Up, up and away

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ABSTRACT

In 1961, Jay Forrester introduced economists, management scientists and other social scientists to a new methodology for studying the behavior of dynamic systems, a methodology which he called Industrial Dynamics. Following closely on the heels of Industrial Dynamics was Urban Dynamics, which purported to analyze the nature of urban problems, their cases, and possible solution to these problems in terms of interactions among components of urban systems. More recently, Forrester has come forth with World Dynamics. We and the inhabitants of the other planets in our universe are now anxiously awaiting the publication of Universe Dynamics, a volume which is to be sponsored by the Club of Olympus, God, the Pope, Buddha, Mohammed, and the spiritual leaders of several other major religions of this world and the universe. Not unlike World Dynamics and other books by Jay Forrester, Universe Dynamics will be characterized by a number of distinct features. These features will be summarized in this paper.

In this presentation we shall comment on the methodology used by Forrester in World Dynamics as well as the methodology which is being set forth by his disciples who publish The Limits of Growth and the other people involved in the Club of Rome project. We shall address ourselves to the whole question of the feasibility of constructing models of the entire world and to model structures alternative to the one set forth by Forrester, et al.

It is first necessary to consider what possible objectives one might have in trying to prove programs correct, since different correctness criteria can be relevant to any particular program, especially when the program is to be used for numerical computation. Then it will be shown that careful structuring, along with the judicious use of assertions, can help one to organize proofs of correctness. Good language facilities are needed for the structuring, while assertions help make specific the details of the proof.

Examples from linear algebra, differential equations and other areas will be used to illustrate these ideas. The importance of language facilities will be emphasized, and implications for Computer Science curricula will be pointed out. A useful analogy with proofs of theorems in mathematics and the relevance of this analogy to certification procedures for computer programs will be discussed.

Policy models—Concepts and rules-of-thumb

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ABSTRACT

The desire to build policy models or models for policy makers is based on two foundations. First, the need to solicit funds to pay for the construction of models means that those who want to construct models have to promise a “useful” product. Since a large portion of the models built are to support some level of policy, public or private, there is a deliberate attempt to promise output which will be useful to the decision process. Secondly, it is clear from history that the advisor to the throne is a coveted position and one dreamed of by many scientists. It is also clear that the day is coming when models will play a large role in making such policy. The advisory role then shifts to the model builder.

Unfortunately, the reality of model development for the policy level does not appear to agree with the rhetoric. This presentation will review the concept of policy models and suggest some rules-of-thumb for building them.