



Agent-Based Modeling for Sustainable Development, with an Illustration: Financial Crisis and Climate Policy

A joint workshop of
Global System Dynamics and Policies
(GSD – an EU FP7 Coordination Action) and the
European Climate Forum (ECF)

**2-4 April 2009,
Ca' Foscari and European Center for Living Technology
Venice, Italy**
(www.ecltech.org/index.html)

Organizers: Carlo Jaeger, Kristian Lindgren, Aida Abdulah, and Claes Andersson with the help of the European Centre for Living Technology (ECLT) and the Foundation Eni Enrico Mattei (FEEM) in Venice

The workshop will offer the opportunity to exchange experiences with advanced multi-agent modeling techniques and to think together about their application to practical problems, in particular the relation between climate policy and the global financial crisis. Later, to study in depth this question, the Illustration “Financial Crisis and Climate Policy” will bring together four distinguished panelists who will look at the problem from four different perspectives: climate research, economic research, business, and the study of complex systems.

Accommodation is organized and covered by the organizers unless agreed otherwise. Requests for support for travel costs can be submitted to the organizers, who will decide on the basis of a necessarily imperfect need assessment and budget limitations. Participation must be confirmed to aida@european-climate-forum.net no later than March 15.

The workshop will be based on written inputs that can be submitted by any participant. Inputs shall be submitted as pdf files to aida@european-climate-forum.net no later than March 20 and shall not exceed 7 pages in length. Inputs will be sent via e-mail to all participants no later than March 31. The organizers reserve the right not to send around inputs they do not consider appropriate for this workshop, but they will do so only as an exception. Participants are requested to read the inputs in advance, so that the workshop can provide an exceptional opportunity for exchange and joint thinking.

Scientific Background of the Workshop

In their landmark review on "Governing Social-Ecological Systems" (Handbook of Computational Economics, vol. 2), Marco Jansen and Elinor Ostrom state: "Empirical studies from laboratory experiments and field work have challenged the predictions of the conventional model of the selfish rational agent for common pool resources and public-good games. Agent-based models have been used to test alternative models of decision-making which are more in line with the empirical record. Those models include bounded rationality, other regarding preferences and heterogeneity among the attributes of agents. Uncertainty and incomplete knowledge are directly related to the study of governance of social-ecological systems."

Multi-agent models, therefore, hold promise for inquiries about the challenges of sustainable development, including climate change, poverty reduction, and financial stability. However, there are several problems that need to be solved in order to model choices and decisions made by agents. In particular, it seems quite difficult to represent the functioning of market prices in multi-agent models in ways that are at least as convincing as those provided by the familiar framework of supply and demand. Also, as is evident from studying human behaviour, decisions made on the basis of non-economic considerations need to be included in the agent mechanisms.

Against this backdrop, there is an urgent need to explore how agent behavior can be rendered so as to realistically reflect empirically verifiable phenomena. For example, the possibilities of integrating plausible price mechanisms in multi-agent models for sustainable development will be explored. This is the task of the present workshop.

The workshop shall discuss the following issues:

- Strengths and weaknesses of the supply and demand framework: examples, challenges and alternatives
- Practical relevance of price vs. non-price policies for sustainability
- Empirical, theoretical and computational aspects of modeling agent behavior

Each point shall be introduced by at least one briefing note and discussed sequentially over the two days of the workshop. If the need arises, during the workshop parallel groups shall be formed to look carefully into technical details of the topics under discussion.

The workshop is one of the activities within the GSD coordination action, and it is designed as a contribution to a research process that has taken shape over three events in the last three months of 2008:

- OECD Global Science Forum on Applications of Complexity Science for Public Policy (Erice, 5-7 October 2008),
- "Towards the next generation of climate policy models" (Berlin, 14 November 2008)
- Dahlem Conference "Is there a mathematics of social entities" (Berlin, 14-19 December 2008).

The process shall be consolidated with further meetings (e.g., in Beijing, 10-11 May, 2009) and a suite of research projects. While the single steps undertaken shall be modest, the overall ambition cannot be denied: to produce a generation of models allowing to identify major policy options for sustainable development that remain hidden to the class of models currently in use.

Agent-based Modeling for Sustainable Development

Thursday, April 2

10:30 Welcome
Prof. Kristian Lindgren, Chalmers University, Göteborg, Sweden

1. Empirical, theoretical and computational aspects of modeling agent behavior

10:45 Introduction to the debate
Dr John Finnigan, CSIRO Centre for Complex System Science

11:15 Open debate on the basis of pre-distributed documents

13:30 Lunch

2. Strengths and weaknesses of the supply and demand framework: examples, challenges and alternatives

15:00 Introduction to the debate
Dr Antoine Mandel

15:30 Open debate on the basis of pre-distributed documents

17:00 Computing bazar – informal exchanges of simulations, code, documents, etc.

20:00 Workshop dinner

Friday, April 3

09:30 Wrap up of first day rapporteurs

10:15 Debate continued

11:30 Coffee break

3. Practical relevance of price vs. non-price policies for sustainability

12:00 Introduction to the debate
Prof. Carlo Jaeger, ECF chair

12:30 Open debate on the basis of pre-distributed documents

13:30 Lunch

15:00 Debate continued

16:00 Break

16:30 Wrap up of first two days with input from rapporteurs
Moderated by Prof. Carlo Jaeger

17:30 End of Friday Meeting



Financial Crisis and Climate Policy

A Science-Policy Debate

April 4th, 2009

Ca' Foscari University, Venice, Italy

The European Climate Forum (ECF - <http://ecf.pik-potsdam.de/>) and the Fondazione Eni Enrico Mattei (FEEM – <http://www.feem.it/>) are pleased to announce the International Conference on “Financial Crisis and Climate Policy”, to be held on April 4th, 2009, at the Ca' Foscari University (*Aula Baratto*), Venice, Italy. The conference has been organised in collaboration with the European Centre for Living Technology (ECLT - <http://www.ecitech.org/>).

"Europe must lead the world into a new, or maybe one should say, post-industrial revolution, the development of a low-carbon economy". This is the perspective offered by EU Commission President José Manuel Barroso when the EU declared its ambitious goals for cutting greenhouse gas emissions, increasing renewable energy use, and improving energy efficiency. In summer 2007, this step enabled the G-8 summit of Heiligendamm to declare the aim to halve global CO₂ emissions by 2050, and at the end of the year, it kept the momentum in the global climate policy process at the United Nations Climate Change Conference in Bali.

A year later, however, the biggest financial crisis since 1929 hit the world. That crisis made painfully clear how unsustainable the financial boom of the past decades had been. But the perspective of sustainable development has been largely absent in the haphazard way different European nations have tried to counter a global financial crisis that will shape the 21st century.

The possibility of this crisis had not been anticipated by the sophisticated computer models run by major central banks and leading institutions of economic research. And the scientists working on the risks of climate change and the options for climate policy had not taken such a possibility in consideration either.

It looks like both scientists and policy-makers have some homework to do. The science-policy debate organized by the European Climate Forum and the Fondazione Eni Enrico Mattei aims to identify the tasks that need to be tackled and the means needed to do so.

Four distinguished panelists will look at the problem from four different perspectives: climate research, economic research, business, and the study of complex systems. With that background, researchers and stakeholders from a variety of fields are invited to engage in an open discussion. Main findings of the debate will be fed into the EU conference “Sustainable Development: A Challenge for European Research” that will take place on May 26-28 in Brussels.

Agenda

Financial Crisis and Climate Policy A Science-Policy Debate

Saturday, April 4

- 9:00** Welcome
Prof. Klaus Hasselmann, Max Planck Institute of Meteorology, Hamburg, Germany
- 9:15** Science and Policy: Dialogue of the Deaf?
Prof. Antonio Navarra, Director of Euro-Mediterranean Center on Climate Change (CMCC), Bologna, Italy
- 9:45** What lessons from the financial crisis for climate policy?
Prof. Carlo Carraro, Director of the FEEM Sustainable Development Programme, University of Venice, CMCC, Venice, Italy
- 10:15** What Lessons from Climate Policy for the Financial Crisis?
Prof. Peter Hoeppe, Head of Munich Re's Geo Risks Research/ Corporate Climate Centre, Munich, Germany
- 10:45** Navigating Complexity: Financial Crisis and Climate Policy
Dr John Finnigan, Director of the CSIRO Centre for Complex Systems Science, Canberra, Australia
- 11:15** Coffee break
- 11:30** Open Debate: Challenges for Research
Moderated by Prof. Carlo Jaeger, Chairman ECF
- 13:30** End of the debate