision making. Mathematical models often appear to be deterministic but in real world scenarios are always subject to uncertainty which needs to be taken into account when making decisions. The first theme of the network is the quantification of uncertainty in complex numerical or mathematical models. Decision making is still largely carried out by people and not machines and different decision makers interpret and handle the results from models differently. The second theme is investigating how decision makers use outputs of models to make decisions. Most decision makers are not experts in handling uncertain information, and even experts frequently get it wrong. The third theme of the network is how we communicate uncertainty, in both words and pictures, to help decision makers. These three themes cover a wide range of academic disciplines from mathematics to psychology, philosophy and the humanities. This wide range of disciplines is reflected in the invited and contributed talks and posters at the conference. One of the challenges we have set speakers is to make their talks accessible to all.

Among the anticipated outputs of the M2D Network is a Research Agenda. This document will identify important challenges for future research in Decision Making Under Uncertainty. On Thursday, there will be an opportunity to engage in one of three themed round table discussions about the Research Agenda. Please participate in this, and the other discussion sessions throughout the week, and let us know your views.



Isaac Newton Institute for Mathematical Sciences

Thank you for attending and enjoy the conference.

Yours sincerely,

Peter Challenor and Catherine Powell,  
On behalf of the Scientific Committee

# Scientific Programme

The aim of the M2D conference is to provide a forum for researchers and decision makers from a wide range of disciplines and working backgrounds to come together to discuss topical challenges in the area of Decision Making Under Uncertainty, in scenarios where decisions are informed by models.

The Conference Programme has been organised by Prof Peter Challenor (University of Exeter) and Dr Catherine Powell (University of Manchester), with the help of the Scientific Committee:

## The Scientific Committee

Prof Richard Bradley (London School of Economics)  
Prof Richard Clayton (University of Sheffield)  
Dr Chris Dent (University of Edinburgh)  
Dr Alejandro Diaz (University of Liverpool)  
Dr Julie Gore (University of Bath)  
Dr James Lyons (University of Exeter)  
Prof Dave Woods (University of Southampton)

## Also with thanks to:

Lissie Hope, Turing Gateway, Isaac Newton Institute  
Jane Leeks, Turing Gateway, Isaac Newton Institute  
Dr Emma Clarke, University of Exeter



# Plenary Speakers

## **Prof. Jason Lowe**

Met Office, Hadley Centre and Priestley International Centre for Climate Chair

Prof. Jason Lowe took up a part-time professorship in the School of Earth and Environment at the University of Leeds in March 2017. He is also Head of Climate Services at the Met Office Hadley Centre and Deputy Director of the Hadley Centre. Lowes' research activities focus on better understanding the issue of potentially dangerous climate changes and the constraints on future pathways of emissions and climate change.

## **Dr Daniel Williamson**

University of Exeter

Dr Danny Williamson is a Senior Lecturer in Bayesian statistics at the University of Exeter. He specialises in Uncertainty Quantification, climate model tuning, subjectivism and decision making under uncertainty

## **Prof. Sir David Spiegelhalter OBE FRS**

Winton Professor of the Public Understanding of Risk, University of Cambridge

David Spiegelhalter is Chair of the Winton Centre for Risk and Evidence Communication at Cambridge University. He works to improve the way in which risk and statistical evidence are taught and discussed in society, and makes frequent media appearances. In 2017-2018 he is President of the Royal Statistical Society, and in 2011 he came 7th in an episode of Winter Wipeout.



# Programme

*Monday 11 June 2018*

## Registration

10.30 - 11.25 Registration, Tea & Coffee on Arrival

## M2D 2018 Opening Plenary. Chair: Peter Challenor

11.25 - 11.30 Dr Christie Marr (Deputy Director, Isaac Newton Institute, Cambridge) Welcome Introduction

11.30 - 12.30 Prof. Jason Lowe (Met Office, Hadley Centre and Priestley International Centre for Climate Chair) From climate models to real world decisions

## Challenges in Trust in Models. Chairs: Richard Bradley & Chris Dent

13.30 - 15.00 Tom Philp (XLCatlin), Wendy Parker (Durham), Jim Smith (Warwick) and Andrew Wright (Ofgem).

## Oral Presentations. Chair: Richard Clayton

15.30 - 15.50 Dimitra Salmanidou (University College London) Potential large tsunami hazards associated with landslide failure along the West coast of India: from uncertainties to planning decision

15.50 - 16.10 Melody Ni (Imperial College London) Trust in medical technologies and confidence in clinical decision-making

16.10 - 16.30 Joe Roussos (London School of Economics) Making confident decisions with model ensembles

16.30 - 16.50 Erica Thompson (London School of Economics) From questions to models to decisions: dialogue to support effective use of simulation modelling

## Poster Blitz

17.00 - 17.30 One minute poster pitches

## Welcome Drinks Reception

17.30 - Welcome drinks reception: Networking and posters



# Tuesday 12 June 2018

## Mathematical Challenges in Uncertainty Quantification. Chairs: Catherine Powell & David Woods

09.00 - 10.30 Tim Waite (Manchester), Max Gunzburger (Florida State University) and Inês Cecílio (Schlumberger)

## Oral Presentations. Chair: Tony O'Hagan

11.00 - 11.20 Victoria Stephenson (University College London) Overcoming uncertainty in legacy engineering resilience modelling for flood hazards

11.20 - 11.40 John Bruun (University of Exeter) Enhancing earth system decision making capacity with dominant frequency state analysis

11.40 - 12.00 David Cameron (CEH-Edinburgh) Managing uncertainties in modelling air pollution (MU-MAP)

12.00 - 12.20 Francesca Pianosi (University of Bristol) Robust and transparent planning and operation of water resource infrastructure

## Challenges in Model Discrepancy. Chairs: Alex Diaz & Peter Challenor

13.30 - 15.00 Jenny Brynjarsdottir (Case Western Reserve University), Ed Wheatcroft (London School of Economics) Richard Ahlfeld (UQuant, Imperial College London) and Michael Goldstein (Durham University)

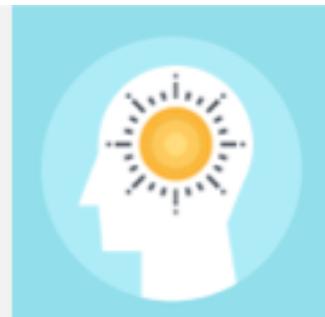
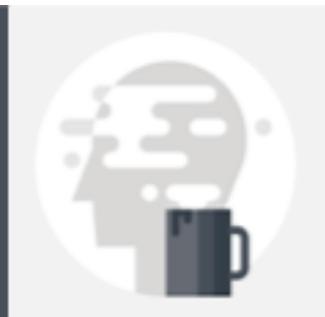
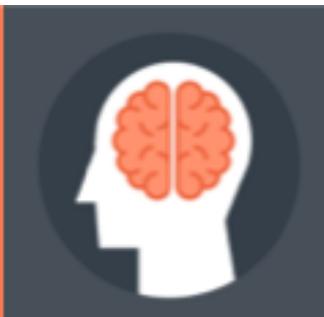
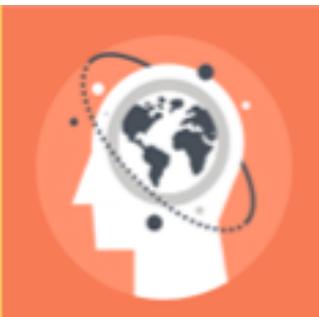
## Mini-Discussions: Developing a Research Agenda on -

15.30 - 16.00 Uncertainty Quantification (Chairs: Catherine Powell & David Woods)

16.00 - 16.30 From Models to Decisions (Chairs: Richard Bradley & Julie Gore)

## Evening Reception at Cambridge University Press Bookshop

18.00 - 19.30 Drinks reception at the Cambridge University Bookshop.



# Wednesday 13 June 2018

## Challenges in Communication & Visualisation. Chairs: Julie Gore & James Lyons

09.00 - 10.30 Wendy Jephson (Nasdaq) and Neesha Kadagoda (VALCRI and University of Middlesex)

## Oral Presentations. Chair: Henry Wynn

11.00 - 11.20 Ekaterina Svetlova (University of Leicester) Communication of uncertainties about a company's future to capital markets

11.20 - 11.40 Alexandra Freeman (University of Cambridge) The effects of communicating uncertainty about numbers and facts

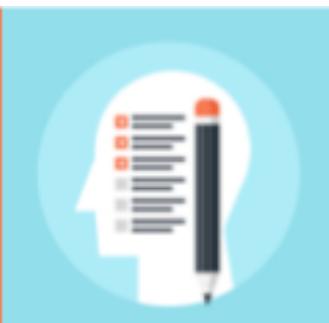
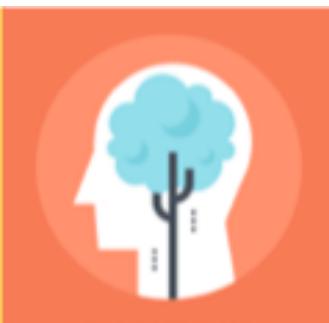
11.40 - 12.00 Suraje Dessai (University of Leeds) Building narratives to characterise uncertainty in regional climate change through expert elicitation

## Mini-Discussions: Developing a Research Agenda on -

12.00 - 12.30 Communication and Visualisation of Uncertainty (Chairs James Lyons & Alex Freeman)

## Conference Gala Dinner

19.00 - Conference Gala Dinner, Murray Edwards College



# Thursday 14 June 2018

## Plenary Talk. Chair: Peter Challenor

**09.00 - 09.50** Danny Williamson (University of Exeter) From big models to big decisions: what is the role of uncertainty quantification in adaptation to climate change (and what should it be)?

## Oral Presentations. Chair: Veronica Bowman

**09.50 - 10.10** Leonard Smith (LSE) Beyond Forecasting: Using today's model(s) to forewarn decision makers

**10.10 - 10.30** Dan Pagendam (CSIRO Data61 Brisbane) Making better decisions in the face of uncertainty in digital agriculture: The Uncertainty Toolbox

## Research Agenda Roundtables

|                      |  |  |   |
|----------------------|--|--|---|
| <b>11.00 - 11.50</b> | Uncertainty Quantification<br>Chairs: Catherine Powell & David Woods | From Models to Decisions<br>Chairs: Richard Bradley & Julie Gore | Communicating Uncertainty<br>Chairs: James Lyons and Alex Freeman |
|----------------------|--|--|---|

**11.50 - 12.30** **Research Agenda Synergy** – bringing the above separate discussions together.

## M2D 2018 Closing Plenary. Chair: Peter Challenor

**13.30 - 14.30** Prof. Sir David Spiegelhalter OBE FRS (Winton Professor of the Public Understanding of Risk, University of Cambridge). Trustworthy communication of numbers.



# Challenge 1.

## Challenges in Trust

Models are indispensable in many areas of public and private sector decision making. But for a variety of reasons both scientists and decision makers may not fully trust the projections yielded by these models. On the one hand, there may be residual scientific uncertainty about the accuracy of the models themselves as these necessarily incorporate idealisations and exclude potentially relevant factors and because available evidence may be too sparse or indirect or of poor quality to discriminate between rival models. And on the other hand, decision makers may not fully understand how the models work or may be using them to support novel interventions and so be unsure about how they should be applied. This session will address the question of when models and the projections they support should and should not be trusted, how scientists can assess and communicate their level of confidence in their models as well as how they can build confidence in them, and how decision makers might calibrate their decisions to their degree of trust in the model projections on which these decisions depend.

### Panel of Speakers

**Andrew Wright** is Senior Partner in Energy Systems at Ofgem, the gas and electricity regulator for Great Britain. He is a member of the Gas and Electricity Markets Authority, Ofgem's governing body. He has worked at Ofgem since 2008, including a nine-month period as interim Chief Executive, and roles as Group Finance Director, leading the Markets Division, and his current post as Senior Partner for Energy Systems.

**Tom Philp** is a Science Analyst at XLCatlin, where he works on the validation and take-up of scientific model projections within the organisation, and a Research Associate in the Centre for Philosophy of Natural and Social Science at the LSE. He also works with Blue Marble Microinsurance on their climate risk platform.

**Wendy Parker** is Associate Professor of Philosophy at the University of Durham and a co-director of their Centre for Humanities Engaging Science and Society. She works on a range of issues regarding the role of evidence and values within science, especially climate science.

**Jim Smith** is Professor of Statistics at Warwick and a Turing Fellow at the Alan Turing Institute. His interests span foundational, methodological and applied Bayesian statistics and decision theory, and he has a particular interest in the role of modelling within decision support.

### Session Chairs

**Chris Dent:** Chancellor's Fellow and Reader in Industrial Mathematics at Edinburgh University and Turing Fellow at the Alan Turing Institute for Data Science.

**Richard Bradley:** Professor of Philosophy at the London School of Economics.

# Challenge 2.

## Mathematical Challenges in Uncertainty Quantification

In areas as diverse as climate modelling, manufacturing, energy, life sciences, finance, geosciences and medicine, mathematical models and their approximate counterparts (computer models) are routinely used to simulate processes, assess risk and inform decisions. Models are used not only to predict future events and their impacts, but also to test hypotheses and aid in the design of new products such as aircraft engines, electronic devices, smart materials, and drug therapies. A crucial question is therefore, how accurate and reliable are predictions made using models? The scientific field of Uncertainty Quantification (UQ) attempts to address this.

No model is a perfect surrogate for reality. We often lack knowledge about the real processes taking place. The process of interest may also be inherently stochastic. Hence, there is always uncertainty associated with the models we use. How can we quantify and estimate model error and discrepancy? Most mathematical models have input parameters that are not precisely known. Hence, we have to deal with parameter uncertainty and understand how uncertainty in inputs propagates to quantities of interest related to model outputs. Often, the quantity of interest is actually an input to a model, and not an output. If we have observations (data) related to the model outputs, then we need to solve an inverse problem to estimate the parameters. Most mathematical models of complex processes cannot be solved exactly. Numerical algorithms that generate approximations must be applied instead. Estimating the numerical errors associated with the resulting computer models is also crucial.

Modern applications typically involve complex mathematical models, high numbers of uncertain parameters and very expensive (slow to run) computer models. In this session, some of the associated mathematical challenges in UQ will be explored from both an academic and end-user perspective.

### Panel of Speakers

**Professor Max Gunzburger** is an applied and computational mathematician at the Department of Scientific Computing at Florida State University. The main foci of his current research interests are uncertainty quantification and control for complex systems, nonlocal modeling in diffusion and mechanics, and ocean modeling.

Talk title: **An applied mathematician's perspective of the mathematical challenges in UQ.**

**Dr. Tim Waite** is a statistician in the School of Mathematics at the University of Manchester. His research is primarily focused on statistical design of experiments and related issues. He is particularly interested in how to select the observations to be taken in a scientific experiment in order to best inform empirical statistical models, mechanistic or phenomenological mathematical models encoding scientific knowledge, and also hybrid models combining both approaches.

Talk title: **Statistical and mathematical challenges in experiments for UQ.**

**Dr. Inês Cecílio** is a research programme manager and scientist at Schlumberger Cambridge Research. Schlumberger is the world's leading supplier of technology and services to the oil and gas industry. Inês' research interests are in Bayesian modelling and inference as well as nonlinear time series analysis applied to model inversion, signal processing and data analysis.

Talk title: **Why is UQ vital to increase safety and efficiency in drilling oil and gas wells?**

### Session Chairs

**Dr. Catherine Powell** (University of Manchester)

**Professor Dave Woods** (University of Southampton)

# Challenge 3.

## Challenges in Model Discrepancy

Decision making in physical, social, environmental, biological and health sciences is often informed by model predictions. It is common to use statistical methods to quantify the uncertainty in these predictions due to the uncertainty in model inputs. However, methods for quantifying uncertainty due to inadequacy in model structure are less developed. This inadequacy, referred to as model discrepancy, can be thought of as the difference between a model run at its true inputs and the true value of the output. In other words, model discrepancy arises as a result of the gap between a model of reality and reality itself.

“Essentially all models are wrong, but some are useful” is one of the most common quotations in science. The reasons why models are imperfect representations of the systems they are meant to describe include the incomplete understanding of the system and simplifications made in favour of making computation feasible. Although these reasons are widely recognised, quantifying model discrepancy is challenging since it requires judgements about a model’s ability to represent a complex real life decision process faithfully. Solving this problem is of the utmost importance since quantifying this inevitable source of uncertainty will provide a principled method of compensating for over-confident predictions.

Some of the challenges that will be discussed in this session include, but are not limited to: How to represent model discrepancy in a meaningful, informative way? How to include relevant prior information provided by experts? How to use model discrepancy to learn about model parameters and aide calibration? What are the risks for decision making associated with ignoring model discrepancy? How can this risk be mitigated?

### Panel Speakers

**Dr Richard Ahlfeld** is a Royal Academy of Engineering Fellow at Imperial College London. His research interests focus on finding new opportunities for artificial intelligence methods in Aerospace Engineering. Richard is also the co-founder and CEO of UQuant; a spin-off from the Imperial College London Uncertainty Quantification Lab. UQuant seeks to develop hybrid approaches between data analytics, machine learning and physical engineering simulations (CAE).

**Dr. Jenny Brynjarsdóttir** is an assistant professor at the Department of Mathematics, Applied Mathematics and Statistics at Case Western Reserve University, USA. Her research interests include Bayesian statistics, environmental statistics, dimension reduction in space-time modelling and uncertainty quantification.

**Prof. Michael Goldstein** a Professor in Statistics at Durham University. Michaels’ research interests include the foundations, methodology and applications of Bayesian/subjectivist approaches to statistics; particularly for problems which are sufficiently large and complex to make the usual Bayesian modelling and analysis extremely difficult. Much of his work concerns the synthesis of expert judgements and experimental data under partial prior belief specification, and comes together under the general structure of Bayes Linear Methodology.

**Dr. Edward Wheatcroft** is a research officer at the London School of Economics where he works on understanding of the effect of climate change on Ecosystems within protected areas in Europe. He also works at designing systems to recycle heat streams in urban environments. His research interests include probabilistic forecasting, forecast evaluation and data assimilation.

### Session Chairs

**Prof. Peter Challenor** (University of Exeter)

**Dr. Alejandro Diaz** (University of Liverpool)

# Challenge 4.

## Challenges in Communication and Visualisation

Communicating and visualising models to improve decision making under uncertainty is a challenge for a diverse range of organisations and professions. Adopting a multi-disciplinary approach to improve understanding is often required. In this session we will explore illustrations of complexity in communicating and visualising trading information in the financial sector, and criminal activities by the intelligence analysis community. Both practitioner and academic communities here are aiming to aid decision making with insights from Behavioural Science, Computer Science and Analytics. The session will address the questions of when and how models might be presented and asks how we might consider developing these representations to continue to improve decision thinking and reasoning.

### Panel Speakers

#### Wendy Jephson

Head of Behavioural Science at Nasdaq and dual qualified as a commercial solicitor and Business Psychologist, Wendy is responsible for leading a unique team of experts in technology, behavioural science and finance that brings diverse thinking and cross-industry experience to help solve some of the biggest challenges in financial services.

#### Dr Neesha Kodogoda

A researcher at Middlesex University, Neesha is a central part of the VALCRI research team. (VALCRI – PF7 European Commission-funded project). Her research focus is on Reasoning and Sensemaking, Visualisation and Data Analytics for Criminal Intelligence Analysis.

### Session Chairs

**Julie Gore:** Reader in Organizational Psychology, University of Bath.

**James Lyons:** Senior Lecturer in English, University of Exeter.

# List of Posters

**Prof Andrew Colman** (University of Leicester) Medical prescribing and antibiotic resistance: A game-theoretic model

**Miss Margarita Grushanina** (Vienna University of Economics) Avoiding potential nonfundamentalness in VAR monetary policy analysis

**Mr Samuel Jackson** (University of Southampton) Design of physical systems experiments using history matching methodology

**Dr Eva Krockow** (University of Leicester) Cooperation in repeated interactions with uncertain ends: An experimental study of centipede games with random game termination

**Mr Chon Lok Lei** (University of Oxford) Challenges in variability and uncertainty quantification for ion channel modelling

**Dr Sebastian Maier** (Imperial College London) Making optimal decisions for real option portfolios under exogenous and endogenous uncertainties

**Mr Andrew M'manga** (Bournemouth University) Eliciting persona characteristics for risk based decision making

**Prof Karin Moser** (London South Bank University) To share or not to share knowledge – that's the decision! The influence of feedback and expert status in knowledge sharing dilemmas

**Dr Valentina Noacco** (University of Bristol) How can sensitivity analysis improve the robustness of natural hazard models utilized by the re/insurance industry?

**Dr Andrés Peñuela-Fernandez** (University of Bristol) Towards a more robust integration of uncertain seasonal hydrological forecasts into operational decisions in the UK water industry

**Dr Briony Pulford** (University of Leicester) Persuading with confidence: Evidence for the confidence heuristic

**Dr Pranay Seshadri** (University of Cambridge) Sensitivity analysis of aerospace manufacturing variations via polynomial-based compressive sensing

**Dr Pranay Seshadri** (University of Cambridge) Subspace-based dimension reduction via polynomials

# List of Delegates

| Name                 | Affiliation   |
|----------------------|---|
| Richard Ahlfeld      | Imperial College London                             |
| Mark Bell            | The National Archives                               |
| Veronica Bowman      | Defence Science and Technology Laboratory           |
| Richard Bradley      | London School of Economics                          |
| John Bruun           | University of Exeter                                |
| Jenny Brynjarsdottir | Case Western Reserve University                     |
| Matt Butchers        | Knowledge Transfer Network                          |
| David Cameron        | CEH   |
| Ines Cecilio         | Schlumberger  |
| Peter Challenor      | University of Exeter                                |
| Emma Clarke          | University of Exeter                                |
| Richard Clayton      | University of Sheffield                             |
| Andrew Colman        | University of Leicester                             |
| Claire Copeland      | University of Sussex                                |
| Chris Dent           | University of Edinburgh                             |
| Suraje Dessai        | University of Leeds                                 |
| Alejandro Diaz       | University of Liverpool                             |
| Hailiang Du          | Durham University                                   |
| Alexandra Freeman    | The Winton Centre for Risk & Evidence Communication |
| Melina Freitag       | University of Bath                                  |
| Michael Goldstein    | Durham University                                   |
| Julie Gore           | University of Bath                                  |
| Margarita Grushanina | Vienna University of Economics                      |
| Serge Guillas        | University College London                           |
| Max Gunzburger       | Florida State University                            |
| Michael Hobson       | Smith Institute                                     |
| Emma Hope            | Department of Health and Social Care                |
| Samuel Jackson       | University of Southampton                           |

# List of Delegates

| Name                     | Affiliation   |
|--------------------------|---|
| Wendy Jephson            | Nasdaq  |
| Neesha Kadagoda          | VALCRI and University of Middlesex                      |
| Solon Karapanagiotis     | MRC Biostatistics Unit, University of Cambridge         |
| Eva Krockow              | University of Leicester                                 |
| Lindsay Lee              | University of Leeds                                     |
| Chon Lok Lei             | University of Oxford                                    |
| Jason Lowe               | Met Office & Priestley International Centre for Climate |
| James Lyons              | University of Exeter                                    |
| Sebastian Maier          | Imperial College London                                 |
| Gary Mirams              | University of Nottingham                                |
| Andrew Mmanga            | Bournemouth University                                  |
| Joe Moncrieff            | University of Edinburgh                                 |
| Karin Moser              | London South Bank University                            |
| Melody Ni                | Imperial College  |
| Valentina Noacco         | University of Bristol                                   |
| Tony O'Hagan             | University of Sheffield                                 |
| Dan Pagendam             | CSIRO Data61  |
| Wendy Parker             | University of Durham                                    |
| Pragya Paudya            | VALCRI  |
| Andrés Peñuela-Fernandez | University of Bristol                                   |
| Tom Philp                | XL Catlin   |
| Francesca Pianosi        | University of Bristol                                   |
| Catherine Powell         | University of Manchester                                |
| David Pugh               | McLaren Applied Technologies                            |
| Briony Pulford           | University of Leicester                                 |
| Joe Roussos              | London School of Economics                              |
| Dimitra Salmanidou       | University College London                               |
| Pranay Seshadri          | University of Cambridge                                 |

# List of Delegates

| Name                 | Affiliation                                       |
|----------------------|---|
| Katy Sheen           | University of Exeter                              |
| Jim Smith            | University of Warwick                             |
| Leonard Smith        | London School of Economics and Political Science  |
| David Spiegelhalter  | Winton Centre for Risk and Evidence Communication |
| Victoria Stephenson  | University College London                         |
| Ekaterina Svetlova   | University of Leicester                           |
| Erica Thompson       | London School of Economics                        |
| Korinus Nixon Waimbo | University of Exeter                              |
| Tim Waite            | University of Manchester                          |
| Inara Watson         | London South Bank University                      |
| Ed Wheatcroft        | London School of Economics                        |
| Daniel Williamson    | University of Exeter                              |
| Dave Woods           | University of Southampton                         |
| Andrew Wright        | Ofgem   |
| Henry Wynn           | London School of Economics                        |
| Edward Young         | University of Cambridge                           |
| Shaowu Yuchi         | University of Cambridge                           |
| Chun Yui Wong        | University of Cambridge                           |

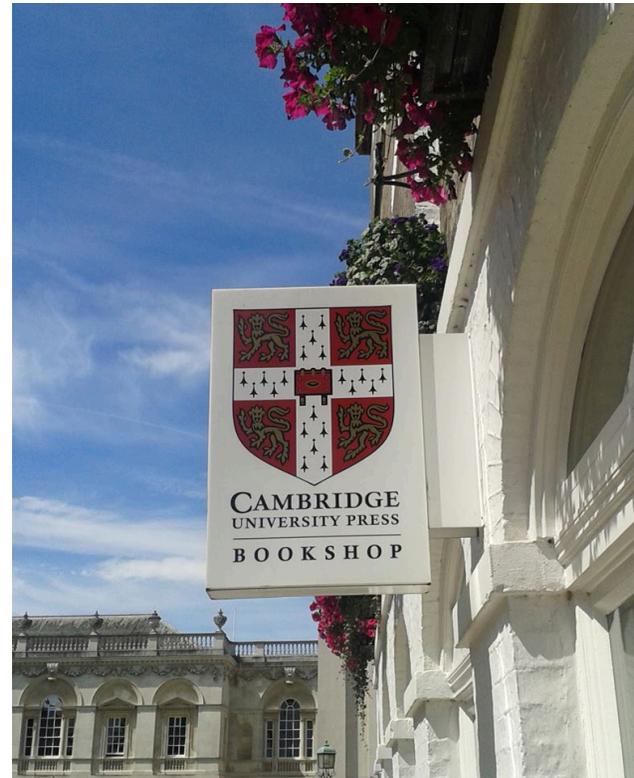
# *Tuesday 12 June 2018*

*“Cambridge University Press welcomes participants at Models to Decisions 2018 to a reception at its bookshop on June 12 from 18.00 to 19.30.*

*As well as enjoying wine and nibbles we hope you'll be able to browse books and chat to editors about anything to do with Publishing.”*



**CAMBRIDGE  
UNIVERSITY PRESS**



# *Wednesday 13 June 2018*

*M2D 2018  
Conference Gala  
Dinner*



**Murray Edwards  
College**  
University of Cambridge



# CRUISSE

Challenging Radical Uncertainty in Science, Society and the Environment

The CRUISSE Network (Confronting Radical Uncertainty in Science, Society and the Environment) is a RCUK funded initiative designed to examine real-world decision-making under uncertainty.

The Network is engaged in a “deeper conversation”, bringing together decision-makers with academics from a wide range of physical and social science disciplines to examine real-world decision-making under uncertainty.

Experienced real-world decision-makers joining this conversation include BP, the Cabinet Office, DSTL, AWE, NCSC, Bank of England, Financial Conduct Authority, the START and FOREWARN networks, the Chiefs of Staff of the French Armed Forces, the House of Lords, the US Energy Department, the MET office, the Department of Transport, COBRA, the insurance industry, and more.

**We invite you to join us in London in November** to deepen the discussion and reflect on emerging results from our programme of challenging academics (from physics to brain science and economics) with real decision problems, on the decision-makers’ terms. The programme outline will soon appear on our website.

## **The conference programme will include:**

**Roundtables** with David Tuckett, Lenny Smith and core members of the network discussing their experience and the lesson learned - Dr Jason Blackstock (Physics, Social Science and Public Policy); Dr Kris De Meyer (Computational Neuroscience; Science Communication); Professor Mark Fenton O’Creevy (Organisational Psychology); Dr David Good (Engineering and Psychology); Dr Julie Gore (Psychology of Expertise), Professor Nigel Harvey (Forecasting and Psychology of Decision-Making), , Dr Brian MacGillivray (Sociologist of Decision-Making), Dr Diana Mangalagu (Physicist, Scenario Analysis and Policy adviser), , Dr Erica Thompson (Statistician and Climate Science).

## **Reports** from the Pilot Projects in the field

- Studying Uncertainty in Decision-Making Processes of Rapid Humanitarian Disaster Relief. Tobias Pforr (Universities of Warwick and Reading)
- Using social media to enable stakeholder communication during floods. Rudy Arthur and Hywel Williams (Exeter University)
- Multi-stakeholder communication in flood management. David Benson, Irene Lorenzoni and Nick Kirsop-Taylor (Exeter University)
- Towards Flexible and Reflexive Standards: Uncertainty in Decision-Making on Resilient Infrastructure”. Laura Bear and Ben Bowles (London School of Economics).
- Identifying and addressing uncertainties in the UK’s cyber risk landscape. (TBC)
- Creating experience to provide evidence to make decisions about what to advise if there is a prolonged power shutdown. (TBC)

## **Keynote speakers**

## **Invited Talks**

## **Opportunities to submit papers.**

**Feedback and reflections** on the CRUISSE approach: how and why is it different? Which insights have proved most useful? Where next?

# Useful Information

## Internet Access:

For those who have **eduroam** access, you may sign in using your home institution's credentials. Otherwise, please ask at the Isaac Newton Institute reception for further advice.

## Parking:

The Isaac Newton Institute has limited car parking and a parking permit is required. Please ask at the reception desk on arrival

## Local travel advice:

CamCab: +44 (0) 1223 704704 [www.camcab.co.uk](http://www.camcab.co.uk)

Panther Taxi: +44 (0) 1223 715715 [www.pantheraxis.co.uk](http://www.pantheraxis.co.uk)

Sat Nav: Use postcode CB3 0EH

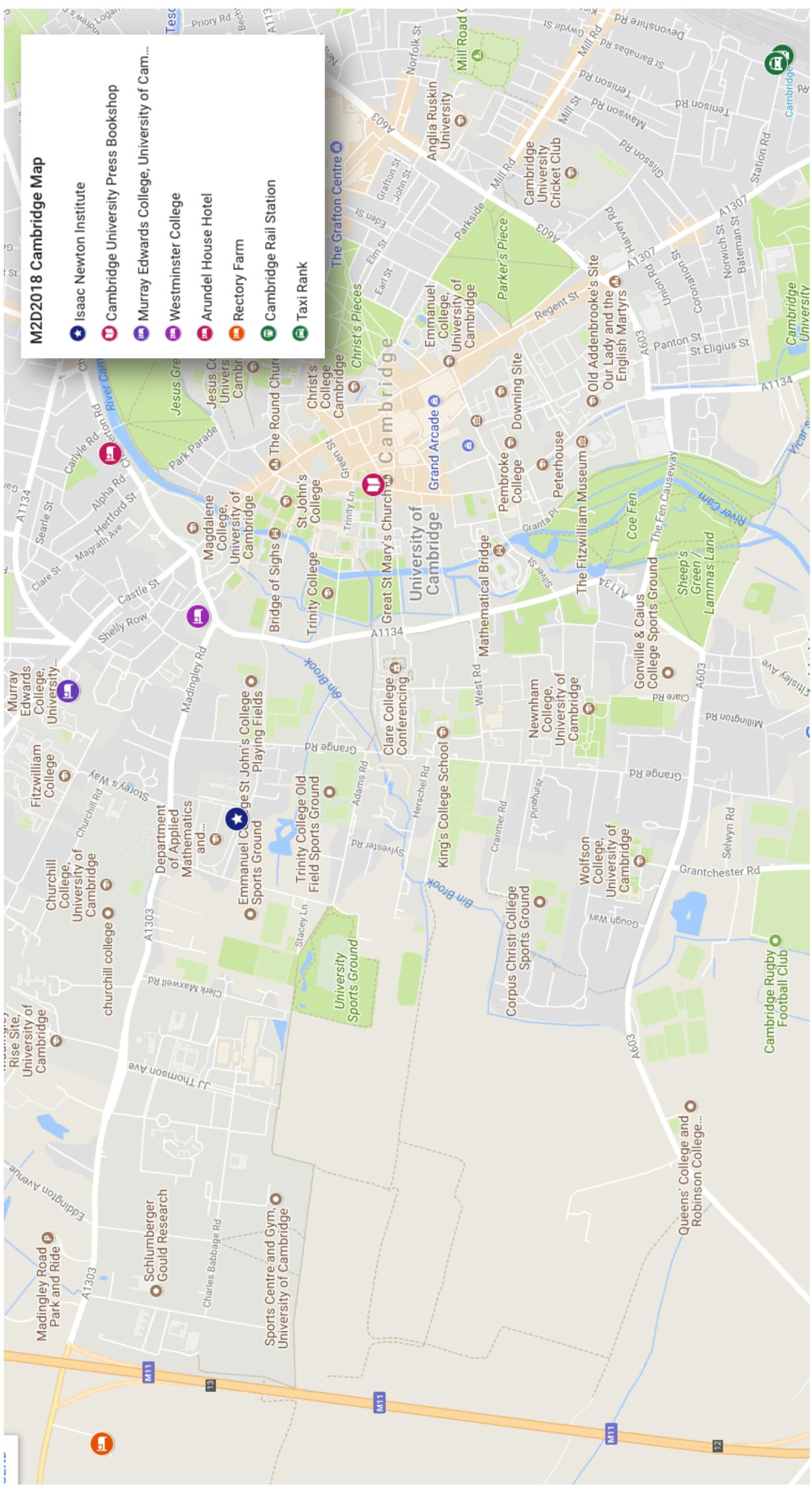
## Local Amenities:

The Isaac Newton Institute is situated a very close walking distance from the Centre for Mathematical Sciences (CMS). Here you will find a large open café area serving a full complement of hot and cold drinks, snacks and more substantial eats. This space is also convenient for informal meetings and discussions. The CMS cafeteria is open from 9:00am to 4:00pm Monday to Friday.

The Isaac Newton Institute is roughly 1 mile / 20 minutes [easy] walking distance from Cambridge City Centre. Here you will find an excellent range of shops, banks, pubs, bars and restaurants.



# Cambridge Map



## M2D2018 Cambridge Map

- Isaac Newton Institute
- Cambridge University Press Bookshop
- Murray Edwards College, University of Cam...
- Westminster College
- Arundel House Hotel
- Rectory Farm
- Cambridge Rail Station
- Taxi Rank

# M<sub>2</sub>D

**Models to Decisions**



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