



COMPLEXiTY
research seminar

**LSE Complexity Group Seminar
Series**

Modelling Seminar

***Global Trade Network Simulator
and Agent Based Modelling***

Dr Ugur Bilge

15 June 2011 @ LSE

14.00-17.30

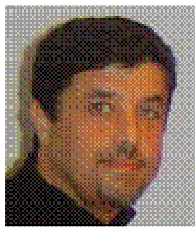
Globalisation and increased connectivity in the world economy make it difficult to model and predict how new shocks may spread in this network. The Global Trade Network Simulator (GTNS) is a decision support tool developed from an Agent Based Modelling (ABM) perspective. Its aim is to understand, and generate insights about changing trade patterns, and their impact on GDP growth in the next 20 to 30 years. GTNS enables users to test their what-if scenarios about the future, as well as randomly generating shocks and visualising the impact of these shocks on global trade and GDP growth. GTNS is still under development for the Game Changers Project based at IIASA (International Institute for Advanced Systems Analysis) in Austria. The project focuses on the detection and simulation of extreme events and game changers for member countries such as

Finland and Scotland, as well as a number of other organisations and companies.

ABM is a bottom-up modelling technique involving a number of autonomous agents each equipped with their own data and connections, following a number of simple rules. This setup can lead to 'emergent patterns'. Visualisations and statistical analyses of the emergent behaviour, provide insights into the problem. Although simulation results cannot be used directly to forecast the future, they can be used to find boundaries of confidence in forecasts when certain event combinations occur. Here we model countries as agents networked with import, export connections, and changes in connectivity can result in unexpected results in GDP growth and trade that are hard to anticipate using conventional macroeconomic models.

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

- Show application of ABM concepts to a real world problem such as global trade
- Present early results of the GTNS
- Discuss use of ABM in decision making
- Discuss other potential applications



Dr Ugur Bilge

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.

After receiving his PhD in Computer Science from University College London, in 1993, 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. 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. Working with the LSE Complexity Group on an EPSRC project, he developed the Organisational Forms Simulator, an ABS and network visualisation tool for exploring informal social networks, and investigating patterns of connectivity within business organisations. He is a Senior Research Associate at the LSE Complexity Group.

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 teaches ABS and Complex Systems, Artificial Intelligence and Data Mining, and applies complexity thinking to medical and healthcare problems. Since April 2010 Ugur has been working for the Game Changers project based at IIASA in Austria, developing the Global Trade Network Simulator with ABM thinking. He is also the Modelling Expert for the ESPA funded REDD Game Project based at LSE.

Please contact Rahoul Masrani at complexitygroup@lse.ac.uk if you wish to attend.

This seminar is free but places are limited.

Details of this event and the others in the series are available on our website, www.lse.ac.uk/complexity