



## **2009/2010 SEMINAR SERIES**

**Wednesday 18<sup>th</sup> November 2009, 14.30-17.00**

**Noah Raford**

***Collapse Dynamics, Part 2: Design and management strategies for times of non-linear change***

At an earlier seminar, the structural conditions of non-linear phase transitions in complex social systems (i.e. collapse, thresholds, tipping points, etc.) were explored. In this seminar, Noah Raford will explore various perspectives on organisational and individual strategy during such transitions, with a focus on decision-relevant management lessons for practical application. The talk will draw from ecology, economics and anthropology, and will explore key complexity issues through the use of historical examples and demonstrative simulation models

Complex social systems can exhibit dramatic non-linear phase transitions after passing key thresholds, or tipping points. Recent research into the dynamics of such transitions suggest that such phase transitions may be structurally endemic to many classes of complex social systems which we depend upon, including critical infrastructures such as the electric grid, IT networks and financial markets. Noah Raford will discuss key findings from this literature and frame a discussion on their social and political implications. The talk will be accompanied by model demonstrations of key concepts. As usual, the focus of the seminar will be to explore some key complexity issues, within the context of practical applications.

**Noah Raford** is an urban planner and a PhD candidate in the Department of Urban Studies and Planning at the Massachusetts Institute of Technology (MIT). He is the former North American Director for Space Syntax Limited, a Senior Research Associate at the LSE Complexity Research Programme, a fellow at the Bartlett School of Architecture, University College London, and a research associate at the Oxford University Institute for Science, Innovation and Society.

Noah's research focuses on the theoretical foundations of systemic change, with a particular emphasis on the impact of climate change on critical infrastructure systems. He uses scenario planning, systems mapping and web participation tools to help managers better understand the risks they face in a changing world, as well as what web-enabled complexity approaches can offer for new forms of management and strategy in turbulent times.

Noah consults and lectures widely and can be reached at [nraford@mit.edu](mailto:nraford@mit.edu).

**Monday 30<sup>th</sup> November 2009, 14.30-17.00**

**Dr Ugur Bilge**

***Agent Based Modelling in the Real World***

**Introduction**

Agent Based Modelling (ABM) is a relatively recent computer paradigm [1, 2, 3]. As opposed to the classic “top down” approach, ABM is a “bottom-up” modelling technique, sometimes resulting in unexpected, so-called “emergent” behaviour. Agent Based Simulations model a medium to high number of independent agents such as shoppers in a supermarket [4] or workers in an organisation [5] for the investigation of overall system behaviour. Today ABM in the organisational context is often used together with network analysis techniques [6, 7] and tools for visualising social agents in organisations. The EPSRC ICoSS Project [5] used the ABM approach to visualise and simulate social networks in an organisation, to investigate connectivity patterns and informal networks, to identify hubs and lynchpins as well as communications bottlenecks.

**Objectives**

It will be assumed that participants have no prior knowledge of ABM. The main objectives of this seminar are to:

- introduce ABM concepts
- show real world examples of ABM
- present social network analysis and simulation concepts
- discuss possible ABM solutions to participants problems

**Dr Ugur Bilge** is an **Agent Based Simulations (ABS)** expert, who develops tools for understanding, communicating and applying the **Complex Systems** approach to real world problems.

In 1993, Ugur received his PhD in Computer Science from University College London, where he worked as a research assistant in European funded research projects on Neural Nets and Genetic Algorithms. Later he worked as a consultant at the Logistics Innovation Centre, J. Sainsbury plc where he designed and developed state-of-the-art software tools for *Forecasting, Optimisation, Planning and Scheduling* applications for *Finance, Retail and Logistics*, applying techniques such as *Neural Nets, Genetic Algorithms, Fuzzy Logic*, and the *Complex Adaptive Systems* approach.

In 1998 Ugur co-founded **SimWorld Ltd** in the UK, a consultancy and innovative solutions company, and developed **SimStore**, a realistic simulation of a supermarket layout with moving customers. Since then he has been developing ABS for a number of clients, including a geographic model of **Container Transport** in the UK, and a coarse grain simulation of **Oil World**. Ugur was the modelling expert for the **ICoSS Project** at London School of Economics (LSE). He developed the **Organisational Forms Simulator**, an agent based network simulation and visualisation tool for exploring informal

social networks, and investigating patterns of connectivity within business organisations.

Since 2003, Ugur has held the position of Assistant Professor at the Department of Biostatistics and Medical Informatics at Akdeniz University, in Antalya, Turkey. He taught Agent Based Simulations and Complex Systems, Artificial Intelligence and Data Mining, and applied complexity thinking to medical and healthcare problems, such as the development of a simulator for management of COPD (Chronic Obstructive Pulmonary Disease).

In 2006 and 2007 he was a tutor for the EPSRC Taught Course for Researchers on Complexity Science and Complex Social Systems, organised by the LSE Complexity Group. He is now a Senior Research Associate at LSE Complexity Group.

**Wednesday 9<sup>th</sup> December 2009, 14.00-16.30**

**Alexandros Paraskevas**

***Patterns in the Dark: detecting crisis signals in turbulent times***

Crises in organisations are seen more as a norm rather than an exception in the contemporary business environment. Although several organisational crises are considered 'sudden', expert studies have shown that over 60% of them normally emit warning signals early enough to be prevented. These signals are either ignored or misinterpreted with often tragic results. The extant literature of crisis management acknowledges the importance of early crisis signal detection but, in recent years, scholars in this field have argued that the traditional linear approach to crisis management - and consequently to crisis signal detection - has been proven inadequate in dealing with the complexity of modern crises. This seminar aims to briefly explore the concept of crisis signal detection in an organisational context and to analyse the conditions that influence the processes and practices of detection, transmission and interpretation of crisis signals by the organisation. As a result of this analysis, a framework of enabling conditions that can be established in an organisation to make these processes and practices more effective will be presented, proposing a paradigm shift to the non-linear principles of complexity thinking.

**Alexandros Paraskevas** is a Senior Lecturer in Strategic Management at Oxford Brookes University Business School. His research and consultancy are in the areas of organisational crisis/risk and disaster management and the application of complexity thinking in business. He works with international hotel chains and tourism authorities in the areas of enterprise risk management, business continuity and counter-terrorism strategy. His most recent work was the development of a community disaster recovery model and the role of private sector, as a result of fieldwork and consultancy on the disaster recovery of Sichuan province in China. Alexandros is a member of the Complexity Society's board of directors, advisor of the Global Council in

Security and Crisis Management of the International Hotel and Restaurant Association and a member of the American Society for Industrial Security.

**Thursday 28<sup>th</sup> January 2010, 14.00-16.30**

**David Wasdell**

***Complex Solutions for Complex Problems: Mobilising social response to accelerating climate change in a post-Copenhagen context***

An introduction to the dynamics of climate change lays the foundation for an examination of the complex system of interactive feedback mechanisms and the phenomenon of amplification of the system response to the precipitating anthropogenic disturbance. Distinction is made between systems of complexity which can dominate behaviour in sub-system dynamics, and the higher level complex system-dynamics which determine the response of the earth system as a whole. The interplay between the two is explored.

The approach is then developed to provide a framework within which to examine the boundary conditions of runaway climate change, an evaluation of risk, and assessment of the implications of the new analysis for strategic intervention.

The second part of the seminar focuses on the dynamics of social systems in response to the climate crisis. The escalating rigidity and complexity of command and control structures reduce the resilience of the social system. The institutions of international negotiation become dysfunctional as a means of mobilising effective global problem-solving. The dominance of powerful vested interests in the politico-economic arena constitute a virtual veto on essential action, reinforced by the psychodynamics of resistance to change in conditions of rising social anxiety.

The insights of complexity science may offer an alternative approach, mobilising the deconstruction of the command and control dynamics and catalysing the emergence of a zone of contained turbulence (the 'chaotic' state) in social behaviour. Connectivity, self-organisation, multiple parallel processing and the emergent properties of a metamorphic transformation of global dynamics, could generate response that is able to get ahead of the curve of the developing crisis. The precipitation of the required phase-change in social dynamics from the rigid, slow response characteristics of the solid state, to the resilient flexibility of a liquid phase may constitute the best hope of achieving a sustainable form of human civilisation within the definitive constraints of the planetary environment. That opens up a concluding period of dialogue around the questions of what such a transition would look like, what risks might be involved, and how it could be initiated.

**David Wasdell** is the Founder and Director of the Unit for Research into Changing Institutions. He directs the Apollo-Gaia Project, a world-wide action-research initiative focussed on the feedback dynamics of the global

climate system and the effective human response. He previously led work on feedback dynamics of coupled complex systems for the Global System Dynamics and Policy Co-ordination Action of the European Commission

**Wednesday 10<sup>th</sup> February 2010, 10.30-13.00 at the LSE**

**Dr Ugur Bilge**

***Agent Based Modelling - Simulation Environments – a practical workshop***

Having covered the general concepts and a number of real world applications of Agent Based Modelling in the previous seminar, we now move onto hands on experience with Agent Based Simulation environments. The best known software environment is NetLogo (<http://ccl.northwestern.edu/netlogo/>) which covers examples ranging from art, biology, physics to social science. We expect participants to bring their laptops to experiment with models in NetLogo. No prior knowledge of programming is necessary.

**Monday 22<sup>nd</sup> February 2010, 10.30-13.00**

**Dr Paul Stevens**

***Economic & Political Influences on the Coinage of Bengal in the Second Half of the Eighteenth Century. A Complexity Perspective***

In 1757 the British defeated the Nawab of Bengal and obtained, amongst other things, the right to mint coins in Calcutta. During the next few years they expanded their power until they controlled all of Bengal, Bihar and Orissa, and for economic and political reasons, they made various changes to the coinage. All of these interventions were unsuccessful in achieving their intended end-points.

My talk will describe some of these interventions, the economic and/or political drivers that led to them, their intended effect and their actual effect. I will discuss how complexity science might play a role in understanding why the authorities were unable to achieve their desired end-points, and explore what might be learnt for the present day.

**Paul Stevens** started working life as a research scientist gaining a PhD from Brunel University, an MSc in Biochemistry from London University and a BSc in Pharmacology from Bradford University. He spent nearly fifteen years unsuccessfully searching for new medicines.

He next spent about twenty years leading various aspects of IT for a major pharmaceutical company eventually reaching the dizzying heights of Vice-president of IT for the UK subsidiary.

In 2008, Paul retired from gainful employment and is now a fulltime, unpaid numismatist researching the coins and coinage of India with particular focus on the British East India Company.

His interest in complexity science began in the 1990s during a series of seminars run at the London School of Economics. Since then he has been interested in the application of these ideas to various aspects of his work, initially in managing people, but most recently to numismatics.

**Wednesday 24 February 2010, 14.00-17.30**

**Dr Chris Martenson**

***Convergence: Can the economy as we know it survive resource depletion?***

Dr. Martenson's main body of work is the Crash Course, a broad and nuanced explanation of the interdependence of the economy, energy and environment.

A rigorously factual and data-based analysis, the Crash Course explores the limitations of an economy and geopolitical system dependent on infinite growth as it encounters the limits of a finite planet.

His talk will continue the discussion undertaken in two recent ESRC seminars on Energy & Climate Change (organized by the LSE Complexity Group, the OU and Cranfield) linking energy and climate. In his talk, Dr Martenson will link the economy and resources with energy as one of several peaking resources. The main point would be to illuminate how and why the economy requires perpetual compound growth and what might happen when this critical systemic feature encounters real-world limits.

The complex system to be explored and discussed is the modern fiat monetary system (which applies to every major country in the world). He will explain its fundamental design, present current data, and examine the implications of extrapolating current trends in resource depletion into the future against the operating mechanism of the monetary system.

The main thesis of the talk will be that the majority of our plans over the next twenty years make a critical assumption that the economy will be there, largely intact and functioning, to fund the technologies and structural shifts we know we need to enact to meet challenges of energy and the environment. There is every reason to suspect it may not.

The talk will cover the following topics:

Laying the foundation

- Money creation (modern fiat money)
- Peak oil (very briefly)
- Peak resources (copper, uranium)

Tying them together

- Our particular monetary system and its strict requirement for growth
- Energy and the Economy

#### The Future

- What needs to be done
  - Net energy is everything (and the deep deficiencies in our present information about net energy)
  - Stewarding our remaining resources
  - Getting serious about aligning human presence and consumption with the actual carrying capacity of the earth (and what is required to allow other species some breathing room)
- Convergence of trends: will the economy be able to satisfy our technological dreams?

**Dr. Chris Martenson** is an independent economist and author of a popular website, ChrisMartenson.com. Chris earned a PhD in neurotoxicology from Duke University, and an MBA from Cornell University. A fellow of the Post Carbon Institute, Chris's work has appeared on PBS and been cited by the Washington Post. He is a contributor to SeekingAlpha.com and FinancialSense.com.

Chris has recently presented public talks at the Commonwealth Club of San Francisco and the United Nations. During his visit to the United Kingdom, he will be presenting before the All Parliamentary Party Group on Peak Oil and Gas, the Department for International Development, the Centre for the Study of Financial Innovation, and Essential Edinburgh business leaders.

ChrisMartenson.com offers ongoing commentary and analysis into financial and energy-related issues and events as they unfold. It is home to an active, engaged community discussing and confronting the challenges we face in the years ahead.

#### **Thursday 4<sup>th</sup> March 2010, 09.30-11.30 at the LSE**

##### **Climate Change Workshop**

The purpose of this workshop is to discuss some of the key issues raised at the seminars held on 28 January and 24 February 2010. If participants have not attended both seminars, they are kindly requested to listen to the audio recordings and look at the presentations on our website, [www.lse.ac.uk/complexity](http://www.lse.ac.uk/complexity).

#### **Wednesday 10<sup>th</sup> March 2010 at Oxford Brookes**

##### **Organised by Alexandros Paraskevas**

##### **ESRC Research Seminar 5**

Applied Complexity Theory as the New Framework for Public Policy

*Terrorism and the Complexity of Soft Targets: The Case of the Tourism Industry.*

Please visit [www.lse.ac.uk/complexity](http://www.lse.ac.uk/complexity) for further information and to access the application form. Places are limited and early application is advised.

Confirmed speakers:

- Bernard Donoghue: Head of Government and Public Affairs, VisitBritain and Deputy Chair of TIER – Tourism Industry Emergency Response Group
- Alan Orlob: Vice President, Corporate Security Marriott International Lodging), based in the USA
- Prof Alex P. Schmidt: Former Director of the Centre for the Study of Terrorism and Political Violence, St Andrews University, editor of the Journal Perspectives on Tourism, based in Vienna
- Dr Dawn Gilpin: Assistant Professor, Walter Cronkite School of Journalism and Mass Communication at Arizona State University, based in the USA

Provisional Programme:

09.30-10.00 Registration & coffee

10.00-12.00 Welcome and Keynote speeches

12.00-13.00 Lunch

13.00-14.30 Keynote speeches

14.30-15.00 Tea

15.00-16.30 Exploring ideas for research projects (breakaway groups)

16.30-17.30 Plenary & close

**Thursday 22<sup>nd</sup> April 2010, 14.00-16.30 at the LSE**

**Ben Ramalingam**

***Aid on the Edge of Chaos: Exploring complexity sciences in international development and humanitarian work***

The complexity and unpredictability of the real world pose serious challenges to researchers, practitioners and policy makers in practically every field of human endeavour. Serious mistakes in public and political life are increasingly being attributed to a bias of seeing interconnected, messy problems as simple and straightforward, and the ill-advised actions that are taken as a result of such biases. The complexity sciences are widely seen as a useful explanatory framework which can be used to help overcome such biases.

This seminar, which draws on research undertaken for a forthcoming book to be published by Oxford University Press, is focused on the implications of complexity sciences for organisations involved in international development and humanitarian action. Aid agencies have been described as dealing with 'some of the most complex, ill-defined questions facing humanity'. The presentation will explore how current aid ideas and practices take account of

the real-world, complex nature of social, economic and political change, drawing on relevant reports, evaluations and practices as well as key informant interviews with those working within and outside the international development and humanitarian sectors. The seminar will also present the implications of complexity sciences for international work, for discussion and debate.

**Ben Ramalingam** is the Head of Research and Development at the Active Learning Network for Accountability and Performance (ALNAP), a unique sector-wide network which works to improve international humanitarian performance through learning and accountability. Ben has worked at the leading UK think-tank, the Overseas Development Institute, where he led research and advisory work on organisational learning, strategic thinking, and knowledge management in the aid sector.

Prior to working for ODI, Ben worked in the private sector, focusing on strategy consulting, investment banking and IT. Highlights from his previous work includes a review of organisational change in the humanitarian sector, work on the global food price crisis, on urban crises and complex emergencies. Ongoing work includes leading an initiative on humanitarian innovations and a cross-Atlantic research programme on leadership in aid organisations. Ben has also published on complexity and aid issues.

**Monday 26 April 2010, 10.00-13.00 at the LSE**

Facilitated by Sandra Dodgson and Eve Mitleton-Kelly

**ESRC Research Seminar Series Workshop following the Seminar at Lancaster**

**Complexity in the International Arena**

***The Challenges for Global Governance: A multi-disciplinary approach***

A workshop to identify 'real' and substantial challenges for global governance, to which applied complexity theory can contribute significantly through a multi-disciplinary research project.

Since one of the objectives of the ESRC Seminar Series is to identify ideas for research projects, this workshop will also consider whether these challenges can provide the basis for a research proposal to be submitted for funding.

Global Governance can be described as the complex multi-level system by which people, states, markets and institutions (both inter- and non-governmental) interact to articulate and resolve shared challenges, establish rights and obligations and mediate differences across the globe. We will explore the significant global public policy challenges faced by the people and processes engaged in governance at a global level and identify those to which value could be added through the application of complexity theory.

This session builds on an initial small group discussion at the University of Lancaster held on 6 November 2009, and subsequent reflections by those present. Some of the shared global challenges which will be considered on 15 January are:

- Climate Protection/Change – before and beyond Copenhagen
- 'Community recovery' following a disaster - natural or man-made
- Global financial market collapse and future regulation
- Conflict situations
- Civil Society and legitimacy to govern

During the half day, we will revisit these policy challenges and identify others, explore the different challenges in more depth, identify where the focus of interest in developing detailed proposals lies, determine possible connections with other disciplines and agree next steps.

**Monday 26 April 2010, 14.30-18.00 at the LSE**

Facilitated by Jean Boulton and Eve Mitleton-Kelly

**ESRC Research Seminar Series Workshop following the seminar at Cranfield**

**Complexity and Policy**

**How the complexity community can engage with policy makers**

This workshop builds on the ESRC-funded workshop held during 2009 at Cranfield, which aimed to explore, from a variety of perspectives, how complexity thinking influences how we view the processes of policy development. The current financial crisis has emphasised, the extent to which policies often lead to unintended consequences; equally, the difficulty for government, in engaging in a discourse which looks at the trade-offs between social, environmental and economic factors is evident when considering, for example, a new runway at Heathrow or in planning energy infrastructure. Consequently, there is now a greater willingness to take a fresh look at policy and a growing recognition of the limitations of current approaches.

The focus of this workshop is to engage with complexity practitioners and policy makers, to deepen our understanding of this topic and how to apply that understanding in practice. Our intention is to see how we could engage, practically, in creating projects which allow us to explore, with real examples, the process of policy development and implementation and how complexity thinking informs that debate. If you are interested to take part, could you please express your interest to Jean Boulton ([jean@jeanb.co.uk](mailto:jean@jeanb.co.uk)) and copy [complexitygroup@lse.ac.uk](mailto:complexitygroup@lse.ac.uk). Could you please also provide some information as to why this is an area of interest? We would like to balance the numbers of

academics, complexity practitioners and those engaged in the actualities of policy. Places are limited and early application is advised.

**Thursday 10<sup>th</sup> June 2010, 14.00-16.30 at the LSE**

**Professor Henrik Jeldtoft Jensen**

***How interaction between co-evolving agents shape temporal mode and structure of the evolving interaction network.***

Understanding systems level behaviour of many complex interacting agents is very challenging for various reasons: the interacting components can lead to hierarchical structures with different causations at different levels. We use the Tangled Nature model to discuss the co-evolutionary aspects connecting the microscopic level of the individual to the macroscopic systems level. At the microscopic level the individual agent may undergo evolutionary changes due to “mutations of strategies”. The micro-dynamics always run at a constant rate. Nevertheless, the systems level dynamics exhibit a completely different type of mode characterised by intermittent abrupt dynamics where major upheavals keep throwing the system between meta-stable configurations. These dramatic transitions are described by a log-Poisson time statistics. The long time effect is a collectively adapted network.

We discuss how the systems level adaptive intermittent search is related to an increase in the mutual information content describing the core of the population, while, at the same time, the adaptive search is conducted through an overall network of agents described by a decreasing degree of correlation measured in terms of mutual information. We further more relate the systems level adaptation to the functional properties of the microscopic duplication probability.

**Henrick Jeldtoft Jensen** is Professor of Mathematical Physics in the Department of Mathematics and Institute for Mathematical Sciences at Imperial College, London