System Dynamics Society

Proceedings of the 17th UK System Dynamics Chapter Annual Conference

Theme:
Public Policy for Innovation and Finance

26 – 27 March, 2015
London School of Economics

Timetable and contents

Thursday 26th March (New Academic Building, Room 1.04)	
12:20	Registration and light refreshments
13:00	Welcome by Chapter President
	Session 1 - Systems thinking in public policy
13:10	*Using Systems Thinking in Public Policy: The experience of the Munro Review of child protection child protection*. David Lane (Henley Business School)
13:40	*System Dynamics and Group Model Building for Public Policy – some examples of the use of SD and GMB at the Ministry of Security and Justice in The Netherlands* Rian van Gulijk-Boon, Willem Stapel (Dutch Ministry of Security and Justice)
14:10	Tea break
	Session 2 - Systems modelling for innovation
14:30	*Systems mapping for international benchmarking of the UK science and innovation system* Ian Mitchell (BIS)
15:00	*Systems change in theory and practice* Geoff Mulgan (Nesta)
15:30	Tea break
	Session 3 - System dynamics in international development and finance
15:50	*Systems thinking and system dynamics in international development* Ben Ramalingam (ODI)
16:20	*Minsky: Extending System Dynamics to easily handle financial flows* Steve Keen (University of Kingston)
16:50	Geoff Coyle medal
17:10	Chapter President: Concluding remarks
17:20	Wine reception in Senior Common Room
18:30	Optional dinner at Coopers Restaurant

Friday 27th March (New Academic Building, Room 1.04)	
8:45	Arrivals — coffees and teas
9:00	**Exploring developments in system dynamics software - Introduction** Siôn Cave (Decision Analysis Services)
9:15	**Session 1 - Disaggregated modelling and handling structural complexity** *Using Simile to handle disaggregation and individual-based modelling* Robert Muetzelfeldt – University of Edinburgh / Simulistics Ltd Jasper Taylor - Simulistics Ltd *Ventity and entity-based System Dynamics modelling* Lee Jones (Ventana UK)
10:45	Coffee break
11:00	**Session 2 - Web-based modelling** *Sysdea and web based modelling* Kim Warren (Strategy Dynamics Ltd) *The Systo toolkit for building modelling-enabled web pages* Robert Muetzelfeldt (University of Edinburgh / Simulistics Ltd)
12:30	Round table discussion
13:00	Buffet lunch and PhD Poster session
13:30	Chapter AGM This short session will report on the status and activities of the UK Chapter, and provide an opportunity to elect new representatives to the Policy Council
14:00	Student presentations and student prize award
16:00	Close

Introduction

Welcome

A warm welcome to all delegates at our 2015 Annual Conference. This year has a theme of Public Policy for Innovation and Finance' and comprises six talks on Thursday afternoon from several perspectives in applied consultancy work and research. Additionally, I will provide an update on the UK Chapter Strategy and also news on current and potential future prospects for system dynamics in the UK. On Friday morning we have an interactive workshop based on innovations in SD software.

I would like to thank the UK System Dynamics Policy Council for their contribution over the last year and for helping to arrange this event.

Many thanks and hope you enjoy the conference.

Dan Arthur (President of the UK Chapter of the System Dynamics Society)

UK Chapter of the System Dynamics Society policy council

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Presentation Abstracts

Using Systems Thinking in Public Policy: The experience of the Munro Review of child protection

David Lane (Henley Business School)

This paper gives an account of how systems thinking was used in 'the Munro Review', a high-profile examination of child protection activities in England, conducted for the Department for Education. The activities constituting 'child protection' and the circumstances that led to the Munro Review are outlined. Two examples of the use of CLDs are then considered: the visualisation of how a 'compliance culture' had grown up and, via group model building, the creation of a large, complex CLD of current operations. The paper continues by describing how this work was then used to give structure to the range of issues the Review had to address, and used as an organising framework for the final recommendations. The paper closes with an account of some significant steps that have been taken so far to create a child protection system with the critically reflective properties of a learning organisation, and a reflection on how the use of systems thinking helped bring this about.

David C Lane is Professor of Business Informatics at Henley Business School. He specialises in strategic analysis using system dynamics and systems thinking. He works interactively with groups of senior managers to help them express their ideas in the form of a system dynamics-based simulation model. The model and the facilitated process help managers to think through the long-term policies of their organisation.

His theoretical work concerns the contribution that system dynamics can make to the formalisation of certain concepts arising in social theory. His practical interests include: healthcare management; the creation of marketing strategies for cinema films, child protection and the dynamics of project management.

David Lane has mathematics degrees from Bristol and Oxford Universities and a Doctorate in mathematical modelling also from Oxford. He was a consultant in Shell International and a marketing manager in Shell UK. Before joining Henley he was a faculty member at City University Business School and then London School of Economics and Political Science. He has consulting and executive education experience in a wide range of commercial and public sector/government organisations.

In 2005 David Lane received an LSE award for outstanding performance and innovation in teaching and in 2008 he received a student-nominated LSE Students' Union Teaching Excellence Award.

In 2004 he was elected Fellow of the Operational Research Society for "outstanding contributions to the theory and practice of OR", and in 2007 was awarded the System Dynamics Society's Jay Wright Forrester Award "for the best contribution to the field of system dynamics in the preceding five years". In 2010 he was appointed as an Advisor to the Munro Review of Child Protection for the Department for Education. In 2011 David Lane served as President of the System Dynamics Society. In 2014 he received the Operational Research Society's President's Medal for the application of systems modelling approaches in the child protection sector.

System Dynamics and Group Model Building for Public Policy – some examples of the use of SD and GMB at the Ministry of Security and Justice in The Netherlands

Rian van Gulijk-Boon(Dutch Ministry of Security and Justice)

Willem Stapel (Dutch Ministry of Security and Justice)

The Dutch Ministry of Security and Justice has a specialized multidisciplinary in-house consultancy team that deals with complex policy issues. The team regularly use System Dynamics and Group Model Building to estimate possible effects of new policy measures (ex-ante impact analysis). For many different issues, SD and GMB have been used to gain an insight in the effects on workload in the criminal Justice Chain or to estimate possible outcome. These issues vary from Home Detention Curfew to raising Court Fees, and from Road Pricing to taking DNA-samples from convicted criminals. The presentation will show two real-life cases in which these methods have been applied..

Rian van Gulijk-Boon studied Public Administration and Marketing. She joined the System Dynamics Team at the Ministry in February 2014. Before that, she worked as a Fraud Investigator (Rabobank) and Project Manager (National Statistics Office). Recently, Rian moved to West-Yorkshire (UK). She now combines her extensive experience in the Public and Private Sector with her knack for communication, working as a Copy Writer for her own company: Boon Copywriting. She also teaches "Dutch for English Speakers".

Willem Stapel studied Consumer Science at Wageningen University and Public Administration at Tilburg University. Since 2006 he has been working at the Ministry of Security and Justice. He joined the System Dynamics Team at the Ministry in august 2008.

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Systems mapping for international benchmarking of the UK science and innovation system

Ian Mitchell (UK Government: Department for Business Innovation and Skills)

Ian Mitchell has worked in Operational Research (OR) since 1988 using systems based approaches since 1993. As an independent OR consultant Ian used Systems Thinking to shape a study on telecommunication satellites for the European Space Agency. He joined the Defence Research Agency at Fort Halstead in 1994 and led OR studies, moving to Porton Down in 1998 to manage force protection studies until 2000 when he was seconded to Whitehall. He sponsored the Capability System Model to audit force protection capability. From 2004 he supported capability management across domains including naval systems, joining the OR Unit at the Department for Business Innovation and Skills in 2010. He has provided analytic support using systems approaches for clients across BIS, including Director General Tera Allas in her study of Science and Innovation evidence.

Ian served on the Council of the UK OR Society from 1994 to 2000 and 2002 to 2012, as Vice-President 2003 - 2005 and Treasurer 2007-2012. Ian was a Town and District Councillor as of 2003 and was the Mayor of Amesbury, the home of Stonehenge for 2013. He is leading the development of the Neighbourhood plan and is keen to develop systems approaches to support this.

Systems change in theory and practice

Geoff Mulgan (Nesta)

Geoff Mulgan took over as CEO of Nesta in 2011, and since then has moved it out of the public sector and significantly increased its work in investment, research and innovation programmes. Between 1997 and 2004 Geoff had various roles in the UK Government including Director of the Government's Strategy Unit and head of policy in the Prime Minister's office. From 2004 to 2011 Geoff was the first Chief Executive of the Young Foundation. He was the first director and co-founder of the think-tank Demos; Chief Adviser to Gordon Brown MP; lecturer in telecommunications; investment executive; and reporter on BBC TV and radio. He is a Visiting Professor at LSE, UCL, Melbourne University and a regular lecturer at the China Executive Leadership Academy. He is an adviser to many governments around the world. He is also currently chair of the Studio Schools Trust and the Social Innovation Exchange. His most recent book is 'The Locust and the Bee', Princeton University Press, 2013.

Systems thinking and system dynamics in international development

Ben Ramalingam (Overseas Development Institute)

Ben Ramalingam is a researcher, consultant and writer specialising in international development and humanitarian issues. His portfolio of work spans innovation and technology, humanitarian assistance, sustainability and resilience, ecosystem services, state fragility, economic development and global health. His work on innovation includes provision of advice to USAID leadership on systemic innovation in development; work with Nesta on the state of innovation efforts in development; advising DFID's work to set up a series of in-country innovation laboratories; work on innovation systems in aid; research on global digital networks for infectious disease efforts, and being an advisory panel member on innovation for the UN Secretary General's 2016 Summit.

Ben is author of [Aid on the Edge of Chaos](), a bestselling 2013 book on complex systems approaches and international aid published by Oxford University Press. He is also founder and chair of the Humanitarian Innovation Fund, the first ever fund for operational innovations in disaster responses. In his previous role as Head of Research and Development at ALNAP/ODI, he led a team of researchers, communications specialists and consultants to develop and implement a programme of research aimed at improving aid effectiveness through innovation, learning and accountability.

Ben was previously deputy director of the Humanitarian Futures Programme at Kings College, and also set up and led the knowledge and learning programme at ODI. Prior to joining the development sector, he worked in strategy consulting and investment banking.

Ben is affiliated with the London School of Economics, the Overseas Development Institute, the Institute of Development Studies, the Royal Veterinary College and the Centre for Research on Innovation Management.

Minsky: Extending System Dynamics to easily handle financial flows

Steve Keen (University of Kingston)

The standard system dynamics flowchart paradigm is poorly suited to financial flows since, ideally, each flow needs to be recorded against four different system states, and signed positively in two cases and negatively in the other. Minsky (see https://sourceforge.net/p/minsky/) was developed to overcome this limitation by using double-entry bookkeeping tables—called "Godley Tables" in honour of Wynne Godley.

Future development plans include extending these tables to multiple dimensions (to support multi-sectoral modelling of production) and multiple system instances (to support multi-country modelling).

Professor Steve Keen is Head of Economics, History & Politics at Kingston University, author of Debunking Economics (http://www.amazon.co.uk/Debunking-Economics-Revised-Expanded-Dethroned/dp/1848139926/). He blogs at www.debtdeflation.com/blogs, has a Forbes column (http://www.forbes.com/sites/stevekeen/) and about 70 academic publications.

Friday Interactive Workshop:

Using Simile to handle disaggregation and individual-based modelling

Robert Muetzelfeldt (University of Edinburgh / Simulistics Ltd)

Jasper Taylor

Many SD models require the ability to handle multiple similar objects. This is sometimes referred to as disaggregation when you divide some component into parts - for example, a hospital into wards - or as multiplicity, or individual-based modelling, when you extend a model of one object to have many such objects - such as a regional healthcare model with several hospitals. In reality, these are just two sides of the same coin. Conventional System Dynamics software uses Fortran-style arrays for handling the variables associated with these objects, but this has long been an outdated approach, and one which hides the object-based nature of the problem.

In the area of software engineering and databases, object-orientation has been around for decades, and provides a more natural and elegant way of handling problems like this. You have one type of object (say "Ward" or "Hospital"), with several properties, then simply specify that there are a number of these. This is a lot easier and more intuitive than having to declare that each variable is an array.

Simile (http://www.simulistics.com), has been in use for some 15+ years, and was developed specifically to combine SD with the ability to express disaggregation/multiplicity in an object-based manner. The key addition to conventional SD software is the "multiple-instance submodel". You define how one object works in SD terms, wrap it up to make a submodel, then simply set the number-of-instances property to (say) 10000. Simile can now simulate the behaviour of 10000 separate instances. So, one could for example have a multiple-instance "Ward" submodel, nested inside a multiple-instance "Hospital" sub-model. Associations between objects are possible: for example, one could add into this healthcare model a district-based zonal model of the city each hospital is in, and model the proximity of a hospital to the districts it serves. Combined with a highly-efficient simulation engine (it generates and compiles models as C++ code for running simulations), this allows Simile to handle problems with very complex patterns of disaggregation.

Robert Muetzelfeldt was until 2002 a lecturer in ecological modelling in the Institute of Ecology and Resource Management at the University of Edinburgh, with a particular interest in the methodology of ecological modelling and the development of software tools to improve the practice of building and using models. This included links for many years with the AI department in Edinburgh, exploring the possibility of developing expert systems to help people build models. During this time he led the project to develop Simile, the SD- and object-based modelling software used in a number of international projects. [Disclosure: Robert is a director and shareholder in Simulistics Ltd, which markets Simile.] He took early retirement in 2002 in order to pursue this interest as an "independent academic", and now concentrates on the development of web-based modelling tools.

Ventity and entity-based System Dynamics modelling

Lee Jones (Ventana UK)

Through practical demonstration, we describe a new platform for system dynamics modelling that supports detailed and object oriented modelling while preserving attractive features of existing tools, including a completely declarative language with a graphical representation.

New concepts supporting this platform include collections of entities, attributes, relationships, aggregation and allocation functions, and actions, which are presented with examples.

The design facilitates modularity and collaboration, provides a more natural description of detail than arrays, and solves sparse matrix problems. It has application to both traditional system dynamics, with modular sectors, and to agent based modelling.

http://vensim.com/vensims-new-partner-ventity/

Lee Jones is co-founder and owner of Ventana Systems UK, a consultancy dedicated to the application of System Dynamics in support of organisations around the world. With 22 years SD experience, Lee works with business and government in North America and Europe, supporting strategy development and policy making, and provides workshops in Vensim and System Dynamics in the United Kingdom. Lee is a Policy Council member of the UK Chapter of the System Dynamics Society. http://uk.linkedin.com/in/leejones66

Sysdea and web based modelling

Kim Warren (Strategy Dynamics Ltd)

Although existing system dynamics software tools are powerful and have proven very useful, this session will explain some remaining opportunities for improvement. If addressed, these improvements might both speed the building of good models and make the method more accessible to newcomers. Included in these improvements is the provision of truly on-line solutions, which free users from the problems caused by varying operating systems and download/update issues. However, producing truly workable online software brings challenges of its own, which will be explained, and a solution demonstrated - see www.sysdea.com and help.sysdea.com.

Kim Warren is an experienced strategy professional, teacher and writer. After 15 years in senior strategy roles, Kim joined the faculty at London Business School, teaching on MBA and Executive programs. Realising serious limitations with the strategy methods available, he developed the powerful strategy dynamics frameworks. He is author of the prize-winning *Competitive Strategy Dynamics* (Wiley, 2002), a major strategy textbook *Strategic Management Dynamics* (Wiley, 2008), and e-book summary of the method – *Strategy Dynamics Essentials* (Kindle, 2011). Most recently, his work has proved directly transferable to non-business domains, including poverty, disaster-preparedness, quality-of-life and international development – see for example a series of presentations on Aid for Trade – plus frameworks for Private Sector Development in emerging countries, for the UK Department for International Development.

The Systo toolkit for building modelling-enabled web pages

Robert Muetzelfeldt (University of Edinburgh / Simulistics Ltd)

The aim of Systo (http://www.systo.org) is to make it easy to build web pages which support interactive modelling: viewing, building and editing models, and running simulations.   Some of these pages might look rather like a conventional web page describing a specific model - with the model diagram, equations and graphs - except that all these elements can be interactive rather than static images: you can manipulate the diagram, or run simulations live. Other pages might look rather like a conventional System Dynamics modelling tool, and provide the ability to build new models from scratch, save/load models, and explore the behaviour of the resulting models.

The basic idea is to have a toolkit of "widgets" (a combination of user-interface and underlying code), each of which performs some standard task.   For example, displaying/editing the model diagram; listing model equations; providing sliders for model parameters; and plotting results.   A web page developer can, with very little HTML, design their own page layout using whatever widgets they want to include.   In addition, anyone (with some coding ability) can make their own widget, to improve an existing one or provide some new feature.   The end result will be a blossoming of resources on the web offering access to models and modelling, and a stimulus to creativity as people think of new and exciting ways to interact with System Dynamics models.

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Student colloquium

Presentations

Update on state stability; introducing the Counter Terrorism and Security Act 2015

Dave Carter (Plymouth University)

Interdependencies between the long-term supply capacity investment decisions of the power and gas industries: the case of the United Kingdom

Donna Peng (Delft University of Technology and Comillas Pontifical University)

Understanding the impact of 'Cycle Superhighway" policy in London using a system dynamics simulation model

Mariana Hernandez (Nijmegen University)

Posters

Informing renewable energy policy in hydrocarbon-rich countries using system dynamics approach: The case of Oman

Aisha Al-Sarihi (Imperial College London)

Causal loop diagram of freight transport system in Laos

Daosadeth Soysouvanh (University of Leeds)

System Dynamics and the development and utilization of isolated island electricity systems

George Matthew (Open University)

Dynamics of school choice problem: Multiple agency views

Dave Carter (Plymouth University)

How can the diffusion of domestic energy-efficient renovations be accelerated? How occupiers make their decisions to proceed with energy efficiency renovations?

Yekatherina Bobrova (University College London)