A Speech by Lord Julian Hunt following the GSD Conference Dinner

July 2nd 2009, The House of Lords

I welcome our distinguished guests to this occasion, a meeting of the Global System Dynamics Coordinated Action project, which is being generously funded by the European Commission through the Future and Emerging Technologies Open programme. I regret that there is no EU flag flying outside our Parliament building, which I have to explain is because the UK's membership of the EU still remains controversial.

Over its long history since 1265, members of both houses of our Parliament have included leading scientists, including Sir Isaac Newton (whose only recorded words were "please close the window") and Sir George Stokes, who respectively were Members of Parliament for the City and for the University of Cambridge. Some of our greatest physicists, Kelvin, Rutherford and Rayleigh, were Menbers in the House of Lords. As I have read and also witnessed myself, Parliament is the scene of important debates on all aspects of science and science-policy. Some recent discussions have been on animal experiments, stem cells, the environment and climate change.

Today we are here to consider how decision-making in the political sphere might improve with the aid of systems modelling. Much current decision-making is based on a mixture of ideological, democratic, and economic principles, with any references to prediction usually being based on historical examples. The limitations of these approaches have led governments and businesses to experiment with new methods, some of which were reviewed in a recent 'Futures & Foresight' UK government report.

It was first proposed in the 19th century that mathematics and science could be applied to policy. This began with statistician Karl Pearson, famous for inventing correlations and his statistical laboratory for processing data at University College London (UCL). To do this, Pearson used about 20 human 'computers', a forerunner of Lewis Fry Richardson's pre-electronic concept of 64,000 humans doing meteorological calculations in a space like the Albert Hall.

Later in the 1920's Richardson extended his mentor Pearson's analysis of society by applying the differential equations of physics to deterministic modelling of how wars began from arms races. Richardson, like Marx and Engels, scoffed at the usual 'great leader' theory of history. But perhaps our recent understanding of chaos might make us less assertive; surely there are critical conditions (which these equations describe) under which great leaders might emerge and have a substantial impact on events. Our colleague Prof. Nowack from Warsaw, is working on these issues. The U.S. defense department continues to apply modelling for its strategy and planning but with mixed success. Indeed it led some leading politicians in the 1980's to describe it as 'garbage in and garbage out'.

In recent years economics modelling and prediction have become central to policies and politics of governments. Similar methods are being applied by business and social programs, as our speakers explained today.

Our challenge now is to consider how this multi-science, complex modelling can address the national and international problems where long-term, deliberate policies are based on simultaneously considering economic, environmental and social questions. This is accepted as the only realistic approach for analysing and finding solutions for the major problems of climate change, energy, sustainability, societal dysfunction and many aspects of health.

The use of systems methods for complex policy leads decision makers to ask new questions and require new data; for example considering how the connectivity in an organization affects creativity on the one hand and managerial efficiency on the other, or the different types and levels of uncertainty in input and output data, and how the organization relates to feedback from those affected by its activities. The complex systems approach is a way of thinking; it is far from being just a collection of many computations. Potentially this approach provides a more transparent, integrated and more rational way for governments to explain their policy decisions.

As Professor Sir Alan Wilson of UCL has written, complex systems analysis is an effective framework for enabling models developed in one field to be applied in other fields, through such concepts of mathematical physics as scale independence, diffusion, shocks, Euler's abstract networks, Lighthill's wave analogy (think traffic jams), and unpredictable bifurcations – characteristic feature of all political systems whether top-down or bottom up. As Poincaré, the father of chaos theory, implied in 'Science and Method', concepts are better understood when they are widely applied.

The recent EU-China seminar in Beijing in May 2009 on Integrated Systems and Policy showed that the GSD approach enables very contentious issues to be discussed in a systematic and unemotional way. We focused on energy policy and climate change. We learnt how China's technocrats envisage a very different picture of the climate of 2100 than current political and IPCC discussions reflect, i.e. double or even triple their current emissions, with concentrations of green house gases rising well above 550ppm.

As we look forward from our discussions, we see that researchers and users of complex systems are on the threshold of exciting intellectual and practical progress in the study of the behavior of common types of national and social phenomena. This will only be successful if we broaden education and research. Paul Wiles, chief scientist at the Home Office, commented today on universities' conservativeness about knowledge. They need to reconsider how to apply their knowledge and in doing so look for new kinds of policy solutions. The use of complex systems modeling for decision-making is as controversial now as making predictions about weather and climate used to be 30 years ago. With sustained international collaboration it will become an accepted part of the modern world, Alfred North Whitehead suggested in his Science and the Modern World in 1925.

You will see another visionary when you leave tonight and notice the athletic statue in Parliament Square of Jan Christian Smuts, Prime Minister of South Africa, graduate of Stellenbosch and Cambridge Universities, who in 1926 was the author of the extraordinarily original book on holistic complex systems. This clearly influenced him in 1945 as he helped draw up the visionary charter of the United Nations – an organisation that could still perhaps do with a bit of help from systems philosophy today.