EPOS

Workshop
Epistemological Perspectives on Simulation
23-25 June 2010, Hamburg University of Technology

Abstract / Paper

No.	4
Title	Time in discrete agent-based models of socio-economic systems

Evaluation
(Please use an ‚x' to indicate your judgement)

	very good	good	average	below average	not acceptable
Topic Does the paper explicitly address epistemological problems of simulation?				X	
Form and Presentation Is the abstract written in clear, understandable English?	X				
Is the core problem/question of the abstract pointed at clearly?			X		
Originality Does the abstract promise an innovative piece of work?				X	
Potential Can one expect the presentation to promote a vivid discussion during the workshop?				X	

Comments for Authors

Please comment on your judgement in a **comprehensive** way and include recommendations on how to improve the paper.

This paper deals with the interpretation and definition of time in discrete agent-based models (ABMs). (While the authors stress that their work is aimed at socio-economic simulations, nothing in the paper is specific to that domain.) A novel Haskell-based formalism is presented to specify the execution framework for ABMs, claimed to be useful relating to the time issue.

I agree with the authors that the anchoring of ABMs in the real world could be a gain, and I also think that making careful assumptions about the meaning of simulated time is a necessity in HiFi (high fidelity, as opposed to LoFi, low fidelity, or “toy”, i.e., thought experiment) models. However, I do not think that the formalised framework they put forward in the paper helps making that happen. In addition, I found little new in that framework, as it closely resembles the scheduling system of the first ever agent-based simulation package, Swarm – a scheduling system that has been replicated in almost all later agent-based simulation platforms (like Repast, MASON, FABLES – with perhaps NetLogo being the single exception among the most known ones).

Moreover, I think that the solution that the authors derive from the framework offers little to content the (not so) worried modeller: their solution rests on the assumption that the agents' internal schedules are based on the same time scale. Now, if this is true, then the underlying problem is basically “assumed away”. That is, because in that case that time scale should be used to anchor simulated time in reality. (Which happens to be the existing best practice in most cases: i.e., using some external definition/reference of time.)

Furthermore, I found the time definition resulting from the proposed framework particularly weak and artificial. It is fine that the proposed system is capable of automatically finding the ‘synchronization points'

for the agents. However, making the arbitrary long periods between these the _equal_ unit of time is simply bad. What is the _meaning_ of such a time unit? How can that be anchored in anything in the real world? (Especially, as the authors note themselves, that with different agent sets – in my view, also with the same set, but with different initial parameters –, the system will yield _different_ time units.) The example presented towards the end of Section 3 strengthens these concerns.

Finally, I would like to remark that the authors seem to be unfamiliar with the classic concept of event-driven simulation, where time is advanced by events (actions) and not in regular (time) intervals (or steps). Consultation with the vast literature on discrete, event-driven simulation, I believe, would help them better understand the current practices addressing the problem that they have set out to study.

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This paper tackles the problem of time in simulation, focusing in discrete dynamical agent-based models with internal transition functions (The authors claim that this is done in the context of socio-economic modelling, but this is not clear in the paper). The problem of time and activation regimes in agent-based modelling is indeed an important one in the field. There is an increasing number of papers of this kind in the field, but few or no papers have addressed epistemological perspectives on the problem of time in simulation.

This paper deals with many technicalities and does not explicitly address any epistemological issue. Although the problem of time could indeed be interesting to tackle in simulation from an epistemological perspective (consequences for validation/verification, consequences on the kind of knowledge acquired, the meaning of time in simulation, the consequences of computational theories of time for simulation etc), this paper does not describe any epistemological perspective on the subject and thus is not appropppriate for EPOS workshops.