

Submitted for an oral presentation at the Society for Freshwater Science meeting 2015, Milwaukee Wisconsin. Due Friday, 30 January, 2015. 180 word maximum.

Sessions: First choice: Biogeochemistry, Second choice: Hydroecology

Note: I want to get this in front of the ecosystem ecologists at SFS. Hence the title and the session priorities.

### **An exploration of convergent evolution in academia: Why ecosystem ecologists and biogeochemists should think about the tools of software engineering**

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The fundamental abstractions of computer science and ecosystem ecology have evolved to be remarkably similar, despite differences in semantics. Ecosystem ecologists study the interactions of “structure” and “function” within ecosystems, while software engineers study the interactions of “fields” and “methods” when designing object-oriented software. Engineers have established a rigorous toolkit (Unified Modeling Language, UML) for organizing hierarchical ontologies of structure and function. We suggest these tools can be effectively applied to the organization of ecological concepts, and that this application will lead to more intuitive implementations of ecological models. In this presentation, we reconcile interdisciplinary semantics and present examples of ontological descriptions of ecosystems in UML, in order to demonstrate the potential value of software engineering tools to the organization of ecologic understanding. Furthermore, we present a working prototype of a hierarchical shared-state-space software abstraction that will facilitate linking qualitative models to quantitative predictions in a hypothesis testing environment. Sharing of state space is critical to the simultaneous application of multiple interdisciplinary hypotheses in the attempt to understand the social and ecological consequences of a changing environment.