

## Workshop on System Dynamics, 14-15 February 2012

Sponsored by the Program in Health Services and Systems Research, Duke-NUS Graduate Medical School through an NMRC grant awarded to develop capacity in System Dynamics in Singapore

### **Title: System Dynamics in Action**

**Overview:** System Dynamics (SD) is a theory-building methodology that identifies physical and social feedback structures to frame, understand and analyze dynamically complex situations. Employing computer-based models, SD simulates how the structure of a system determines behavior and outcomes. From the personal to the societal level we are subject to patterns of behavior that are unexpected, undesirable and often incomprehensible. The application of SD methodology reveals the interconnections of a system that help explain the counterintuitive performance of these complex systems. Tracing its roots to the study of organizational behavior, SD is widely applied in policy analysis and the design of management structures for social systems.

**Objective and learning outcomes:** The objective of the course is to offer potential users of System Dynamics the opportunity to see it applied to real situations and experience the problem solving approach SD is based upon. There will be two tracks:

1. A qualitative track that will enable facilitated discussions of applied system dynamics. This will include individual and group learning using the methodology; with application to local, national and global issues.
2. A quantitative track that will involve hands-on model building, testing and analysis. Participants will develop a simulation model for a hypothetical project to look at the effects of quality, changing goals, schedule pressure and resource constraints on performance. Projects, whether paying bills or building a subway, are one of the most pervasive human activities and the insights this work generate are surprisingly universal.

By the end of this course, participants in the qualitative track will have a better appreciation for the System Dynamics method and will be able to recognize problems for which it could be usefully applied. Participants in the quantitative track will have experienced the complete model development and analysis process and understand what is required for the rigorous application of the System Dynamics methodology.

**Target audience:** The course is designed for policy makers, analysts and researchers who are faced with or investigate difficult problems that evolve over time. The course will not focus on a specific subject area, but show how insights and learning related to structure and performance can be applied to a wide variety of issues.

### **Course faculty:**

#### **Dr. James Thompson**

Jim Thompson heads the Health Care Systems Design Laboratory for the Health Services and Systems Research (HSSR) Program at Duke-NUS Graduate Medical School. Prior to coming to Singapore, Jim worked as a consultant for various organizations, and applied System Dynamics methodology to help clients define and resolve persistent strategic issues. Among his many projects, he created simulation models of the U.S. and European health care systems used in trend forecasting and policy analysis. While at Cigna, he advised pharmacy and other medical technology coverage committees on the economic impact of new products and services in many therapeutic areas. Before joining Cigna, Jim worked with Ventana as co-consultant and liaison with a national strategy consulting firm. He has consulted in North America and Europe in electronics, aerospace, finance, chemicals, pharmaceuticals, and government organizations. Jim's special research interest is in how clients learn to solve complex dynamic problems.

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### **Dr. Robert L. Eberlein**

Bob Eberlein has a broad range of experience in helping organizations understand and address complex business social and problems. As a founding member of the System Dynamics Society he has been active in the field, and with the Society, since 1984. He has extensive experience in using dynamic models to address problems in project management, economic development, manufacturing, marketing, telecommunications, retail sales, equipment maintenance. Dr. Eberlein was the primary architect and developer of the VensimR software from its inception through 2010. He has also developed software systems for spare parts management, stock fulfillment and created the conference management software used by the System Dynamics Society. He is Vice President Electronic-Presence and a past President of the System Dynamics and teaches a graduate course in model analysis techniques at Worcester Polytechnic Institute.

### **Dr. George P. Richardson**

George Richardson's teaching and research center on computer-based tools and analyses for public administration and policy. His recent work has focused on public policy problems in social welfare and the use of formal computer-based modeling methods to help groups move toward policy consensus in complex dynamic systems. He founded and served for seven years as the executive editor of the System Dynamics Review and is the author of *Introduction to System Dynamics Modelling with Dynamo* (1981), *Feedback Thought in Social Science and Systems Theory* (1991), both of which were honored with the System Dynamics Society's Forrester Award, and the edited two-volume collection *Modelling for Management: Simulation in Support of Systems Thinking* (1996). Professor Richardson has received numerous awards for Excellence in Academic Service and, most recently, the Outstanding Service Award from the System Dynamics Society in recognition of his lifetime volunteer contributions to the Society (2011).

### **Dr. John Richardson**

John Richardson has pioneered computer modeling to study long-term global problems involving relationships between population, resources and environment. Dr. Richardson was an early contributor to field of global modeling, under the auspices of the Club of Rome, and played a major role in the global modeling "clearing house" activities organized by the International Institute for Applied Systems Analysis. His publications on global modeling are widely regarded as definitive. He co-authored books with Elizabeth Neeld, Donella Meadows, Ted Howard, Joan Holmes, F.A. Praeger, and Gerhart Bruckmann including *Groping in the Dark: The First Decade of Global Modeling*, *Making it Happen: A Positive Guide to the Future*, and *Ending Hunger: An Idea whose Time Has Come*. Dr. Richardson's current work focuses on the causes of political conflict in Third World nations and non-violent strategies for development.

### **Karan Khosla**

Karan Khosla has been using SD to help non-governmental organizations design strategies by modeling their often complex relationships with stakeholders; he also uses SD to study various issues related to sustainable development such as, natural resource management, the effect of population on climate change and the diffusion of renewable energy products in emerging markets. Recognizing the need for a more rigorous approach to sustainable development theory and practice, Karan started EarthSafe Enterprises in 2009. The consultancy wing of EarthSafe aims to apply systems principles and mathematical modeling to design resource efficient policies and services for public and private sector organizations in developing countries. He is a member of the Board of Directors of the Balaton Group, a founder member of the System Dynamics Society of India, and Director of System Dynamics at the Systems Research Institute of India.

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### Program outline:

Day	Date	Title	Time
1	14 Feb	Introduction Applying System Dynamics Modeling for Insight	8.30am – 12pm
1	14 Feb	Parallel tracks: Hands on model building, testing and analysis Influential models – the how and why of having an impact How we learn – case studies in applied system dynamics	1pm - 3pm
1	14 Feb	Parallel tracks: Hands on model building, testing and analysis (continued) Technocratic successes and mistakes – forty years of practice Using system dynamics in community settings	3.30pm- 5.30pm
2	15 Feb*	Parallel tracks: Influential models – the how and why of having an impact How we learn – case studies in applied system dynamics	8.30am – 10am
2	15 Feb*	Parallel tracks: Technocratic successes and mistakes – forty years of practice Using system dynamics in community settings	10.30am – 12pm
2	15 Feb	Wrap up session	12pm – 1pm
2	15 Feb	Hands on model building, testing and analysis (continued)	2pm – 5pm

\*By repeating parallel sessions, participants in the Qualitative Track can attend all sessions and participants in the Quantitative Track can attend at least two of the qualitative sessions.

*A more detailed Program will be sent to registered participants.*

**Venue:** Introductory session: Duke-NUS Amphitheatre, 2<sup>nd</sup> Floor  
Duke-NUS GMS, 8 College Road  
Singapore 169857

Parallel sessions: Duke-NUS meeting rooms

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### Course fees:

S\$500

Course fees include course materials, lunches and tea breaks.

There are a limited number of scholarships, including travel and accommodation for those not in Singapore, available for students and researchers. Applicants should indicate that they would like to apply for a scholarship on the registration form. Scholarship recipients will then be selected by a Duke-NUS selection committee.

To confirm your place, we would appreciate receipt of the attached registration form along with payment by 1 January 2012. The payment options are:

1. Check (crossed, for Singapore delegates only), payable to *NUS (GMS)*.
2. Bank Draft, payable to *NUS (GMS)*.

Please send the registration form along with the check or bank draft to:

Amina Islam, HSSR Program 4<sup>th</sup> Floor, Duke-NUS Graduate Medical School 8 College Road Singapore 169857.

Registration is on a first come first serve basis. For more information, please contact the course coordinator Amina Islam by email at [amina.islam@duke-nus.edu.sg](mailto:amina.islam@duke-nus.edu.sg) or by telephone at 65-65165462.

Course fees will not be refunded in the event of withdrawal. Substitutions may be permitted, contingent to approval by the course coordinator. Any replacement must be conveyed via email by 30 January 2012. The organizer reserves the right to cancel the course and fully refund the fee in the event of unforeseen circumstances.

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### Registration Form

Name	
Title	
Department	
Organization	
Contact details	Email: Address: Telephone:
Areas of research interests	
To apply for a scholarship please write a short statement of why you are interested in participating and how it will benefit your research or studies. You may attach this as a separate document if you wish.	