

# **Tentative delineation of an agent-based project for vertical integration of multi-scale knowledge**

A case study on small rodents hosts and their parasites bio-ecology.

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This project aims to develop an agent-based framework devoted to the integrative articulation of knowledge on a scientific field: the co-evolution dynamics of small-rodents hosts and their parasites. In this domain, the various thematic studies lead to a cross-disciplinary and multi-scale scientific field covering among others, gene and chromosome evolution, physiological adaptations, behavioral, ecological and phylogeographic studies.

The project is based on the analysis of concrete scientists' knowledge with the goal to provide a core framework where successive agent based modelling studies on the various levels could be gradually built on.

To ensure the mid-term articulation of the various studies the focus is on robustness. A preliminary study tried to capture the diversity of the concepts involved in the whole field. This survey has been based on rigorous elicitation-reification of the various scientists' knowledge and coupled to an object-based information system dedicated to the definition of the meta-typology (concepts, processes, patterns, tools, scales ...) upon which the requirements of the final model are built.

This preliminary study results in a hardly tractable range of functional levels, time and spatial scales involved. As a working hypothesis, a modular approach may be proposed in the line of the nearly decomposable systems (Simon, 1962) where the whole system is broken down into functional subsets of levels (*e.g.*, individuals-ecologies, genes-chromosomes). To provide a link, the 'complex system' trans-disciplinary paradigm may also be proposed as a common denominator to the formalization. In this approach, each subset has to be formalized and tackled with inner primitives such as diversity, interaction, environment, ontogeny, ability to self-adapt. The expected outcome is a possible dialog between sub-systems.

The conceptual framework and rationale as well as the elicitation-reification phase of the protocol are presented. The adequacy of the approach and of the agent based formalism is questioned.

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