

Agent Based Social Simulation

Description	A computer assisted technique for knowledge elicitation assists in building rules of how people respond to a variety of stimuli and scenarios of environmental and social conditions. Agent based social simulation is a relatively formal approach to stakeholder and institutional analysis. It is a computer programming method that uses software agents to represent the positions, boundaries, and actions of stakeholders. This approach is one of the few means to realistically simulate the behavior of stakeholder networks in the context of the rules, norms, and shared strategies from social and economic institutions. This approach can be applied at various stages of an assessment. One example is that agent based social simulation can incorporate socioeconomic scenarios that are constructed as sets of rules regarding, for example, environmental values, regulation, and economic goals. An advantage of this approach is that the realization of socioeconomic scenarios is the outcome of stakeholder behavior rather than being exogenously imposed in a way that bears little relation to actual decision making processes.
Appropriate Use	Applicable to various stages of the design of a strategy to respond to climate change and its subsequent implementation in specific measures.
Scope	Global, but most appropriate at national or local level.
Key Output	Insight in to how the decision making and implementation processes. For example, realistic socioeconomic pathways constructed as the outcome of multiple decisions.
Key Input	A mixture of qualitative and quantitative data.
Ease of Use	Varies, though constructing an agent based social simulation model would require significant expertise.
Training Required	Some training is useful, but expertise in policy analysis is more important than specific analytical techniques when it comes to using and interpreting results of agent based social simulation.
Training Available	Very little experience has been gained regarding these approaches to date, and hence no formal training or certification is available. However, occasional workshops are offered. See documentation section below.
Computer Requirements	Personal computer.
Documentation	The major computing software in the field is RePast (http://www.repast.org/), using a Java platform. Center for Policy Modeling at Manchester Metropolitan University is one of the world leaders in agent based social simulation. The CPM developed a user friendly software package (SDML) to facilitate model development. http://www.cpm.mmu.ac.uk/ and http://www.cpm.mmu.ac.uk/firma .
Applications	Agent based social simulation is only beginning to be applied to climate change. Oxford University's Environmental Change Unit is collaborating with the CPM on various applications to integrated assessment of climate policy. Also, the Carnegie Mellon global change program has elements of agent behavior in the Integrated Climate Assessment Model. A European Union project on integrated water resource management (Freshwater Integrated Resource Management Agents, coordinated by the University of Surrey) will develop agent based approaches further.
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Agent Based Social Simulation (cont.)

<i>Cost</i>	No cost.
<i>References</i>	West, J.J. and H. Dowlatabadi. 1999. On assessing the economic impacts of sea-level rise on developed coasts. In <i>Climate Change and Risk</i> , T.E. Downing, A.A. Olsthoorn, and R.S.J. Tol (eds.). Routledge, New York, pp. 205-220.