Steven Bishop

Professor of Mathematics
University College London

Global System Dynamics and Policies :
simulation and visualisation technologies

Project Details

- **Coordinated Action Award
  Funded by the European Commission**
- **Seventh Framework Programme for
  Research under Future and Emerging
  Technologies (FET) Open Programme of
  the research area in Information and
  Communication Technologies**
- **Grant Number : 221955**
- **The EC contact is Dr Ralph Dum**

Partners

- **Steven Bishop (Coordinator) –** University College London (UCL), **UK**

- **Julian Hunt –** House of Lords, **UK**

- **Bert de Vries -** Environmental Assessment Agency and Copernicus Institute for Sustainable Development and Innovation of Utrecht University, **Netherlands**

- **Klaus Hasselmann –** Max Planck Institute of Meteorology, **Germany**

- **Kristian Lindgren –** Chalmers University, **Sweden**

- **David Wasdell –** Apollo Gaia Project, **UK**

More Partners

- **Anastasia Sofroniou –** Intercollege, **Cyprus**
- **Tarmo Soomere –** Tallinn University of Technology Institute of Cybernetics, **Estonia**
- **Antonio Ruiz de Elvira -** Universidad de Alcalá de Henares, **Spain**
- **Henri Berestycki, Jean-Pierre Nadal -** École des Hautes Études en Sciences Sociales, Paris and Centre d'Analyse et de Mathématique Sociales of CNRS, **France**
- **Carlo Jaeger –** Chair European Climate Forum and Potsdam Institute for Climate Impact Research, **Germany**

What are the new challenges?

- Climate change

- Health (pandemics, bio-terrorism)

- Energy (security of supply, demand)

- Transport

- Security

- Global economy

- Education

and many more, e.g.

- Taxation

- Crime

- Immigration

- Sustainable urban growth

- Supply of food

- Olympics

- …..

Why are these so hard to solve?

- Problems form open systems, global in scale
- Highly dynamic, including rapid changes
- Complex local interactions, including social interactions which are hard to model
- There are often underlying nonlinear processes, including feedback and complex networks
- Individual decisions lead to global changes
- We often need immediate solutions but these have long-term effects
- Data is often only partial and/or unreliable

How can we help?

- We need to educate the decision makers, particularly politicians and their advisors

- We need to educate the public

- We must envisage the threats

- Perform experiments *'in silico'*, i.e. run scenarios

- We need to provide clear advice based on a consensus probably using visualisations

- We must deliver answers that the public can trust

Mathematics to the rescue

- Discrete models, Networks and Agent Based models
- Coupled models
- Analysis to provide reliable benchmarks
- Complex systems approach incorporating scientific and economic data together with a consideration of the social implications
- Produce models that enable predictions, that enable us to respond to threats, recover after events and produce hindcasts to validate models
- We need to provide clear advice based on a consensus
- Produce visualisations so that everyone can understand

GSD GOALS

- Create a new set of links between scientists and stakeholders

- Investigate what new methods are required to support policy and decision making

- Put forward a plan for future action

We aim to achieve this by

- Series of workshops and conferences that bring together scientists specialising in these global challenges, including economists, mathematicians and social scientists

- Engage stakeholders from industry, commerce and government

- Proposing web-based experiments to facilitate the interaction between models and consider modelling social dynamics

- A series of Case Studies (e.g. water shortage in Cyprus)

- Involve younger sections of the community

www.globalsystemdynamics.eu

GSD
Global System
Dynamics & Policies

UCL