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	Conflict, Cooperation, and Distributed Information	
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Letter of Intent

Information Technology Research

National Science Foundation

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Principal Investigator:

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	Steven Bankes	Computer Science	Evolving Logic, Inc., Los Angeles, CA	
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Participating institutions: (University of California campuses in the Los Angeles metro area)

University of California, Los Angeles (UCLA)

University of California, Irvine (UCI)

University of California, Riverside (UCR)

Possibly participating institutions:

California Institute of Technology

University of Southern California

Claremont Graduate School

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The advent of digital computers in the 1950s made possible complex multiagent simulations. The physical sciences contributed models with rich multidisciplinary implications; the biological sciences provided concepts of learning, adaptation, evolution, and Artificial Life. Governments, central banks, and the military use massive models, consisting of huge numbers of variables and equations, to predict counterintuitive, and often complex, effects of social policy, monetary policy, and military strategy. The computational revolution has now reached the social sciences. Across the globe researchers position their work as Computational Social Science, Artificial Societies, Social Informatics, or Socio Dynamics.

We seek to develop theoretical simulations emphasizing cooperative and non-cooperative social interactions and their evolutionary underpinnings. The substantive focus of our research lies in developing and testing models of distributed knowledge and intelligence with applications across the social sciences: information aggregation through markets and political processes; culture as distributed cognition; information networks in organizations; and the informatics of human and social capital.

While powerful in their own right, standard social science models obscure real-world heterogeneity by subdividing the whole, averaging its parts into a single normalized representation, and then extrapolating these parts back to an idealized homogeneous whole. In this oversimplified world, individuality and interaction are lost. The paradigm underlying our research program, by way of contrast, is bottom-up and algorithmic, foregrounding heterogeneity, individuality, and interaction. It accommodates realistic notions of bounded rationality, limited knowledge, distributed cognition, and the plurality of perceptions, thoughts, and actions experienced by individuals and groups. Agents are constructed from simple local senses, cognitions, and behaviors. Agents interact locally in social and physical environments to produce complex emergent global patterns of behavior.

Multiagent models serve as experimental laboratories where suites of "what-if" scenarios can be explored to map out probable outcomes in a high-dimensional space of possibilities; they are insightful and coarsely predictive. Multiagent modeling at UCLA has reached a critical mass. We propose to establish a synergistic multi-disciplinary physical "community of practice" in Southern California, centered around UCLA's newly founded Center for Computational Social Science. Currently, we bring together social and computer scientists at six universities in the Los Angeles metro area, the military and entertainment industries, and nearby centers of genetic and evolutionary programming. We have established the necessary momentum. We now need to focus it on common practice.

We will apply for a five-year grant of \$2,000,000 to support research and educational activities based at the Center for Computational Social Science. We will conduct research and train graduate students in a synergetic web of expertise and resources. We will connect faculty, students, local government, business, and the general public to programmers, laboratories, the Internet, periodic conferences, weekly workshops, courses and tutorials, degree programs, and networking opportunities. Educational activities will include the development of a multidisciplinary undergraduate cluster course, an interdepartmental undergraduate degree program, and a multidisciplinary course sequence for Ph.D. students in the social sciences. We will hire consultants to assist in the creation of computational models and applications. We will make computers available for individual and clustered operation.