Discussion of Agent Modeling

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Spherical Chickens and Other Models

- **Model**-*Definition*: small scale; a preliminary construction or plan; standard

- **Simulate**-*Definition*: To make in imitation or as substitute of; to create a representation or model of

- FIDELITY, ACCURACY, PRECISION, GENERALIZABILITY, FLEXIBILITY, UNDERSTANDABILITY, ETC.

- "**ALL MODELS ARE *WRONG* BUT SOME ARE MORE *USEFUL* THAN OTHERS**"

Uses of Models or Simulations for Complex Systems

- To Aid in Making (design/strategy/policy) **Decisions**
- To **Predict** (unemployment rate In 12 months, MTBF)
- To aid in **Verification** of design
- To **Test** hypotheses
- To **Learn/Discover** General Principles
- To **Train** Operators (Experienced or New)
- To **Educate** people about complex systems
- To **Learn from the Process** of constructing a model – including the interactive, iterative process as the model evolves

Artificial Socio-Technical Systems

- Simulations with Social and Human Actors
  - Rational Choice (can be deductive)
  - Adaptive

- Simulation Value

- Simulation Validity

- Contrast between Systems Dynamics and Artificial Societies – *aka* agent-based models

- Generative Social Science
  - Complexity in Results *not* in Assumptions
  - Low Fidelity (not for training)
  - Useful for Decision-making??

Agent-Based Modeling Applications

- Axelrod
  - Promoting Norms-their emergence and stability
  - Setting Standards-firms and their choice of standard-setting alliances
  - The emergence of new political states
  - Culture dissemination-local convergence and global polarization

- Epstein and Axtell
  - Wealth Inequity
  - Sex, culture and Conflict: the emergence of History
  - Trade and equity

Agent-Based Modeling Applications 2

- Nuclear Reactor Operation

- Competitive Technology Implementation

- Product Development

- Verification and Validation

- Hybrid with Technically Complex Models to Introduce Simple Assumptions about People and simulate the Complex Possible Results
  - Environmental Policy Choice
  - Protocol Development