Exploring System Behaviour Using Model Structure

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A central premise of system dynamics is that dynamical behaviour can be explained by model structure, especially its feedback loops. For example the familiar S-shaped growth of the limits-to-growth archetype is explained using shifting loop dominance. Although such an explanation appears clear, what is less clear is how a loop is quantified, how dominance is defined, and what aspect of dynamical behaviour is being explained. These issues become more pronounced as the number of variables and feedback loops increases. A number of loop dominance tools have been developed to analyse such complex models, but they are highly technical and are perceived to have steep learning curves.

The purpose of this workshop is to bring the ideas of loop dominance analysis to mainstream system dynamicists. Participants will be invited to explore a number of models using specific definitions of behaviour, structure and dominance and compare them with their own understanding of the model's behaviour. Participants will be encouraged to work in groups and share ideas. No mathematics, programming or system dynamics software is required. Participants only need access to a laptop with an internet connection to use the online models provided. Models will remain online for those who wish to revisit the material after the conference.

John Hayward is a Visiting Research Fellow at the University of South Wales, pursuing research in mathematical sociology with applications to the spread of social phenomena, particularly church and political growth. He is a member of the History Working Group of the Psychology and Human Behaviour SIG of the System Dynamics Society seeking to construct models that cross the boundaries of many academic disciplines. He is also active in designing analytical methods for model analysis and loop dominance.

John started his academic life in astrophysics obtaining a PhD in general relativity from the University of London and subsequently working in solar physics. He switched to a lecturing career in mathematics, specialising in mathematical modelling and software engineering. For the last fifteen years before retirement from lecturing he taught system dynamics on the final year of a mathematics degree and supervised a number of PhD students in social modelling.