DATA STANDARDS FOR COMPUTATIONAL ECOLOGY: CONSTRAINING SOFT SUB-SYSTEMS TO INCREASE INTERNAL COMPLEXITY FOR COMMUNITY RESILIENCE

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The Creative Systemic Research Platform at the Design and Innovation College of Tongji University in Shanghai focuses on facilitating learning of a diverse set of organizations, researching on the quality of interactions occurring among different agents, both human and non, and their context. A major communication channel available today employs sensors to observe otherwise invisible conditions of the environment, enabling a detailed understanding of how patterns of interactions among biological elements influence the global conditions. To address some of the most urgent need resulting from urbanization, industrialization and globalization processes, in 2018 we started working on computational ecology to support agricultural practices delivering self-organization capacity in diverse human settlements. The complex web of interactions occurring in such a context calls for a rich qualitative analysis of its conditions. To start building knowledge models that fit diverse range of human agents, a case-study methodology is employed. Boundaries have been set to describe the diversity of the analysed contexts, ranging from urban indoor greenhouses to agro-forestry management, working on the edges of these systems to address functional clustering and distribution. The first case study reflects a semi-controlled environment to constrain the space and time of natural cycles of vegetation and water and the number of observable interactions as preconditions for a university class of Design Students to interact with an indoor greenhouse. This process led to work on the development of data standards for collection and integration protocols to embed qualitative observation. Ontological constraints in computational agriculture as a sub-system of living communities is key element to enable access to self-monitoring practice into farm management, distributing learning and adaptation capacity as basis for autonomous, ecologically fitting human settlements ready to address internal transformations.