ITS 832
Chapter 13

Management of Complex Systems: Toward Agent-Based Gaming for Policy

Information Technology in a Global Economy

Introduction

- Simulating/Managing Social Complex Phenomena
- Leadership and Management in Complex Systems
- Serious Gaming
- Agent-Based Games for Testing Leadership and Management
- Single and Multiplayer Settings
- Summary and conclusions

Simulating and Managing Social Complex Phenomena

- Study of how people interact
- Scale prohibits experimentation with real populations
- Agent-Base modeling (ABM)
  - Networked agents
  - Each agent is an individual
- Interaction may modify agent behavior
- Managing complex phenomena introduces complexity
  - Techniques to manage turbulent situations vary
  - Technique success depends on responding to agent behavior
    - Which may change based on interactions

Leadership and Management in Complex Systems

- Traditional leadership research
  - Generally focuses on single period in time
  - Doesn't address dynamic relationships
- Timing of leadership principle application matters
- Primary leadership functions
  - Instructional and regulatory
  - Developmental
- Simulations offer promise to help model leadership in complex systems

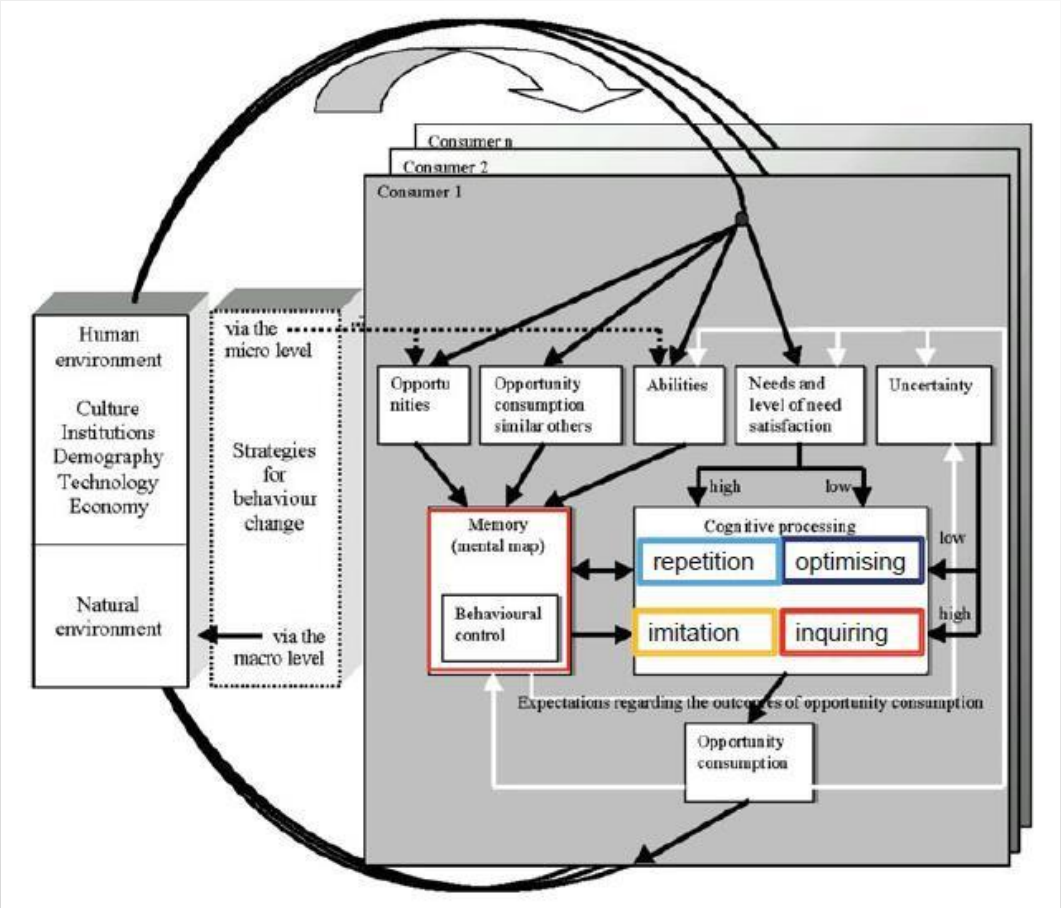
Serious Gaming

- Applying gaming techniques to real life situations
  - Flight simulators
- Effective for evaluating complex environments
  - Player must interact with multiple actors and situations
- Currently used for side range of training applications
- Leadership use
  - Deterministic – limited scope
  - Agent Based Modeling (ABM)s in serious gaming can help understand more complex interactions

Agent-Based Games for Testing Leadership and Management

- Agent Based Modeling (ABM) games with autonomous Artificial Population
- Test leadership style effectiveness
  - Explore which styles work best in different situations
  - Determine the best choice for a given scenario
- Current state of the art is more conceptual
- Advances needed in interfaces
  - Need to allow users to interact with simulation
  - Opportunity to keep players engaged

Behavior Impacted by Multiple Factors



Single and Multiplayer Games

- AI may react poorly to management input
  - Simulating unexpected consequences of decisions
  - Overactive AI may degrade realism
- Players can dynamically see how decisions affect others
- Early simulations allow for only single players
- Multiple real players adds more realistic interaction
  - Players replace some AI
  - Players interact with each other and AI

Summary and Conclusions

- Agent Based Modeling (ABM) - based gaming can measure behaviors of players
- Supports experimentation in controlled environment
- Study leaderships and management in complex systems
- Focus
  - Interaction with leadership
  - Interaction with players as a result of leadership action