

## **Agent Based Modelling – Learning from application to water abstraction reform**

**Jon Pocock, Risk Solutions**

Seminar at DEFRA, Rm 808, Nobel House, 17 Smith Square  
5.30 (for 6.00) - 9.00 p.m., Wednesday, 29th April 2015

Agent based modelling is a powerful tool for representing real world behaviours in models exploring complex policy questions.

Risk Solutions have applied this technique to challenges as diverse as modelling traffic flow on SMART motorways to the management of outbreaks of exotic animal disease such as foot and mouth. Between 2011 and 2014 Defra contracted Risk Solutions to lead a consortium delivering a series of agent based models to support Defra/EA/NRW and the Welsh Government as they investigated the best way to license abstraction of water from rivers and groundwater in the face of changing climate and socio-economic conditions. The reforms aim to deliver levels of environmental protection consistent with statutory requirements more effectively and efficiently, at lower costs to businesses than the current system. One of the principal ways they do this is by allowing trading of water rights.

Risk Solutions constructed a suite of linked hydrological and agent-based models designed to estimate the performance of each policy option based on the sum of responses of different agents (abstractors) interacting together, each with their own motivations and approach to decision making. The approach to model development was highly consultative and participative. Policy makers, the regulator, experts, stakeholder representatives and abstractors were involved throughout the project. A project steering board, abstractor representative group and peer review group provided oversight.

This seminar will introduce some practical applications of agent based modelling. Using Water Abstraction Reform modelling as a case study, it will aim to demonstrate how participative approaches and tools such as agent based modelling and behavioural economics can help deliver insights regarding the regulation of complex systems under changing conditions and significant uncertainty. It will demonstrate how traditional techniques can fail to capture essential features of complex systems. We will also discuss the very real challenges that implementing these techniques present. We will describe lessons learnt, how the modelling could have been improved and how it could be applied more broadly to make it as widely relevant as possible.

### **Presenter:**

#### **Jon Pocock, Risk Solutions**

Jon has over 25 years consulting and modelling experience across a range of sectors. He specialises in developing agent-based, micro-simulation models using highly participative approaches. His assignments have included modelling Foot and Mouth Disease and Avian Influenza outbreaks in Great Britain for Defra, developing an agent based, real-time traffic flow simulation model of the M42 motorway, developing novel methods for analysing Highways Agency traffic flow data to explore the impact that changes in traffic flow and mix have on journey time reliability; and the work we are focusing on here, on Water Abstraction Reform for Defra.

Risk Solutions are a consulting company specialising in the provision of high quality decision information where there is a high degree of complexity, uncertainty or

risk. A small highly motivated and client focused team, we tailor solutions to clients' needs, combining traditional qualitative and quantitative methods with cutting-edge participative modelling and decision analysis techniques.

Chair:

**Henry Leveson-Gower** (Joint Head of Water Abstraction Reform, Defra)

Discussants:

**Ronan Palmer, Chief Economist, English Environment Agency**

His role goes across the wide range of the Environment Agency's business, from flood risk management to water resources, from industry regulation to climate change adaptation. He joined the Environment Agency shortly after it was established in 1996. Previously he had been a regulatory economist at the newly privatised National Grid Company and worked in the UK's Department of Environment on water privatisation and policy appraisal. He has a degree in Philosophy and Economics from University College Dublin. From 2013 to 2015 Ronan is sharing his time with Ofwat, on assignment as their Environment Director, and leading their strategy development."

**Robin Smale, Director, Vivid Economics**

Robin is an economist who has been continuously involved in the UK water industry and policy for 20 years. He has recently been heavily involved in abstraction policy reform, advised the Walker Review and the Tideway cost benefit group, and for a decade he convened a group of water industry executives, while also sitting on the regulatory board of a large water company. He has substantial experience across natural resources, energy, heavy industry and knowledge of finance. Together with his full time role as a director of Vivid Economics he is a member of the Natural Capital Committee.

**David Fell, Director, Brook Lyndhurst Ltd**

David Fell is a researcher, writer, presenter and activist in the field of sustainable economics. He is director and co-founder of the research and strategy consultancy [Brook Lyndhurst](#); editor of on-line debate for [London Remade](#); supports community groups in London via the [Just Space](#) programme; and blogs as [EconEnough](#). His work is concerned, in particular, with the development of strategies for promoting changes in individual and institutional behaviour to bring about a more sustainable economy.

David has a degree in economics from Cambridge University; 25 years' research and strategy experience for clients in the government, private and not-for-profit sectors; and served for several years on the London Sustainable Development Commission.

Followed by discussion.

8.00 p.m. Refreshments

To register, e-mail [epw@camecon.com](mailto:epw@camecon.com)

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