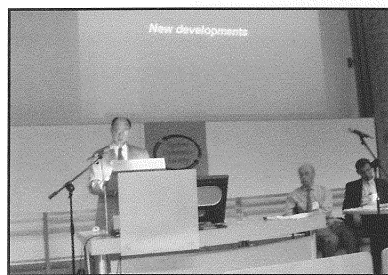


Jay W. Forrester – Operational Researcher Creator of the System Dynamics Field Joins IFORS' OR Hall of Fame

Stefan N. Groesser and David C. Lane

A surprise was sprung on attendees at the 2006 International System Dynamics Conference, held in Nijmegen in July. The fields of Operational Research and System Dynamics acknowledged each other in a session which climaxed with the news that the International Federation of Operational Research Societies had inducted Jay Wright Forrester, the creator of the System Dynamics field, into its OR Hall of Fame – and Forrester responded by emphasising how operational researchers and system dynamicists both work to improve the world.



David Lane announces J. W. Forrester's induction.

A seemingly innocuous looking session at the 2006 International System Dynamics Conference, held at Radboud University, in Nijmegen, The Netherlands, had David Lane from the London School of Economics give a plenary session on "System Dynamics and Operational Research: Common Foundations and New Developments". During the first part of his presentation, Lane explored the similarities between System Dynamics and Operational Research using three examples concerning the creation of military defensive systems. Choosing a member of the IFORS' Operational Research Hall of Fame, his first example was Pat Blackett, Nobel Prize winner in physics and "The Father of OR". Using his natural scientific training, he worked on the air defence system of the UK in the run

up to World War Two, eventually contributing to the creation of a system which used radar sighting data to direct fighter aircraft and anti-aircraft guns to repulse attacking German bombers.

Forrester was the second example. During that same war Forrester was to use his knowledge of servomechanism theory to build devices to control ship-mounted radar antennae and to guide anti-aircraft guns using radar data. Then, in the 1950s, he was central to the creation of the SAGE air defence system which used a network of radar stations and digital computers to control fighter aircraft and missiles with the aim of repulsing attacking Soviet bombers. Magnetic core memory, Forrester's invention, was a central element of this system. For his final example Lane presented his candidate for the title 'first operational researcher': Archimedes. Asked during the Second Punic War to develop military means to support Syracuse against Roman attack by the 22nd and 23rd legions, Archimedes used his understanding of levers, pulleys and the stability of floating bodies to develop military devices to hold off the attacking fleet of Roman general Marcellus.

The same roots of the field of System Dynamics and Operational Research lead to a strong overlap in ideas that the fields display in their modern form. Blackett, Forrester and Archimedes have contributed significantly to the development of not only their fields but also the society in general. At this point in his talk David Lane turned to the subject of 'new developments' in the relationship between OR and SD – and the purpose of his session became clear. By special arrangement with IFORS, he was able to announce at ISDC2006 that Jay W. Forrester had been made a member of the IFORS' Operational Research Hall of Fame. Lane described the purpose of the Hall of Fame. Then, using excerpts from the

formal announcement article due to appear in the IFORS journal *International Transactions in Operational Research*, he described the contributions that Forrester was judged to have made to OR that had lead IFORS induct him to membership.*

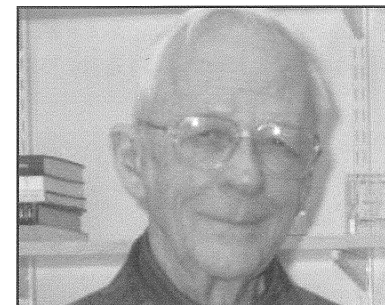


Nathan Forrester reads a response on behalf of his father.

"Creator of the system dynamics modelling technique and a life-long practitioner and advocate of its use to promote long-term policy analysis, learning about complex organizations and the redesign of such organizations."

Jay Wright Forrester's distinguished career at MIT led to his founding the field of system dynamics. By adapting servomechanistic ideas he created a new approach to simulating the behavior of social systems, to explaining that behavior and to crafting effective long-term policies. He established the subject as an academic discipline at MIT's Sloan School and led high-profile modeling studies himself. System dynamics is now one of the most widely used systems approaches in the world, with academics and practitioners on every continent, and interest, applications and publications all growing. Forrester's writings continue to inspire the field and he remains actively involved in its development."

Nathan Forrester then read a response on behalf of his father. In his response, Forrester expressed his surprise and appreciation to IFORS for the honour of being added to their OR Hall of Fame. He also thanked David Lane for his presentation, observing that until he had read its text he had not known



Jay Wright Forrester, in his study at MIT in 2002.

that he was a professional descendent of Archimedes. System Dynamics, he acknowledged, was like Operational Research, in that both deal with operations and how to improve the way a system functions. However, he went on to elaborate the differences between the both fields. He saw OR as a varied collection of techniques from which one can choose the approach that fits a problem. In contrast, System Dynamics is a more unified field based on several underlying principles. He identified these as: (1) changes through time are caused by feedback loops; (2) only the two concepts of stocks and flows are necessary to represent system elements; (3) System Dynamics is an experimental approach conducted via

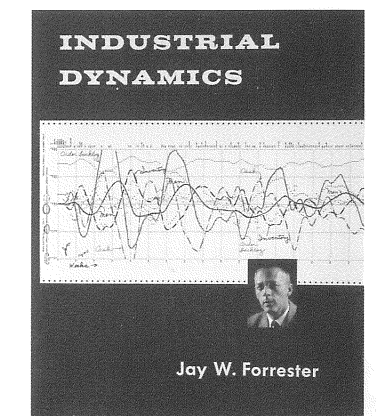
computer simulations; (4) System Dynamics models are based not only on historical time series data but also on mental databases; (5) in conceptualising systems in terms of integration rather than differential equations, System Dynamics yields models that are easier to understand; and (6) in particular contrast to statistical approaches, the establishment of confidence in a System Dynamics model is achieved by a very broad range of tests. Whilst OR and System Dynamics "have been running on rather separate and parallel tracks", Forrester observed that individuals from both fields had increasingly been using to advantage ideas from the other. He looked to further cooperation and exploration of the overlap between Operational Research and System Dynamics. Forrester closed by saying that he viewed his induction by IFORS as an acknowledgement of how the two professions could work together to create a better world.

* The full article which officially records Forrester's induction and which gives an account of his contributions is published as: Lane DC. 2006. IFORS' Operational Research Hall of Fame - Jay Wright

Forrester. *International Transactions in Operational Research* 13: 483-492.

The IFORS' Operational Research Hall of Fame currently has 23 members. For information on the purpose of the scheme, and to find out more about these pioneers of Operational Research, go to <http://www.ifors.org/hall/>

Stefan N. Groesser, University of St. Gallen, Switzerland
David C. Lane, London School of Economics and Political Science, UK



Forrester's writings continue to inspire the field.

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