Ralph Dum

Complex system modelling for policies: How can modelling impact policies?.

It is by now recognised that tools from mathematics and computer science will form the basis for new breakthroughs in biology (system biology and computational neuroscience mainly) and at the same time stimulate new ideas and concepts in mathematics in the same way as physics stimulated such concepts in the last century. As Joel Cohen (Rockefeller institute) succinctly put it: *'Biology is mathematics next physics''*

It seems timely to go one step further and to ask *'Is sociology mathematics' next biology?*' Mathematics is now routinely used to investigate socio-economic systems: dealing with uncertainty, agent representations that reflect the heterogeneity of social systems etc. are defining new research agendas in mathematics and open new perspectives for social sciences. Can tools of mathematics and computer science help in better understanding and better guiding the evolution of social systems or more specifically what is the role of modelling in policy decisions?

Decision processes in society are complex processes that often take a dynamics of their own or as Hubert Vedrine has put it*: 'Policy is not Nescafe'.* Values, norms, and culture influence societal reactions to perceived challenges and often do not allow to react efficiently to identified threats like for instance climate change (see Joseph Tainter, *'Collapse of complex societies'*). Can modelling provide insights into the decision processes (societal and political) and provide hints how to overcome 'systemic failures' of societies to react?

More generally, complex systems research is an attempt to decipher the characteristics of highly entangled (interdependent) systems. Clearly, ecological and social sustainability can not be handled independently. Environmental risk, mitigation of climate change is intimately entangled with issues of poverty, food supply and social stability. Can modelling in climate change issues be extended to models of social and economic impact of climate change? Can we extend IPCC to an International Panel for Climate *and Social* Change?

The network *'Global system dynamics and policies'* brings together researchers from various disciplines that try to answer the above and related questions regarding the role of information technologies: For instance, how can information technologies help deliver the right signals to society that convey the urgency of a situation? This network – funded by the Future and Emerging technologies unit of the European Commissions - will attempt to establish a research agenda and best practices that would lead to a stronger synergy between modelling and policy making.