Lessons from implementing in parallel with 3 platforms the same didactic agent-based model

Developing an agent-based model (ABM) typically involves acquiring knowledge of the model's domain, developing the model itself, and then translating the model into software. This process can be complex and is an iterative one. Any ABM, to be considered as a robust and reliable tool, must be replicable in different computing settings. Previous works in comparing the implementation of the same ABM with different simulation platforms have been conducted either from scratch with a simple [1]or even "*stupid*" [2] benchmark or by trying to replicate an original implementation of a model related to a specific domain, for instance economics [3], political science [4] or ecology [5]. Most of these works relate difficulties to produce similar outputs from the various implementations, which is questioning the value of agent-based simulation as a scientific method. We present here an experience of conducting in parallel three implementations of the same model, a fire spreading over a forest and fire-fighter agents trying to eliminate it. Starting from a non-prescriptive narrative of this stylized socio-ecosystem, a set of UML diagrams was produced to serve as a common basis for the implementation by experienced agent-based modelers with three platforms: Cormas, Gama and NetLogo. We show that following the principles of test-driven agent-based simulation development can help uncovering potential areas of ambiguity which inevitably remain in the information provided by the description. In addition to these tests carried out on components of the model taken in isolation, we encourage to provide in the documentation the specification of a particular configuration of the simulation. Running then the simulation step-by-step allows checking in the visualization interface if the expected phenomenon occurs or not. It means ABM platforms should provide functionalities to load from external files any particular situation, and also to directly manipulate agents on the visualization interface.

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